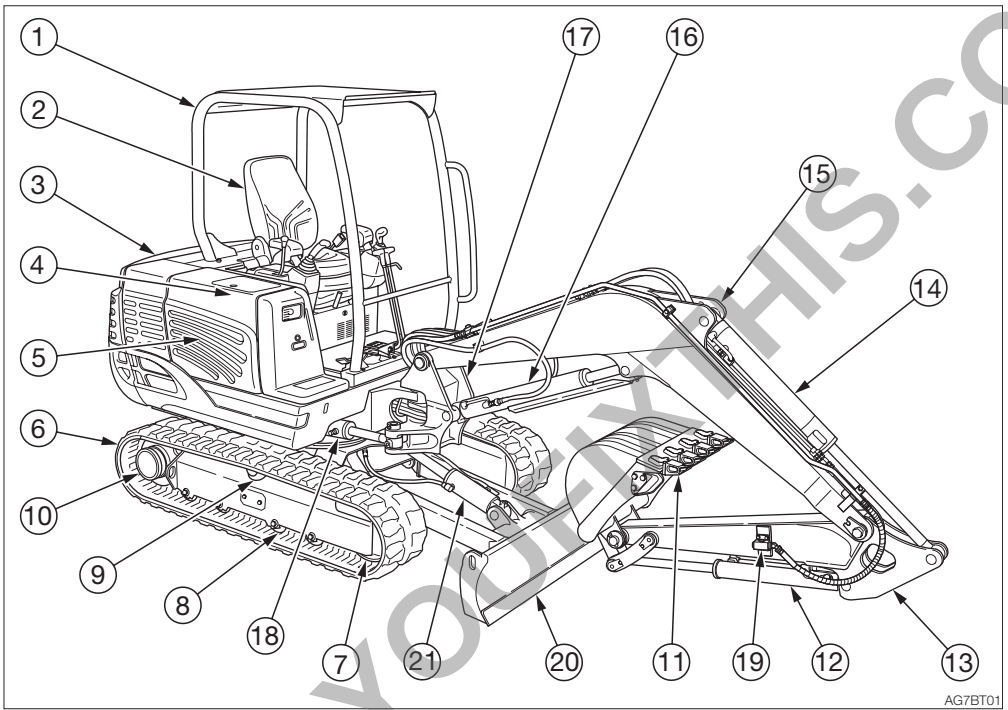
NAMES OF COMPONENTS (CANOPY)



Upperstructure
1. Canopy
2. Seat
3. Engine hood
4. Fuel tank
5. Hydraulic tank

Undercarriage
6. Crawler belt
7. Idler
8. Track roller
9. Carrier roller
10. Travel motor

Working equipment
11. Bucket
12. Bucket cylinder
13. Arm
14. Arm cylinder
15. Boom
16. Boom cylinder
17. Boom bracket
18. Swing cylinder
19. Auxiliary hydraulic lines
20. Dozer blade
21. Blade cylinder

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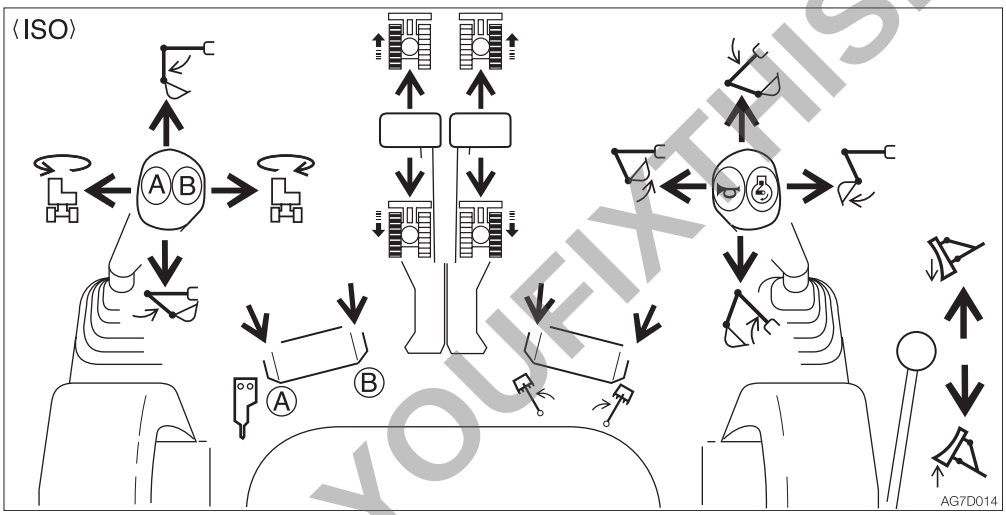
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OPERATING THE MACHINE

LEVER PATTERN (ISO PATTERN)

⚠ WARNING

- Before starting operation, carefully check which lever pattern you are going to use.
- It is described using the ISO pattern in this manual.



	Left crawler forward		Right crawler forward
	Left crawler reverse		Right crawler reverse
	Arm out		Boom lower
	Arm in		Boom raise
	Upperstructure slew left		Bucket load
	Upperstructure slew right		Bucket dump
	Boom swing left		Dozer blade lower
	Boom swing right		Dozer blade raise

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MAINTENANCE LIST

Inspection and maintenance item	Page
Walk-around inspection	
Inspecting by opening the engine hood and covers	5-14
Inspecting by walking around the machine	5-15
Inspecting while sitting in the operator's seat	5-15
Daily inspection (every 10 hours)	
Inspecting and replenishing the coolant	5-16
Inspecting and replenishing the engine oil	5-17
Inspecting the water separator	5-17
Inspecting the fuel level	5-18
Inspecting the hydraulic oil tank level and replenishing	5-18
Lubricating the working equipment	5-20
After the initial 50 hours (only for new machines)	
Replacing the engine oil and the oil filter	5-21
Inspecting and adjusting the fan belt	5-22
Inspecting and adjusting the compressor belt (AC)	5-22
Every 50 hours	
Inspecting and adjusting the crawler tension	5-24
Lubricating the slew bearing	5-26
Draining the water from the fuel tank	5-27
Inspecting the battery fluid level and replenishing	5-28
Every 100 hours	
Cleaning the water separator	5-30
After the initial 250 hours (only for new machines)	
Replacing the hydraulic oil return filter	5-31
Replacing the pilot line filter	5-32
Replacing the travel motor gear oil*	5-33
Every 250 hours	
Replacing the engine oil and the oil filter	5-34
Inspecting and adjusting the fan belt	5-34
Inspecting and adjusting the compressor belt (AC)	5-34
Cleaning the air cleaner	5-34
Cleaning the radiator fins and oil cooler fins	5-35
Cleaning the air filters	5-36
Cleaning the condenser (AC)	5-36
Inspecting the refrigerant (gas) level (AC)	5-37

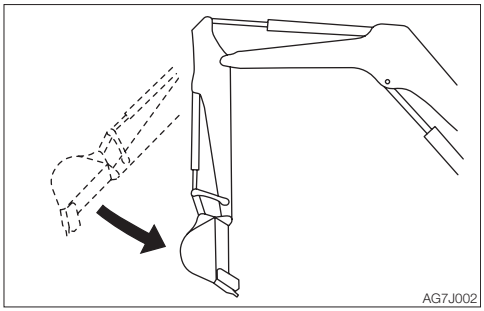
*: If the percentage of the traveling time within the total operating time is high, replace the gear oil earlier than the specified time.

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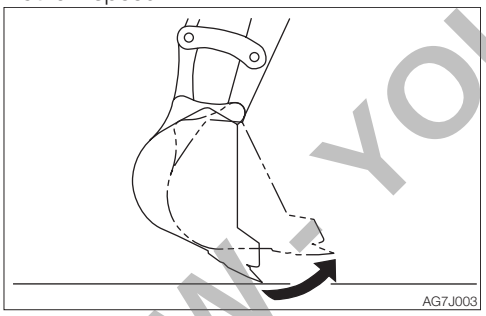
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SYMPTOMS THAT ARE NOT MALFUNCTIONS

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.

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BASIC SPECIFICATIONS

<TB228>

Type				Canopy	Cab
MASS					
Operating mass	kg (lb)	Rubber crawlers		2770 (6105)	2885 (6360)
		Steel crawlers		2835 (6250)	2950 (6505)
PERFORMANCE					
Bucket capacity (Standard bucket)	m^3 (cu.ft.)	Heaped		0.068 (2.4)	
		Struck		0.051 (1.8)	
Slew speed	min^{-1} (rpm)			10 (10)	
Travel speed	km/h (mph)	Rubber crawlers	1st	2.8 (1.74)	
			2nd	4.9 (3.04)	
		Steel crawlers	1st	2.7 (1.68)	
			2nd	4.8 (2.98)	
Gradeability	(degrees)			30	
Ground pressure	kPa (psi)	Rubber crawlers		28.3 (4.11)	29.5 (4.28)
		Steel crawlers		29.0 (4.21)	30.2 (4.38)
Noise level	dB (A)	Sound power level		L_{WA} 94	
		Sound pressure level		L_{pA} 73	
ENGINE					
Manufacturer and model				Yanmar 3TNV82A-BPTB1	Yanmar 3TNV82A-BPTB
Rated output	Net (ISO 14396)	kW/min^{-1} (hp/rpm)		17.8/2400 (23.9/2400)	
	Net (ISO 9249/ SAEJ1349)	kW/min^{-1} (hp/rpm)		17.5/2400 (23.5/2400)	
Displacement		ml (cu.in.)		1331 (81.2)	
Starter		V-kW		12-1.7	
Alternator		V-kW		12-0.48	
Battery (IEC 60095-1)		V-A·h		12-73	

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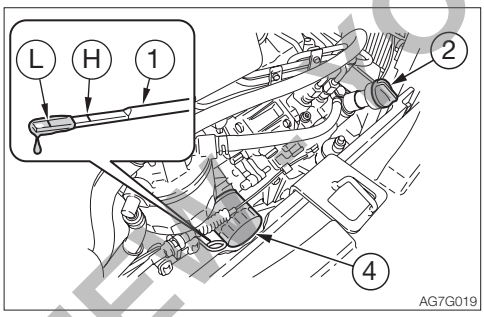
AFTER THE INITIAL 50 HOURS (ONLY FOR NEW MACHINES)

REPLACING THE ENGINE OIL AND THE OIL FILTER

⚠ WARNING

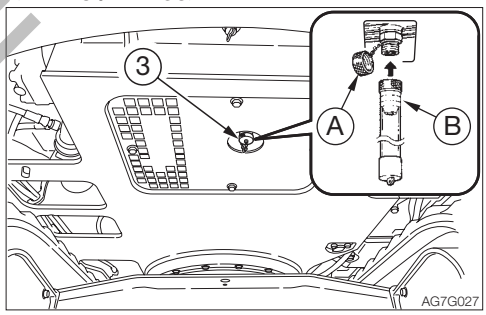
Stop the engine and allow the machine to cool down before performing maintenance.

- **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.**

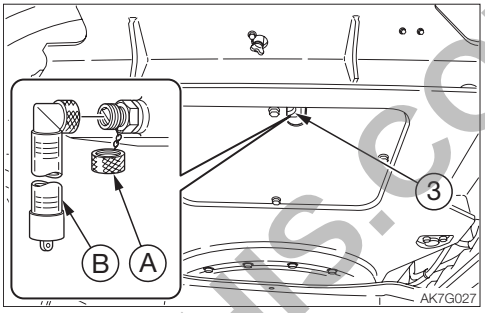


1. Open the engine hood and remove the oil filler cap (2).

<TB228 / TB235>



<TB250>



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

5. Turn the filter (4) 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 by hand.
9. Tighten one more turn (with the filter wrench) after the filter packing comes in contact with the surface of installation. (Torque when tightening with filter wrench: 19.6 to 23.5 N·m or 14 to 17 ft-lb)
10. 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.
11. Tighten the oil filler cap (2).
12. Start the engine, run it at low idle for about 5 minutes, then stop it.
13. After about 10 minutes, inspect the oil level.

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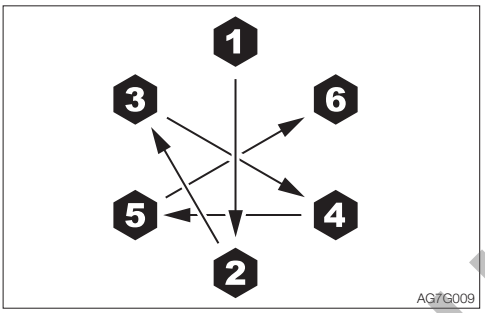
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LIST OF TIGHTENING TORQUES

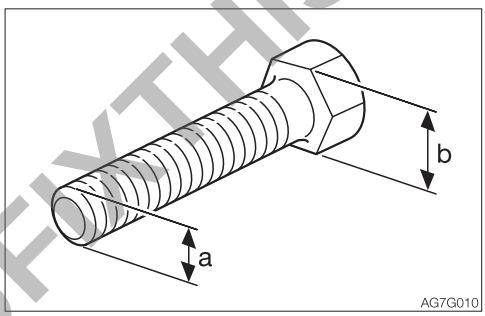
Nuts and Bolts (for ISO strength category 10.9)

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.



AG7G009



AG7G010

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

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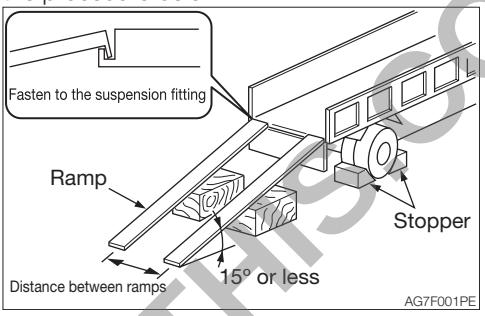
LOADING AND UNLOADING

⚠ WARNING

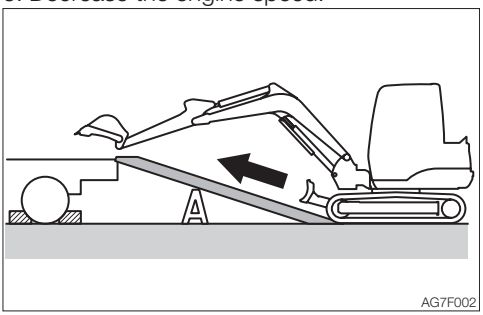
The machine may roll or tip over or fall while being loaded or unloaded. Take the following precautions:

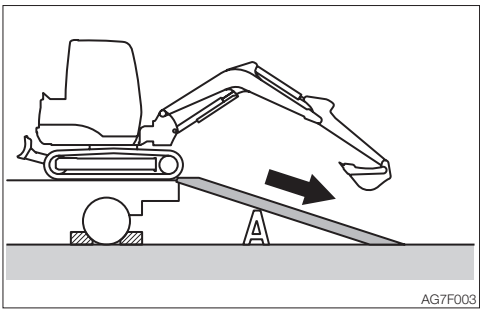
- **Select a firm, level surface and keep sufficient distance from road shoulders.**
- **Secure the ramps of adequate strength and size to the truck bed. The slope of the ramps must not exceed 15°. If the rumps are bowed down too low, support them with poles or blocks.**
- **Never use the working equipment to load or unload the machine. Doing so may result in tipping over or falling down of the machine.**
- **Keep the truck bed and loading ramps clean of oil, soil, ice, snow, and other materials to prevent the machine from sliding sideways. Clean the crawlers.**
- **Chock the transporter wheels to prevent movement.**
- **Turn off the deceleration switch and auto-deceleration switch. Otherwise, the engine speed may suddenly increase to cause troubles (for machines with the deceleration and auto-deceleration switches).**
- **When being loaded or unloaded, travel slowly in 1st (low) gear by following the signal from the signal person.**
- **Never change courses on the ramps.**
- **Do not slew/swing on the ramps. The machine may tip over.**
- **When slewing/swinging on the truck bed, do it slowly as the footing should be unstable.**
- **Lock the cab door after being loaded, if applicable. Otherwise, the door may open during transport.**
- **Chock the tracks and secure the machine to the truck bed with wire rope or chain.**

When loading or unloading the machine, be sure to use ramps or a platform and follow the procedure below.



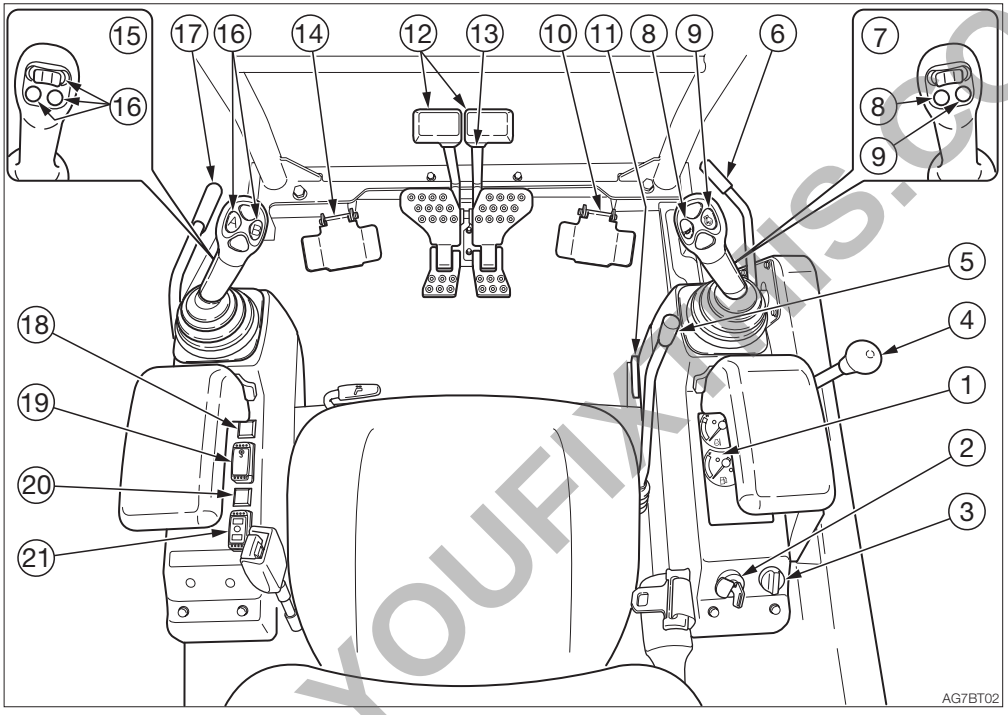
1. Set the parking brake on the transporter and chock the wheels.
2. Fix the ramps securely to the truck bed. The slope of the ramps must not exceed 15°.
3. Align the center of the truck bed with the center of the machine, and of the ramp with the center of the crawler.
4. Make sure the dozer blade does not hit the ramps.
5. Lower the hoe attachment as far as possible without letting it touch the transporter.
6. Decrease the engine speed.





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1. Instrument cluster
2. Starter switch
3. Light switch
4. Blade lever
5. Throttle lever
6. Safety lock lever (R.H.)
7. Right operating lever*
8. Horn button
9. Deceleration button
10. Boom swing pedal
11. Hour meter
12. Travel lever/Pedal
13. Travel speed switch
14. Auxiliary hydraulic pedal*
15. Left operating lever*
16. Auxiliary hydraulic switches*
17. Safety lock lever (L.H.)
18. Third auxiliary hydraulic warning lamp*
    Detent mode switch*
19. Overload warning switch*
20. Arm in restriction lamp*
21. Arm in restriction switch*

*: Subject to the specifications or optional products selected

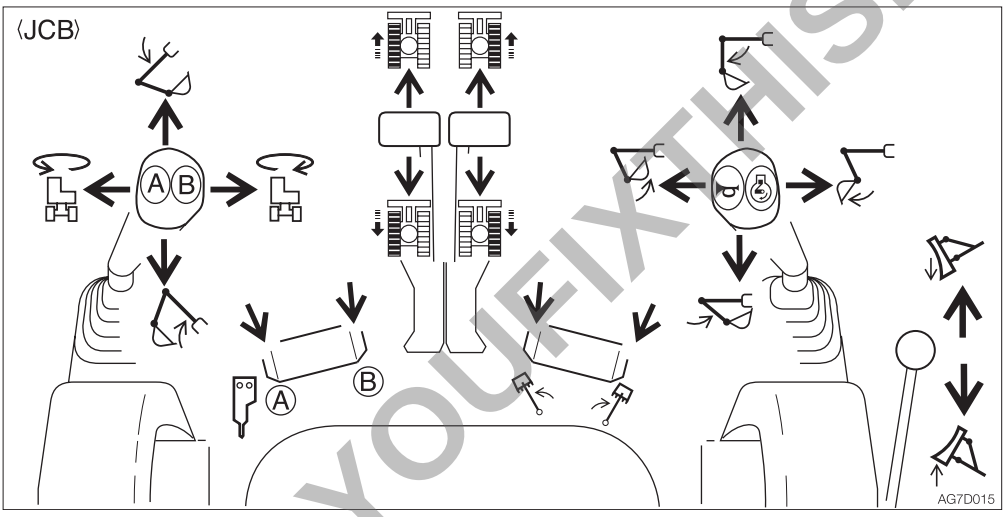
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LEVER PATTERN (JCB PATTERN)

⚠ WARNING

- **Before starting operation, carefully check which lever pattern you are going to use.**
- **It is described using the ISO pattern in this manual.**



	Left crawler forward		Right crawler forward
	Left crawler reverse		Right crawler reverse
	Boom lower		Arm out
	Boom raise		Arm in
	Upperstructure slew left		Bucket load
	Upperstructure slew right		Bucket dump
	Boom swing left		Dozer blade lower
	Boom swing right		Dozer blade raise

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Inspection and maintenance item	Page
Every 500 hours	
Replacing the fuel filter	5-39
Replacing the water separator filter (If equipped with filter for high sulfur fuel)	5-39
Every 1000 hours	
Replacing the hydraulic oil return filter	5-40
Replacing the pilot line filter	5-40
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 filter (If equipped)	5-43
Inspecting and adjusting the engine valve clearance	5-43
Retightening the engine cylinder head bolt	5-43
Every 1500 hours	
Inspecting and cleaning the engine fuel injectors	5-44
Inspecting the crankcase breather system	5-44
Every 2000 hours	
Lapping the engine valve seats	5-45
Every 4000 hours	
Replacing the hydraulic oil and cleaning the suction strainer	5-46
When Required	
Replacing the bucket teeth and the side cutters	5-48
Replacing the bucket	5-52
Adjusting the gap between the bucket and arm (If equipped)	5-54
Inspecting and replenishing the windshield washer fluid	5-55
Lubricating the levers and pedals	5-56
Inspecting the rubber crawlers	5-57
Replacing the rubber crawlers	5-58
Every 2 years	
Replacing the receiver drier	5-60

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

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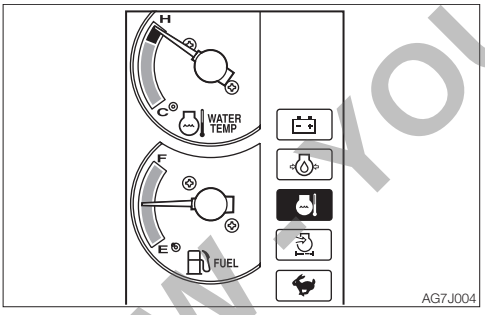
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IF THE ENGINE OVERHEATS

⚠ WARNING

- **Do not open the engine hood 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.



- An alarm is sounded and the coolant temperature warning lamp start flashing.
- The water temperature gauge needle is in the red zone.
- The engine slows down and the engine power decreases.
- 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.
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. When the water temperature gauge needle drops in the green zone, stop the engine.
5. Perform the inspections and the remedies listed below once the engine cools down.
   - Fan belt slack..... Adjust
     Refer to page 5-22.
   - Coolant level ..... Add
     Refer to page 5-16.
   - Water leakage..... Repair
   - Radiator fins..... Clean
     Refer to page 5-35.
   - 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.

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