MAINTENANCE



GENERAL

MAINTENANCE OVERVIEW

To keep the machine in good condition and use if for a long period, perform the inspection and maintenance properly and safely following the procedures recommended by this manual.

The inspection and maintenance items are divided into groups according to the machine's total operating time: every 10 hours (walk-around and daily inspection), every 50 hours, every 250 hours, etc. Refer to the hour meter readings to determine when to schedule an inspection and maintenance. Items for which it is not possible to determine the inspection and maintenance interval are included under "When Required".

When operating the machine in extremely harsh environments (with high dust levels or high temperatures), inspection and maintenance should be performed earlier than the times specified on the Maintenance List.

CAUTIONS ON MAINTENANCE

Do not perform any other inspection and maintenance works than those listed in this manual.
For works not listed in this manual, ask your sales or a service dealer for help.

Keep the machine clean
- Clean the machine before performing inspection and maintenance and try to keep it clean.
- Stop the engine before washing the machine. Cover the electrical parts so that water cannot enter. Water on electrical parts could cause short-circuits or malfunctions. Do not use water or steam to wash the battery, electronic control components, sensors, connectors or the operator's compartment.

Fuel, lubricant and grease
- Choose fuel, lubricant and grease by following to the "Fuel and lubricant table".
- Use fuels, lubricants and greases which do not contain water, and be careful to keep dirt out when changing or replenishing fuel, lubricant or grease.
- Store fuels, lubricants and greases in the prescribed places and in such a way that no water or dirt can get in them.

Cautions on refueling
- If the port includes a strainer, do not remove the strainer when fueling.
- After fueling, be sure to securely tighten the fuel filler cap.
- Do not add more than the specified amount of fuel.

Do not use fuel to clean parts
Do not use fuel to clean parts. Use a non-combustible cleaning agent.

Keep dirt out
When mounting and removing parts, do so in a place where there is no dust, clean the working area and the part, and keep dirt out.

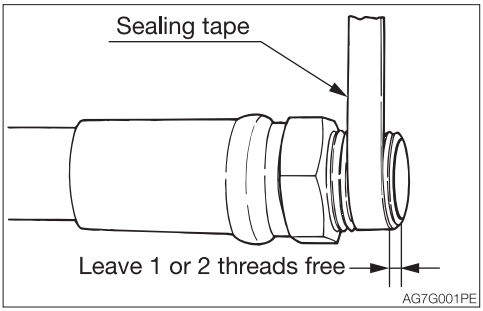
Clean the installation surfaces

When installing and removing parts, be sure that the surfaces of contact of the parts are clean. If the sealing grooves of the surface of contact are damaged, consult your sales or service dealer for repair or release.

Seals and split pins

- Be sure to replace all seals and cotter pins with new ones.
- When installing, be careful not to damage or twist the seal.

Sealing tape



- When wrapping the plug with sealing tape, remove any old sealing tape from the threads and clean the threads.
- Wrap the thread tight with seal tape starting 1 or 2 threads away from the thread end.

Disposing of wastes

- Always collect oil that is drained from the machine in containers. Improperly disposed waste oil can cause environmental harm.
- Follow appropriate laws and regulations when disposing of harmful objects such as oil, fuel, cooling water, coolant, filters and batteries.

Check after maintenance

- Gradually increase the engine speed from a low idle to maximum speed and check that there is no oil or water leaking from serviced parts.
- Operate each control lever and check that the machine is operating properly.

Cautions on handling of battery wiring

- Disconnect the wiring from the both terminals (+ and –) on the battery before working on the electrical system or doing electric welding.
  Always disconnect it from the earth side (–). When connecting, connect the earth side last.
- Do not disconnect the battery wiring while the engine is moving. Otherwise, the electric circuits of the rotary converter or others may be damaged.

SERVICE DATA

FUEL AND LUBRICANT TABLE

Select the appropriate fuel, lubricant and grease according to the temperature by referring to the table below.

- Regardless of the specified time, change the oil if it becomes too dirty or degraded.
- When refilling, never mix oils of different brands. If a brand is to be changed, replace the whole fuel/oil.

Fuel

Diesel fuel specifications

Diesel fuel should comply with the following specifications. The table lists several worldwide specifications for diesel fuels.

Diesel fuel specification	Area
ASTM D975 No.1D S15 No.2D S15	USA Canada
ISO 8217DMX	International

Diesel fuel specification	Area
EN590: 2009	European union
Bio-diesel fuel Biodiesel blends up to B7 EN14214, EN590	
BS2869-A1 or A2	United kingdom

Precautions when using diesel fuel

- To maintain the performance and service life of the engine, always use clean and high-quality fuel.
- To avoid freezing in cold climates, use a diesel fuel that still functions when the temperature is at least 12°C (21.6°F) below the lowest expected ambient temperature.
- Use a diesel fuel that has a cetane number of 45 or higher. When operating at a very low temperature or at a high altitude, a higher cetane number fuel will be required.
- Use fuel with sulfur content of less than 0.1% by volume.
  Especially in the U.S.A. and Canada, ultra-low sulfur fuel should be used.
  A higher sulfur content fuel may cause sulfuric acid corrosion in the cylinders of the engines.
- Never mix kerosene, used engine oil, or residual fuel with the diesel fuel. Use of kerosene is prohibited.
- Poor quality fuel can reduce engine performance and / or cause engine damage.
- Fuel additives are not recommended. Some fuel additives may cause poor engine performance.

Precautions when using bio-diesel fuel

The warranty of the engine manufacturer may be voided by using a bio-diesel fuel that does not meet the standard or that is deteriorated.

<Applicable machine models 211011130 or later>

Hydrotreated Vegetable Oil (HVO) fuel

HVO fuel compliant with EN15940 can be used.

IMPORTANT: Note that HVO fuel has a lower fuel density than light oil, which may reduce engine power and machine performance.

Precautions when using HVO fuel

Do not use HVO fuel that does not comply with the specified standards. Doing so could result in malfunction.

Lubricant

Location	Type	Type by air temperature -4 14 32 50 68 86 104°F -20 -10 0 10 20 30 40°C	When to replace
Engine oil pan	Diesel engine oil API: CF, CF-4, CG-4, CH-4 or CI-4 class	SAE 10W-30 SAE 15W-40	Every 250 hrs. after the initial 50 hrs.
Hydraulic oil tank	Biodegradable oil recommended by Takeuchi*** Mobil EAL Envirosyn 46H Panolin HLP Synth 46	ISO VG46	Every 2000 hrs.
	Anti-wear hydraulic oil	ISO VG32 ISO VG46 ISO VG68	
Engine cooling system	Cooling water (water + coolant)** SAE: J814C or J1034	Mixture of 50% coolant Mixture of 30% coolant	Every 1000 hrs.
Travel reduction gear	Gear oil API: GL-4	SAE 90	Every 1000 hrs after the initial 250 hrs*.
Slew motor pinion	Lithium based grease EP-2 NLGI No.2	—	Every 50 hrs.
Slew bearing			Every 50 hrs.
Working equipment			Daily or every 10 hrs.
Levers			When required

* : If the ratio of traveling time to total operating time is high, replace the gear oil earlier than the specified time.

** : For water, use tap water (soft). Do not use well or river water. When the ambient temperature drops below 0°C (32°F), add coolant (antifreeze). Follow the coolant manufacturer's instructions to determine the mixture ratio.

*** : When replacing a mineral oil with a biodegradable oil, the residual mineral oil in the machine should be about 2% or less, as complying with the ISO 15380. For details, refer to "Biodegradable oil" on page 8-10.

API standard: American Petroleum Institute
ACEA standard: Association des Constructeurs Européens d'Automobiles
SAE standard: Society of Automotive Engineers

Volume

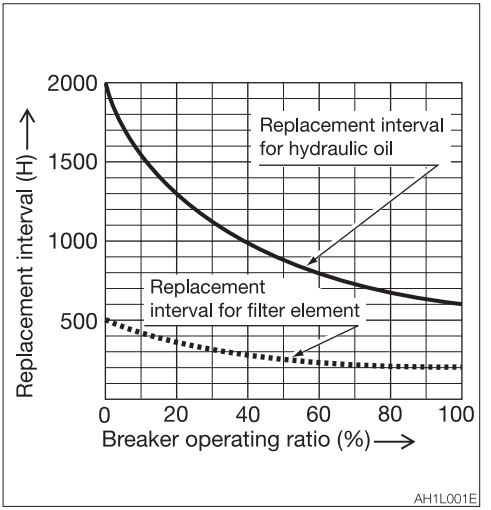
Engine oil pan	Engine cooling system	Hydraulic oil tank	Fuel tank	Travel reduction gear
Upper limit 2.8 L (3.0 US qt.) Lower limit 1.8 L (1.9 US qt.)	4.0 L (4.2 US qt.)	System 15 L (4.0 US gal.) Tank 9 L (2.3 US gal.)	Level capacity 12 L (3.3 US gal.)	0.33 L X 2 (0.35 US qt.) X 2

Note: After flushing or replacing the hydraulic oil, the oil cleanliness when starting full operation shall be code 20/17/14 or better as specified by ISO.

REGULARLY REPLACE THE HYDRAULIC OIL

When a hydraulic breaker is used, the oil deteriorates more quickly than that used for a usual excavation operation. Be sure to replace the hydraulic oil and the return filter elements.

- Failure to replace these in time can lead to damage to the machine and the breaker hydraulic system. To prolong the service life of the hydraulic devices, properly replace the hydraulic oil and the return filter elements according to the table below.
- When replacing the hydraulic oil, clean the suction strainer.



Replacement interval (hours)

Item	Hydraulic oil	Filter element
1st time	—	25
2nd time	—	100
Periodically	600	200

When the breaker operating ratio is 100%.
Refer to “Hydraulic breaker” on page 8-8.

HYDRAULIC SYSTEM SPECIFICATIONS

Working pressure range	P1 MAIN : 18.2 MPa (2639.7 psi) PTO PUMP Pilot : 3.4 MPa (493.1 psi) See workshop manual for detail. “Service data - Specification table”
Working temperature range	-40 to 100°C (-40 to 212°F)
Type of fluid being used	ISO VG 32 to 68 or equivalent oil. See workshop manual for detail. “Service data - Table of fuel and lubricant”
Working flow-rate range	P1 MAIN : 11.1 L/min (2.9 US gal/min) PTO PUMP Pilot : 5.8 L/min (1.5 US gal/min) See workshop manual for detail. “Service data - Specification table”
Lifting provisions	Refer to “Hoisting the machine” on page 4-4.
Emergency, safety and energy isolation requirements	Refer to “Operating the machine with an accumulator” on page 2-22.
Painting or protective coating	Painted or plated (each hydraulic components)

LIST OF CONSUMABLES

Periodically replace consumables such as filters and elements according to the table below.

System	Item	Part name	Part No.	When to replace
Hydraulic system	Hydraulic oil return filter	Cartridge	15510-20310	Every 500 hrs after the initial 50 hrs.
	Air breather (if equipped) Applicable machine models: 211000997 or later		15520-03000	Every 1000 hrs.
Engine lubrication system	Engine oil filter	Cartridge	K15841-32432	Every 250 hrs after the initial 50 hrs.
Fuel system	Fuel filter	Element	KRA211-51280	Every 500 hrs.
	Pre-fuel filter (if equipped) Applicable machine models: 211001351 or later		K12581-43012	
Air cleaner system	Air cleaner	Primary (Outer) element	K1G659-11220	Every 1000 hrs. or after 6 cleanings (whichever comes first)
		Secondary (Inner) element	19111-01342	When the primary element is replaced.

LIST OF TOOLS (IF EQUIPPED)

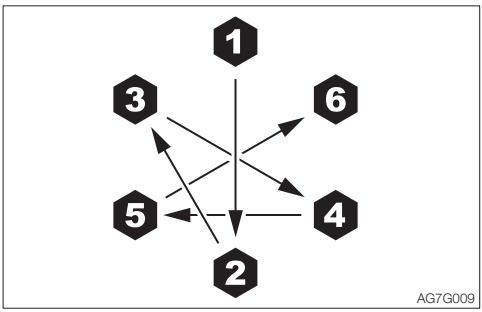
Code	Part name	Part No.	Remarks
1	Spanner	19102-12081	10 - 12
2	Spanner	19102-12082	12 - 14
3	Spanner	19102-12083	13 - 17
4	Spanner (Box)	19102-12084	19 - 22
5	Spanner	16901-00013	13
6	Spanner	16900-01922	19 - 22
7	Spanner	16909-00026	26
8	Screwdriver	19102-12085	(+) (–) replaceable shank
9	Filter wrench	03392-22610	
10	Monkey wrench	16904-00250	250 mm
11	Pliers	16905-00200	200 mm
12	Tool case	16914-00005	
13	Grease gun	16910-60600	500 cc
14	Drain connector	15545-12201	

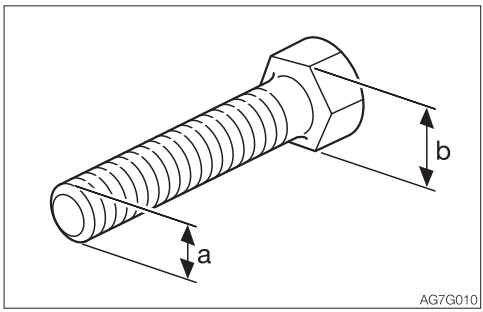
LIST OF TIGHTENING TORQUES

Nuts and Bolts (for ISO strength category 10.9)

Tighten nuts and bolts at the torques shown on the table below, unless otherwise specified.

- The tightening torques used for the mounted plastic covers are not listed in the table below. Consult your sales or service dealer for details. They will be damaged if over tightened.
- When replacing nuts and bolts, replace them with nuts and bolts of the same size and standards.
- Tighten nuts and bolts alternately (top, bottom, left then right) or in 2 or 3 times so that they are evenly tightened.





Classification	Head width (b)	Size (a) x pitch	Tightening torque	
			General connection points	
	mm	mm	N·m	ft-lb.
Coarse	10	M6 x 1.0	9.8±0.5	7.2±0.4
	12, 13	M8 x 1.25	22.6±1.1	16.6±0.8
	14, 17	M10 x 1.5	47.1±2.4	34.7±1.7
	17, 19	M12 x 1.75	83.4±4.1	61.5±3.0
	19, 22	M14 x 2.0	134.4±6.7	99.1±4.9
	22, 24	M16 x 2.0	207.9±10.4	153.3±7.7
	27, 30	M20 x 2.5	410.9±20.5	303.1±15.1
Fine	12, 13	M8 x 1.0	24.5±1.2	18.1±0.9
	14, 17	M10 x 1.25	50±2.5	36.9±1.8
	17, 19	M12 x 1.5	87.3±4.3	64.4±3.2
	19, 22	M14 x 1.5	135.3±6.8	99.8±5.0
	22, 24	M16 x 1.5	220.6±11	162.7±8.1
	27, 30	M20 x 1.5	452.1±22.6	333.4±16.6

SAFETY-CRITICAL PARTS

To use the machine safely, periodically perform inspection and maintenance. The safety-critical parts listed below must be periodically replaced for an increased safety.
Serious injury or a fire could result if they are worn or damaged.

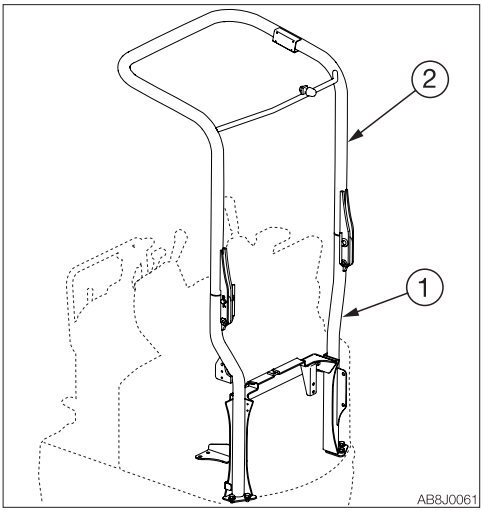
List of safety-critical parts

Unit		Safety-critical parts to be replaced periodically	When to replace
Fuel system		Fuel hoses	Every 2 years
		Packing on fuel filler cap	
Cooling system		Rubber hoses	
Air-intake system		Air cleaner hose and breather hose	
Hydraulic system	Main body	Hydraulic hoses (pump - delivery)	
		Hydraulic hoses (pump - suction)	
		Hydraulic hoses (slew motor)	
		Hydraulic hoses (travel motor)	
	Working equipment	Hydraulic hoses (boom cylinder piping)	
		Hydraulic hoses (arm cylinder piping)	
		Hydraulic hoses (bucket cylinder piping)	
		Hydraulic hoses (swing cylinder)	
		Hydraulic hoses (blade cylinder)	
		Hydraulic hoses (span cylinder)	
		Hydraulic hoses (pilot valve)	
		Hydraulic hoses (auxiliary piping)	
		Seat belt	Every 3 years
		Non-slip sheet	

The material of the safety-critical part listed above tends to change over time and cause wear or deterioration. It is difficult to determine the degree of deterioration at the periodic inspection, and thus they need to be replaced with new ones after a certain time to maintain their proper performance even if they appear in good condition. Note that regardless of the replacement schedule, replacement must be performed immediately if a symptom of wear is found. If a hose clamp is deformed or cracked, replace it together with the hose immediately. When replacing the safety-critical parts, ask your sales or service dealer.
In addition to the safety-critical parts, inspect the hydraulic hoses and retighten or replace as necessary. When replacing the hydraulic hoses, replace the O-rings and seals at the same time.
Check the fuel and hydraulic hoses according to the periodic schedule described below. Refer to “Maintenance”.

Type of inspection	Inspection item
Daily inspection	Leakage from the connecting parts of hydraulic or fuel hoses Damage to canopy - replace*
Monthly inspection	Leakage from the connecting parts of hydraulic or fuel hoses Damaged hydraulic or fuel hoses (cracks, wear and tear)
Annual inspection	Leakage from the connecting parts of hydraulic or fuel hoses Deteriorated, twisted, damaged hydraulic or fuel hoses (cracks, wear and tear) or hoses in contact with other parts of the machine

*: Canopy parts No.(1) 03284-00035
*: Canopy parts No.(2) 03284-00010



MAINTENANCE LIST

Inspection and maintenance item	Page
Walk-around inspection	
Inspecting by opening the engine hood and covers	5-16
Inspecting by walking around the machine	5-17
Inspecting while sitting in the operator's seat	5-17
Daily inspection (every 10 hours)	
Inspecting and replenishing the coolant	5-18
Inspecting and replenishing the engine oil	5-19
Inspecting the fuel filter (water separator)	5-20
Inspecting the fuel level	5-20
Inspecting the hydraulic oil tank level and replenishing	5-21
Lubricating the working equipment	5-23
After the initial 50 hours (only for new machines)	
Replacing the engine oil and the oil filter	5-24
Inspecting and adjusting the fan belt	5-26
Replacing the hydraulic oil return filter	5-27
Every 50 hours	
Inspecting and adjusting the crawler tension	5-28
Lubricating the slew bearing	5-30
Lubricating the slew motor pinion	5-30
Draining the water from the fuel tank	5-31
Inspecting the battery fluid level and replenishing	5-32
Every 100 hours	
Cleaning the fuel filter	5-34
After the initial 250 hours (only for new machines)	
Replacing the travel motor gear oil*	5-35
Every 250 hours	
Replacing the engine oil and the oil filter	5-36
Inspecting and adjusting the fan belt	5-36
Cleaning the air cleaner	5-36
Cleaning the radiator fins	5-38

*: If the percentage of the traveling time within the total operating time is high, replace the gear oil earlier than the specified time.

Inspection and maintenance item	Page
Every 500 hours	
Replacing the hydraulic oil return filter	5-39
Replacing the fuel filters	5-39
Every 1000 hours	
Replacing the travel motor gear oil*	5-40
Cleaning the engine cooling system	5-40
Replacing the air cleaner element	5-42
Replacing the air breather (If equipped)	5-43
Inspecting and adjusting the engine valve clearance	5-43
Every 1500 hours	
Inspecting and cleaning the engine fuel injection nozzle	5-44
Every 2000 hours	
Replacing the hydraulic oil and cleaning the suction strainer	5-45
Inspecting the accumulator (If equipped)	5-47
Every 3000 hours	
Inspecting the fuel injection pump	5-48
When required	
Replacing the bucket	5-49
Lubricating the levers	5-50
Inspecting the rubber crawlers	5-51
Replacing the rubber crawlers	5-52

*: If the percentage of the traveling time within the total operating time is high, replace the gear oil earlier than the specified time.

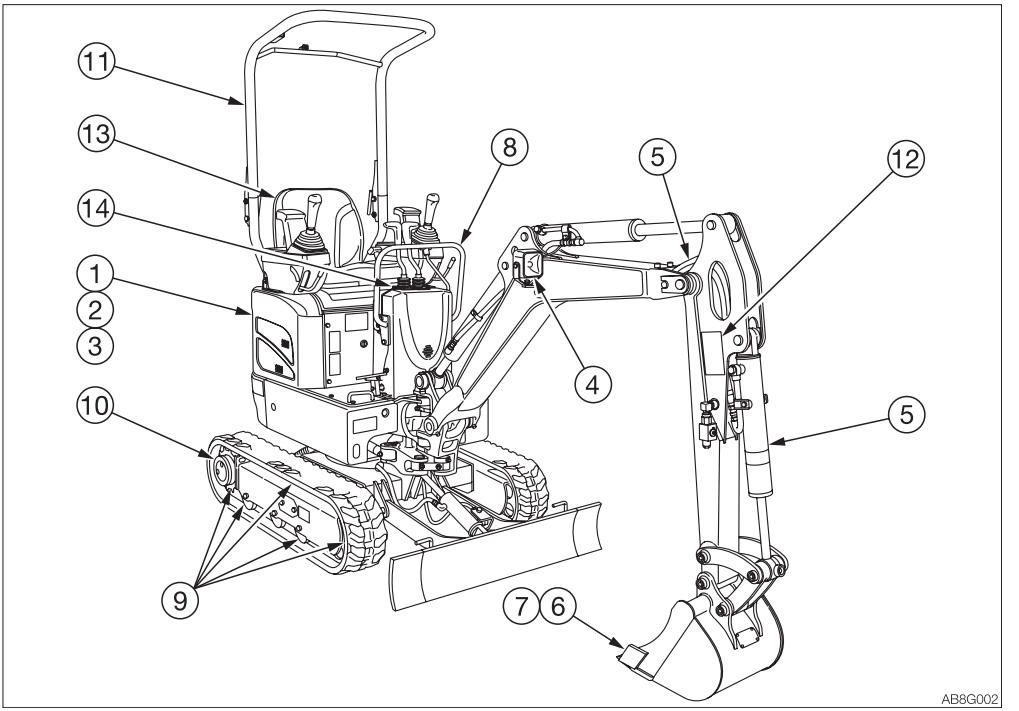
WALK-AROUND INSPECTION

Perform the following inspections every day before starting the engine for the first time.

⚠ WARNING

- **Before operating, perform the walk-around inspections and make repairs immediately where necessary.**
- **Be sure to secure the engine hood or cover before working the inside. Do not keep the hood or cover open on a windy day or if the machine is parked on a slope.**

Before starting the engine, look around the machine and clean any combustibles from the surroundings of the engine. Also, inspect if oil or water is leaking and any nuts, bolts or electric wiring are loosened or damaged.



INSPECTING BY OPENING THE ENGINE HOOD AND COVERS

1. Check for any twigs, leaves, oil or other combustible materials around the engine and battery.
2. Check for oil or engine coolant water leakage around the engine.
3. Check for oil leakage from the hydraulic oil tank, hydraulic devices, hoses or connections.

INSPECTING BY WALKING AROUND THE MACHINE

4. Check lights for dirt, damage and burnt out bulbs.
5. Check attachments and hoses for damage.
6. Check the bucket, bucket teeth and side cutter for wear, damage and looseness.
7. Check the hook, slip stopper and hook mount of buckets with hooks for damage. (Option)
8. Check the handrail, the steps and the slip-resistant surfaces for damage and loose bolts.
9. Check the crawlers, shoe slides, track rollers, idlers and sprockets for damage, wear and loose bolts.
10. Check for oil leakage from the travel motor.
11. Check the canopy and the guard for damage and loose or damaged nuts and bolts.
12. Check the labels for dirt and damage.

INSPECTING WHILE SITTING IN THE OPERATOR'S SEAT

13. Check the seat and seat belt for dirt or damage.
    Check the operator's seat for dirt, oil or other combustible materials.
14. Check the monitor, instruments and switches for dirt or damage.

DAILY INSPECTION (EVERY 10 HOURS)

Perform the following inspections every day before starting the engine for the first time.

⚠ WARNING

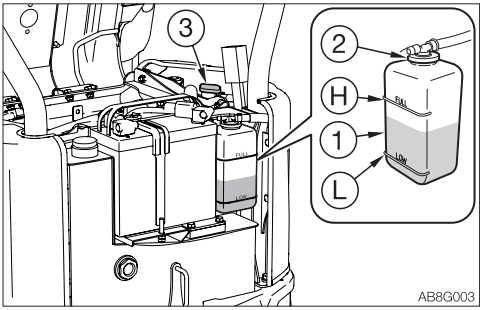
- **Before operating, perform the daily inspections and make repairs immediately where necessary.**
- **Be sure to secure the engine hood or cover before working the inside. Do not keep the hood or cover open on a windy day or if the machine is parked on a slope.**

INSPECTING AND REPLENISHING THE COOLANT

⚠ WARNING

- **Do not remove the radiator cap or the drain plug when the cooling water is hot. Stop the engine and wait until the engine and the radiator cool before slowly loosening the radiator cap and the drain plug to remove them.**
- **Always wear the protective goggle and gloves when handling coolant (antifreeze). If any coolant (antifreeze) comes in contact with eyes or skin, wash it off with clean water. Otherwise, it could result in injures.**

Inspection



1. Open the engine hood.
2. Inspect the cooling water level in the reserve tank (1).
   The level should be between the upper limit (H) and the lower limit (L).
   If it is below the lower limit (L), replenish.

Replenishing

1. Remove the cap (2) of the reserve tank (1).
2. Add cooling water up to the upper limit (H) of the reserve tank (1).
   If the reserve tank (1) is found empty at the inspection, check for water leakage and then the water level in the radiator (3). Add water to the radiator (3) as required, and then to the reserve tank (1).
3. Install the cap (2).

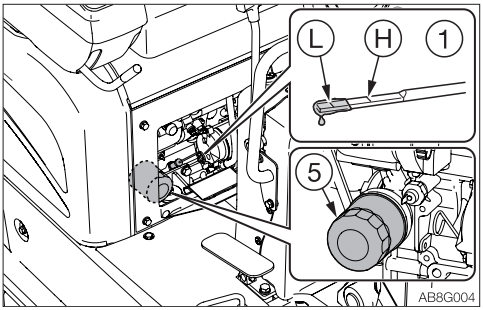
Note: Use only clean water (soft water) to replenish the cooling water loss due to evaporation. Use coolant (antifreeze) and clean water (soft water) of the specified mixing ratio to replenish the cooling water loss due to leaking.

INSPECTING AND REPLENISHING THE ENGINE OIL

⚠ WARNING

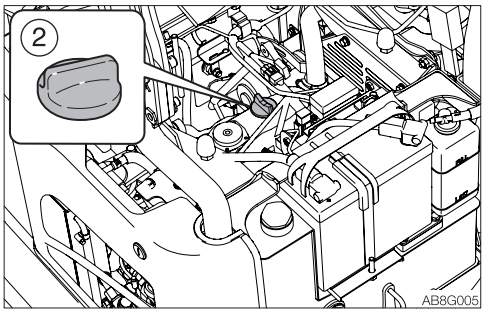
Stop the engine and allow the machine to cool down before performing maintenance.

Inspection



1. Open the engine hood and the maintenance cover.
2. Take out the dipstick (1) and wipe the oil off with a rag.
3. Fully reinsert the dipstick (1), and then pull it back out.
4. Check the oil on the dipstick (1).
   The level should be between the upper limit (H) and the lower limit (L).
   If it is below the lower limit (L), replenish.

Replenishing

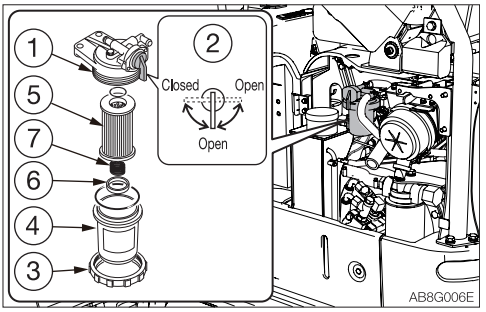


1. Remove the oil filler cap (2).
2. Add oil up to between the upper limit (H) and the lower limit (L) of the dipstick (1). Problems could arise if the oil level is either too low or too high.
3. Tighten the oil filler cap (2).
4. Start the engine, run it at low idle for about 5 minutes, then stop it.
5. After about 10 minutes, inspect the oil level.

INSPECTING THE FUEL FILTER (WATER SEPARATOR)

⚠ WARNING

- Do not smoke or permit open flames while handling fuel or working on the fuel system.
- Stop the engine in a well-ventilated place and allow it to cool down before performing maintenance.
- Clean up spilled fuel immediately.

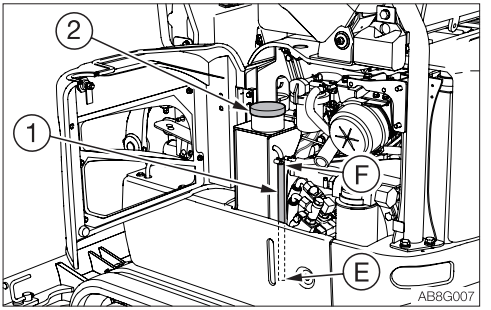


1. Open the fuel lid.
2. Inspect the fuel filter (1).
   If the red indicator ring (6) is sunk to the bottom of case (4), no water is mixed in.
   If the red indicator ring (6) is floating, there is water up to the ring. Drain the water and clean.
   Refer to “Cleaning the fuel filter” on page 5-34.
   Refer to “Bleeding air from the fuel system” on page 6-8.

INSPECTING THE FUEL LEVEL

⚠ WARNING

- Do not smoke or permit open flames while handling fuel or working on the fuel system.
- Never remove the fuel cap or add fuel when the engine is running or still hot. Do not spill fuel on the hot surface of the machine.
- Fill the fuel tank in a well ventilated place.
- Clean up spilled fuel immediately.
- Do not fill the fuel tank to capacity. Allow room for oil expansion.
- Securely tighten the fuel filler cap.
- Use the correct grade of fuel for the operating season.



1. Check the fuel level using the sight gauge (1).
   F: Tank is full.
   E: Tank is empty.
2. If the fuel level is low, open the fuel lid.
3. Add fuel from the fuel filler port (2) while watching the sight gauge (1).
   Refer to “Fuel filler port” on page 2-5.

INSPECTING THE HYDRAULIC OIL TANK LEVEL AND REPLENISHING

⚠ WARNING

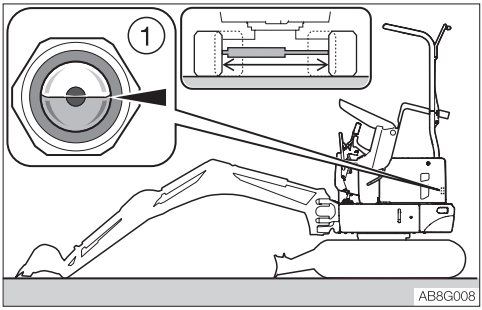
Oil may spurt out if caps or filters are removed or pipes are disconnected before releasing the pressure in the hydraulic system.

- **Gradually loosen the vent plug to relieve tank pressure.**

Inspection

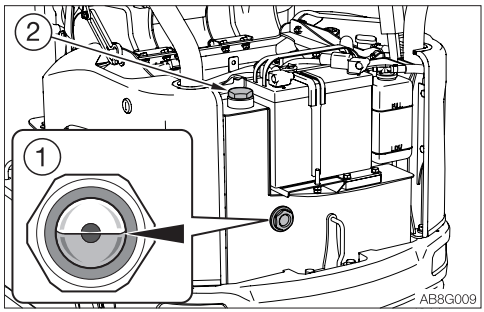
The oil level changes with the oil temperature. Inspect the oil by maintaining the machine at posture shown in the figure at the next.

- Machine posture for inspecting the hydraulic oil level



1. Start the engine and run it at low speed.
2. Fully extend the crawler width.
3. Fully retract the cylinders (arm and bucket), and lower the bucket to the ground.
4. Lower the dozer blade, and then stop the engine.
5. Open the engine hood.
6. Inspect the oil level using the sight gauge (1).
   · When the oil temperature is about 20°C (68°F):
   The proper oil level should be in the middle of the sight gauge (1).
   If the level is lower, replenish.

Replenishing



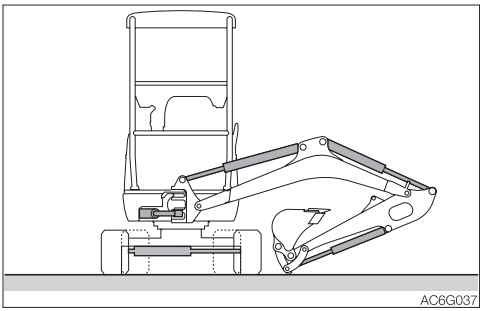
IMPORTANT: Do not fill up to the level higher than the middle level of the sight gauge (1). Doing so will damage the hydraulic circuits or result in oil spurting. If filled over the middle level, stop the engine, wait for the hydraulic oil to cool and then let the excessive oil drain from the drain plug.
IMPORTANT: Do not forget to apply pressure to the hydraulic oil tank to avoid damage to the pump caused by air sucking. (If not equipped with the air breather)

1. Slowly loosen the air bleeding plug (2) to relieve the internal pressure, and then remove it.
2. Add hydraulic oil up to the midpoint of the sight gauge (1).
3. Pressurize the hydraulic oil tank as follows.

Note: For a machine equipped with the air breather, no pressurization is necessary.

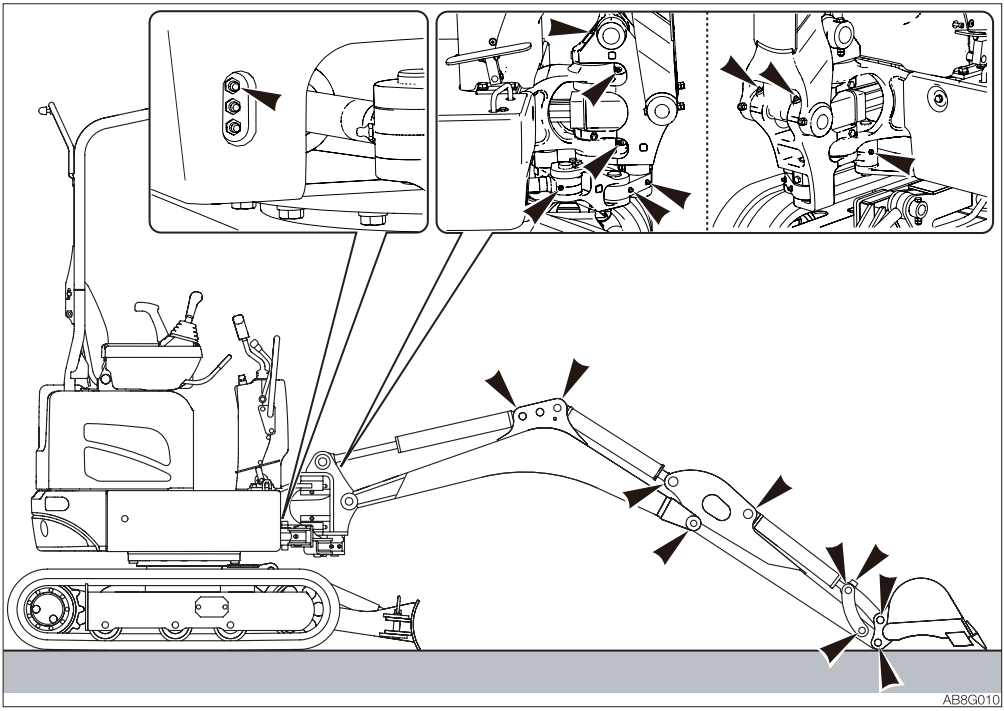
Pressurizing the hydraulic oil tank
(If not equipped with the air breather)

1. Start the engine and run it at low speed.
2. With the vent plug (2) removed, set the safety lock levers to the released position.
   · Hydraulic oil tank pressurization posture



3. Fully extend the bucket, arm, boom, swing and span cylinders.
4. Stop the engine and raise the left safety lock lever to engage the lock.
5. Tighten the vent plug (2), and then pressurize by retracting the cylinders.

LUBRICATING THE WORKING EQUIPMENT



1. Keep the machine configuration as shown in the diagram above, lower the working equipment to the ground, and then stop the engine.
2. Use the grease gun to lubricate the grease fittings.
3. Wipe off the excess grease.

Note: It is not necessary to lubricate the dozer blade, as it is using a “self-lubrication bush”.

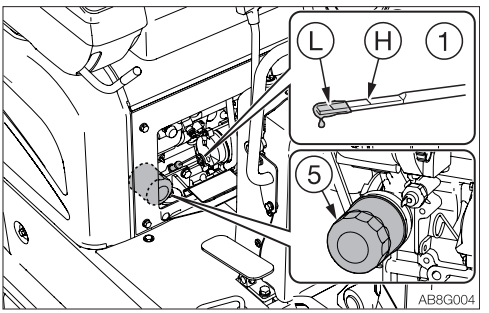
AFTER THE INITIAL 50 HOURS (ONLY FOR NEW MACHINES)

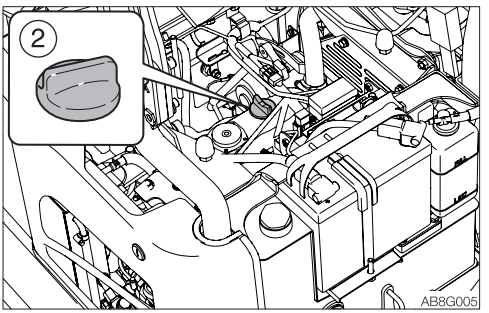
REPLACING THE ENGINE OIL AND THE OIL FILTER

⚠ WARNING

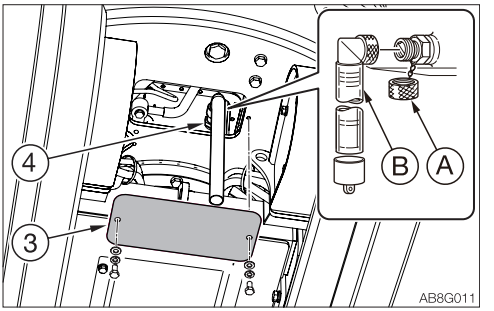
Stop the engine and allow the machine to cool down before performing maintenance.

- **The engine, muffler, radiator, hydraulic lines, sliding parts and many other parts of the machine are hot immediately after the engine is stopped. Touching these parts will cause burns.**
- **The engine oil is also hot. Be careful not to touch the hydraulic oil when loosening the cap or plug. Working on the machine under these conditions could result in burns or injuries.**





1. Open the engine hood and the maintenance cover.
2. Remove the oil filler cap (2).



3. Loosen the bolt and remove the under cover (3).
4. Place a pan for catching the waste oil under the drain plug (4).
5. Remove the cap (A), install connector (B) and drain the oil. (The oil comes out when the screw is tightened.)
6. Remove the connector (B) and install the cap (A).

IMPORTANT: Check the waste oil for metal powder. If it contains large amounts of metal powder, consult your sales or service dealer.

7. Turn the filter (5) counterclockwise with the filter wrench and remove it.
8. Clean the surface of installation of the filter stand.
9. Apply a thin layer of oil on the packing of the new filter.
10. Install the new filter by hand.
11. Securely tighten the filter by hand (not using the filter wrench) after its packing comes in contact with the surface of installation.
12. Add oil up to between the upper limit (H) and the lower limit (L) of the dipstick (1). Problems could arise if the oil level is either too low or too high.
13. Tighten the oil filler cap (2).
14. Start the engine, run it at low idle for about 5 minutes, then stop it.
15. After about 10 minutes, inspect the oil level.
16. Install the under cover (3).

INSPECTING AND ADJUSTING THE FAN BELT

⚠ WARNING

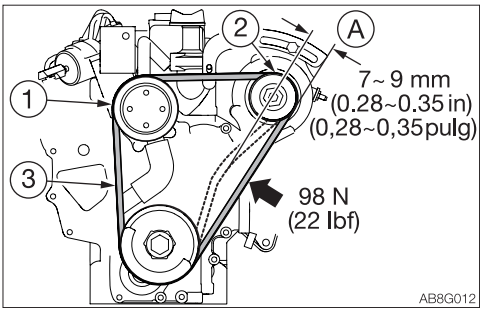
Stop the engine and allow the machine to cool down before performing maintenance.

- **The engine, muffler, radiator, hydraulic lines, sliding parts and many other parts of the machine are hot immediately after the engine is stopped. Touching these parts will cause burns.**

IMPORTANT: The loose belts could result in bad battery charge, overheat of engine or early wear of belt. Too tight belts could damage the water pump or bearing and belt used to drive the alternator.
IMPORTANT: Do not let any oil or grease get on the belt.

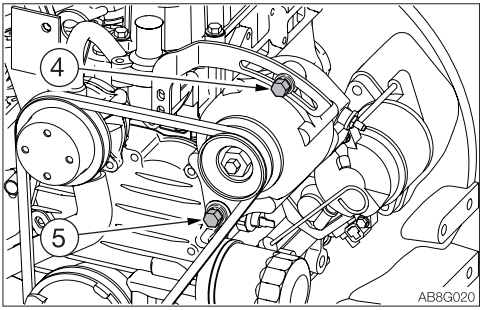
Inspection

1. Open the maintenance cover.



2. Press at the center of the fan pulley (1) and alternator pulley (2) to check the tension (approx. 98 N or 22 lbf).
   The slack (A) should be 7 to 9 mm (0.28 to 0.35 in).
3. Inspect the fan belt (3) and replace if it is as follows.
   · There are cuts or cracks.
   · The belt is worn and touches the bottom of the V groove in the pulley.
   · The belt stretched too loose to be adjusted.

Adjustment



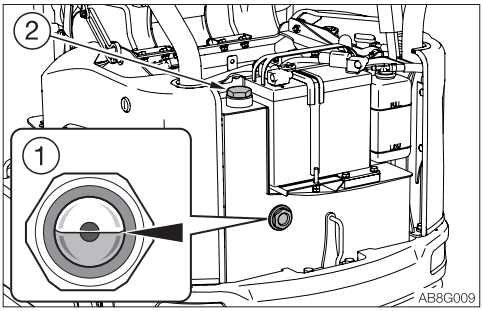
1. Loosen the adjusting bolt (4) and the locking bolt (5).
2. Move the alternator by using leverage to adjust the slack.
3. Tighten the adjusting bolt (4) and the locking bolt (5).

Note: When replacing with a new belt, run the engine at low idle speed for about 3 to 5 minutes to break in the new belt, before adjusting the tension.

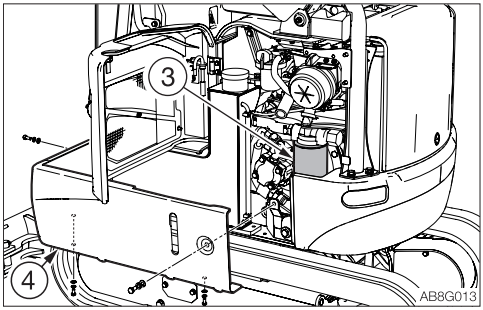
REPLACING THE HYDRAULIC OIL RETURN FILTER

⚠ WARNING

- **Stop the engine and allow the machine to cool down before performing maintenance.**
  - **The engine and the hydraulic system and many other parts of the machine are hot immediately after the engine is stopped. Touching these parts will cause burns.**
  - **The hydraulic oil is also hot and under high pressure. Be careful not to touch the hydraulic oil when loosening the cap or plug. Working on the machine under these conditions could result in burns or injuries due to the hot oil spurting out.**
- **Oil may spurt out if caps or filters are removed or pipes are disconnected before releasing the pressure in the hydraulic system.**
  - **Gradually loosen the vent plug to relieve tank pressure.**
  - **When removing plugs or screws, or when disconnecting hoses, stand to the side and loosen them slowly to gradually release the internal pressure before removing.**



1. Open the engine hood.
2. Slowly loosen the air bleeding plug (2) to relieve the internal pressure, and then remove the plug.



3. Loosen the five bolts and remove the left side cover (4).
4. Open the fuel lid.
5. Turn the filter (3) counterclockwise with the filter wrench and remove it.
6. Clean the surface of installation of the filter stand.
7. Apply a thin layer of oil on the packing of the new filter.
8. Install the new filter.
   - Tightening torque: 13.7 ± 2 N·m (10.1 ± 1.5 ft-lb.)
9. Install the left side cover (4).
10. Inspect the level with the sight gauge (1), and replenish if the level is too low.
    Refer to “Inspecting the hydraulic oil tank level and replenishing” on page 5-21.
11. Pressurize the hydraulic oil tank.
    (If not equipped with the air breather)
    Refer to “Pressurizing the hydraulic oil tank” on page 5-22.

Note: For a machine equipped with the air breather, no pressurization is necessary.

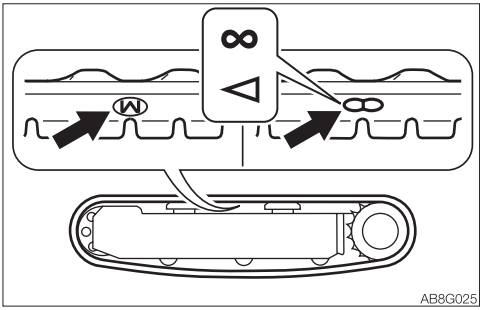
EVERY 50 HOURS

INSPECTING AND ADJUSTING THE CRAWLER TENSION

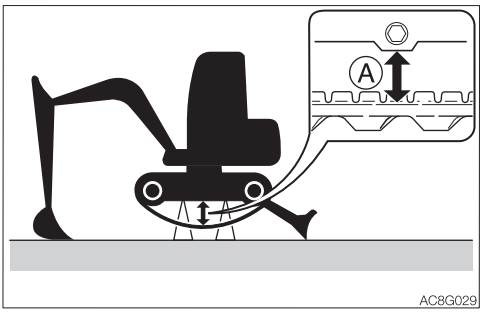
⚠ WARNING

- If you must work beneath the raised machine or working equipment, always use wood blocks, jack-stands or other rigid and stable supports. Never get under the machine or working equipment if they are not sufficiently supported. This procedure is especially important when working on hydraulic cylinders.
- Be careful with the high-pressure grease In the track adjuster, the grease has been injected under high pressure. If the tension is adjusted without following the prescribed procedure, the grease discharge valve may fly off, resulting in injury.
  - Never loosen the grease fitting.
  - Loosen the grease discharge valve slowly. Do not turn it more than one turns.
  - Do not put your face, arms, legs or body in front of the grease discharge valve.
  - If grease does not come out when the grease discharge valve is loosened, the valve is faulty. Ask a Takeuchi service agent for repair.

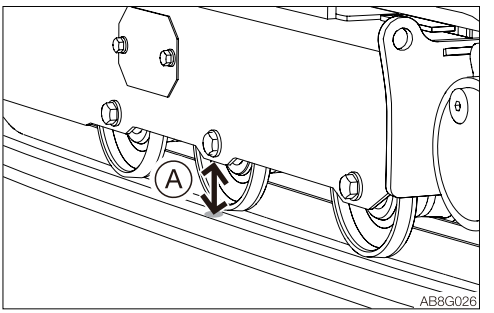
Inspection



1. For rubber crawlers, move the machine so that the “M”, “∞” or “◁” mark at the joint is at the top center of the crawler frame.



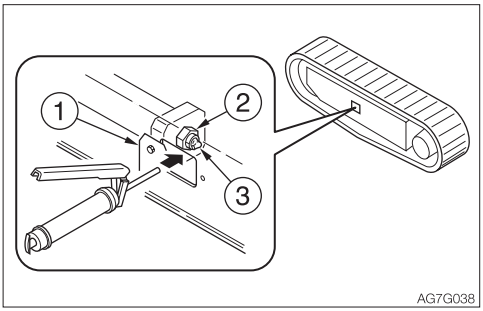
2. Use the working equipment to lift the machine body. Operate the levers slowly.



3. Inspect the gap between the bottom surface of the frame at the center of the crawler frame and the top surface of the crawler.
   The gap must be within the following range:
   (A) Rubber crawler
   53 to 58 mm (2.1 to 2.3 in.)

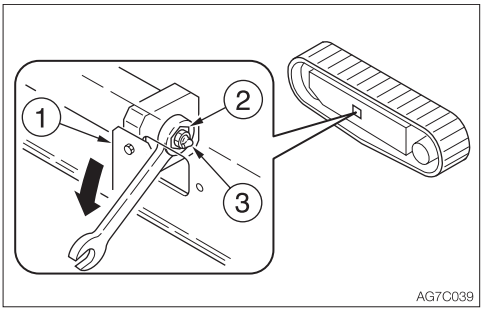
Adjustment

Increasing the tension



1. Remove the cover (1).
2. Inject grease through the grease fitting (3) of the grease discharge valve (2) with a grease gun.
3. Inspect the crawler tension.

Decreasing the tension

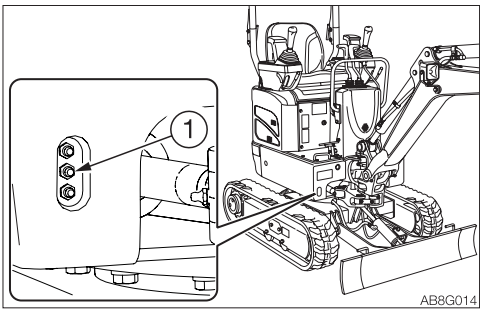


1. Remove the cover (1).
2. Slowly loosen (one turn) the grease discharge valve (2) with a spanner to discharge grease. If grease does not come out well, move the machine back-and-forth.
3. Tighten the grease discharge valve (2).
   · Tightening torque: 177 N·m (130 ft-lb.)

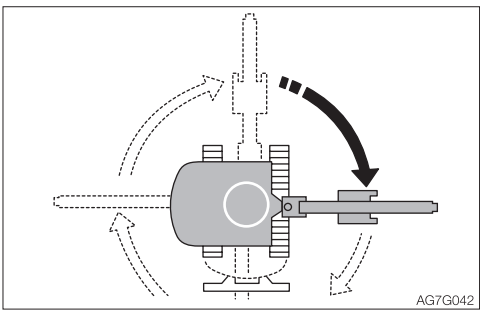
LUBRICATING THE SLEW BEARING

⚠ WARNING

Do not slew while lubricating. Doing so is dangerous, as you may get caught in the machine.

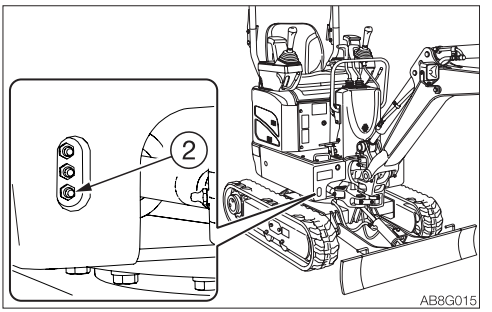


1. Stop the engine with the machine in the posture shown on the figure above.
2. Use the grease gun to grease the grease fitting (1).



3. Start the engine, lift the bucket and slew clockwise 90°.
4. Lower the bucket to the ground, and then stop the engine.
5. Repeat the steps 2 to 4 above three times.
6. Wipe off the grease expelled from the slew bearing and grease fitting.

LUBRICATING THE SLEW MOTOR PINION



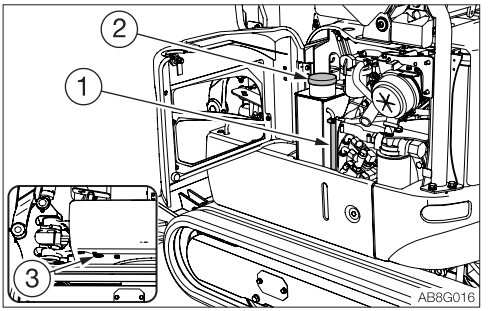
1. Stop the engine with the machine in the posture shown on the figure above.
2. Use the grease gun to lubricate the grease fitting (2).
3. Wipe off the excess grease.

DRAINING THE WATER FROM THE FUEL TANK

⚠ WARNING

- **Do not smoke or permit open flames while handling fuel or working on the fuel system.**
- **Never remove the fuel cap or add fuel when the engine is running or still hot. Do not spill fuel on the hot surface of the machine.**
- **Fill the fuel tank in a well ventilated place.**
- **Do not fill the fuel tank to capacity. Allow room for oil expansion.**
- **Clean up spilled fuel immediately.**
- **Securely tighten the fuel filler cap.**
- **Use the correct grade of fuel for the operating season.**

Do the draining operation before starting the machine.



1. Slew the upperstructure to the position for easy draining.
2. Remove the fuel filler cap (2).
3. Place a pan under the drain plug (3).
4. Loosen the drain plug (3) to drain water and sediment buildup in the bottom of the tank.
5. Tighten the drain plug (3).
6. Add fuel while watching the sight gauge (1).
7. Tighten the fuel filler cap (2) and lock the fuel lid.
8. Bleed air.

Bleeding air from the fuel system
Refer to “Bleeding air from the fuel system” on page 6-8.

Note: Air in the fuel system causes the engine to fail to start or to have problems. Bleed air when the fuel tank is emptied, using the same procedure above.

INSPECTING THE BATTERY FLUID LEVEL AND REPLENISHING

⚠ DANGER

- Do not use the battery when the fluid level is below the lower level limit. Doing so will hasten the deterioration of the internal portions of the battery and shorten the battery life. It also can cause rupturing (explosion).
- Batteries generate flammable hydrogen gas which may explode. Keep away from flame, sparks, fire or lighted cigarettes.
- Use a dampened cloth to clean above the fluid level line and check the fluid level. Do not clean with a dry cloth; otherwise it can cause static electricity to build up, resulting in ignition or explosion.
- Do not use the cable if it's connecting terminal is loose or corroded. If used, ignition or explosion may occur.
- Do not block the exhaust hole of the battery. An explosion could result, if blocked.

⚠ WARNING

- Wear protective goggle and clothing when working with batteries.
- Do not add the distilled water above the upper level limit. Doing so could cause the fluid to leak. This fluid can cause skin damage if contacted, or can cause the machine components to corrode.
- Batteries contain sulfuric acid which will damage eyes or skin if contacted.
  - If eye contact occurs, flush immediately with clean water and get prompt medical attention.
  - If accidentally swallowed, drink large quantities of water or milk and call a physician immediately.
  - If acid contacts skin or clothing, wash off immediately with a lot of water.

Inspection

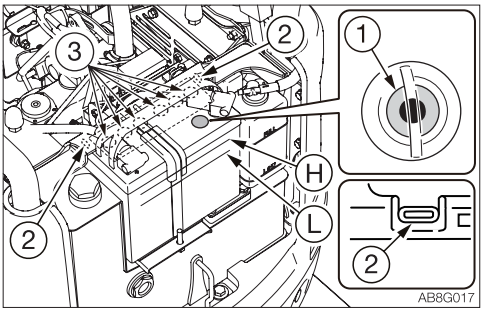
IMPORTANT: Check the fluid level of all cells following the steps below, even when the fluid level can be checked using the indicator.

Note: Under normal operating conditions, the maintenance-free battery does not require addition of water because of the special plate designed to minimize fluid loss. However, for those machines that are heavily used or operated under severe conditions (for example, in high ambient temperature), the fluid level often becomes low. If that is the case, check the fluid level of the maintenance-free battery and add water as needed.

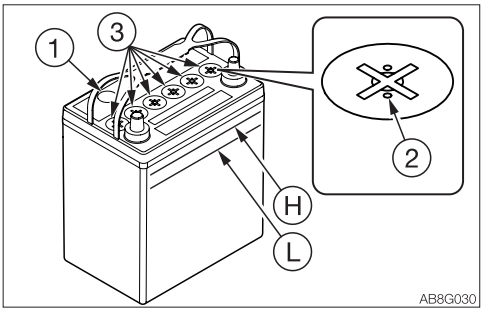
Note: The warranty will be void if the label on the battery is removed during the warranty period. If the indicator displays "Insufficient battery fluid" during the warranty period, contact your sales or service dealer without doing anything to the battery.

1. Open the engine hood.

<Applicable machine models 211000004 to 211006786>
<Applicable machine models 211006865 to 211006870>



<Applicable machine models 211006787 to 211006864>
<Applicable machine models 211006871 or later>



2. Inspect the indicator (1).
   - Blue: Good
   - White: Charging needed
   - Red: Insufficient battery fluid
3. Inspect the fluid level.
   The fluid level must be between the upper level line (H) and lower level line (L). If not, add distilled water up to the line (H).
4. Check the battery terminal for looseness, dirt and corrosion.
5. Check the exhaust holes (2) for dirt.

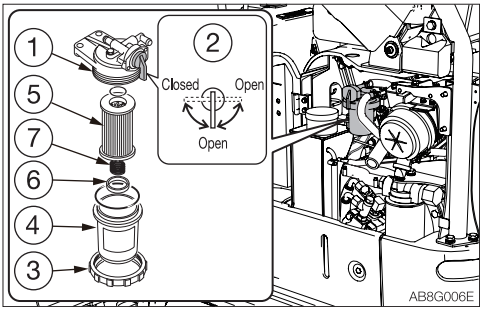
Replenishing
When adding distilled water, do so before starting operations in order to prevent freezing.
1. Upon expiration of the warranty period, remove the label from the sealing plugs (3). (Applicable machine models: 211000004 to 211006786 and 211006865 to 21100687 only)
2. Loosen the sealing plugs (3) and add distilled water up to the highest level line (H).
3. Check that the indicator (1) turns blue.
4. Securely tighten the sealing plugs (3).

EVERY 100 HOURS

CLEANING THE FUEL FILTER

⚠ WARNING

- **Do not smoke or permit open flames while handling fuel or working on the fuel system.**
- **Stop the engine in a well-ventilated place and allow it to cool down before performing maintenance.**
- **Clean up spilled fuel immediately.**



1. Open the fuel lid.
2. Close the valve (2).
3. Loosen the ring (3), and then remove and clean the case (4), element (5) indicator ring (6) and spring (7).
4. Inspect the O-ring and the element (5). If there are any scratches or other irregularities, replace them.
5. Install the indicator ring (6), spring (7), element (5) and case (4), and then tighten the ring (3).
6. Open the valve (2) to bleed air.
   Refer to “Bleeding air from the fuel system” on page 6-8.

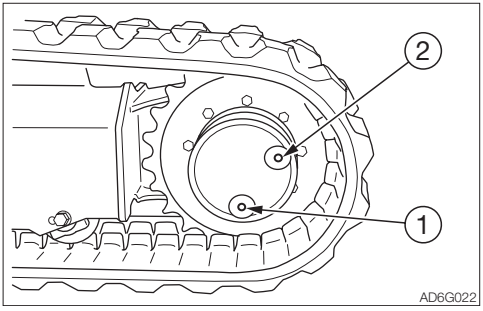
AFTER THE INITIAL 250 HOURS (ONLY FOR NEW MACHINES)

REPLACING THE TRAVEL MOTOR GEAR OIL

⚠ WARNING

- Stop the engine and allow the machine to cool down before performing maintenance.
  - The travel motor is hot immediately after the engine is stopped. Touching it will cause burns.
  - The gear oil is also hot and under high pressure immediately after the engine is stopped.
    Be careful when loosening the plugs. Working on the machine under these conditions could result in burns or injuries.
- The pressure in the reduction gear case of travel motor may cause oil or the plug to fly out. Loosen the plug slowly to release the pressure.

IMPORTANT: If the percentage of the traveling time within the total operating time is high, replace the gear oil earlier than the specified time.



1. Set the travel motor so that plug (1) is at the very bottom.
2. Place a pan under the plug (1).
3. Remove the plugs (1) and (2) and drain the oil.
4. Rewrap the plugs with new sealing tape.
5. Tighten the plug (1).
6. Add oil through the hole of the plug (2) until oil flows out of the hole of the plug (2).
7. Tighten the plug (2).

EVERY 250 HOURS

REPLACING THE ENGINE OIL AND THE OIL FILTER

Refer to “Replacing the engine oil and the oil filter” on page 5-24.

INSPECTING AND ADJUSTING THE FAN BELT

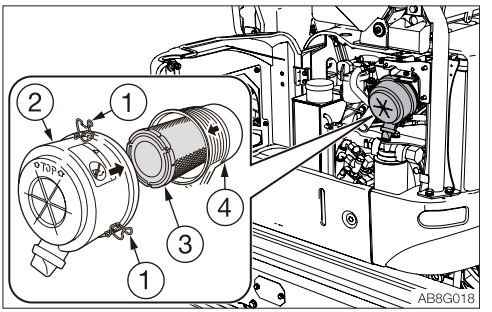
Refer to “Inspecting and adjusting the fan belt” on page 5-26.

CLEANING THE AIR CLEANER

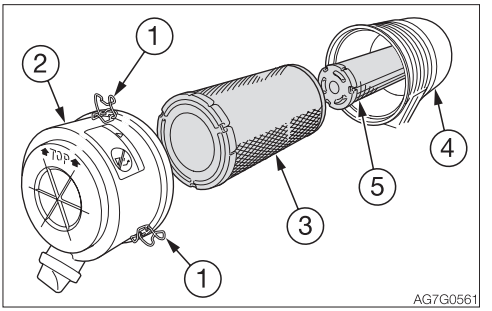
⚠ WARNING

- **Stop the engine and allow the machine to cool down before performing maintenance.**
  - **The engine, muffler, radiator and many other parts of the machine are hot immediately after the engine is stopped. Touching it will cause burns.**
- **Wear required appropriate equipment such as protective goggle and filter mask when using compressed air, as metal fragments or other objects can fly and cause serious injury.**

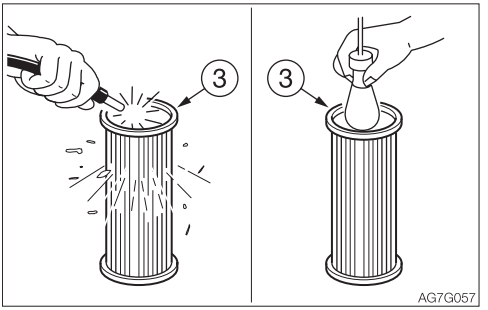
IMPORTANT: Be careful not to scratch the element. Do not use an element if it is damaged.
IMPORTANT: When operating the machine in very dusty places, perform inspection and maintenance operations every day.
IMPORTANT: Be sure to install the element and dust cap securely. If not, dust could be drawn into the cylinder, damaging the engine.



1. Open the fuel lid.
2. Loosen the clamps (1) and remove the dust cup (2).



3. Clean the inside of the dust cup (2).
4. Remove the primary element (3).
5. Cover the intake hole at the back of the body (4) with cloth or tape to prevent dirt from getting in.
   <If equipped with the secondary element>
   To prevent dirt from getting inside the engine, do not remove the secondary element (5).
6. Clean the inside of the body (4).



7. Clean the primary element (3) with dried compressed air (294 to 490 kPa or 43 to 71 psi).
   First blow the air from the inside of the element along the pleats. Then blow the air from the outside and finally from the inside again.
8. Light up the inside of the primary element (3) with a light bulb, inspect it, and replace it if there are small holes or thin spots.
9. Remove the cloth or tape applied in step 5.
10. Install the primary element (3).
11. Install the dust cup (2) with its "⬆ TOP ⬆" mark facing up, and then fasten it with the clamps (1).

CLEANING THE RADIATOR FINS

⚠ WARNING

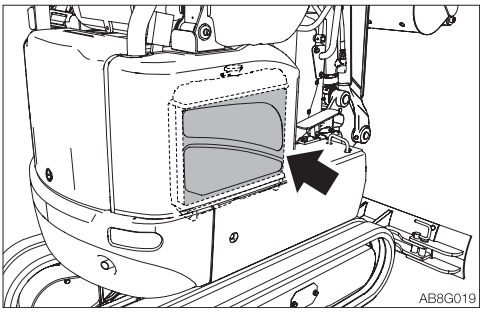
Wear required appropriate equipment such as protective goggle and filter mask when using compressed air, as metal fragments or other objects can fly and cause serious injury.

IMPORTANT: Be careful not to damage the fins when cleaning.

- **When using compressed air or pressurized water, make sure the pressure is no higher than 200 kPa (28 psi) and hold the nozzle sufficiently away from the fins.**

IMPORTANT: When using water, cover the electrical system to prevent water from getting in.

IMPORTANT: When operating the machine in very dusty places, perform inspection and maintenance operations every day.



1. Blow compressed air on the fins to remove mud and dirt stuck on them.

EVERY 500 HOURS

REPLACING THE HYDRAULIC OIL RETURN FILTER

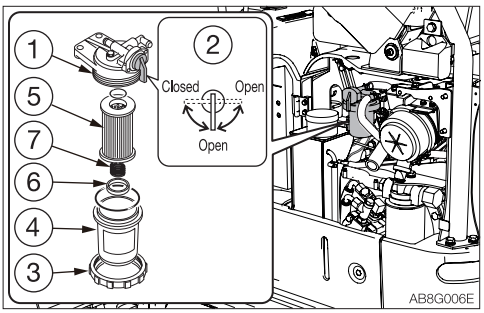
Refer to “Replacing the hydraulic oil return filter” on page 5-27.

REPLACING THE FUEL FILTERS

⚠ WARNING

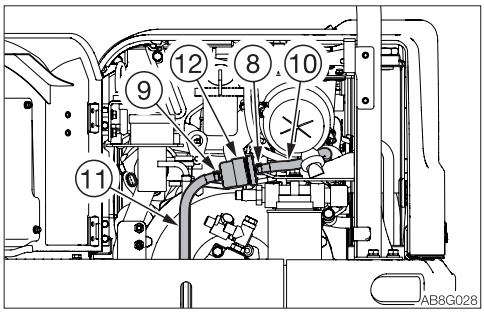
- **Do not smoke or permit open flames while handling fuel or working on the fuel system.**
- **Stop the engine in a well-ventilated place and allow it to cool down before performing maintenance.**
- **Clean up spilled fuel immediately.**

Fuel filter



1. Open the fuel lid.
2. Close the valve (2).
3. Loosen the ring (3) and remove the case (4).
4. Remove the spring (7) and the indicator ring (6) from the case (4).
5. Clean the case (4).
6. Inspect the O-ring. If there are any scratches or other irregularities, replace it.
7. Replace the element (5) with a new one.
8. Install the indicator ring (6) and the spring (7) in the case (4).
9. Install the case (4) to the bracket and tighten the ring (3) by hand.
10. Open the valve (2) to bleed air.
    Refer to “Bleeding air from the fuel system” on page 6-8.

Pre-fuel filter (If equipped)



1. Open the fuel lid.
2. Remove the clamps (8) and (9).
3. Remove the hoses (10) and (11).
4. Replace the filter (12) with a new one.
5. Install the hoses (10) and (11).
6. Install the clamps (8) and (9).
7. Bleed air.
   Refer to “Bleeding air from the fuel system” on page 6-8.

EVERY 1000 HOURS

REPLACING THE TRAVEL MOTOR GEAR OIL

Refer to “Replacing the travel motor gear oil” on page 5-35.

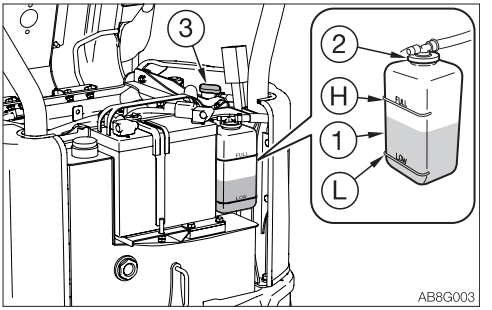
CLEANING THE ENGINE COOLING SYSTEM

⚠ WARNING

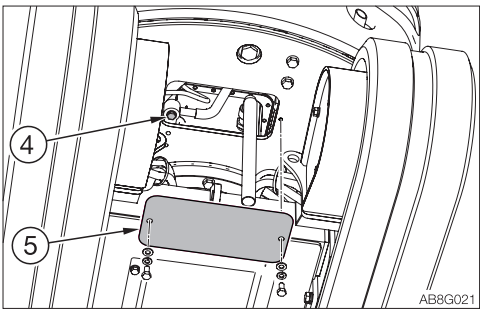
- **Stop the engine and allow the machine to cool down before performing maintenance.**
  - **The engine, muffler, radiator and many other parts of the machine are hot immediately after the engine is stopped. Touching these parts will cause burns.**
  - **The engine coolant is also hot and under high pressure immediately after the engine is stopped. Be careful when loosening the caps or plugs. Working on the machine under these conditions could result in burns or injuries due to the hot coolant spurting out.**
- **If maintenance must be performed with the engine running, always work as a two person team communicating each other.**
  - **One person must sit in the operator’s seat so that he/she can immediately stop the engine when necessary. He/she must take care not to touch the lever or pedal unless necessary.**
  - **The one who performs maintenance must make sure to keep his/her body or clothing away from the moving part of the machine.**
- **Standing at the back of the machine while the engine is running is extremely dangerous, as the machine could move suddenly. Never stand at the back of the machine while the engine is running.**
- **Do not remove the radiator cap or the drain plug when the cooling water is hot. Stop the engine and wait until the engine and the cooling water cool. Then, slowly loosen the radiator cap and the drain plug to remove them.**

When cleaning, if the temperature of the coolant is low, the thermostat will be closed and the coolant will not circulate in the radiator. Heat the coolant water to at least 90°C (194°F) before cleaning.

1. Open the engine hood.



2. Gradually loosen the radiator cap (3) to release the internal pressure, and then remove the cap.



3. Loosen the bolt and remove the under cover (5).
4. Place a pan for catching the waste coolant under the drain plug (4), and then loosen the drain plug (4) to drain the coolant.
5. Tighten the drain plug (4).
6. Add tap water to the radiator through the coolant fill port up to the top of the port. Take time and slowly add water, so that no air enters the radiator.

7. Close the radiator cap (3).
8. Start the engine and run it at a speed slightly above low idling. Raise the water temperature to at least 90°C (194°F), and then run the engine for about 10 minutes with the thermostat open.
9. Stop the engine, wait until the cooling water temperature becomes lower, and then remove the drain plug (4) to drain the water.
10. After draining, clean the cooling system using a cleaning agent. When using the cleaning agent, follow the instructions included with the agent.
11. Repeat the steps 4 to 8 to rinse the cooling system.
12. Tighten the drain plug (4).
13. Take time and slowly add the new coolant (mixture of antifreeze and tap water) to the radiator through the fill port until it is full.
14. Close the radiator cap (3).
15. Warm up the engine. Use the meters to check that there are no irregularities in the cooling system at this time.
16. Increase the water temperature to at least 90°C (194°F). Then, run the engine for about 10 minutes with the thermostat kept open.
17. Stop the engine, wait until the cooling water temperature becomes lower, and then check the level of coolant in the radiator.
    If necessary, add cooling water until the radiator is full.
18. Close the radiator cap (3) and install the under cover (5).
19. Clean the interior of the reserve tank (1), and then add coolant to the upper limit (H).
20. When the coolant has been replaced, inspect the coolant level once again after operating the machine.
    When the machine is operated, the coolant is distributed throughout the entire system, resulting in the lower coolant level.
    Add coolant up to the full level.

REPLACING THE AIR CLEANER ELEMENT

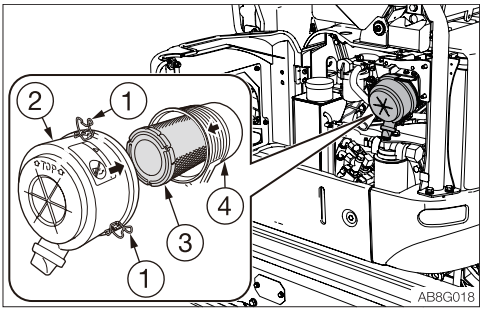
⚠ WARNING

Stop the engine and allow the machine to cool down before performing maintenance.

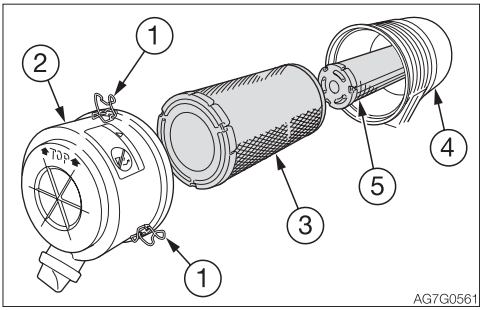
- **The engine, muffler, radiator and many other parts of the machine are hot immediately after the engine is stopped. Touching these parts will cause burns.**

IMPORTANT: Do not use an element if its pleats, gaskets or seals are damaged.
IMPORTANT: Be sure to install the element and dust cap securely. If not, dust could be drain into the cylinder, damaging the engine.

1. Open the fuel lid.



2. Loosen the clamps (1) and remove the dust cup (2).
3. Clean the inside of the dust cup (2).



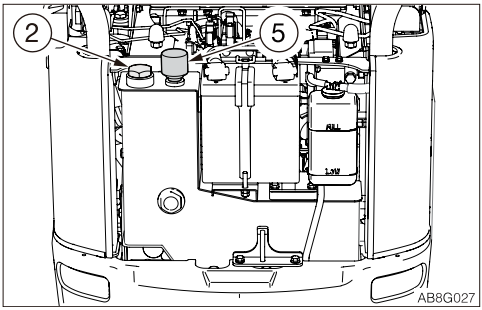
4. Remove the primary element (3).
5. Cover the intake hole at the back of the body (4) with cloth or tape to prevent dirt from getting in.
   <If equipped with the secondary element>
   Do not yet remove the secondary element (5).
6. Clean the inside of the body (4).
7. Remove the cloth or tape applied in step 5.
   <If equipped with the secondary element>
   Remove the secondary element (5).
8. Install the new elements.
9. Install the dust cup (2) with its "⬆ TOP ⬆" mark facing up, and then fasten it with the clamps (1).

REPLACING THE AIR BREATHER (IF EQUIPPED)

⚠ WARNING

Oil may spurt out if caps or filters are removed or pipes are disconnected before releasing the pressure in the hydraulic system.

- **Gradually loosen the vent plug to relieve tank pressure.**



1. Open the engine hood.
2. Slowly loosen the air bleeding plug (2) to relieve the internal pressure, and then remove the plug.
3. Turn the air breather (5) counterclockwise by hand or with the wrench and remove it.
4. Apply a thin layer of oil on the packing of the new air breather
5. Install the new air breather by hand.
   · Tightening torque: Max. 5 N·m

Note: For a machine equipped with the air breather, no pressurization is necessary.

INSPECTING AND ADJUSTING THE ENGINE VALVE CLEARANCE

This operation requires experience. Ask your service dealer for it.

EVERY 1500 HOURS

INSPECTING AND CLEANING THE ENGINE FUEL INJECTION NOZZLE

This operation requires experience. Ask your sales or service dealer for it.

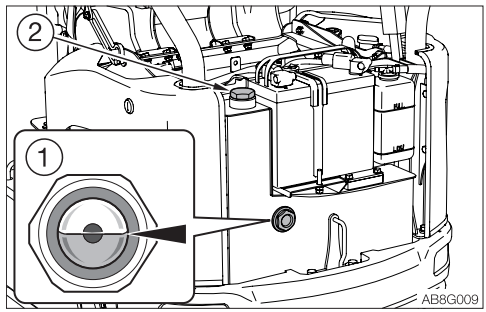
EVERY 2000 HOURS

REPLACING THE HYDRAULIC OIL AND CLEANING THE SUCTION STRAINER

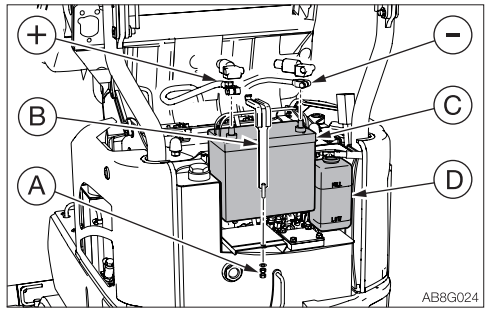
⚠ WARNING

- **Stop the engine and allow the machine to cool down before performing maintenance.**
  - **The engine and the hydraulic system and many other parts of the machine are hot immediately after the engine is stopped. Touching these parts will cause burns.**
  - **The hydraulic oil is also hot and under high pressure immediately after the engine is stopped. Be careful when loosening the caps or plugs. Working on the machine under these conditions could result in burns or injuries due to the hot oil spurting out.**
- **Oil may spurt out if caps or filters are removed or pipes are disconnected before releasing the pressure in the hydraulic system.**
  - **Gradually loosen the vent plug to relieve tank pressure.**
  - **When removing plugs or screws, or when disconnecting hoses, stand to the side and loosen them slowly to gradually release the internal pressure before removing.**

1. Set the machine to the hydraulic oil level inspection posture.
   Refer to “Inspecting the hydraulic oil tank level and replenishing” on page 5-21.
2. Raise the safety lock lever to the locked position.



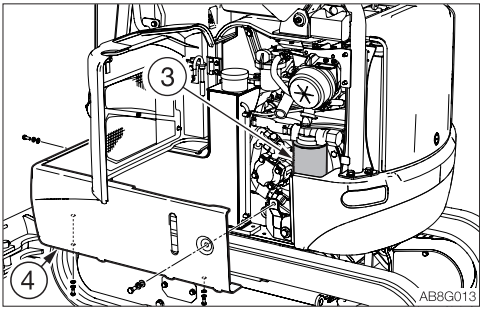
3. Open the engine hood.

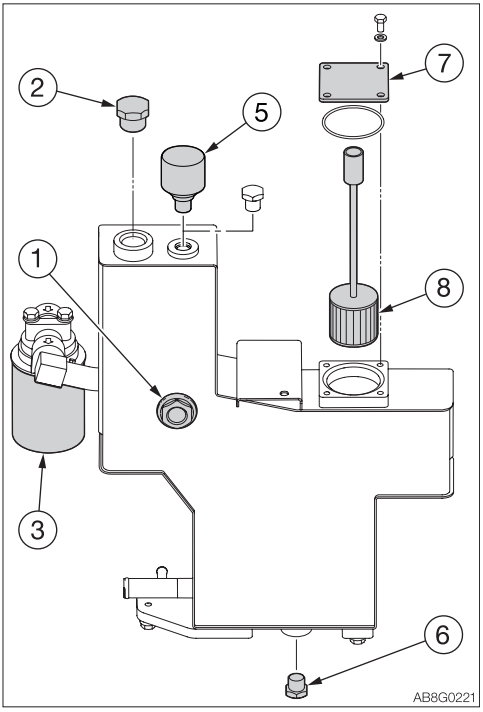


4. Remove the battery (C).
   a. Remove the key from the starter switch.
   b. First, remove the cable from the negative (-) side.
   c. Next, remove the cable from the positive (+) side.
   d. Then, loosen the double nut (A) and remove the fitting (B).
   e. Remove the battery (C).

Note: Depending on the specifications of the machine, the positions of the negative (–) and positive (+) terminals are reversed. Check the markings on the battery, and then disconnect the terminal from the earth (–) side first.

5. Lift the reserve tank (D) and remove it.
6. Slowly loosen the air bleeding plug (2) to relieve the internal pressure, and then remove the plug.





7. Place a pan for catching the waste oil under the drain plug (6).
8. Loosen the drain plug (6) and drain the hydraulic oil.
9. Loosen the bolts and remove the flange (7).
10. Remove the suction strainer (8) and clean it.
11. Clean the inside of the hydraulic oil tank.
12. Replace the return filter (3).
    Refer to “Replacing the hydraulic oil return filter” on page 5-27.
13. Replace the air breather (5) (if equipped).
    Refer to “Replacing the air breather (If equipped)” on page 5-43.
14. Install the suction strainer (8).
15. Install the flange (7).
16. Tighten the drain plug (6).
17. Add hydraulic oil from the hole of plug (2) up to the midpoint of the sight gauge (1).
18. Tighten the plug (2).
19. Bleed air from the hydraulic oil circuit following “Bleeding air” below.
20. Set the machine to the hydraulic oil level inspection posture and inspect the oil level when the oil temperature drops.
    Refer to “Inspecting the hydraulic oil tank level and replenishing” on page 5-21.
21. Pressurize the hydraulic oil tank.
    (If not equipped with the air breather)
    Refer to “Pressurizing the hydraulic oil tank” on page 5-22.

Note: For a machine equipped with the air breather, no pressurization is necessary.

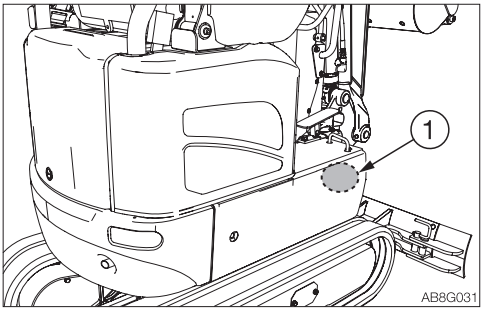
Bleeding air

IMPORTANT: After replacing the hydraulic oil or hydraulic devices, or after performing maintenance of the hydraulic devices, bleed air from the hydraulic circuits and hydraulic devices. Failure to do so may damage the hydraulic devices.

• **Cylinders**

1. Start the engine, let it run at a low-idling speed for 10 minutes.
2. Maintain the engine at low idle, then extend and retract each cylinder 4 or 5 times, without let them reach the stroke end.
3. Run the engine at high speed, then extend and retract each cylinder 4 or 5 times, without let them reach the stroke end.
4. Set the engine back to a low idle, then extend and contract all the cylinders 4 or 5 times to the stroke ends.

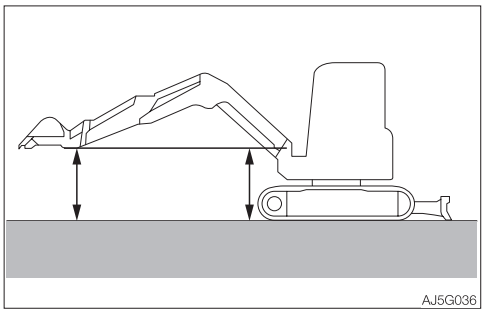
INSPECTING THE ACCUMULATOR (IF EQUIPPED)



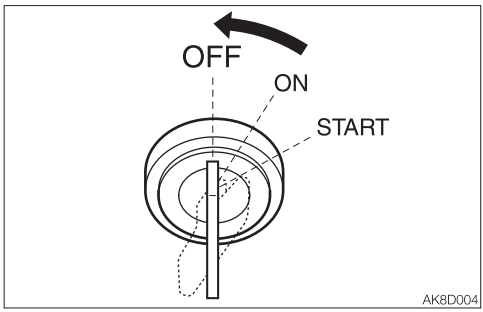
⚠ WARNING

- High-pressure nitrogen gas is enclosed in the accumulator (1). If handled incorrectly, it could explode and cause serious injury. Strictly observe the following precautions:
  - Do not disassemble.
  - Do not allow flame nearby or throw it into a fire.
  - Do not drill, weld or fuse.
  - Do not subject it to physical shock such as hitting, rolling or dropping.
  - Before disposing of the unit, the sealed gas must be drained. Contact a Takeuchi sales or service dealer for help.
- Clear all personnel from the work area.
- Sound the horn to warn people around the machine.

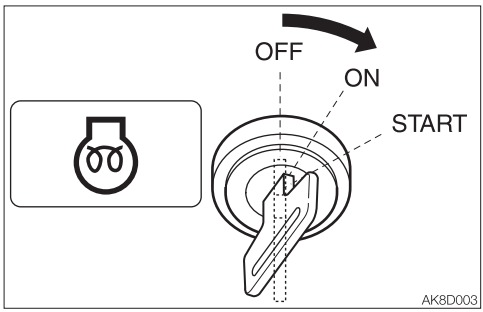
IMPORTANT: If the accumulator (1) fails, the boom cannot be lowered or the residual pressure in the hydraulic circuit cannot be released while the engine is stopped.



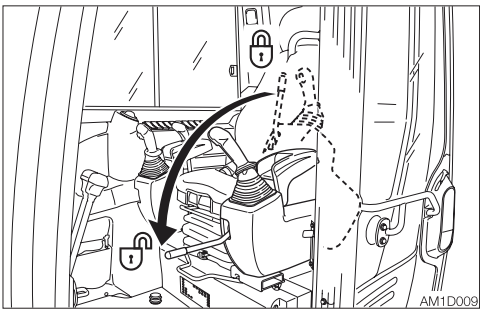
1. Start the engine, then fully retract the arm and bucket cylinders.
2. Operate the boom so that the tip of the arm is positioned at the bottom of the boom.



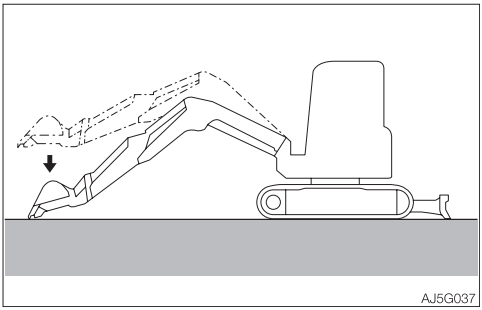
3. Turn the starter key to the OFF position to stop the engine.



4. Turn the key to the ON position. (Do not start the engine.)



5. Fully lower the safety lock lever to disengage the lock.



6. Lower the boom until the bucket contacts the ground.
   The machine is normal if the bucket is lowered to the ground. The accumulator (1) is probably faulty if the boom cannot be lowered or stops halfway. Consult a Takeuchi sales or service dealer for help.

Note: When the boom is lowered to lower the bucket to the ground, do it within 10 minutes of stopping the engine.

EVERY 3000 HOURS

INSPECTING THE FUEL INJECTION PUMP

This operation requires experience. Ask your sales or service dealer for it.

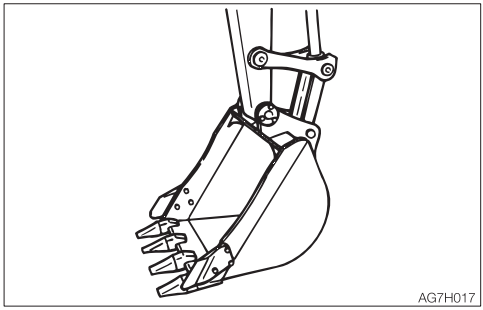
WHEN REQUIRED

REPLACING THE BUCKET

⚠ WARNING

- Before performing maintenance or repairs under the machine, lower all working equipment to the ground or in the lowermost position.
- If maintenance must be performed with the engine running, always work as a two person team communicating each other.
  - One person must sit in the operator's seat so that he/she can immediately stop the engine when necessary. He/she must take care not to touch the lever or pedal unless necessary.
  - The one who performs maintenance must make sure to keep his/her body or clothing away from the moving part of the machine.
- When using a hammer, pins may fly out or metal particles may be scattered. This may lead to serious injury.
  - If hard metal parts such as pins, bucket teeth, side cutter or bearings are hit with a hammer, wear protective gear such as safety goggles and gloves.
  - When hitting pins or bucket teeth, always check that there is no one in the surrounding area.
- When aligning the pin holes, always do so by checking them visually. Do not insert your finger in the pin hole, or you could lose your finger.

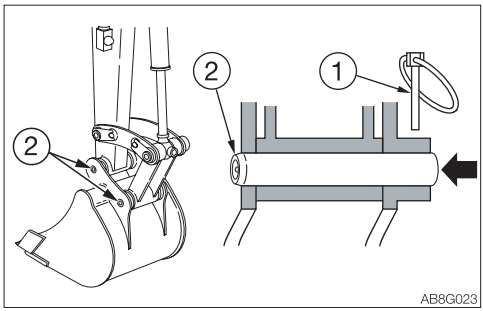
Removing



1. Lower the bucket to the ground as shown on the figure above in a stable position.

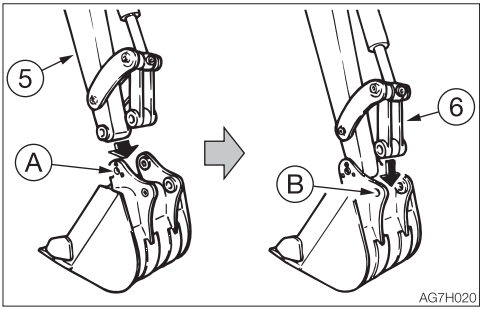
Note: When removing pins, set the bucket so that it is barely touching the ground. If the bucket is firmly touching the ground, the resistance will be great and it will be difficult to remove the pin.

2. Set the safety lock lever to the locked position and stop the engine.

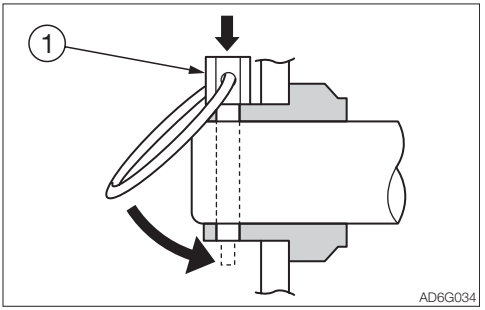


3. Disengage the ring of the lock pin (1) and remove the lock pin (1).
4. Hammer the pin (2) out of the bucket.
5. Remove the bucket.

Installation



1. Align the pin hole (A) on the bucket with the pin hole on the arm (5), and install the pin (2).
2. Operate the cylinder, align the pin hole (B) on the bucket with the pin hole on the link arm (6), and install the pin (2).



3. Align the turn prevention holes, install the lock pin (1), and then engage the ring inside.

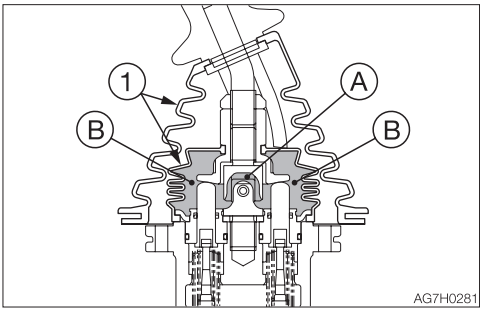
LUBRICATING THE LEVERS

⚠ WARNING

Set the machine to the parking posture, stop the engine, remove the starter key and store it. Failure to do so may result in the machine moving abruptly, leading to serious injury or death.

If the levers or pedals no longer move smoothly, grease them.

Operating levers



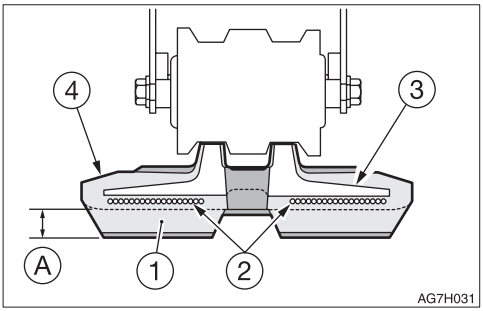
1. Remove the lower mount section of the boot (1) and turn it upward.
2. Wipe off the old grease.
3. Apply grease to points (A) and (B).
4. Set the boot (1) back as it was.

INSPECTING THE RUBBER CRAWLERS

Repair or replace the rubber crawlers if their condition becomes as described below. Consult your sales or service dealer for repair or replacement.

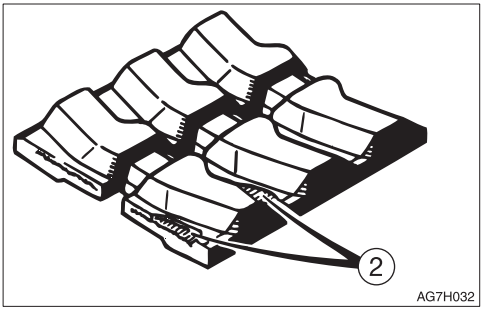
Rubber crawler
Replace the crawler if the entire crawler is stretched and cannot be adjusted.

(1) Lug



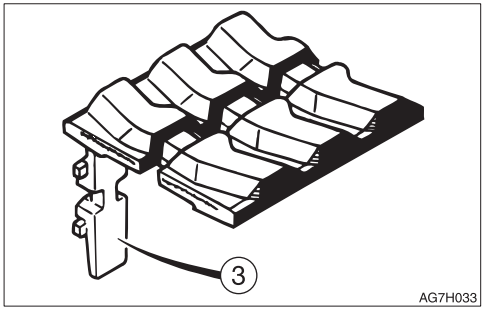
Replace if the height of (A) is 5 mm (0.2 in.) or below.

(2) Steel cord



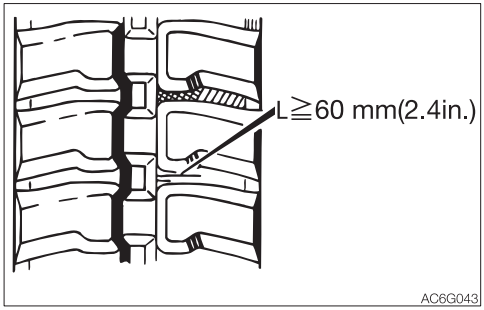
Replace if the steel cord is exposed for two links or more.
Replace if the half or more of the steel cords on one side are cut.

(3) Metal core



Replace if even one metal core is off.

(4) Rubber



Repair if there are cracks of 60 mm (2.4 in.) or greater in length.
If the steel cord is visible, repair as soon as possible, regardless of the length of the crack.

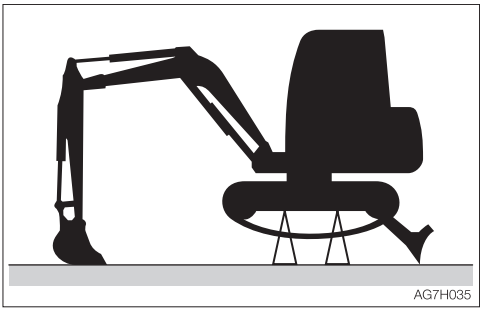
REPLACING THE RUBBER CRAWLERS

⚠ WARNING

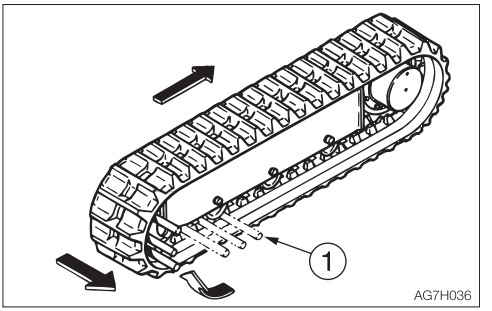
- **If you must work beneath the raised machine or working equipment, always use wood blocks, jack-stands or other rigid and stable supports. Never get under the machine or working equipment if they are not sufficiently supported.**
- **If maintenance must be performed with the engine running, always work as a two person team communicating each other.**
  - **One person must sit in the operator's seat so that he/she can immediately stop the engine when necessary. He/she must take care not to touch the lever or pedal unless necessary.**
  - **The one who performs maintenance must make sure to keep his/her body or clothing away from the moving part of the machine.**

Removal

1. Fully release the tension of the rubber crawler.
   Refer to "Inspecting and adjusting the crawler tension" on page 5-28.



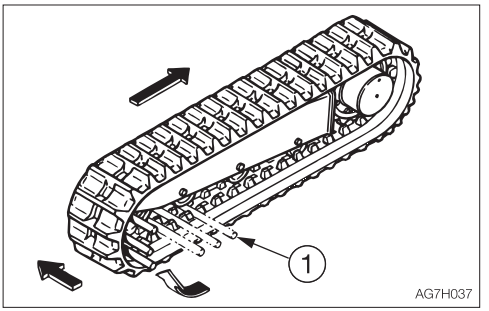
2. Use the working equipment to lift the body.



3. Set an iron pipe (1) in the rubber crawler and turn the sprocket slowly in the reverse direction.
4. Turn until the iron pipe (1) is directly next to the idler and the rubber crawler lifts away from the idler, then stop turning the sprocket.
5. Slide the rubber crawler sideways and remove it from the crawler frame.
   Remove the other rubber crawler using the same procedure.

Installation

1. Use the working equipment to lift the body.



2. Set the rubber crawler on the sprocket.
3. Set an iron pipe (1) in the rubber crawler and turn the sprocket slowly in the reverse direction.
4. Turn until the iron pipe (1) is directly next to the idler and the rubber crawler lifts away from the idler, then stop turning the sprocket.
5. Slide the rubber crawler inward, engage it on the idler, then pull out the iron pipe.
6. Check that the rubber crawler is securely engaged on the sprocket and idler.
7. Tighten the rubber crawler to the standard tension.
   Refer to “Inspecting and adjusting the crawler tension” on page 5-28.
8. Install the other rubber crawler using the same procedure.

MAINTENANCE DURING EXTENDED STORAGE PERIOD

Storage procedures

If the machine is to be stored for 30 days or more, store it indoors. If it must be stored outdoors, park the machine on a surface laid with lumber on a flat ground, and place a waterproof cover over it so that it stays dry.

1. Clean the machine.
2. Inspect for oil leakage, water leakage, cracks and loose nuts and bolts.
3. Add fuel and replace the hydraulic oil and oil.
4. To prevent rusting and freezing, replace the engine coolant with long-life coolant (LLC).
   Refer to “Cleaning the engine cooling system” on page 5-40.
5. Use the grease gun to lubricate the grease fittings.
6. Fully retract the bucket and arm cylinders and lower the bucket and dozer blade to the ground.
7. Apply rust-inhibiting oil to the hydraulic cylinder rods.
8. Disconnect the negative cable from the battery and cover the battery to prevent freezing.

During storage

⚠ WARNING

- **Do not operate the machine in an enclosed area without adequate ventilation.**
- **If natural ventilation is not possible, install ventilators, fans, exhaust extension pipes or other venting devices.**

1. To prevent rusting, operate the machine once a month so that the oil can be circulated throughout the system.
2. Inspect the battery and recharge it as necessary.
   Ask your sales or service dealer for recharging.

Starting the machine after storage

IMPORTANT: If the above “Storage procedures” have not been followed during the extended storage periods, consult your sales or service dealer before starting the machine again.

1. Wipe off the rust-inhibiting oil that was applied on the piston rods of the hydraulic oil cylinders.
2. Add oil or grease as necessary.

Returning the engine to service

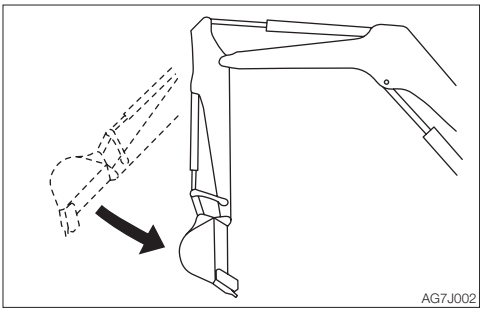
1. Perform the daily checks.
2. The engine should be pre-oiled before startup.
   a. Crank the engine, leaving the fuel system shut off so the engine will not start, for 15 seconds.
   b. Then pause for 30 seconds.
   c. Repeat the procedure until you have cranked the engine for a total of one minute. This will circulate the oil in the engine’s lubrication system.
3. Prime the fuel system.
4. Start the engine. Allow the engine to idle for approximately 15 minutes while you check for:
   - Proper oil pressure
   - Fuel, engine oil or coolant leaks
   - Proper operation of the indicators and/or gauges
5. Avoid prolonged operation at minimum or maximum engine speeds and loads for the remainder of the first hour of operation.

TROUBLESHOOTING

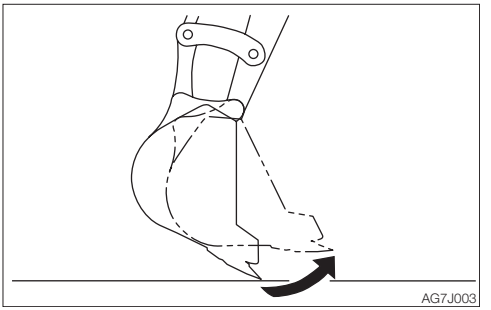


SYMPTOMS THAT ARE NOT MALFUNCTIONS

The symptoms listed below are not malfunctions.



- The arm retracting speed momentarily slows down when it reaches an almost vertical position while the engine is running at low speed.



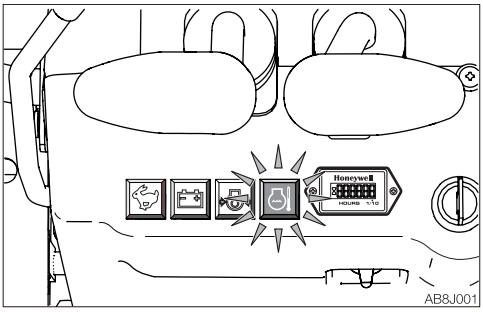
- The bucket teeth moving speed momentarily slows down when it reaches an almost horizontal position while the engine is running at low speed.
- The slew motor produces noise at the beginning and end of the slewing.
- The travel motor produces noise when stopped suddenly from its high speed traveling.
- The control valve produces noise if excessive force is applied to the working equipment or when it moved to the stroke end.
- It becomes less easy to operate the machine when an attachment weighing more than a standard arm or bucket is installed.

IF THE ENGINE OVERHEATS

⚠ WARNING

- **Do not open the engine hood and covers when steam is coming from it. The steam or hot water may spurt out and cause burns.**
- **Do not try to remove the radiator cap or the drain plug when the cooling water is hot. Stop the engine, wait until the engine and the radiator cool, and then slowly loosen the radiator cap to release the internal pressure.**
- **Before performing maintenance, stop the engine and allow the machine to cool down.**

The symptoms listed below indicate overheating.



- The coolant temperature warning lamp lights up.
- Steam comes from the engine room.

Remedy procedure

1. Park the machine in a safe place.
2. Check if steam is coming out of the closed engine hood and covers.
3. If there is steam, stop the engine immediately and contact your sales or service dealer for repair. If steam, is not coming out run the engine at low idle and let the water temperature cool down.
4. Stop the engine when the coolant temperature warning lamp goes out.
5. Perform the inspections and the remedies listed below once the engine cools down.
   - Fan belt slack..... Adjust
     Refer to page 5-26.
   - Coolant level ..... Add
     Refer to page 5-18.
   - Water leakage..... Repair
   - Radiator fins..... Clean
     Refer to page 5-38.
   - Sediment in cooling system
     ..... Clean
     Refer to page 5-40.

If the problem persists after the above remedies, contact your sales or service dealer for repair.

IF THE BATTERY GOES DEAD

The symptoms below indicate that the battery is dead.
- The starter motor does not turn or fails to start the engine.
- The horn is too weak.

Remedy procedure

Start the engine using the booster battery on the other vehicle (booster vehicle) and the jumper cables.

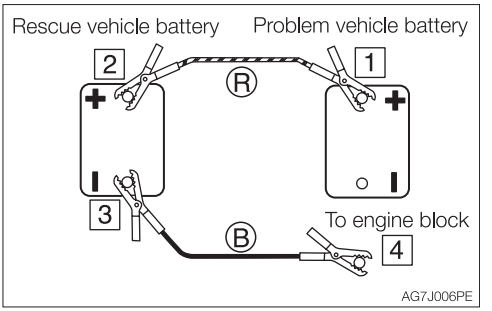
⚠ WARNING

- **When starting the engine using the jumper cables, be sure to connect the cables by following the proper steps. Improper use of jumper cables can result in battery explosion or unexpected machine motion.**
  - **Do not allow the booster vehicle and the machine with a dead battery (dead machine) to touch each other.**
  - **Do not allow the positive (+) and the negative (–) clips of the jumper cables to touch each other.**
  - **When connecting, attach the jumper cable to the positive (+) terminals first. When disconnecting, remove the cable from the negative (–) terminal (ground) first.**
  - **Connect the last clip of the jumper cable to a point as far away from the battery as possible.**
- **Always wear the protective goggle when jump starting the engine by using the jumper cables.**

IMPORTANT: Use the jumper cables and clips of a size suited to the capacity of battery. Do not use damaged or corroded jumper cables and clips.
IMPORTANT: Be sure that the battery of the booster vehicle has the same capacity as the battery of the dead machine.
IMPORTANT: Be sure to connect the clips securely.

Connecting the jumper cables

IMPORTANT: Set the starter keys of the booster vehicle and the dead machine to the OFF position.



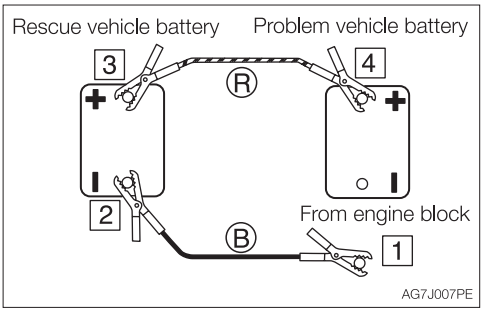
1. Connect the clip of jumper cable (R) to the positive (+) battery terminal of the dead machine.
2. Connect the other clip of jumper cable (R) to the positive (+) battery terminal of the booster vehicle.
3. Connect the clip of jumper cable (B) to the negative (–) battery terminal of the booster vehicle.
4. Connect the other clip of jumper cable (B) to the engine block of the dead machine. Connect the clip to a place as far from the battery as possible.

Starting the engine

1. Check that the clips are securely connected to the terminals.
2. Start the engine of the booster vehicle and run it at high speed.
3. Start the engine of the dead machine.

Disconnecting the jumper cables

Once the dead machine is successfully running, remove the jumper cables by following the same steps as for connection in the reverse order.



1. Disconnect the clip of jumper cable (B) from the engine block of the dead machine.
2. Disconnect the other clip of jumper cable (B) from the negative (–) battery terminal of the booster vehicle.
3. Disconnect the clip of jumper cable (R) from the positive (+) battery terminal of the booster vehicle.
4. Disconnect the clip of jumper cable (R) from the positive (+) battery terminal of the dead machine.

Recharging

Ask your sales or service dealer for recharging the dead battery.

IF A FUSE BLOWS

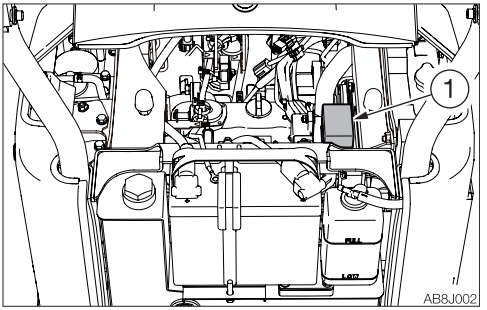
If a light does not come on or the electrical system does not work, a fuse may be blown. Inspect the fuses.

INSPECTING AND REPLACING THE FUSE

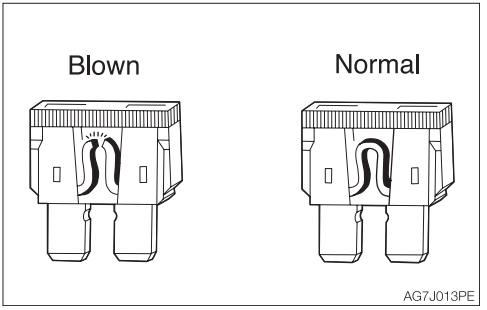
⚠ WARNING

If the fuse blows again soon after replacement, then the electric system is likely faulty. It may pose a fire hazard if not properly repaired. Contact your sales or service dealer for advice.

1. Turn the starter key to the OFF position to stop the engine.
2. Open the engine hood.



3. Open the fuse box cover (1).
4. Check for any blown fuses.

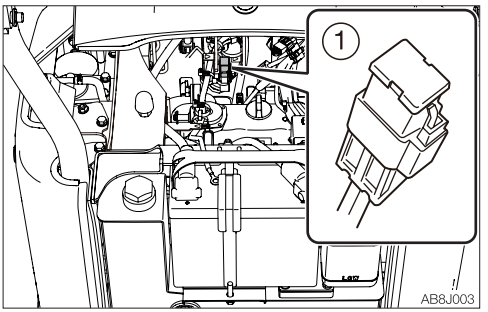


5. If a fuse is blown, replace it with a spare fuse of the same capacity.

Fuse layout and circuits protected

Capacity	Symbol	Protected circuit
10A		Horn
30A		Engine stop solenoid
20A		Boom light
10A		Hour meter
15A		Lever lock
3A		Feed pump

INSPECTING THE SLOW BLOW FUSE



If the machine is not turned on after turning the starter switch to the ON position, the cartridge type slow blow fuse (1) is likely blown. Open the engine hood and inspect. If the slow blow fuse is blown, please contact your sales or service dealer.

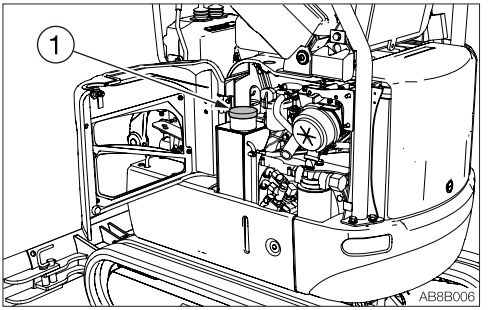
Note: Slow blow fuses are large type fuses used in high current applications. Like a regular fuse, they act as fuses by protecting the electric components and wirings from damage caused by excessive current draw.

RESTARTING AFTER ADDING FUEL

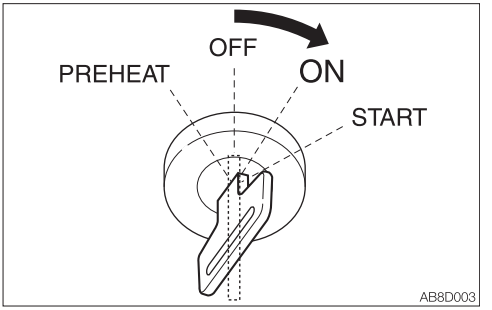
BLEEDING AIR FROM THE FUEL SYSTEM

IMPORTANT: 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 gear and/or ring gear.
IMPORTANT: If the engine stalls due to fuel shortage, add fuel, turn the key to the ON position for 60 seconds, and then turn it to the START position. Running the starter for a long time before there is enough fuel is going through can cause the starter to fail.

For machines without a pre-fuel filter

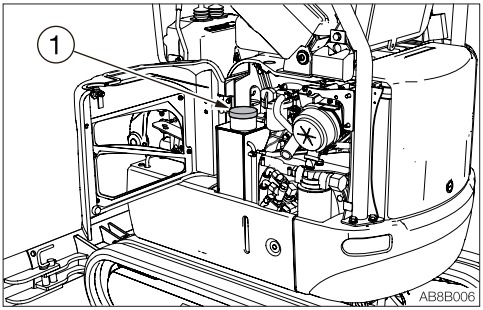


1. Add fuel.

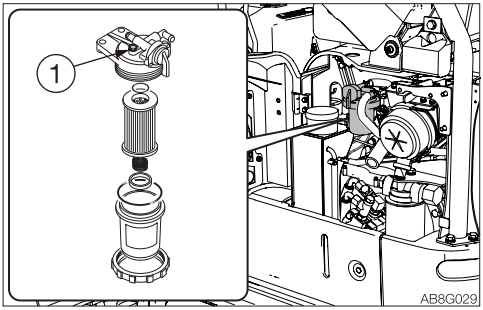


2. Turn the starter key to the ON position and hold it for about 60 seconds.

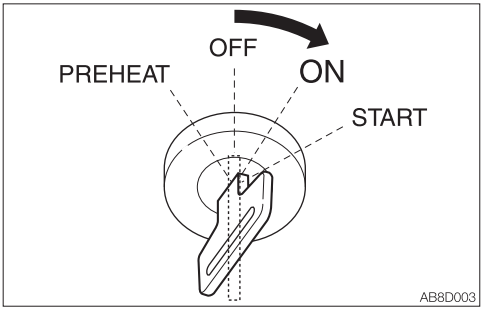
For machines with a pre-fuel filter



1. Add fuel.



2. Loosen the air-bleeding bolt (1).

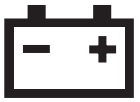


3. Turn the starter key to the ON position and hold it for about 60 seconds.
   The automatic air bleeder bleeds air from the fuel system.

Note: Air in the fuel system causes the engine to fail to start or to have other problems. Always bleed air when the fuel tank is emptied or when there is air in the fuel system.

IF A WARNING LAMP LIGHTS UP

If a warning lamp lights up during operation, park the machine in a safe place and perform the procedures described below.

Warning lamp	Lamp name	Causes and remedies
 AG7J019	**Battery charge warning lamp**	There is a problem with the fan belt or charger. Inspect the fan belt for slack or breakage and adjust as necessary. If the lamp lights up even after maintenance, there is likely a problem with the charger. Consult your sales or service dealer for help. Refer to “Inspecting and adjusting the fan belt” on page 5-26.
 AG7J017	**Engine oil pressure warning lamp**	There is a problem in the engine lubrication system. Check the engine oil level. If the lamp lights up when the level is normal or even after replenishment of oil, consult your sales or service dealer for help. Refer to “Inspecting and replenishing the engine oil” on page 5-19.
 AG7J018	**Coolant temperature warning lamp**	The coolant temperature is too high and the engine is overheating. Refer to “If the engine overheats” on page 6-3.

OTHER SYMPTOMS

For symptoms not included in the table below or if the problem persists after the proper remedies have been taken, consult your sales or service dealer.

Symptoms	Major causes	Remedies
Left and right operating levers do not move smoothly	• Insufficient grease on the left and right operating levers	• Grease the levers. Refer to page 5-50.
Throttle lever does not move smoothly	• Wire is stretched too lose	• Adjust or replace (ask your sales or service dealer).
Hoe attachment, slewing or traveling operation not possible	• Safety lock lever is raised (locked)	• Lower (release) the safety lock lever. Refer to page 2-14.
	• Fuse is blown	• Replace the fuse. Refer to page 6-6.
	• Adjustment of travel lock is faulty	• Adjust the travel lock (ask your sales or service dealer).
Digging force is insufficient	• Hydraulic oil level too low	• Add to the specified level. Refer to page 5-21.
	• Hydraulic oil is not warm enough	• Perform the warm-up. Refer to page 3-10.
	• Air cleaner is clogged	• Clean the air cleaner. Refer to page 5-36.
	• Hydraulic oil is not of suitable type	• Replace the hydraulic oil. Refer to page 5-45.
Traveling is not possible or not smooth	• Stones or foreign objects are stuck	• Remove the foreign object.
Machine veers to the right/left	• Stones or foreign objects are stuck	• Remove the foreign object.
	• Faulty crawler tension adjustment	• Adjust the crawler to the prescribed tension. Refer to page 5-28.
Travel speed cannot be changed	• Fuse is blown	• Replace the fuse. Refer to page 6-6.

Symptoms	Major causes	Remedies
Slewing is not possible or not smooth	• Slew lock lever lock is not released	• Release the slew lock lever
	• Insufficient grease on slew bearing	• Grease the bearing. Refer to page 5-30.
Hydraulic oil temperature is too high	• Hydraulic oil level too low	• Add up to the specified level. Refer to page 5-21.
Starter motor turns but engine does not start	• Insufficient fuel	• Add fuel. Refer to page 5-20.
	• Air in fuel system	• Bleed air. Refer to page 6-8.
	• Water in fuel system	• Drain water. Refer to page 5-31.
	• Fuel is frozen.	• Warm the fuel pipe with hot water or wait until the ambient temperature becomes high.
	• Engine control system is faulty.	• Adjust or repair (ask your sales or service dealer).
	• Fuel line is faulty.	• Adjust or repair (ask your sales or service dealer).
	• Preheating device is faulty.	• Adjust or repair (ask your sales or service dealer).
Crawlers come off	• Crawlers too loose	• Increase the tension. Refer to page 5-28.

Symptoms	Major causes	Remedies
Engine exhaust is white or bluish	• Excessive engine oil	• Adjust to the specified level. Refer to page 5-19.
	• Insufficient engine warm-up.	• Perform the warm-up operation. Refer to page 3-5.
	• Engine control system is faulty.	• Adjust or repair (ask your sales or service dealer).
	• Fuel line is faulty.	• Adjust or repair (ask your sales or service dealer).
	• Prolonged idling (approx. two hours or more)	• Increase the engine RPM and check for smoke.
	• Poor fuel	• Replace the fuel.
Engine exhaust is occasionally black	• Air cleaner is clogged	• Clean the air cleaner. Refer to page 5-36.
	• Engine control system is faulty.	• Adjust or repair (ask your sales or service dealer).
	• Fuel line is faulty.	• Adjust or repair (ask your sales or service dealer).
	• Clogging in the exhaust line.	• Adjust or repair (ask your sales or service dealer).
Irregular noise is produced from the engine (combustion or mechanical noise)	• Low quality fuel is being used	• Replace the fuel.
	• Engine is overheating	• Refer to “If the engine overheats” on page 6-3.
	• Damage inside the muffler	• Replace the muffler. For replacement, ask your sales or service dealer.

LOWERING THE BOOM TO THE GROUND

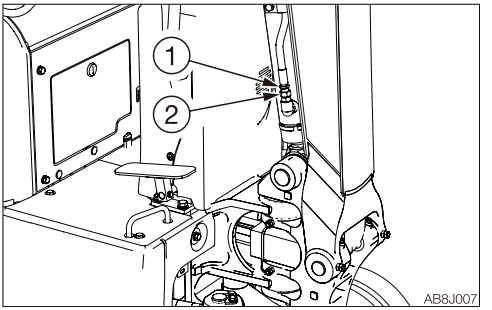
If the hoe attachment must be lowered to the ground while the engine is stopped, use the following procedure.

Procedure 1
(machines with an accumulator)
Perform this operation within 10 minutes after the engine stopping.
1. Sit at the operator's seat.
2. Turn the starter switch to the ON position.
3. Lower the safety lock lever to the unlock position
4. Slowly push the operating lever forward to lower the boom.

Procedure 2
(machines without an accumulator)
This operation is dangerous and requires experience. Ask your sales or service dealer for it.

⚠ WARNING

- **Stop the engine and allow the machine to cool down before performing maintenance.**
  - **The engine and the hydraulic system and many other parts of the machine are hot immediately after the engine is stopped. Touching these parts will cause burns.**
  - **The hydraulic oil is also hot and under high pressure immediately after the engine is stopped.**
    Be careful when loosening the caps or plugs. Working on the machine under these conditions could result in burns or injuries due to the hot oil spurting out.
- **Keep away from the working area when the hoe attachment is lowered. You may be hit by dirt falling out of the bucket or the hoe attachment as it drops.**
- **Slowly turn the hose nut and lower the boom at a slow pace.**
- **Do not loosen or remove the hoses not located in the specified places. Oil may spurt out if wrongly handled.**



1. Place a pan under the hose to catch the waste oil.
2. Hold the hose fitting (1) with a wrench and slowly loosen the hose nut (2) with another wrench.
3. The oil in the boom cylinder is drained and the hoe attachment is lowered.
4. After the hoe attachment is lowered to the ground, check the safety and stability of the machine.
5. Hold the hose fitting (1) with a wrench and tighten the hose nut (2) with another wrench.
   - Tightening torque: 24.5 to 29.4 N·m (18.1 to 21.6 ft-lb.)

TOWING

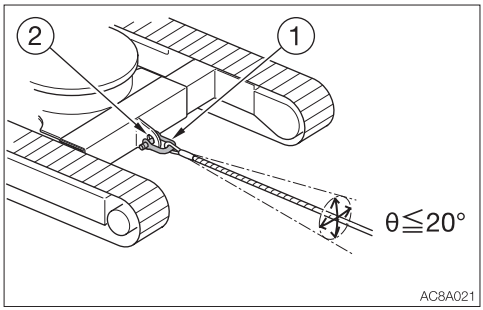
⚠ WARNING

When towing, serious injury or death could result, if performed incorrectly or the wire rope being used is inappropriate or not properly inspected.

- **It becomes dangerous if the wire rope breaks or becomes disengaged. Use a wire rope appropriate for the required tractive force.**
- **Do not use a wire rope that is kinked, twisted or otherwise damaged.**
- **Do not apply heavy loads abruptly to the wire rope.**
- **Wear safety gloves when handling the wire rope.**
- **Make sure there is an operator on the machine being towed as well as on the machine that is towing.**
- **Never tow on slopes.**
- **Do not let anyone come near to the wire rope while towing.**

IMPORTANT: Do not tow a machine if its engine does not start or if the machine does not run. Doing so could damage the machine being towed.
When recovering a machine from soft terrain such as mud, hoist the machine or contact your sales or service dealer.
IMPORTANT: Be sure to follow the steps below closely when using the towing hole to tow. Failure to heed even one of the steps may cause damage to the towing hole or other parts of the frame.

Towing the machine (when the engine is started, the travel motor runs)
Use the procedure described below to tow heavy objects or the machine itself if it should get stuck in the mud and not be able to get out on its own.



- Permissible force: 16.9 KN (3800 lbf)

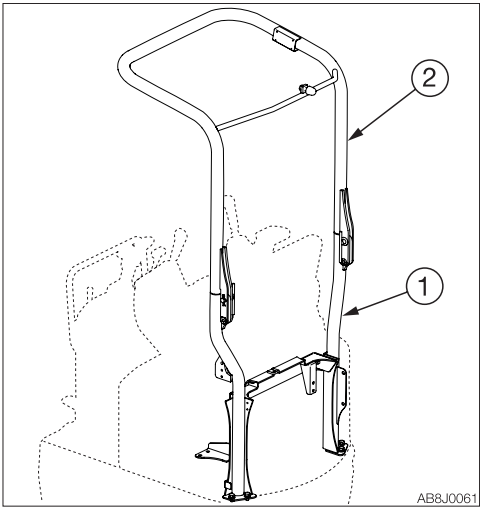
1. Attach the wire rope to the shackle (1).
2. Fasten the shackle (1) to the towing holes (2).
3. Make sure that the wire rope is at a cone angle of 20° or less to the travel frame.
4. Move the machine to tension the wire rope.
5. Move the machine at a low speed of 2 km/h (1.24 mph) or less to a place (convenient location for repair) a short distance from the site.

IF THE CANOPY IS DAMAGED

⚠ WARNING

Immediately replace the damaged canopy.
Serious injury or death could occur if the machine is operated with damaged canopy.
Do not operate the machine until the replacement is complete. Do not try to repair the damaged canopy by welding. Doing so could endanger the safety of the canopy.

Canopy parts No.(1) 03284-00035
Canopy parts No.(2) 03284-00010



SPECIFICATIONS



BASIC SPECIFICATIONS

Type				Canopy
MASS				
Operating mass	kg (lb)	Rubber crawlers		1150 (2535)
PERFORMANCE				
Bucket capacity (Standard bucket)	m^3 (cu. ft.)	Heaped		0.022 (0.76)
		Struck		0.016 (0.57)
Slew speed	min^{-1} (rpm)			10 (10)
Travel speed	km/h (mph)	Rubber crawlers	1st	2.0 (1.24)
			2nd	3.7 (2.30)
Gradeability	(degrees)			15
Ground pressure	kPa (psi)	Rubber crawlers		28.0 (4.06)
ENGINE				
Manufacturer and model				Kubota D722-E4B
Rated output	Net (ISO 14396)	kW/min^{-1} (hp/rpm)		8.8/2200 (11.9/2200)
	Net (ISO 9249 / SAE J1349)	kW/min^{-1} (hp/rpm)		8.6/2200 (11.5/2200)
Displacement		ml (cu.in.)		719 (43.9)
Amount of CO_2 emission*		g/kWh		1019.8
Starter		V-kW		12-1.2
Alternator		V-kW		12-0.48
Battery (IEC 60095-1)		V-A·h		12-45

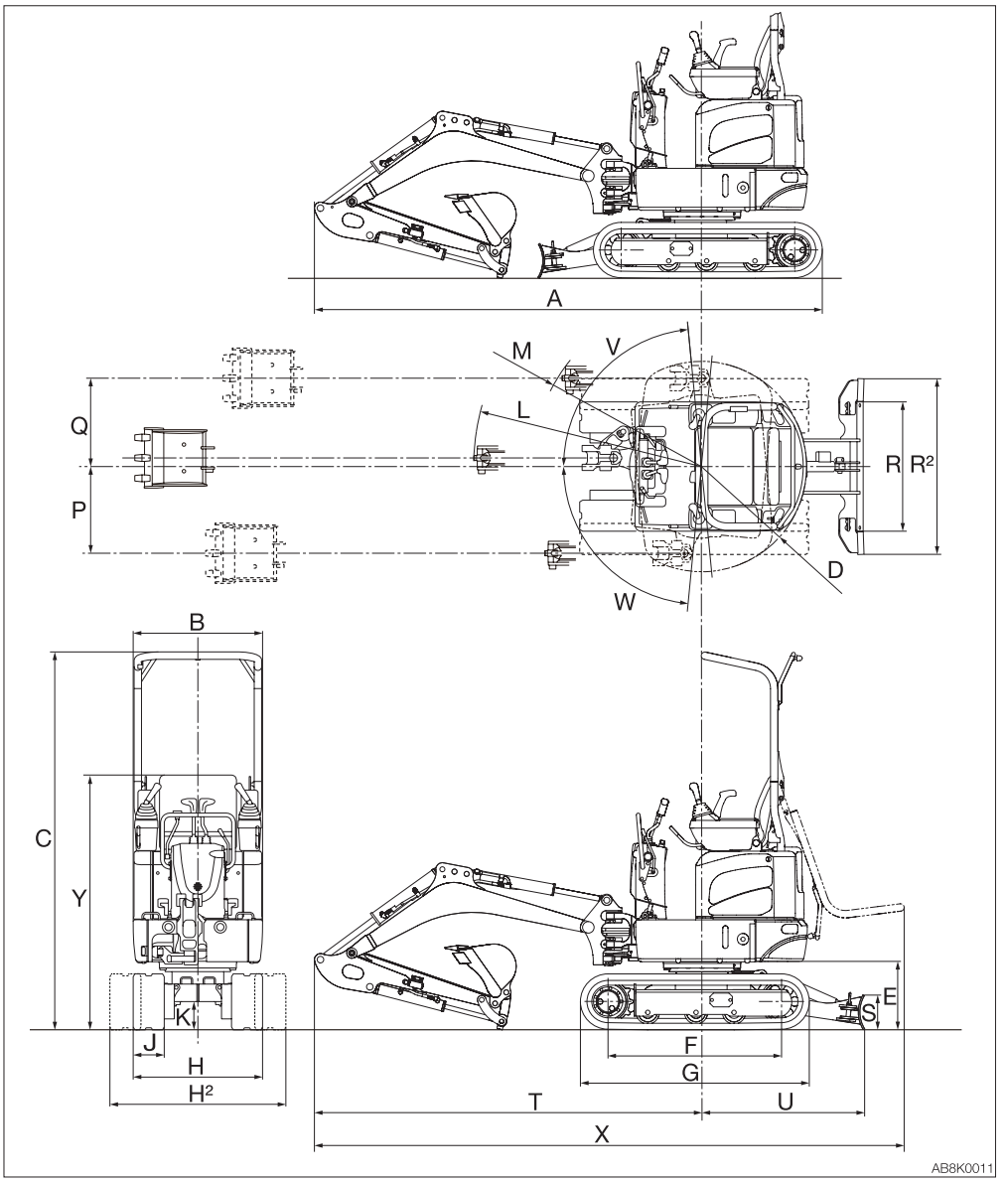
*: The amount of CO_2 emission refers to the value obtained by testing the parent engine representing the engine type (engine family member) being used; it shall not guarantee the performance of the machine.

Unit: dB (A)

NOISE EMISSION		
DECLARED SINGLE-NUMBER NOISE EMISSION VALUES in accordance with ISO 4871.		
Sound power level (2000/14/EC)	Measured mean noise level	90
	Uncertainty	1
	Guaranteed noise level	91
Emission sound pressure level at the operator's position*	Emission sound pressure level**	78
	Uncertainty	2

*: Values determined according to noise test code given in ISO 6396.
**: Declared single-number noise emission values are the sum of measured values and the associated uncertainty.

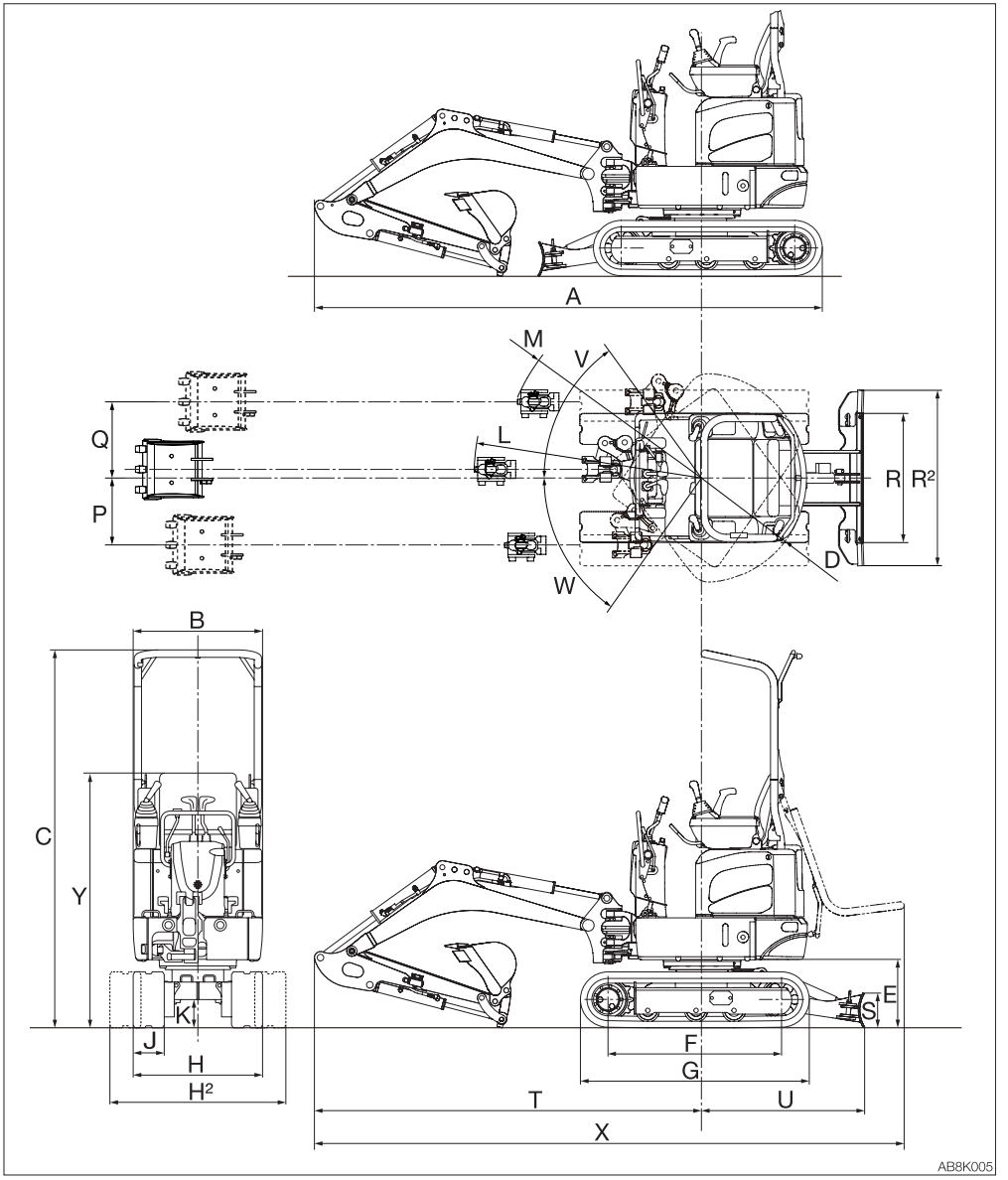
MACHINE DIMENSIONS



Unit: mm (inch)

	Item	Rubber crawlers
A	Overall length	2955 (116.3)
B	Upperstructure overall width	750 (29.5)
C	Overall height	2190 (86.2)
D	Slew radius	610 (24.0)
E	Clearance height under upperstructure	395 (15.6)
F	Crawler base	1005 (39.6)
G	Crawler overall length	1325 (52.2)
H	Crawler overall width (narrow)	750 (29.5)
H[2]	Crawler overall width (wide)	1020 (40.2)
J	Crawler shoe width	180 (7.1)
K	Ground clearance of undercarriage	165 (6.5)
L	Minimum radius of equipment and attachment	1320 (52.0)
M	Minimum radius of equipment at maximum front offset	980 (38.6)
P	Offset distance of bucket (Right swing)	505 (19.9)
Q	Offset distance of bucket (Left swing)	510 (20.1)
R	Dozer blade width (narrow)	750 (29.5)
R[2]	Dozer blade width (wide)	1020 (40.2)
S	Dozer blade height	200 (7.9)
T	Front distance to axis of rotation	2245 (88.5)
U	Dozer blade distance to axis of rotation	930 (36.6)
V	Boom swing angle (Right)	85°
W	Boom swing angle (Left)	85°
X	Overall length (canopy is folded)	3415 (134.4)
Y	Overall height (canopy is folded)	1475 (58.1)

Limited boom swing angle type

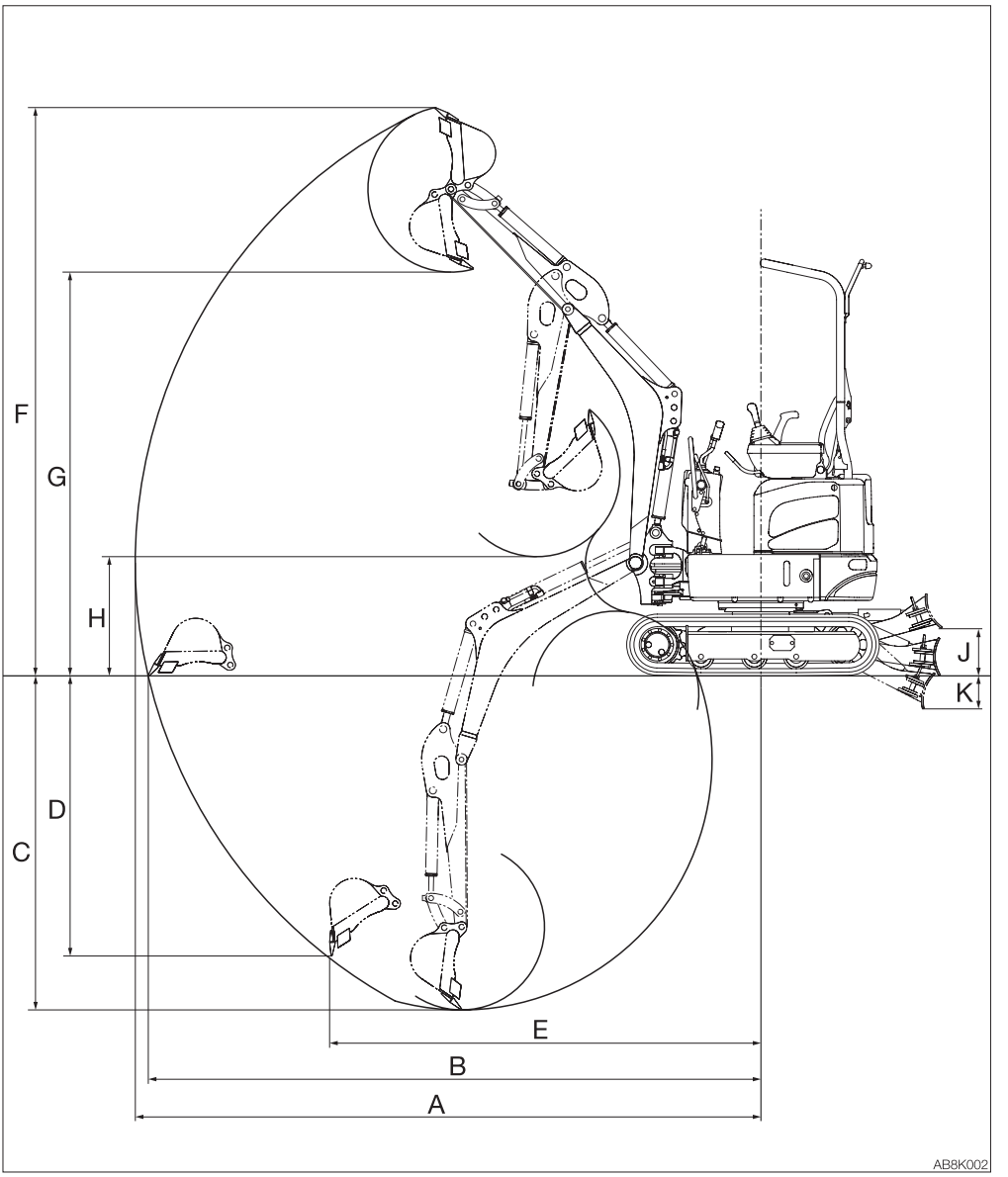


Limited boom swing angle type

Unit: mm (inch)

	Item	Rubber crawlers
A	Overall length	2955 (116.3)
B	Upperstructure overall width	750 (29.5)
C	Overall height	2190 (86.2)
D	Slew radius	610 (24.0)
E	Clearance height under upperstructure	395 (15.6)
F	Crawler base	1005 (39.6)
G	Crawler overall length	1325 (52.2)
H	Crawler overall width (narrow)	750 (29.5)
H[2]	Crawler overall width (wide)	1020 (40.2)
J	Crawler shoe width	180 (7.1)
K	Ground clearance of undercarriage	165 (6.5)
L	Minimum radius of equipment and attachment	1320 (52.0)
M	Minimum radius of equipment at maximum front offset	1165 (45.9)
P	Offset distance of bucket (Right swing)	390 (15.3)
Q	Offset distance of bucket (Left swing)	440 (17.4)
R	Dozer blade width (narrow)	750 (29.5)
R[2]	Dozer blade width (wide)	1020 (40.2)
S	Dozer blade height	200 (7.9)
T	Front distance to axis of rotation	2245 (88.5)
U	Dozer blade distance to axis of rotation	930 (36.6)
V	Boom swing angle (Right)	55°
W	Boom swing angle (Left)	55°
X	Overall length (canopy is folded)	3415 (134.4)
Y	Overall height (canopy is folded)	1475 (58.1)

OPERATING RANGES



Unit: mm (inch)

	Item	Rubber crawlers
A	Maximum reach	3285 (129.3)
B	Maximum reach at ground reference plane	3220 (126.8)
C	Maximum digging depth	1755 (69.1)
D	Maximum vertical digging depth	1475 (58.1)
E	Reach at maximum vertical digging depth	2265 (89.2)
F	Maximum height of cutting edge	2985 (117.5)
G	Maximum dumping height	2120 (83.5)
H	Minimum dumping height	625 (24.6)
J	Dozer blade maximum lifting	250 (9.8)
K	Dozer blade maximum lowering	175 (6.9)

MEMO

LIFTING CAPACITIES

Rated lift capacity chart

- The loads in the charts do not exceed 87% of hydraulic lift capacity or 75% of tipping load.
- Figures marked with an asterisk (※) are hydraulically-limited capacities.
- The mass of slings and any other lifting devices shall be deducted from the rated load to determine the net load that may be lifted.
- The load point is the bucket hinge pin, and the bucket posture is with the standard bucket completely retracted under the arm.
- Unit: kg (lbs)

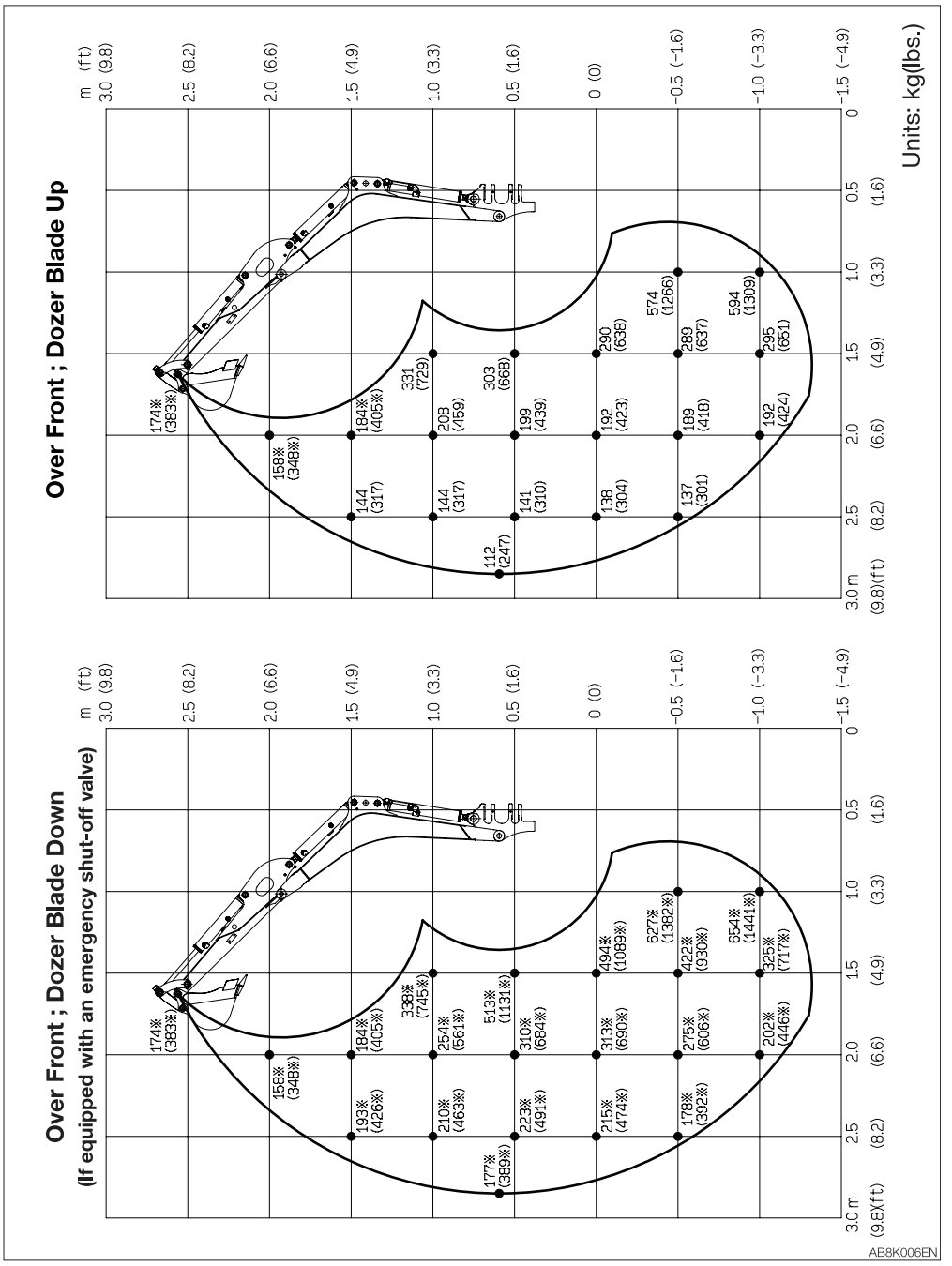
Load hooking system

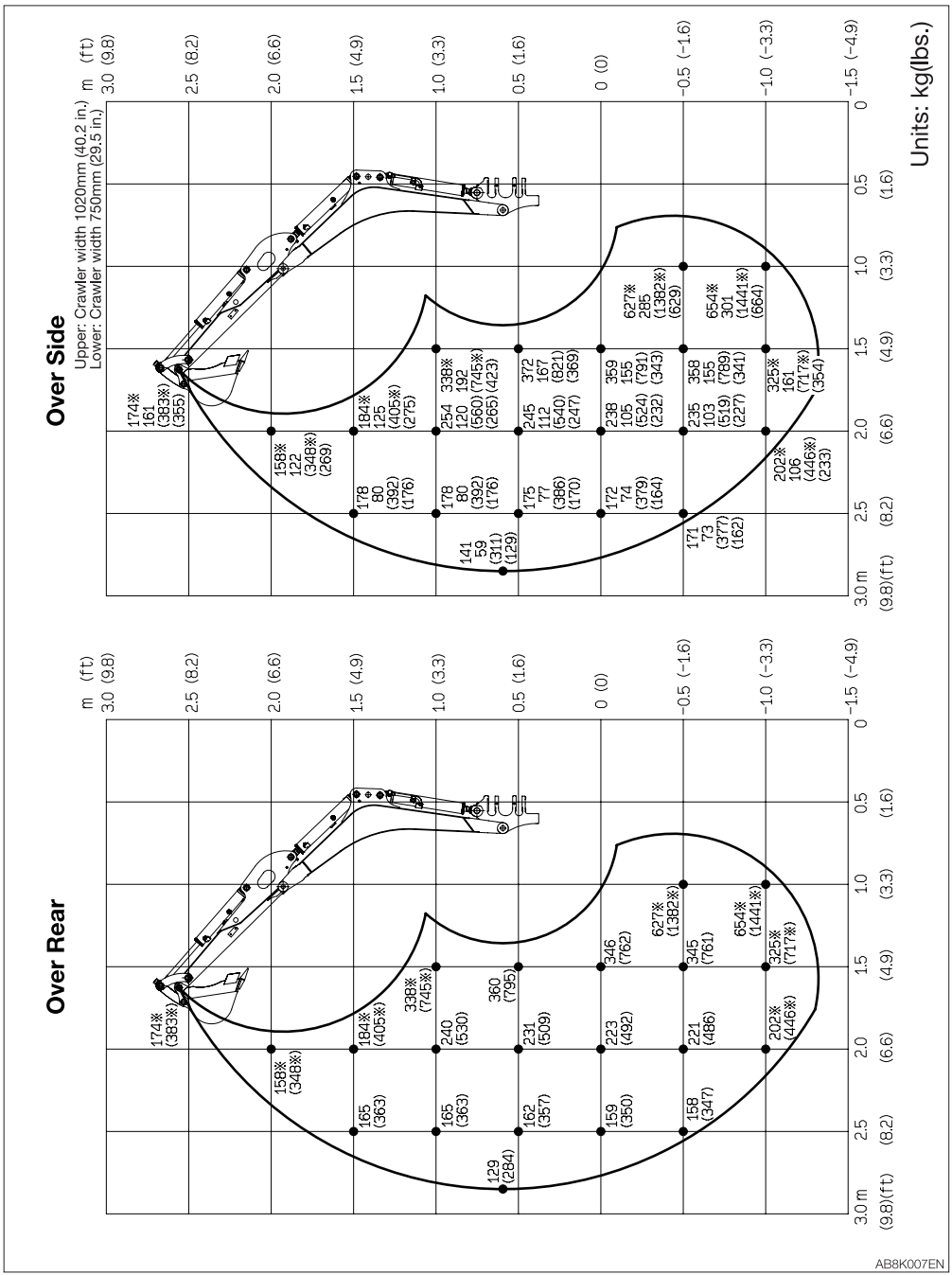
A load hooking system must be provided with the following capabilities.

1. A system which can withstand two-and-a-half times the rated lift capacity no matter at what position the load is applied.
2. A system that poses no risk of the lifted load falling from the hooking device. For example, equipped with a hook slippage prevention device.
3. A system that poses no risk of the hooking system slipping from the hoe attachment.

⚠ WARNING

- **Do not attempt to lift or hold any load that is greater than these rated values at their specified load radii and height.**
- **The rated lift capacities are based on the machine being level and situated on a firm supporting surface. For safe lifting, the operator is expected to make due allowance for the particular job conditions such as soft or uneven ground, non-level condition, side loads, hazardous conditions, experience of personnel, etc. The operator and other personnel should fully acquaint themselves with the operator's manual furnished by the manufacturer before operating this machine. When operating the machine, the safety rules of the equipment must also be followed.**
- **Do not travel while lifting a load; It is very dangerous.**


Over Front ; Dozer Blade Down
(If equipped with an emergency shut-off valve)
Over Front ; Dozer Blade Up
Units: kg(lbs.)
m (ft)
3.0 (9.8)
2.5 (8.2)
2.0 (6.6)
1.5 (4.9)
1.0 (3.3)
0.5 (1.6)
0 (0)
-0.5 (-1.6)
-1.0 (-3.3)
-1.5 (-4.9)
3.0 m (9.8)ft
2.5 (8.2)
2.0 (6.6)
1.5 (4.9)
1.0 (3.3)
0.5 (1.6)
0 (0)
AB8K006EN


Over Side
Upper: Crawler width 1020mm (40.2 in.)
Lower: Crawler width 750mm (29.5 in.)
Over Rear
m (ft)
3.0 (9.8)
2.5 (8.2)
2.0 (6.6)
1.5 (4.9)
1.0 (3.3)
0.5 (1.6)
0 (0)
−0.5 (−1.6)
−1.0 (−3.3)
−1.5 (−4.9)
3.0 m (9.8)(ft)
2.5 (8.2)
2.0 (6.6)
1.5 (4.9)
1.0 (3.3)
0.5 (1.6)
0 (0)
−0.5 (−1.6)
−1.0 (−3.3)
−1.5 (−4.9)
Units: kg(lbs.)
AB8K007EN

OPTIONS

GENERAL PRECAUTIONS

SAFETY PRECAUTIONS

⚠ WARNING

When removing or installing an attachment or optional part, take the following precautions.

- Consult with Takeuchi before installing an optional attachment.
- Do not use any attachments not approved by Takeuchi. Doing so may cause safety problems. Or, it may adversely affect the machine's operation or service life.
- We will not be held responsible for any injuries, accidents or damage to its products caused by the use by a non-approved attachment.
- Select a firm, level work area. Also, be sure to park in a well ventilated place.
- Clear obstacles and dangerous objects, and clean up spilled fuel immediately.
- When hoisting, be sure to designate a person to act as a signalman. Follow the instructions of the signalman regarding the procedure and measures.
- When it is necessary to temporally place a heavy object or an attachment on the ground during removal or installation, be sure to place it in a stable position.
- Keep everyone out of the area when hoisting. There is a hazard of objects falling or contacting with people in the area.
- Use a crane to move heavy objects (25 kg (55 lb.) or greater).
- Before removing a heavy object, be sure to put a support to it. When lifting with a crane, pay attention to the center of gravity of the load to keep the machine in balance.
- Do not operate the machine while the load is lifted by a crane stand.
- Use the proper procedure when mounting a boom or arm; otherwise serious damage could result. Consult your sales or service dealer for help.

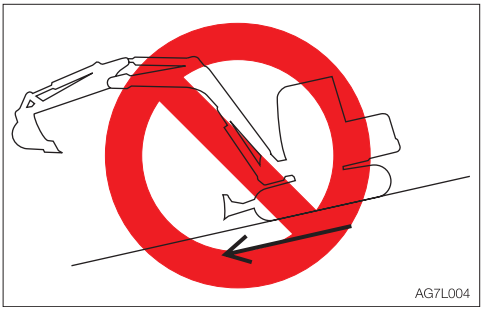
CAUTIONS WHEN INSTALLING ATTACHMENTS

Be sure to perform a test operation after an optional or other special attachment has been replaced. Inspect the hydraulic oil level and recharge it as necessary. Consult your sales or service dealer for detailed procedures on installing/removing attachments.

CAUTIONS WHEN OPERATING ATTACHMENTS

⚠ WARNING

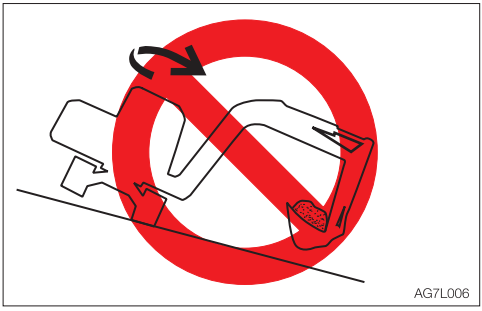
Long attachments reduce stability of the machine. The machine may tip over if it loses the balance when traveling or slewing on slopes.
Never perform the operations listed below as they are extremely dangerous.



- Traveling down the slopes with the attachment raised



- Traveling across slopes



- Slewing on slopes
- If there is a heavy attachment is installed, the machine takes longer distance than usual to come to a complete stop when the stopping operation is performed. Carefully judge the distance so as not to bump into an object around the machine. Keep a safe distance from surrounding obstacles. When a heavy attachment is installed, natural drop (the gradual dropping of the attachment under its own weight when it is stopped in midair) increases.
- The machine can tip over more easily in the lateral direction than in the longitudinal direction.
  - Do not slew sideways with a heavy load at the how attachment. In particular, do not slew sideways on slopes.
  - The attachment is heavier for machines equipped with breakers or crushers than for machines equipped with the standard bucket. Do not operate such machines sideways, especially digging downhill.

ATTACHMENT COMBINATION TABLE

The table below shows the bucket to be installed on the arm. Select a proper bucket by following the table.

⚠ WARNING

- **Consult with Takeuchi before installing an optional attachment.**
- **Do not use any attachments not approved by Takeuchi. Doing so may cause safety problems. Or, it may adversely affect the machine's operation or service life.**
- **We will not be held responsible for any injuries, accidents or damage to its products caused by the use by a non-approved attachment.**

√ :Can be used.
Δ :Can be used only for light operations (digging and loading of dry and loose soil or mud)
— :Cannot be used.

Bucket	Rated capacity m^3 (cu. ft.)	Bucket cutting width mm (inch)	Standard arm 880 mm (34.6 in.)
350W	0.022 (0.76)	350 (13.8)	√

MEMO

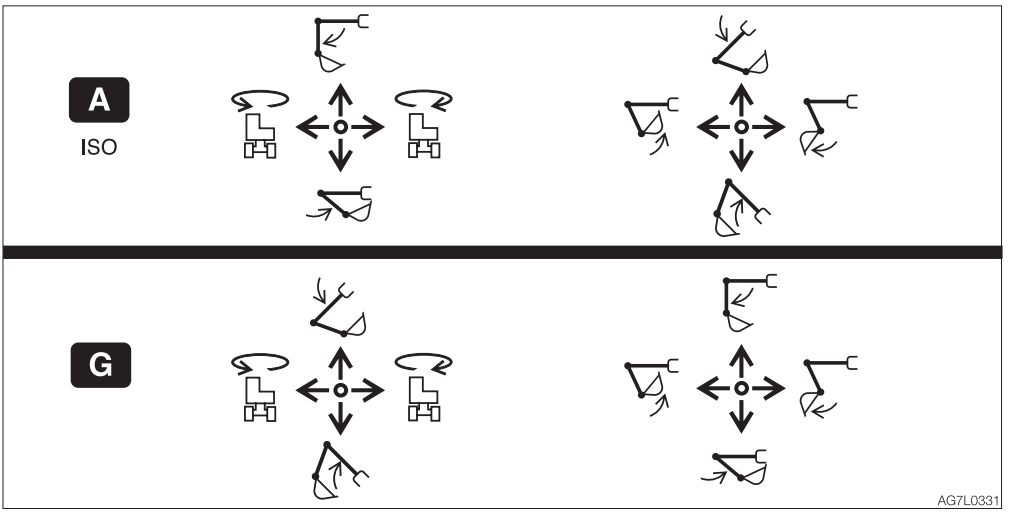
SELECTING A LEVER PATTERN

SELECTING A LEVER PATTERN (A-G)

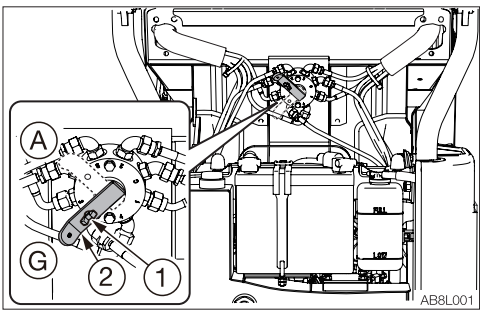
The operating pattern of the left and right operating levers can be changed.

⚠ WARNING

Before starting the engine, check the selector to see which operating pattern the left and right operating levers are set.



SWITCHING THE LEVER PATTERN



(A) : ISO pattern
(G) : G pattern

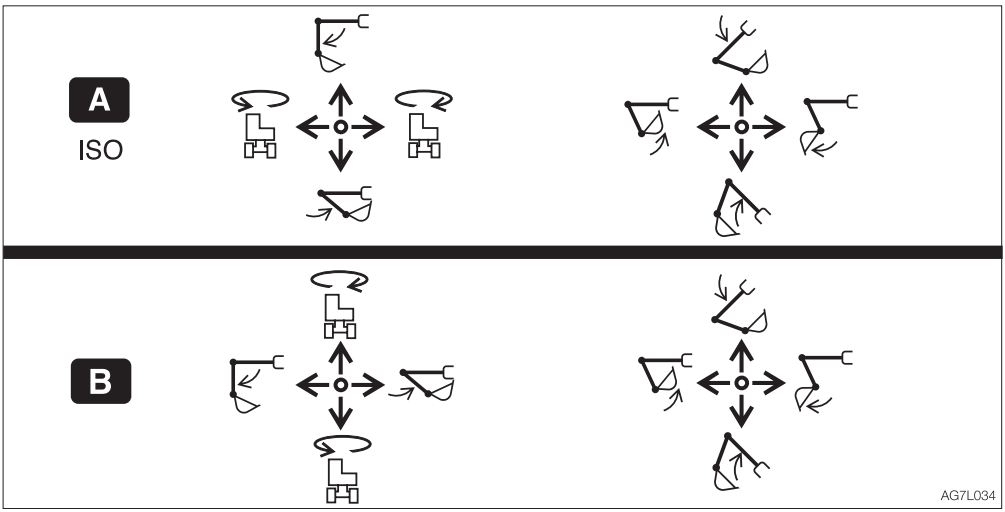
1. Park the machine on a flat and rigid ground, and stop the engine.
2. Open the engine hood.
3. Loosen the wing bolt (1).
4. Turn the selector valve lever (2) to switch the pattern.
5. Tighten the wing bolt (1) and fasten the lever (2) in place.
6. Close the engine hood.
7. Confirm the lever pattern.

SELECTING A LEVER PATTERN (A-B)

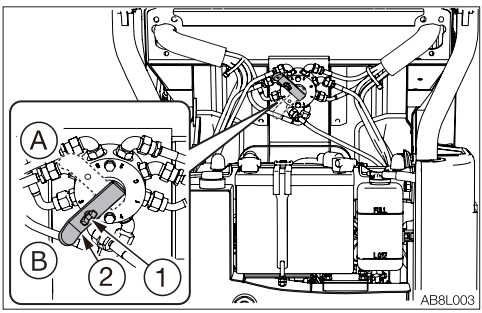
The operating pattern of the left and right operating levers can be changed.

⚠ WARNING

Before starting the engine, check the selector to see which operating pattern the left and right operating levers are set.



SWITCHING THE LEVER PATTERN



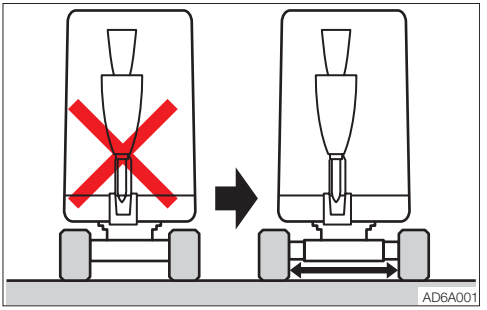
(A) : ISO pattern
(B) : B pattern

1. Park the machine on a flat and rigid ground, and stop the engine.
2. Open the engine hood.
3. Loosen the wing bolt (1).
4. Turn the selector valve lever (2) to switch the pattern.
5. Tighten the wing bolt (1) and fasten the lever (2) in place.
6. Close the engine hood.
7. Confirm the lever pattern.

HYDRAULIC BREAKER

For handling of the breaker, read the hydraulic breaker's manual, provided separately.

⚠ WARNING



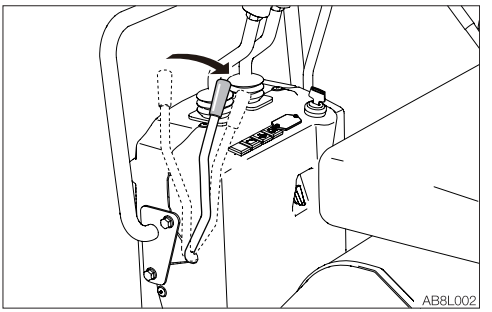
Do not use the breaker when the crawler width is narrowed!

- **Always operate the machine with the crawler width extended to 1020 mm (40.2 in.) to maximize the machine stability. If the machine is operated with the crawler width narrowed (750 mm, 29.5 in.), the machine may tip over due to its poor stability.**
- **If the machine must be operated with the narrowed crawler width (750 mm, 29.5 in.), traveling should be done after folding the hoe attachment, lowering the boom to lower the center of gravity and keeping the machine facing forward.**

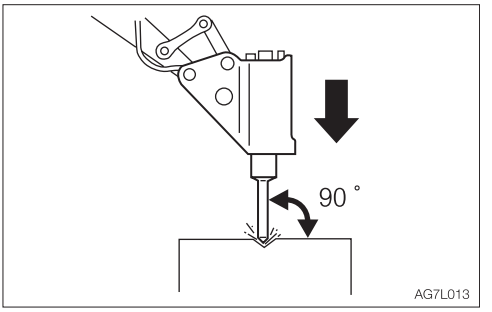
When an optional attachment, such as a breaker, tilted bucket or clamshell, is operated, be sure that the crawler width is extended to 1020 mm (40.2 in.).

IMPORTANT: When installing an attachment, make sure that it is appropriate for the machine being used. Contact your sales or service dealer for advice on selecting attachments.

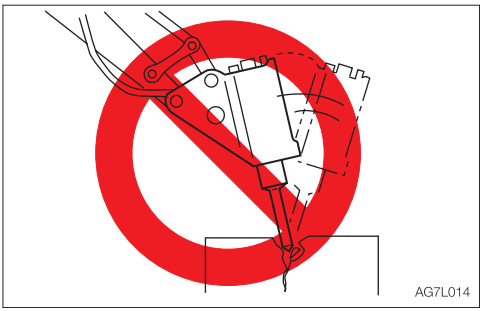
Cautions on operating



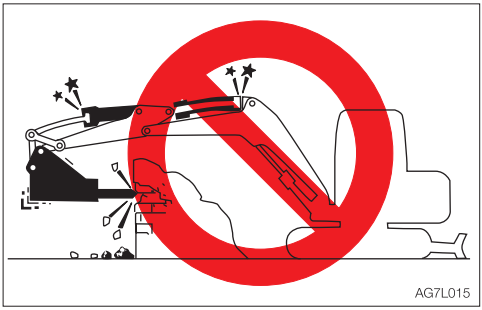
- Start the engine and run it at 75% of the maximum speed.



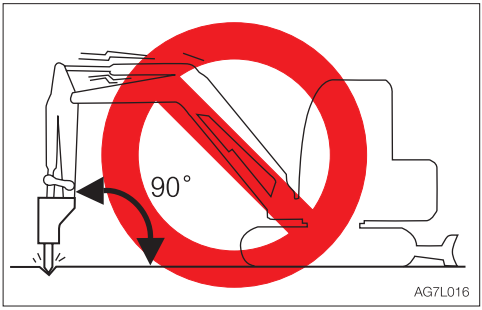
- Pound with the chisel pressed perpendicular to the surface to be pounded.
- When pounding, press the chisel properly against the object to be broken so as to avoid pounding the air.



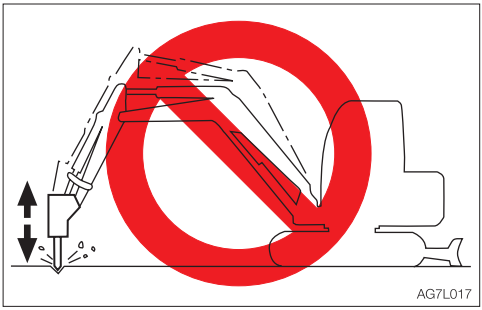
- Do not pry with the chisel or do not pry while pounding.
- Do not move the chisel while pounding.
- Do not pound continuously for over 30 seconds on the same surface.



- Do not pound with the cylinder fully extended or retracted (at the stroke end). Leave a margin of at least 50mm(2 in).



- Do not pound with the arm placed perpendicular to the ground surface.



- Do not drop the breaker itself on the object to be broken in order to break it.
- Do not move objects to be broken or rocks with the breaker itself.
- Slew the machine occasionally to cool the engine.
- If a hydraulic hose is vibrating abnormally, nitrogen gas may be leaking from the accumulator. Ask for an inspection early.

REPLACING THE HYDRAULIC OIL REGULARLY

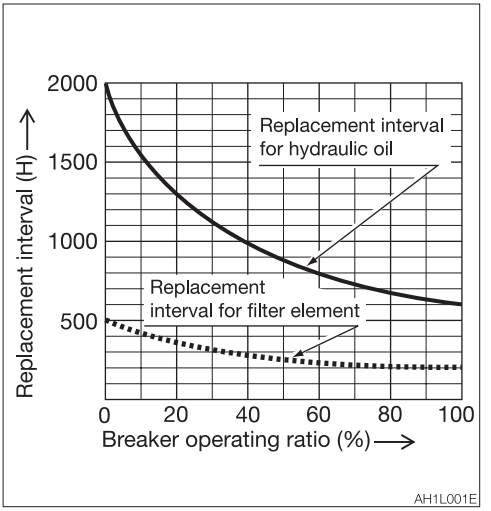
When a hydraulic breaker is used, the oil deteriorates more quickly than that used for a usual operation. Be sure to replace the hydraulic oil and the return filter elements.

- Failure to replace these in time can lead to damage to the machine and the breaker hydraulic system. To improve the service life of the hydraulic systems, be sure to replace the hydraulic oil and return filter element after the number of hours shown on the diagram below.
- When replacing the hydraulic oil, clean the suction strainer.

Replacement interval (hours)

Item	Hydraulic oil	Filter element
1st time	—	25
2nd time	—	100
Periodically	600	200

When the breaker operating ratio is 100%.



BIODEGRADABLE OIL

Biodegradable oil is a new type of hydraulic oil that is decomposed into carbon dioxide and water by microorganisms in the soil and water. It is highly safe for living organisms and offers advantages in term of environmental protection.

- Recommended biodegradable oil: Mobile EAL Envirosyn 46H (an ester synthetic oil) and Panolin HLP Synth 46 (an ester synthetic oil).
  When replacing the mineral oil with biodegradable oil, use either of the above brand oil.
  Note that there are oils of other brands, even among ester synthetic oils, which may damage O-rings, packings and seals.
- When switching from a mineral oil to a biodegradable oil, the parking brake torque decreases by about 30%.

REPLACING THE MINERAL OIL WITH BIODEGRADABLE OIL

- A mixture of mineral oil and biodegradable oil or a mixture of different brands of biodegradable oils will result in a decrease in performance of the hydraulic oil, biodegradability and safety. The inside of the hydraulic oil system must be flushed (cleaned) before replacing. The residual mineral oil in the machine should be about 2% or less, as complying with the ISO 15380.
- This operation is dangerous and requires experience. Ask a Takeuchi sales or service dealer for help.

Flushing

To be performed by a Takeuchi sales or service outlet

1. Drain the hydraulic oil (mineral oil) from the hydraulic oil tank and clean the inside of the tank and suction strainer.
   Refer to “Replacing the hydraulic oil and cleaning the suction strainer” on page 5-45.
2. Remove the cylinder hoses and drain the hydraulic oil (mineral oil) from inside the cylinders.
3. Supply new biodegradable oil to the hydraulic oil tank.
4. Bleed the air from the hydraulic oil system.
5. Operate the hydraulic devices for 30 minutes.
6. Drain the biodegradable oil from the tank and cylinders.
7. Replace the hydraulic oil return filter with a new filter.
8. Repeat steps 3 and 4.
9. Operate the hydraulic devices for 30 minutes.
10. Drain the biodegradable oil from the tank and cylinders.
11. Repeat steps 3 and 4.
12. Operate the hydraulic devices for 1 hour.
13. Drain the biodegradable oil from the tank and cylinders.
14. Replace the return filter with a new filter.
15. Repeat steps 3 and 4.
16. Operate the hydraulic devices, then check for oil leakage.

There is no need to flush the hydraulic oil system when switching from biodegradable to mineral hydraulic oil.

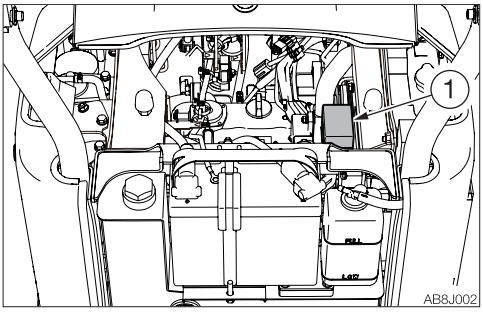
TRAVEL ALARM

The alarm sounds while the machine is traveling and stops when the machine stops traveling.
If the alarm does not sound when the machine travels, the fuse may be blown. Inspect the fuses.

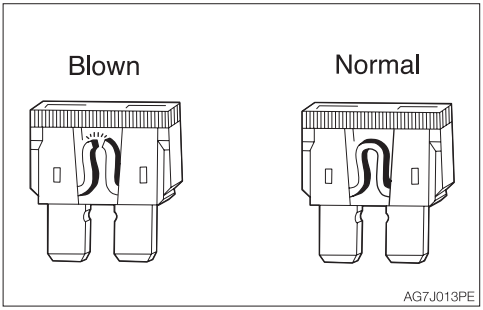
⚠ WARNING

If the fuse blows again soon after replacement, then the electric system is likely faulty. It may pose a fire hazard if not properly repaired. Contact your sales or service dealer for advice.

1. Turn the starter key to the OFF position to stop the engine.
2. Open the engine hood.



3. Open the fuse box cover (1).
4. Check for fuse.



5. If a fuse is blown, replace it with a spare fuse of the same capacity.

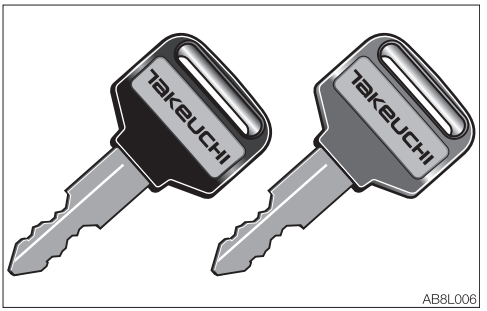
Fuse layout and circuits protected

Capacity	Symbol	Protected circuit
10A		Horn
30A		Engine stop solenoid
20A		Boom light, **Travel alarm**
10A		Hour meter
15A		Lever lock
3A		Feed pump

TAKEUCHI SECURITY SYSTEM

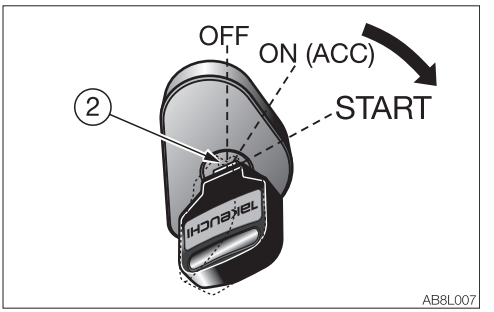
The Takeuchi Security System is a system that allows only registered starter keys to be used for starting the engine.
The engine cannot be started with any unregistered or counterfeit starter keys. If a registered starter key is lost or stolen, you can set the system to delete the registered key information, so that the lost or stolen key cannot be used to start the engine. Although machine theft cannot be completely prevented, the system certainly helps reduce the risk of theft.

STARTER KEY



There are two types of starter key, red and black, which can be registered in the Takeuchi Security System.
The red key is the master key. The black key is the starting key.

STARTING THE ENGINE



The engine can be started using the normal method with a registered BLACK key.
The engine cannot be started using the RED master key.
Refer to Chapter 3, “Starting and stopping the engine”.

If an attempt is made to start the engine with an unregistered key:

If an unregistered starter key is turned from the OFF to the ON (ACC) position, the alarm starts sounding.
If this attempt is repeated five times in a row, the horn sounds for two minutes, and the engine cannot be started. The horn stops when the key is turned to the OFF position.

REGISTERING AND DELETING THE STARTER KEY

To register or delete the starter key, use a tool specifically designed for this purpose. Consult your sales or service dealer for help.

IF THE MASTER KEY IS LOST

If you lose your master key, contact your service or sales dealer for assistance.

COUNTRIES WHERE THE SYSTEM CAN BE USED

To use the Takeuchi Security System, “radio wave authentication” must be obtained in the country where the system is to be used. The system can be used in the countries listed below, as of January 2017. Do not use the system in other countries. For details on how to disable the system, please contact your service or sales dealer for assistance.

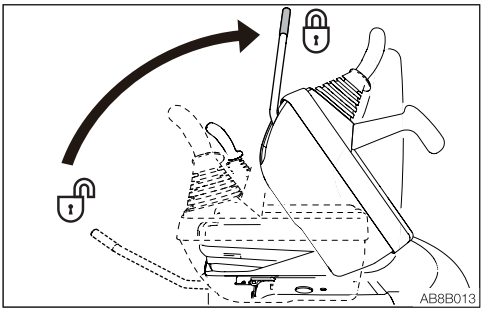
Countries where the system can be used:
Ireland, Italy, UK, Estonia, Austria, Holland, Cyprus, Greece, Croatia, Sweden, Spain, Slovakia, Slovenia, Czech, Denmark, Germany, Hungary, Finland, France, Bulgaria, Belgium, Poland, Portugal, Malta, Latvia, Lithuania, Rumania, Luxemburg, Iceland, Norway, Liechtenstein, Switzerland, Turkey

ADJUSTABLE LEVER STANDS

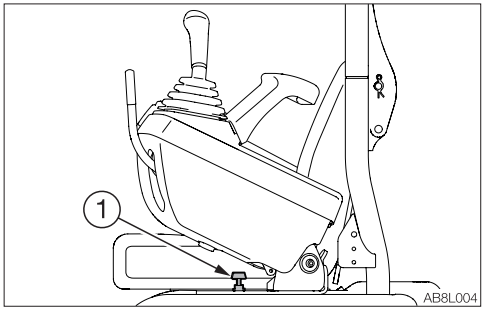
By spreading the lever stands to the left and right, you can have more space for your knees and thighs.

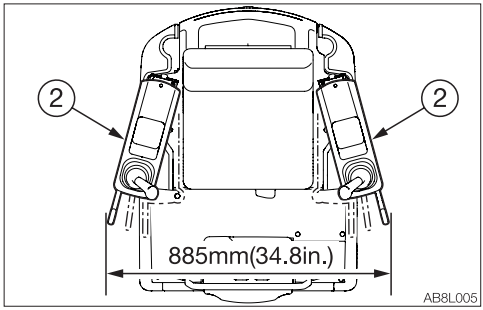
⚠ WARNING

Move the lever stands to where you want to secure them. Operating the machine without securing the lever stands could result in an accident.



1. Set the safety lock lever to the locked position.





2. Move the lever stands (2) while pressing the button (1). (Two-point adjustment is available.)

Note: When the lever stands are spread, the maximum width between the front ends of the stands is 885 mm (34.8 in), which is larger than the crawler overall width (narrow).

First Published July 2015
Twenty-sixth Published December 2025

AB8EN025

OPERATOR'S MANUAL

TB210R Mini excavator

Edited and issued by TAKEUCHI MFG. CO., LTD.

Printed in Japan by STATION M Co., Ltd.

ASAHI DENSO
6-2-1 Somejidai, Hamakita-ku, Hamamatsu, Shizuoka 434-0046, Japan

EU DECLARATION of CONFORMITY (DoC)

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Name:	ASAHI DENSO CO.,LTD
Address:	6-2-1 Somejidai, Hamakita-ku, Hamamatsu, Shizuoka, 434-0046 Japan

We declare that the DoC is issued under our sole responsibility and belongs to the following product.

Object of the declaration:

Product Name	Immobilizer
Model Name	CZ156
Accessories	N/A

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

Radio Equipment (RE) Directive (2014/53/EU)

The following harmonized standards and technical specifications have been applied:

Health & Safety (Article 3.1(a)):	EN 60065: 2014
EMC (Article 3.1(b)):	EN 301 489-1 V2.1.1 EN 301 489-3 V2.1.1 (Final draft)
Radio Spectrum (Article 3.2):	EN 300 330 V2.1.1

Japan, Shizuoka	May 29, 2017	Tomohiro Yaguchi
Place of Issue:	Date of Issue:	Tomohiro Yaguchi Section chief Engineering Department

ASAHI DENSO
6-2-1 Somejidai, Hamakita-ku, Hamamatsu, Shizuoka 434-0046, Japan

UK DECLARATION of CONFORMITY (DoC)

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Name:	ASAHI DENSO CO.,LTD.
Address:	6-2-1 Somejidai, Hamakita-ku, Hamamatsu, Shizuoka, 434-0046 Japan

We declare that the DoC is issued under our sole responsibility and belongs to the following product.

Object of the declaration:

Product Name	Immobilizer
Model Name	CZ156
Accessories	N/A

The object of the declaration described above is in conformity with the relevant statutory requirements:

STATUTORY INSTRUMENTS 2017 No. 1206 TELECOMMUNICATIONS (The Radio Equipment Regulations 2017)

The following designated standards and technical specifications have been applied:

Health & Safety (Regulation 6.1(a)):	EN 62368-1: 2014
EMC (Regulation 6.1(b)):	EN 301 489-1 V2.1.1 EN 301 489-3 V2.1.1 (Final draft)
Radio Spectrum (Regulation 6.2):	EN 300 330 V2.1.1

Signed for and on behalf of:

Shizuoka, Japan	September 8, 2021	Tomohiro Yaguchi
Place of Issue:	Date of Issue:	Tomohiro Yaguchi Section chief Engineering Department

Declaration of Conformity

We herewith declare that the following named machine, based on its conception and design, and in the form brought into service is in accordance with the relevant, basic safety and health requirements of the following EU directives. In case of any alteration of the machine not coordinated with us, this certificate loses its validity.

Designation of the machine	Compact Excavator
Manufacturer	TAKEUCHI MFG. CO., LTD 205 Uwadaira, Sakaki-machi, Hanishina-gun, Nagano 389-0605, Japan

Model	TB210R
Engine type	D722-EF19 (e1*2016/1628*2022/992EV2/D*0008*Δ)
Engine performance	8.8 kW @ 2200 rpm

The machine is in accordance with the requirements of EU directives:

1) Machinery directive: 2006/42/EC and appendix
2) Electromagnetic Compatibility-Regulation 2014/30/EU and appendix.
3) Noise Directive 2000/14/EC (Evaluation procedure according to appendix VI), 2005/88/EC and appendices.
4) Regulations on engine emissions: Regulation (EU) 2016/1628, as last amended by Regulation 2022/992.

Harmonized norms: EN474-1:2022, EN474-5:2022

Compiler of the technical files:
Romain Loffredi
Takeuchi France S.A.S.
Parc d'Activités des Béthunes
3, avenue de la Mare 95310 SAINT OUEN L'AUMONE,
CS 29258 – SOA

Issued in Sakaki, Japan
Toshiya Takeuchi, President

Declaration of Conformity

We herewith declare that we take full responsibility that the following named machine, based on its conception and design, and in the form brought into service is compliant with the relevant, basic safety and health requirements of the following (UK) enactments. In case of any alteration of the machine not coordinated with us, this certificate loses its validity.

Designation of the machine	Compact Excavator
Manufacturer	TAKEUCHI MFG. CO., LTD 205 Uwadaira, Sakaki-machi, Hanishina-gun, Nagano 389-0605, Japan

Model	TB210R
Engine type	D722-EF19 (e1*2016/1628*2022/992EV2/D*0008*Δ)
Engine performance	8.8 kW @ 2200 rpm

The machine is compliant with the following UK enactments:

1) Supply of Machinery (Safety) Regulations 2008 (S.I. 2008/1597)
2) Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091)
3) Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001 (S.I. 2001/1701)

And the Designated Standards referred to and adopted therein and particularly EN474-1:2022, EN474-5:2022

Compiler of the technical files:
Daniel Bryning (Product Manager)
TAKEUCHI MFG. (UK) Ltd.
Unit E2B, John Boyd Dunlop Drive
Kingsway Business Park Rochdale OL16 4NG

Issued in Sakaki, Japan
Toshiya Takeuchi, President

 **WARNING:** Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.



WARNING:

Cancer and Reproductive Harm –
www.P65Warnings.ca.gov