WORKSHOP MANUAL

TL120

Serial No.21200008~

Book No. CT3E001



CRAWLER LOADER

TAKEUCHI

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SAFETY ALERT SYMBOL



This symbol represents the safety alert. The message that follows the symbol contains important information regarding human safety.
Read and understand the message to avoid personal injury or death.

Safety label

Safety labels are used to alert operators or other people exposed to the risks of injury or damage. There are the following three types of labels.
Read the labels carefully as they are important for your safety.

⚠ DANGER

The word "DANGER" indicates an imminently hazardous situation which, if not avoided, is likely to result in serious injury or death.

⚠ WARNING

The word "WARNING" indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.

⚠ CAUTION

The word "CAUTION" indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

IMPORTANT: The word "IMPORTANT" is used to alert operators and maintenance personnel about situations which could result in damage to the machine and its components.

This manual is intended for trained and qualified personnel only. Warnings or cautions described in this manual do not necessarily cover all safety measures. It is also impossible to cover all hazards and risks which may be associated with the maintenance of the machine in every environment. For maintenance work, each person must take adequate safety precautions against possible hazards in the respective working environment.

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SPECIFICATIONS TABLES

Performance

Bucket type			Standard bucket
Bucket capacity		m^3	0.298
Tipping load		kg	1610
Rated loading mass		kg	565
Breakout force		kN	21.4
Raising time (load)		s	3.6
Lowering time		s	2.4
Bucket forward tilting time		s	2.6
Travel speed	Forward 1st	km/h	6.5
	Forward 2nd	km/h	9.3
	Reverse 1st	km/h	6.5
	Reverse 2nd	km/h	9.3
Maximum tractive force		kN	29.5
Gradeability		degree (°)	30
Minimum turning radius	Bucket outside	m	1.995

Dimensions

Overall length in transport condition	Without teeth	mm	3220
	With teeth	mm	–
Overall width (body)		mm	1470
Bucket width		mm	1600
Overall height	Bucket on ground*	mm	1970
	Max. raised height of bucket	mm	3725
Crawler bearing length		mm	1240
Track gauge		mm	1170
Shoe width		mm	300
Crawler bearing area		m^2	0.745
Ground clearance of undercarriage		mm	250
Bucket hinge pin height		mm	2905
Dumping clearance (at 45-degree forward tipping)	Without teeth	mm	2275
	With teeth	mm	–
Dumping reach (at 45-degree forward tipping)	Without teeth	mm	590
	With teeth	mm	–
Bucket roll back angle	On ground	degree (°)	30.4
Bucket dumping angle	Maximum height position	degree (°)	38.5
Maximum digging depth		mm	0

* Up to the canopy

Mass

Gross machine mass	Canopy	kg	3180
	Cab	kg	3230
Operating mass	Canopy	kg	2700
	Cab	kg	2760
Machine mass	Canopy	kg	2630
	Cab	kg	2680
Shipping mass	Canopy	kg	2580
	Cab	kg	2640

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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.

Location	Type	Type by air temperature -30 -20 -10 0 10 20 30 40°C	When to change/ replenish	Volume
Engine oil pan	Diesel engine oil API: CD class	SAE 5W-30 SAE 10W-30 SAE 15W-40	Every 250 hrs after the first 50 hrs	Upper limit 7.4 L Lower limit 4 L
Hydraulic oil tank	Diesel engine oil API: CD class	SAE 10W-30	Every 1000 hrs	Total amount of oil: 46 L Tank capacity: 29.2 L
Fuel tank	Light oil	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 light oil that still functions when the temperature is at least 12 degrees C below the lowest expected ambient temperature. • Use a light oil 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.		Level capacity: 58 L
Engine cooling system	Cooling water (water** + coolant***)	Mixture of 50% coolant Mixture of 30% coolant	Every 1000 hrs	11 L
Travel reduction gear	Gear oil API: GL-4	SAE 90	Every 500 hrs after the first 250* hrs	1.0 L
Track roller A	Diesel engine oil API: CD class	SAE 30	—	0.18 L
Track roller B	Mobilgear SHC680	—	—	0.14 L
Working equipment	Lithium grease EP-2 NLGI No.2	—	Daily or every 10 hrs	As required
Lever/pedal			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, add coolant (antifreeze). Follow the coolant manufacturer's instructions to determine the mixture ratio.

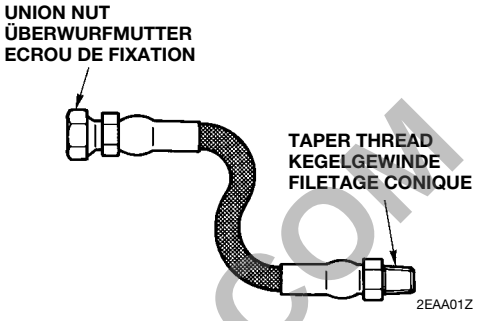
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TIGHTENING TORQUE

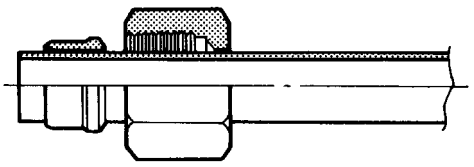
Hydraulic hose

Hose fitting size	Tightening torque	
	Union nut (G)	Taper thread (R)
	N·m	N·m
1/8	$9.8^{+4.9}_{0}$	11.8 ±1.2
1/4	$24.5^{+4.9}_{0}$	29.4 ±2.9
3/8	$49.0^{+4.9}_{0}$	53.9 ±5.4
1/2	$58.8^{+4.9}_{0}$	88.3 ±8.8
3/4	$117.7^{+4.9}_{0}$	147.1 ±14.7
1	$137.3^{+4.9}_{0}$	196.1 ±19.6



Bite-type pipe fitting for steel pipe

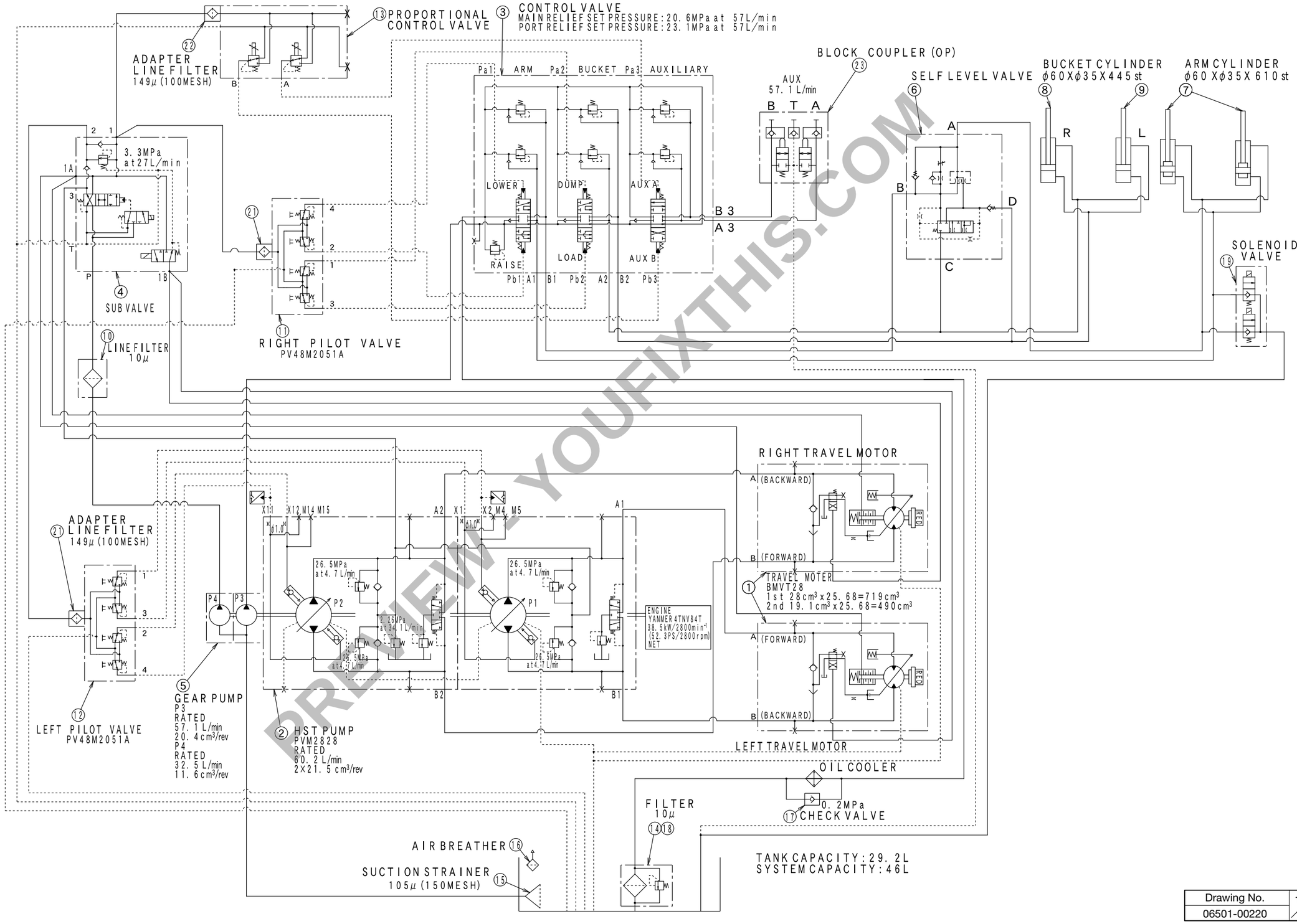
Pipe outer diameter (mm)	Tightening torque
	N·m
8	34.3 ±4.9
10	41.7 ±2.5
12	58.8 ±4.9
15	88.3 ±4.9
16	93.2 ±4.9
18	132.4 ±4.9
22	205.9 ±9.8
27.2	245.2 ±9.8
28	313.8 ±19.6
32	313.8 ±19.6
35	411.9 ±19.6



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HYDRAULIC CIRCUIT DIAGRAM

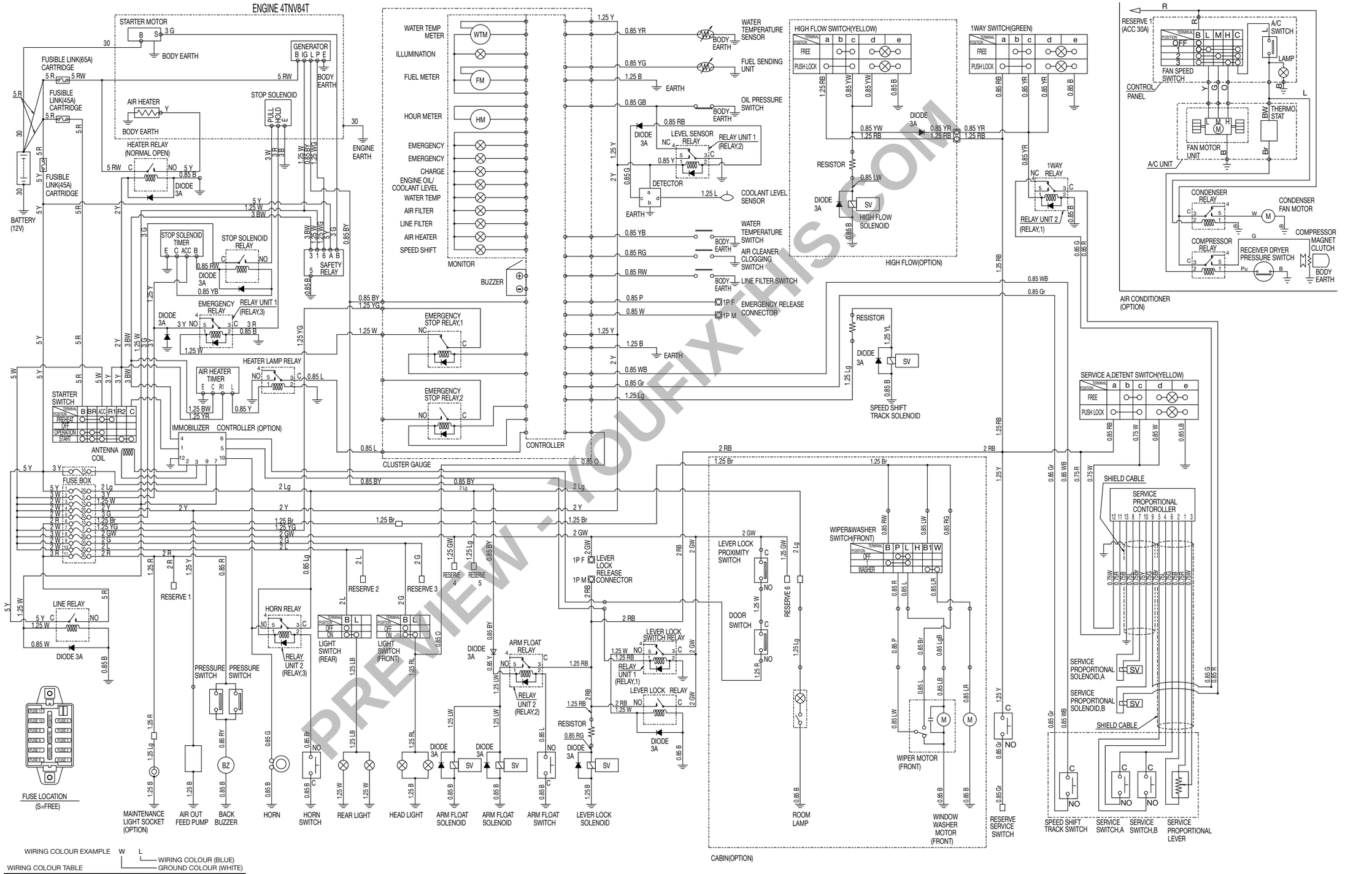


Drawing No.	1/1
06501-00220	

2FAA01Z

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ELECTRICAL WIRING DIAGRAM



WIRING COLOUR EXAMPLE W L
WIRING COLOUR (BLUE)
GROUND COLOUR (WHITE)

WIRING COLOUR TABLE

CODE	COLOR	CODE	COLOR	CODE	COLOR	CODE	COLOR
B	BLACK	W	WHITE	Br	BROWN	V	VIOLET
G	GREEN	Y	YELLOW	Lg	LIGHT GREEN	Dg	DARK GREEN
L	BLUE	P	PINK	Gr	GREY	Ch	CHOLATE
R	RED	O	ORANGE	Sb	SKY BLUE		

Drawing No.	1/1
06501-00150	

2GAA01Z

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2. Inspection and adjustment

2.1 Periodic maintenance schedule

The engine periodic inspection timing is hard to determine as it varies with the application, load status, qualities of the fuel and lubricating oils used and handling status. General rules are described here.

○: User-maintenance ◎: Parts replacement ●: Shop-inspection

Classification	Item	Daily	Maintenance period				
			Every 50 hours	Every 250 hours or 3 months	Every 500 hours or 6 months	Every 1000 hours or one year	Every 2000 hours or two years
Whole	Visual check around engine	○					
Fuel oil system	Fuel tank level check and fuel supply	○					
	Fuel tank draining		○				
	Water separator (Option) draining		○				
	Bleeding the fuel system		○				
	Water separator cleaning				○		
	Fuel filter element replacement				◎		
Lubricating oil system	Lube oil level check and replenishment	○					
	Lube oil replacement		◎ 1st time	◎ 2nd time and thereafter			
	Lube oil filter replacement						
Cooling water system	Coolant water level check and replenishment	○					
	Radiator fin cleaning			○			
	V-belt tension check		○ 1st time	○ 2nd time and thereafter			
	Coolant water replacement					◎	
	Coolant water path flushing and maintenance						
Rubber house	Fuel pipe and coolant water pipe inspection and maintenance	○					●
Governor	Inspection and adjustment of governor lever and accelerator	○		○			●
Air intake system	Air cleaner cleaning and element replacement			○	◎		
	Diaphragm assy inspection					● (2 years)	
	Turbocharger blower cleaning*					●*	
Electrical system	Warning lamp & instruments function check	○					
	Battery electrolyte level check and battery recharging		○				
Cylinder head	Intake/exhaust valve head clearance adjustment					●	
	Intake/exhaust valve seat lapping						●
Fuel injection pump and nozzle	Fuel injection nozzle pressure inspection					●*	
	Fuel injection timing adjustment Fuel injection pump inspection and adjustment						●*

*) EPA allows to maintain the emission related parts every 1,500 or 3,000 hours as shown in 1.6.3 of chapter1.

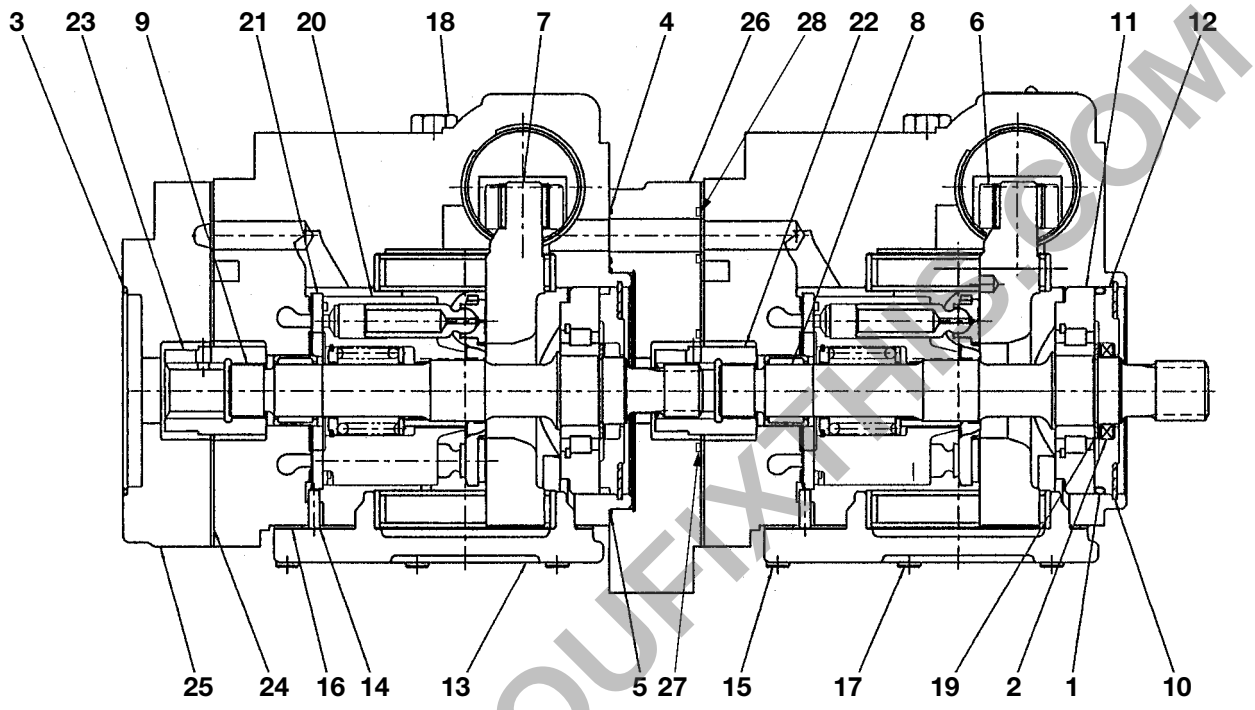
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HST pump

Construction

Pump assembly (1/4)



1. O-ring
2. Seal
3. O-ring
4. O-ring
5. O-ring
6. Bearing
7. Swash plate
8. Shaft
9. Shaft
10. Ring
11. Bearing
12. Seal carrier
13. Cover
14. Pin
15. Cap screw
16. Gasket
17. Cap screw
18. Plug
19. Ring
20. Cylinder block
21. Valve plate
22. Coupling
23. Coupling
24. Gasket
25. Pad “A” adaptor
26. Pad “B” adaptor
27. O-ring
28. O-ring

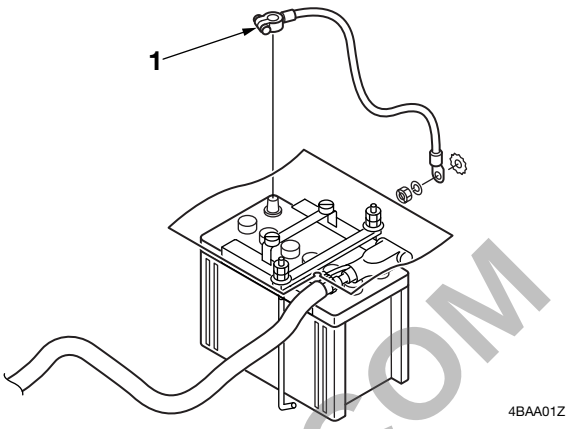
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Drive system

Removing the engine

1. Disconnect the battery ground cable (1) from the battery terminal.



2. Remove the canopy.
   ☞ "Removing the canopy"

3. Remove the floor frame.
   ☞ "Removing the floor frame"

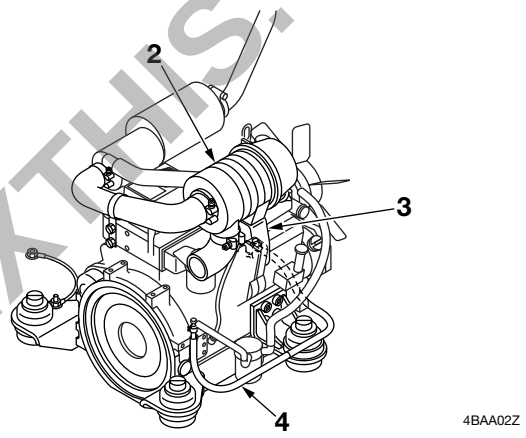
4. Disconnect the electrical wiring to the air cleaner (2).

5. Remove the bracket (3) together with the air cleaner (2).

6. Remove the radiator.
   ☞ "Removing the radiator"

7. Remove the drain hose (4).

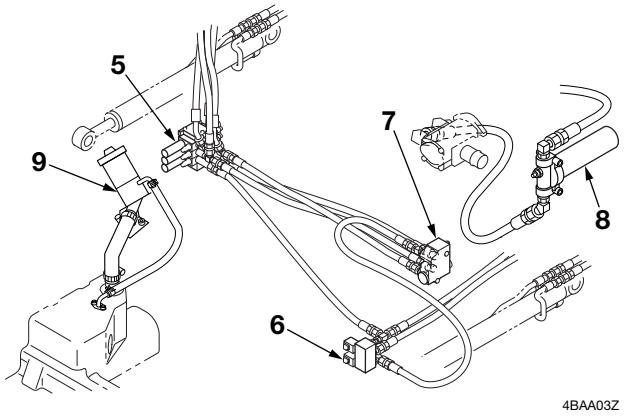
8. Remove the hydraulic pump.
   ☞ "Removing the hydraulic pump"



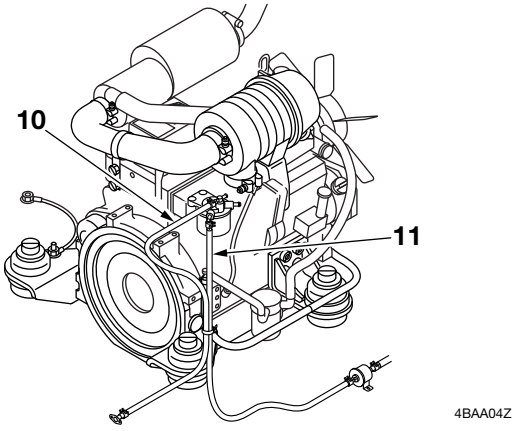
9. Remove the control valve (5), the solenoid valve (6) and the self-level valve (7).

10. Remove the line filter (8).

11. Remove the filler opening (9).



12. Disconnect the fuel hoses (10) and (11).



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HST PUMP

☞ "4. Disassembly and assembly, HST pump"

HST system

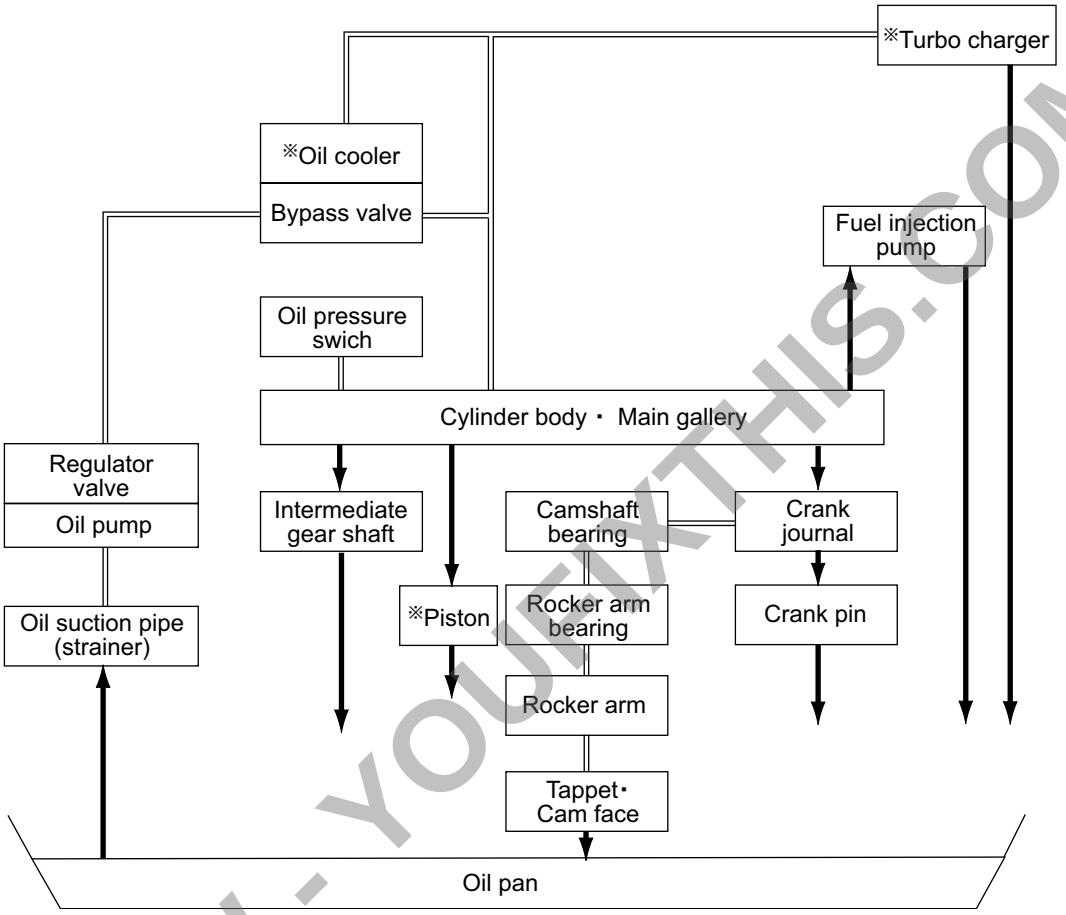
Symptoms	Major causes	Remedies
The neutral position is hard or impossible to set	• Pilot valve faulty • Neutral adjustment of HST pump is faulty • Adjustment of the rotational torque of the servo piston is faulty	• Repair or replace. • Re-adjust the neutral position of the HST pump. If this fails, replace the HST pump. • Re-adjust the rotational torque of the servo piston. If this fails, replace the HST pump.
Travels only either forward or in reverse	• Pilot valve is faulty • The supply pressure to the pilot valve is too low • Charge pressure is too low • Orifice is clogged • High-pressure relief valve is faulty • Scoring or seizing on the servo piston • Travel motor is faulty	• Repair or replace. • Check, repair or replace the hydraulic pump P4 and the solenoid valve. • Check, repair or replace the hydraulic pump P4, the solenoid valve and low-pressure relief valve. • Clean the orifice. • Repair or replace. • Repair or replace. • Repair or replace.
Cannot travel forward or in reverse Veers when traveling in a straight line	• Hydraulic oil tank level is too low • Pilot valve is faulty • Supply pressure to the pilot valve is insufficient • Charge pressure is insufficient • Orifice is clogged • High-pressure relief valve is faulty • Adjustment of displacement limiter is faulty • Travel motor is faulty	• Add oil to the specified level. • Repair or replace. • Check, repair or replace the hydraulic pump P4 and the solenoid valve. • Check, repair or replace the hydraulic pump P4, the solenoid valve and low-pressure relief valve. • Clean the orifice. • Repair or replace. • Adjust the displacement limiter. If this fails, replace the HST pump. • Repair or replace.
Operating temperature of the system is too high	• Hydraulic oil tank level is too low • Oil cooler is faulty • High-pressure relief valve is faulty • Parking brake release pressure is too low • Travel motor is generating heat • HST pump is generating heat	• Add oil to the specified level. • Repair or replace. • Repair or replace. • Check, repair or replace the hydraulic pump P4 and the solenoid valve. • Repair or replace. • Repair or replace.

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5. Lubrication system

5.1 Lubrication system diagram

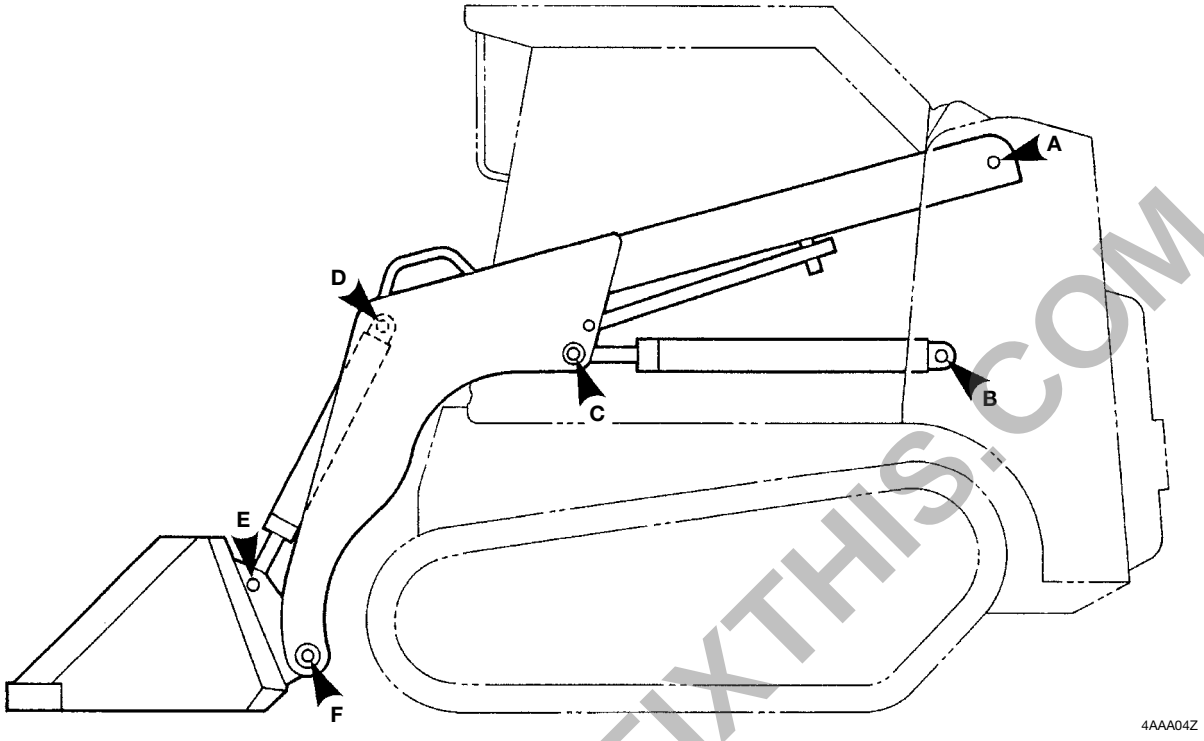


Note: It varies in the specifications of each model whether Oil cooler, Piston and Turbo charger of the * mark are attached.

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Clearance for pin and bushing



Unit: mm

Code	Item	Criteria					Action
		Standard dimension	Tolerance		Standard clearance	Allowable clearance	
			Axis	Hole			
A	Lift arm & frame	35	-0.02 -0.05	+0.15 +0.10	0.47 to 0.163	1.0	Replace
B	Arm cylinder & frame	35	-0.02 -0.05	+0.15 +0.05	0.07 to 0.20	1.0	
C	Arm cylinder & lift arm	35	-0.02 -0.05	+0.15 +0.10	0.07 to 0.20	1.0	
D	Bucket cylinder & lift Arm	35	-0.02 -0.05	+0.15 +0.05	0.07 to 0.20	1.0	
E	Bucket cylinder & quick attachment	35	-0.02 -0.05	+0.15 +0.05	0.07 to 0.20	1.0	
F	Lift arm & quick attachment	35	-0.02 -0.05	+0.15 +0.10	0.47 to 0.163	1.0	

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PERFORMANCE CRITERIA

Standard values table

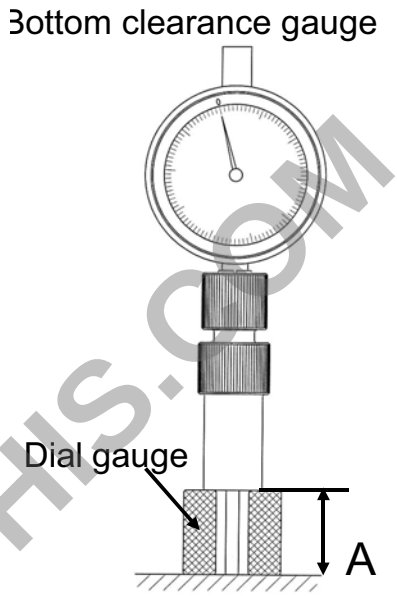
Serial Number			21200008 or later	
Item		Unit	Standard Value	Allowable Value
Hydraulic oil pressure				
Travel		MPa	$26.5^{+4.5}_{-0.5}$	—
Arm		MPa	$20.6^{+1.1}_{-0.5}$	—
Bucket		MPa	$20.6^{+1.1}_{-0.5}$	—
Charge pressure				
Low		MPa	1.8 ±0.3	—
High		MPa	2.3 ±0.3	—
Pilot pressure		MPa	2.9 ±0.3	—
Travel				
Travel speed (5 revs.)				
1st		s	11.1 ±0.6	12.8
2nd		s	7.6 ±0.5	9.2
Travel speed (10 m)				
		s	5.6 ±0.6	6.8
		s	3.9 ±0.4	4.8
Straight-ahead traveling		mm	125^{0}_{+125}	500
Natural travel drop				
Engages parking brake		mm	0	—
Releases parking brake		mm	0	—
Cylinders				
Cylinder speed				
Lowering speed when in arm float		s	5.2 ±1.2	6.9
Arm	Extended	s	3.7 ±0.4	4.5
	Retracted	s	2.7 ±0.3	3.3
Bucket	Extended	s	1.9 ±0.3	2.4
	Retracted	s	2.6 ±0.3	3.2
Cylinder spontaneous drop				
Arm		mm	7^{0}_{-5}	14
Bucket		mm	5^{0}_{-4}	10
Bucket tip		mm	—	
Lever				
Lever operating force				
Arm		N	10 ±4	
Bucket		N	10 ±4	
Travel		N	10 ±4	
Lever play				
Arm		mm	4^{0}_{-4}	
Bucket		mm	4^{0}_{-4}	
Travel		mm	4^{0}	
Crawler				
Crawler tension		mm	15 to 30	—
Level of bucket front edge		mm	10^{0}_{-10}	—

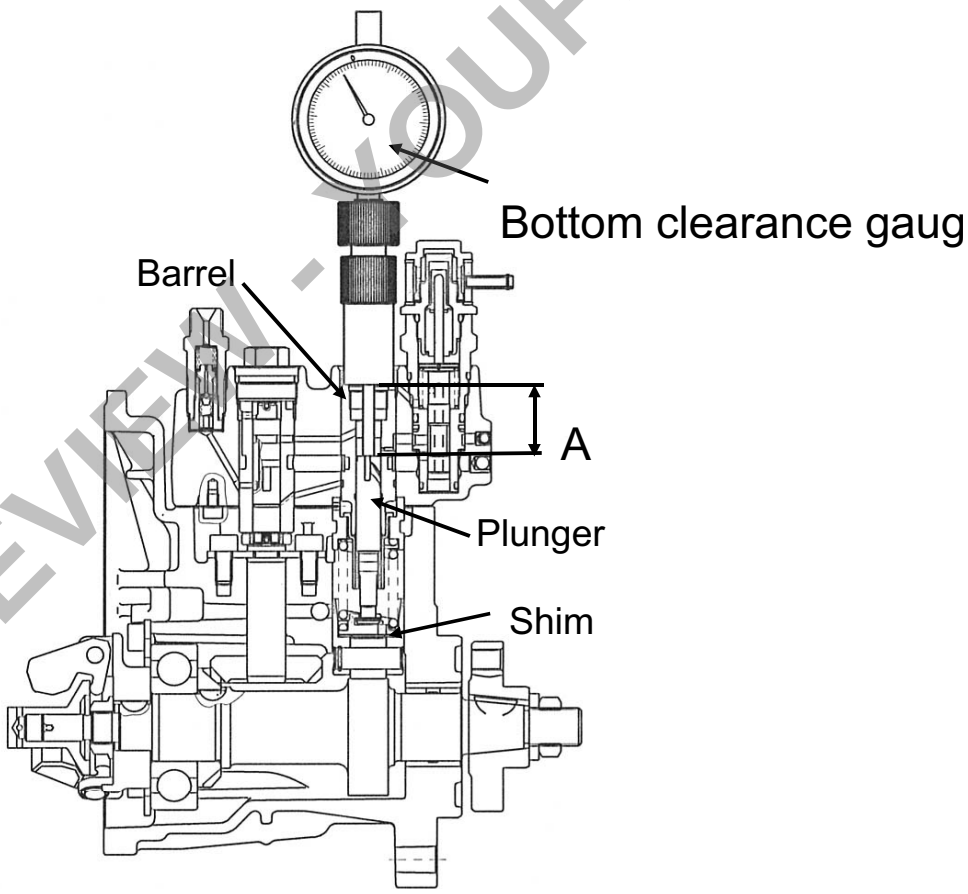
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4.2. Bottom clearance adjustment(Fuel Injection Timing)

1. The Fuel Injection Timing of MP-pump is made by means of adjusting the bottom clearance of the Cam ie. adjustment of the Pre-stroke of the plunger , as follows.
2. The adjustment of the clearance shall be made at cam-top position in order to get the reliable and easier method. Therefore herein after we will mention that “The adjustment of the bottoms clearance (of the Cam)”.
3. First of all , put the JIG of the bottom clearance measurement on the standard gauge(W/”A”- measurement). Then set the O-point of the dial gauge.
4. Next adjust the clearance by shims into the standard after measuring the bottom clearance A* with JIG (Dial gauge)(Refer to the attached sheet)*Measurement between upper surface of the Barrel and upper surface of the plunger at Cam bottom position





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Inspection and Maintenance-without gauges

Click on any of these subject headings to go directly to the page

- **Discussion of Inspection & Maintenance Survey Results**
- **Visual Inspection - System Off**
- **Electrical System Inspection**
- **Performance Inspection - Engine Running**
- **Heater System Inspection**
- **Preventive Maintenance Worksheet**
- **Chapter Review**

Discussion of Inspection & Maintenance Survey Results

There are three reasons for regular inspection and maintenance procedures:

1. They save money in the long run by reducing down time and often prevent more costly repairs.
2. They help to insure driver comfort and safety.
3. They add to your store of knowledge about these systems and maintain your level of efficiency.

About half of all heavy duty vehicles have air conditioners. Surveys of AC system owners find that over 30% of the systems are serviced every six months or less, and another 62% are serviced at least once a year.

The survey also covered how often the different components required maintenance. Figure 7.1 below shows survey finding percentages. Failure of any of the AC components listed in the survey could cause a system to malfunction or stop cooling.

Figure 7-1
This chart shows maintenance frequency, lists key parts and how often they require maintenance.

INSPECTION & MAINTENANCE SURVEY

How often are your air conditioners serviced?				
Average	1 to 6 months 30%	7 to 12 months 62%	More than 12 months 6%	Never 2%

Which AC components require frequent maintenance?					
Belts 32%	Compressor Clutch 26%	Condenser 12%	Add Refrigerant 12%	Refrigerant Lines 11%	Valves 7%

Note: The above survey results may not apply to your situation. Actual operating conditions for the vehicles you service will determine or influence maintenance frequency and requirements.

The following inspection procedures should take about 15 to 20 minutes, longer if corrective steps, part replacement or adding refrigerant is necessary. There is a "Preventive Maintenance Worksheet" you may use at the end of this chapter, Figure 7-9

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Air conditioner system

Overview of System Operation

Click on any of these subject headings to go directly to the page

- **Truck and Heavy Equipment Systems**
- **Air Conditioner-System Operation**
- **Heater System Operation**
- **Environmental Effects on System Operation**
- **Chapter Review**

Truck and Heavy Equipment Systems

A variety of HVAC systems are in use today, some old and some new. There are:

- Vehicle manufacturer installed systems
- Owner specified systems
- Add-on systems
- Retrofit systems

The system components come in different colors, shapes, and sizes. They may be mounted in or on the cab in varied locations. Owners or fleet maintenance people can modify systems by adding controls, auxiliary units or ducts. Major components are sometimes replaced due to damage or failure. All systems were, at least originally, designed and installed to meet the needs of an operator. Figure 2-1 includes illustrations of various AC and Heater systems. They illustrate system advantages and disadvantages explained in the paragraphs that follow.

The HVAC system includes both heater and air conditioner components, usually a common control, and air ducts. The system cools the cab by removing heat energy. It removes moisture from damp air in the cab and adds fresh outside air to the cab. In this way, the operator can work comfortably in all kinds of weather.

A sleeper unit, built in or added on, increases the air volumes in the cab. The air conditioner or heater must circulate and cool or heat a larger amount of air. This is accomplished by routing ducts and controls to the sleeper compartment as part of system design. Components may be increased in size to handle the larger cab air volume. A bigger heater core, air conditioning evaporator coil, condenser, blower or fan may be included. Often, on long haul trucks, auxiliary air conditioning and heater components and controls are added. The objective remains the same, to move heat energy and maintain occupant comfort.

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As the spring lever and control lever are mounted on the same shaft, when the control lever is turned towards full, the governor spring is pulled and the load gradually increases.
Since the tension lever can move freely around the governor shaft on the player bearing, as speed increases and the shifter is pushed to the left, the tension lever rotates clockwise, and when speed decreases, the tension lever rotates counterclockwise.

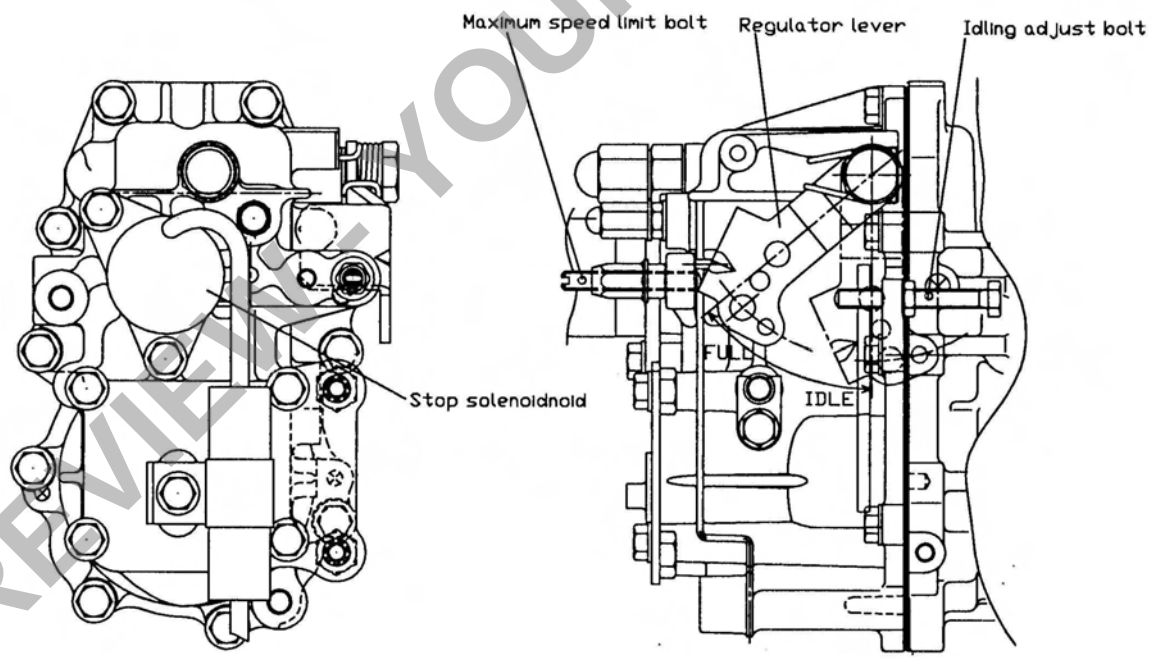
The governor lever rotates smoothly on the second shaft installed on the tension leveb. The bottom part of this lever is in contact with the sleeve through the shifter, which is in contact with the bottom of the tension lever through the excess fuel spring. It therefore moves with the tension lever according to increases／decreases in engine speed.

The top of the governor lever is connected to the fuel pump control rack through the governor link. The movement of the lever controls the volume of fuel injected by the pump. When speed increases the lever rotates clockwise to cause the control rack to reduce fuel and when speed decreases the lever rotates counterclockwise to cause the control rack to increase fuel, thus engine speed is controlled.

The top of the tension lever comes in contact with the stopper built into the top of the governor case to limit the maximum fuel injection volume.

(1) Shape of control and stop levers

The control and stop levers that operate the governor have different shapes depending on engine design and method of attachment, as seen in the pictures below.
The motion of the control lever is regulated by the maximum speed adjustment bolt and the idling adjustment bolt. This maintains the necessary engine speed.



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Attachments

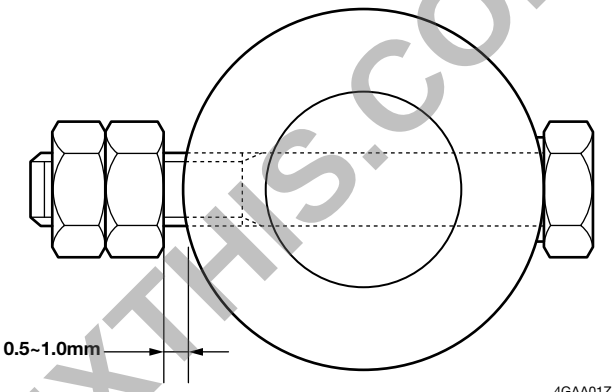
Removing the quick attachment

⚠ WARNING

- **Be sure to release the residual pressure from the hydraulic hose before disconnecting it.**
- **When adjusting the pin hole position, never put your finger into the hole.**

Important:

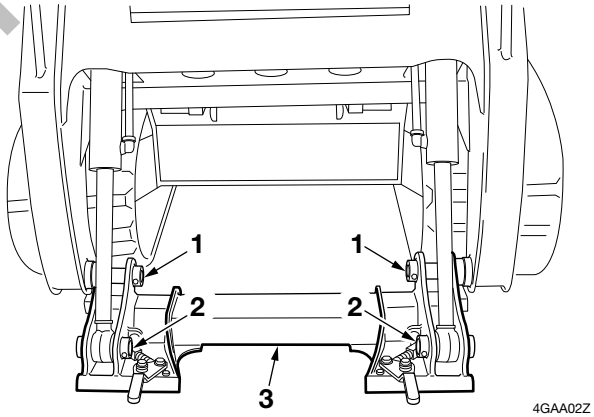
- **When tightening the lock bolt with a double nut, allow a clearance of 0.5 to 1.0 mm between the nut and the lock collar.**
- **When assembling, adjust the pin-connecting area with a shim so that no clearance is left. Be sure to reduce the clearance until a 0.2-mm-thick-shim cannot be inserted by hand.**
- **Be sure to bleed the air from the cylinder before starting for the first time after reassembling hydraulic devices such as the hydraulic cylinder or hydraulic piping.**



4GAA01Z

1. Lower the quick attachment surface side on which the bucket is mounted to the ground.

2. Pull out the bucket pins (1) and (2), and remove the quick attachment (3).
   - kg Quick attachment: Approx. 63 kg
   - Apply grease on both the bucket pin (1) and the pin hole. Bostik NEVER-SEEZ NS-42B or its equivalent

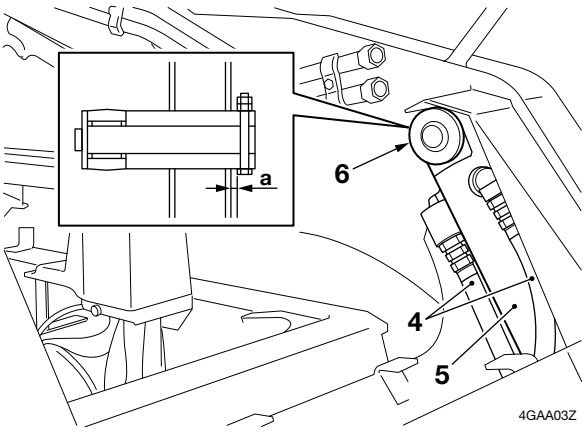


4GAA02Z

3. Disconnect the hydraulic hoses (4) from the bucket cylinders.

4. Suspend the bucket cylinder (5) temporarily, pull out the pin (6) and then remove the bucket cylinder.
   - kg Bucket cylinder: Approx. 15 kg
   - Apply grease on both the bucket pin (6) and the pin hole. Bostik NEVER-SEEZ NS-42B or its equivalent

Important: When assembling, do not insert a shim until there is no clearance of "a" between the lock bolt and the arm.



4GAA03Z

Installing the quick attachment

For installation, follow the same procedure as for removal in the reverse order.

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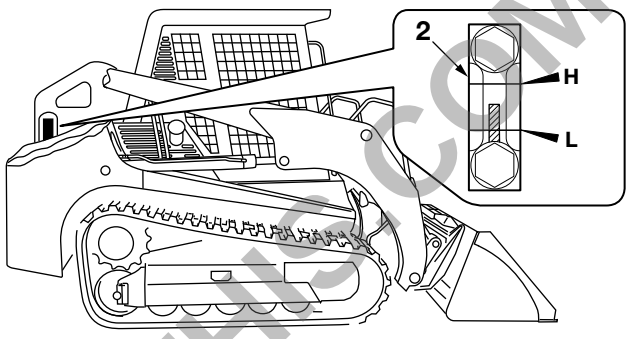
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Filling with hydraulic oil

The oil level changes with the oil temperature. Inspect the oil while maintaining the machine at the attitude shown in the figure on the right.

Machine attitude for inspecting the hydraulic oil level

1. Start the engine and run it at low speed.
2. Fully retract the lift arm cylinder and the bucket cylinder, and then lower the bucket to the ground.
3. Stop the engine.
4. Inspect the oil level using the sight gauge (2).
   When the oil temperature is about 20°C: The level should be halfway between the upper limit (H) and lower limit (L). If it is below the lower limit (L), replenish.
   When the oil temperature is about 50 to 80°C: The level should be near the upper limit (H).



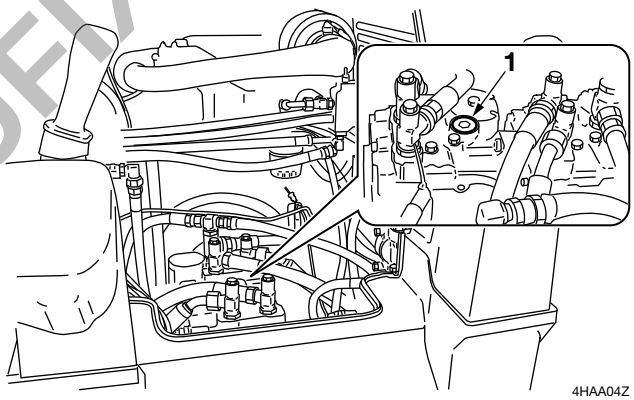
4HAA03Z

Bleeding the air

After replacing the hydraulic oil, bleed the air from the hydraulic circuits and hydraulic devices. Failure to do so may damage the hydraulic devices.

Hydraulic pump

1. Slowly raise the canopy.
2. Loosen the plug (1) used for bleeding air from the hydraulic pump.
3. Tighten the plug (1) once the hydraulic oil overflows from the plug hole.



4HAA04Z

Cylinder

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

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BUCKET

Bucket cylinder fails to move.

1	Check the operation of actuators other than the bucket cylinders			
	Normal ↓			
2	Check the pilot valve	Faulty →		Repair or replace the pilot valve.
	Normal ↓			
3	Check the spool operation	Faulty →		Repair or replace the housing block.
	Normal ↓			
4	Test the port relief valve with a replacement valve	Problem solved →	The port relief valve faulty →	Repair or replace the port relief valve.
	No change ↓			
5	Check the bucket cylinder	Faulty →		Repair or replace the bucket cylinder.

1. Check the operation of actuators other than the bucket cylinders.

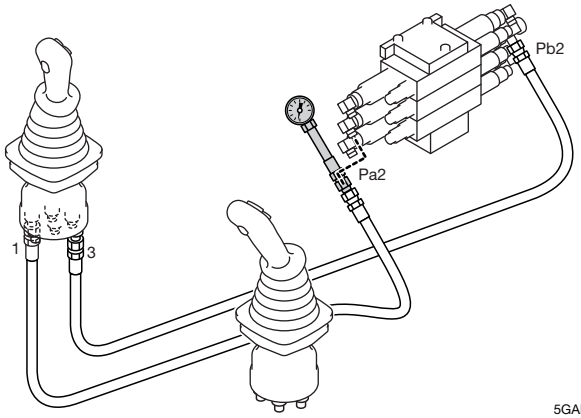
Check the lift arm as listed in the table on the right. If the lift arm is faulty, check the main relief valve and the hydraulic pump P3.

☞ "5-4 and 5-8"

Lever to operate	Location to check	
Lift arm	Relief valve R3	Pump P3

2. Check the pilot valve.

a. Disconnect the hose connecting the pilot valve and the control valve (bucket block) from the control valve.
b. Fit a pressure gauge to the hose just disconnected.
c. Operate the lever (bucket) and measure the pressure.
- If the pressure level is between 0 to 2.9 MPa for each angle, the valve is normal.



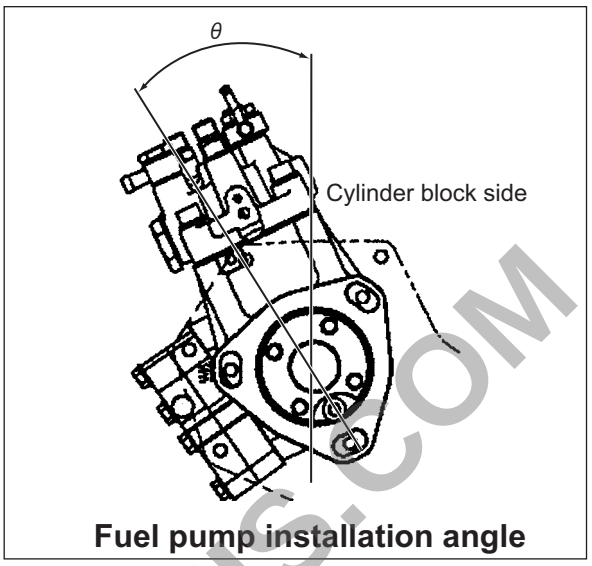
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(Supplementary explanation 1)

The installation angle of the fuel pump is as follows.

Model	Installation angle θ (deg.)
3TNV82A to TNV88	25
4TNV94L/98/106 (T)	13
4TNV106 (T)	11.5



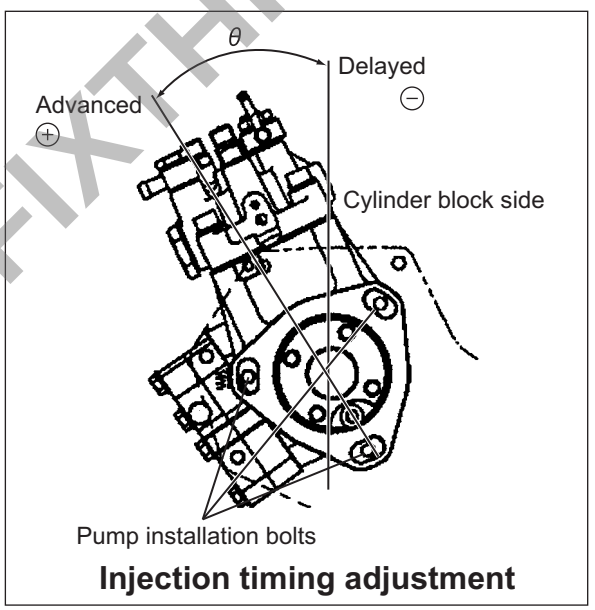
Fuel pump installation angle

(Supplementary explanation 2)

When fuel injection timing is advanced or delayed, the installation angle of the fuel pump is adjusted.

When fuel injection timing is advanced for example at 0.5 degrees(cam), loosen the nuts, which fix the fuel pump on the gear case, and turn the fuel pump body in the inside direction of the cylinder block at 0.5 degree(cam), and tighten the pump installation nuts.

And, when fuel injection timing is delayed, a pump is turned in that reverse direction.



Injection timing adjustment

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(R.1)

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9.1.8 Characteristic test

Since the characteristics can be checked roughly by means of a simple no-load test as explained below.
NOTE: Complete the test quickly since the rating of the starting motor is 30 seconds.

(1) No-load test

Fix the starting motor on a test bench and connect wiring as shown in Fig.31. When the switch is closed, a current flows in the starting motor, which is rotated at no-load. Measure the current, voltage and number of revolutions then and check if they satisfy the specified characteristics.

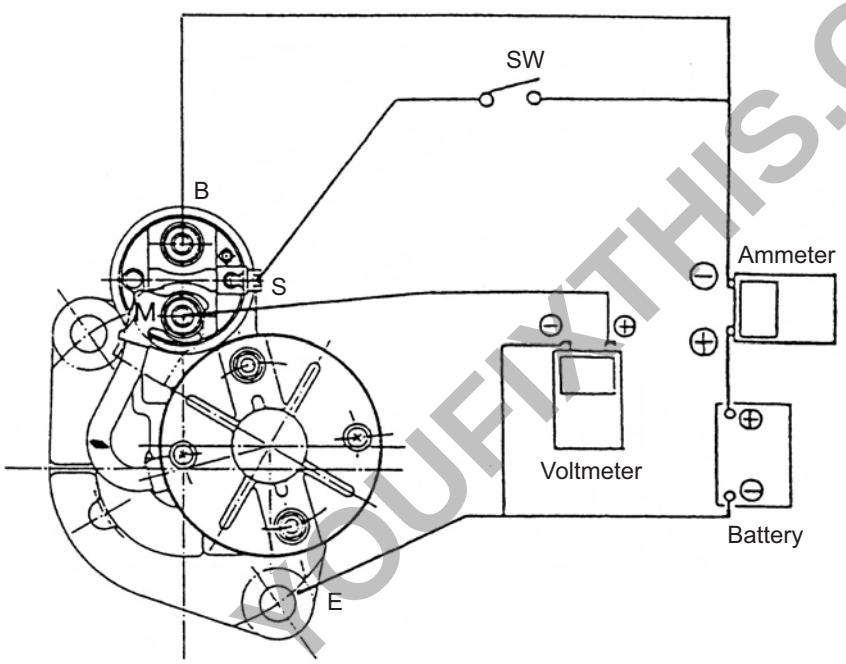


Fig. 31

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