TL150

Crawler Loader

BOOK No. CT7E001

WORKSHOP MANUAL

Serial No. 21500004~

TAKEUCHI

REV.1

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SAFETY PRECAUTIONS

SAFETY ALERT SYMBOL

This symbol means Attention! Be Alert! Your Safety Is Involved.
The message that follows the symbol contains important information about safety.
Read and understand the message to avoid personal injury or death.

■ SIGNAL WORDS

Safety messages appearing in this manual and on machine decals are identified by the words "DANGER", "WARNING" and "CAUTION". These signal words mean the following:

⚠ DANGER	⚠ WARNING	⚠ CAUTION
The word "DANGER" indicates an imminently hazardous situation which, if not avoided, can result in serious injury or death.	The word "WARNING" indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.	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 against operators and maintenance personnel about situations which can result in possible 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. For maintenance work, each person must take adequate safety precautions against possible hazards present in the respective working environment.

Observe all safety rules

- Operation, inspection and maintenance of this machine must be performed only by a trained and qualified person.
- All rules, regulations, precautions and safety procedures must be understood and followed when performing operation, inspection and maintenance of this machine.
- Do not perform any operation, inspection and maintenance of this machine when under the adverse influence of alcohol, drugs, medication, fatigue, or insufficient sleep.

Wear appropriate clothing and personal protective equipment

- Do not wear loose clothing or any accessory that can catch on controls or in moving parts.
- Do not wear oily or fuel stained clothing that can catch fire.


E3A040

- Wear a hard hat, safety shoes, safety glasses, filter mask, heavy gloves, ear protection and other protective equipment as required by job conditions. Wear required appropriate equipment such as safety glasses and filter mask when using grinders, hammers or compressed air, as metal fragments or other objects can fly and cause serious injury.
- Use hearing protection when operating the machine. Loud prolonged noise can cause hearing impairments, even the total loss of hearing.

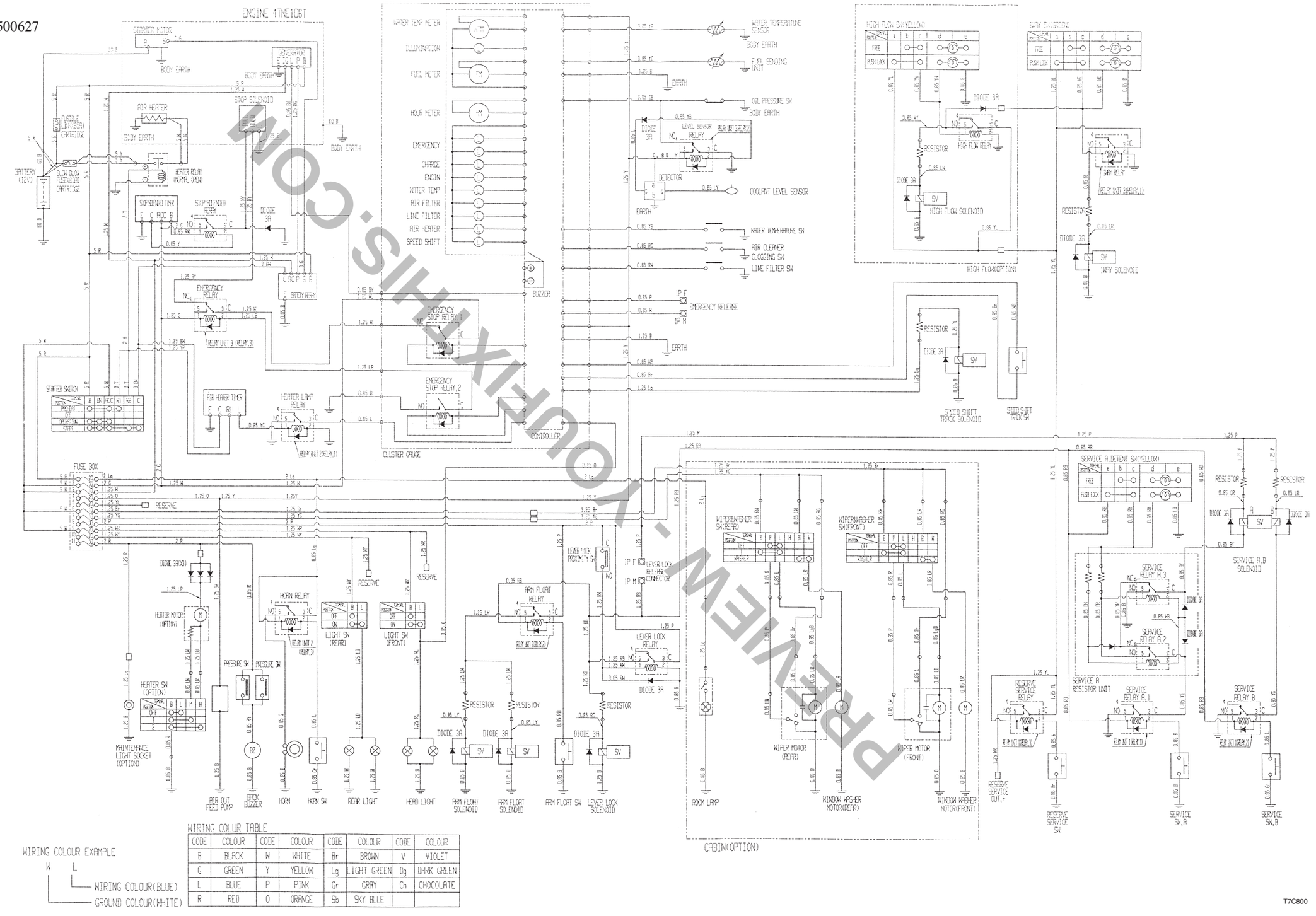
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ELECTRICAL SYSTEM

ELECTRICAL WIRING DIAGRAM

Serial No. 21500004~21500627



WIRING COLUR TABLE

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

WIRING COLOUR EXAMPLE

W L
- L — WIRING COLOUR(BLUE)
- W — GROUND COLOUR(WHITE)

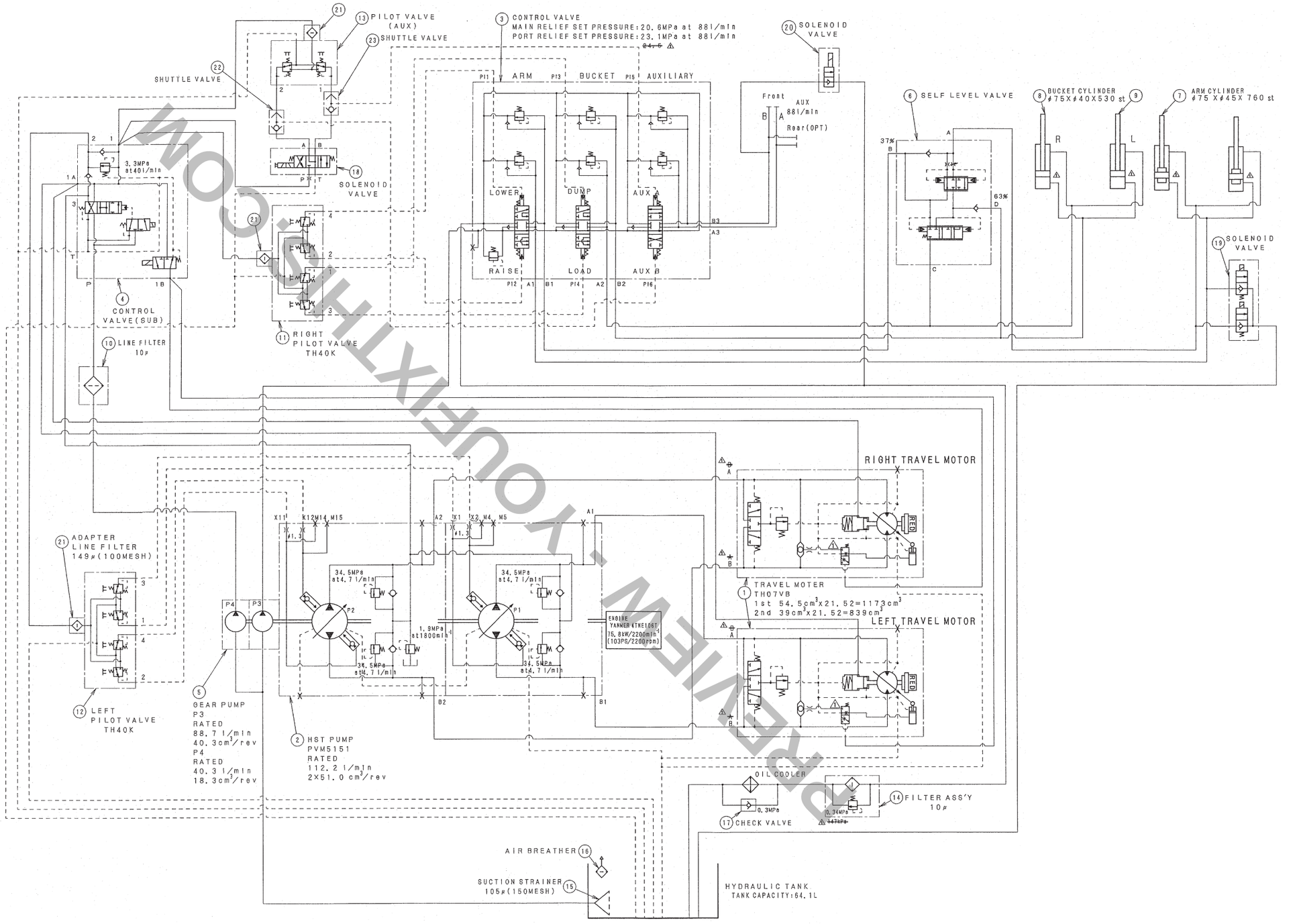
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HYDRAULIC SYSTEM

HYDRAULIC CIRCUIT DIAGRAM

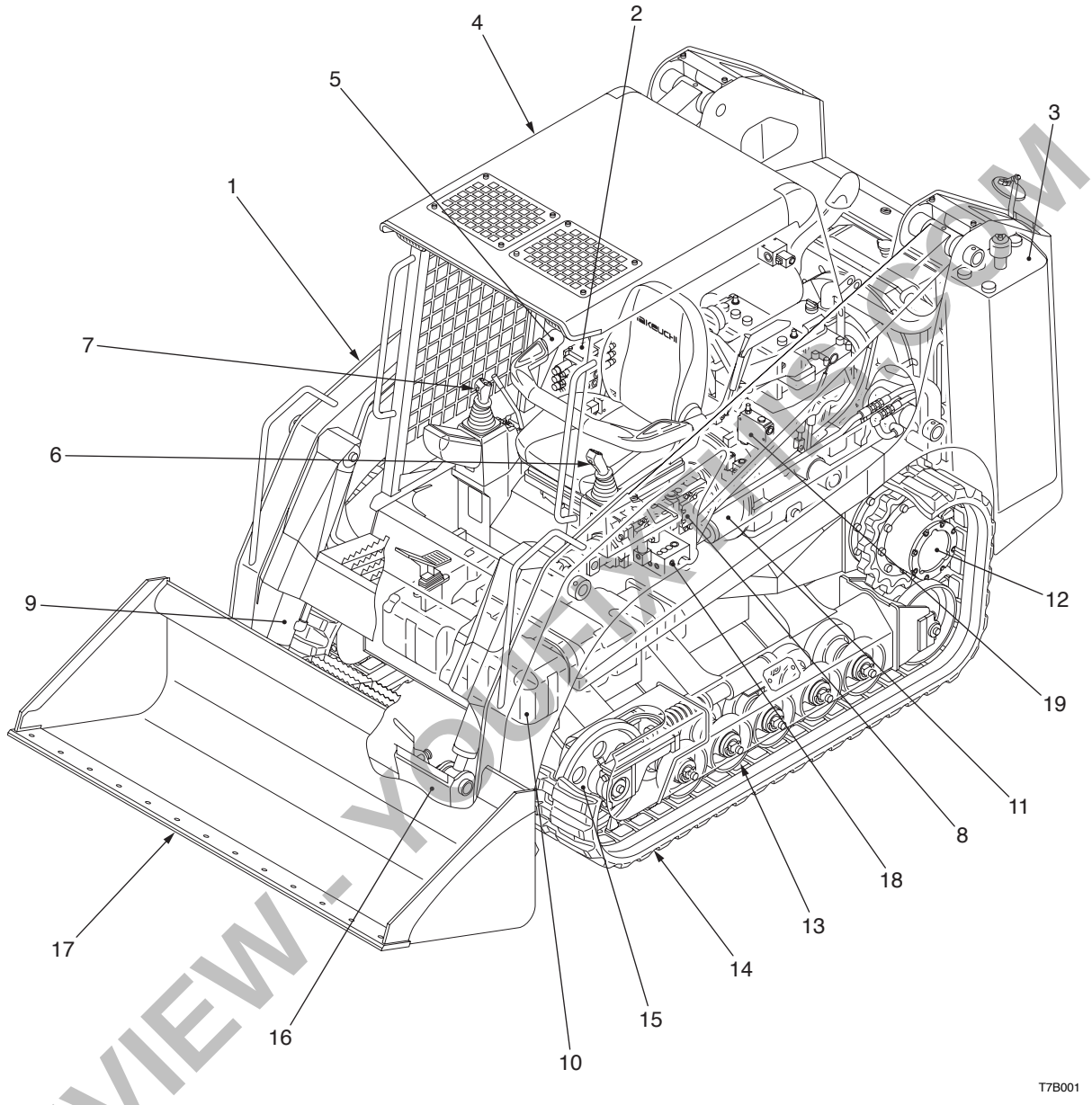
Standard
Serial No. 21500004~21500627



T7C7001

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NAMES OF COMPONENTS



1. Lift Arm
2. Control Valve
3. Hydraulic Tank
4. Canopy
5. Safety Bar
6. Pilot Valve (L. H.)
7. Pilot Valve (R. H.)
8. HST Pump
9. Bucket Cylinder
10. Fuel Tank
11. Arm Cylinder
12. Travel Motor
13. Track Roller
14. Crawler Belt
15. Idler
16. Quick Attachment
17. Bucket
18. Control Valve (Sub)
19. Self -Level Valve

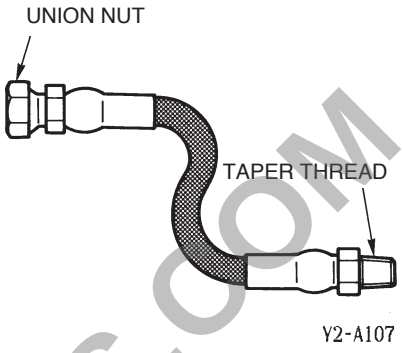
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TIGHTENING TORQUES

Hydraulic Hoses

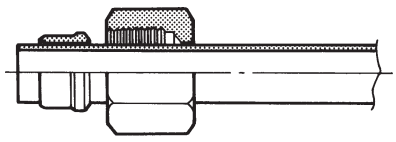
Hose Fitting Size	Torque			
	Union Nut (G)		Taper Thread (R)	
	N·m	ft-lb	N·m	ft-lb
1/8	9.8 $^{+4.9}_{0}$	7.3 $^{+3.5}_{0}$	11.8 ±1.2	8.7 ±0.8
1/4	24.5 $^{+4.9}_{0}$	18.1 $^{+3.5}_{0}$	29.4 ±2.9	21.7 ±2.1
3/8	49 $^{+4.9}_{0}$	36.2 $^{+3.5}_{0}$	53.9 ±5.4	39.8 ±3.9
1/2	58.8 $^{+4.9}_{0}$	43.4 $^{+3.5}_{0}$	88.3 ±8.8	65.1 ±6.4
3/4	117.7 $^{+4.9}_{0}$	86.8 $^{+3.5}_{0}$	147.1 ±14.7	108.5 ±10.7
1	137.3 $^{+4.9}_{0}$	101.3 $^{+3.5}_{0}$	196.1 ±19.6	144.7 ±14.3



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Bite Type Pipe Fitting for Steel Pipe

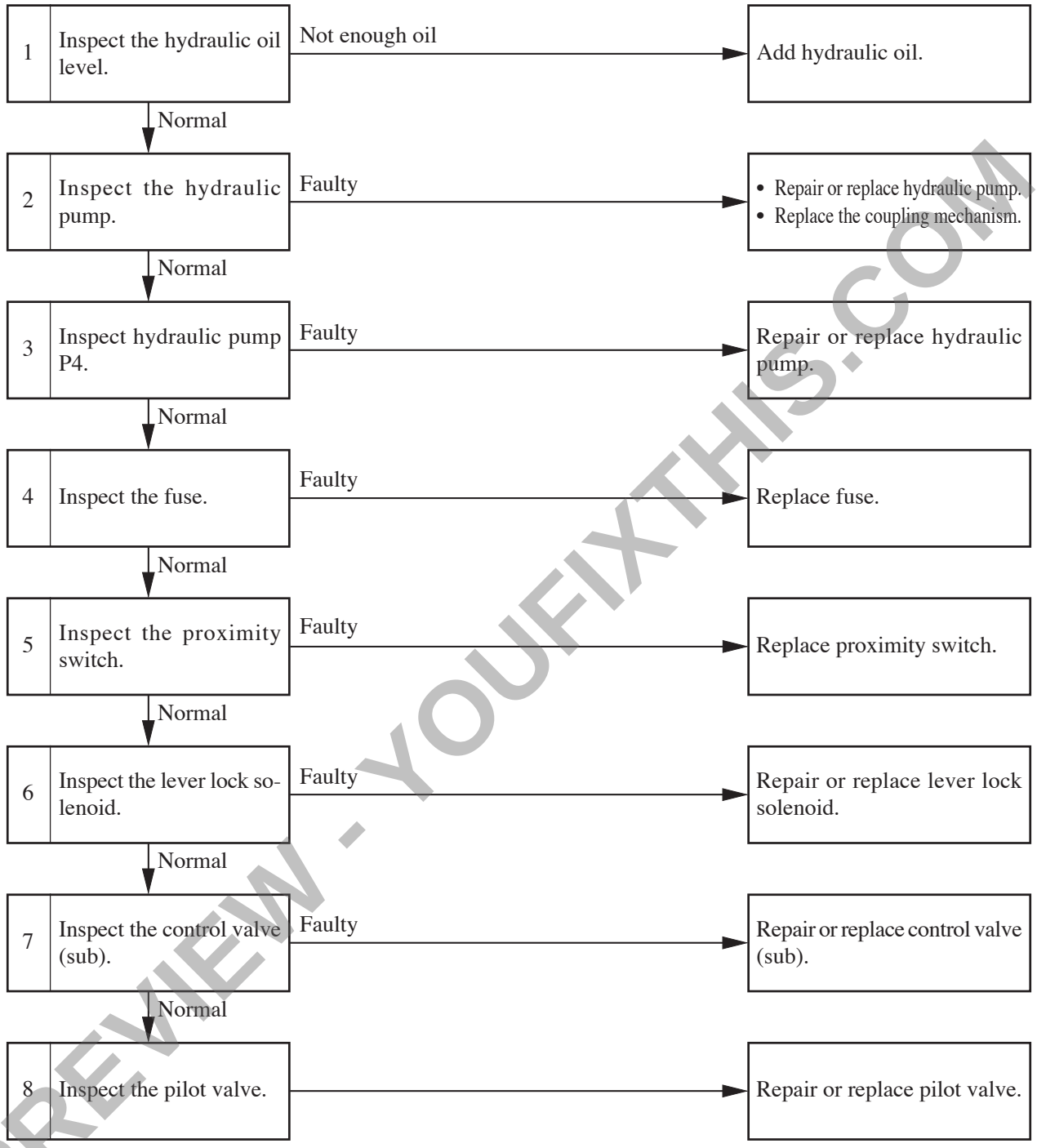
Pipe Outer Diameter (mm)	Torque	
	N·m	ft-lb
8	34.3 ±4.9	25.3 ±3.5
10	41.7 ±2.5	30.7 ±1.7
12	58.8 ±4.9	43.4 ±3.5
15	88.3 ±4.9	65.1 ±3.5
16	93.2 ±4.9	68.7 ±3.5
18	132.4 ±4.9	97.6 ±3.5
22	205.9 ±9.8	151.8 ±7.2
27.2	245.2 ±9.8	181.0 ±7.2
28	313.8 ±19.6	231.4 ±14.3
32	313.8 ±19.6	231.4 ±14.3
35	411.9 ±19.6	303.7 ±14.3


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COMPLETE FAILURE OF ALL SYSTEMS.



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SPECIFICATION TABLES

SPECIFICATIONS

Serial Number		21500004~			
Type		Canopy			
Standard Bucket Capacity					
Rated Capacity	m^3	0.579			
Struck Capacity	m^3	0.426			
Machine Mass (not including operator)	kg	4775			
Dimensions		21500004~ 21500131	21500132~ 21500627	21500628~ 21500749	21500750~
Overall Lenght: with bucket	mm	3930	3955	3985	←
without bucket	mm	3085	3105	3135	←
Overall Width: with bucket	mm	1960	←	←	←
without bucket	mm	1860	←	←	←
Overall Height	mm	2205	←	←	2320
Minimum Ground Clearance	mm	345	←	←	←
Front Clearance Radius: with bucket	mm	2435	←	←	←
without bucket	mm	1560	←	←	←
Rear Clearance Radius	mm	1745	←	1755	←
Overall Width of Crawler	mm	1860			
Overall Length of Crawler	mm	2155			
Bucket Width	mm	1960			
Angle of Departure	degree	30			
Working Range					
Maximum Lift Height to Bucket Pin	mm	3205			
Maximum Dumping Height	mm	2430			
Maximum Dump Angle Fully Raised	degree	39			
Maximum Bucket Rollback at Ground Level	degree	31			
Reach Fully Raised	mm	985			
Performance					
Breakout Force	kN	38.5			
Travel Speed 1st/2nd	km/h	8.1/11.1			
Gradeability	degree	30			
Ground Pressure	kPa	29.7			
Tipping Load	kg	3200			
Cycle Time					
Raise-Full Load (Lift Arm)	Sec.	4.8			
Lower-No Load (Lift Arm)	Sec.	3.1			
Dump-Full Load (Bucket)	Sec.	3.3			
Curl-Full Load (Bucket)	Sec.	2.4			

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RECOMMENDED LUBRICANTS

Use different fuels, lubricants and greases according to the temperature, referring to the chart below.

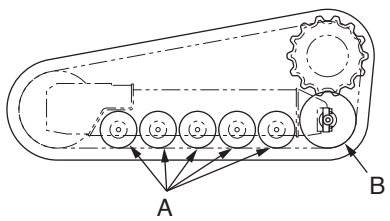
- Change the lubricant earlier than as show in the table if it is extremely dirty or its performance has deteriorated severely.
- Whenever possible, use the same brand of lubricant as before. If changing with a different brand, replace the entire quantity – do not mix different brands.

Part	Type	Type by temperature -22 -4 14 32 50 68 86 104°F -30 -20 -10 0 10 20 30 40°C	Replacement interval	Capacity
Engine oil pan	Diesel engine oil API service CD	SAE 5W-20 SAE 10W-30 SAE 15W-40	After first 50 hrs. Every 250 hrs.	Upper limit: 14 L Lower limit: 7 L
Hydlaulic tank	Diesel engine oil API service CD	SAE 10W-30	Every 1000 hrs.	Total system: 95 L Tank level 64: L
Fuel tank	Diesel fuel	Use a clean, Quality fuel for performance and optimum engine life. • To prevent fuel flow problems in cold weather, use diesel fuel with a pour point of at least -12°C (10°F) below the lowest expected ambient temperature. • Minimum cetane number is 45. Low temperature or high altitude operation may require the use of fuel with a higher cetane number.		Tank level: 108 L
Engine cooling system	Coolant (water**+Coolant***)	30% coolant mixture 50% coolant mixture	Every 1000 hours	15 L
Travel reduction gear	Gear oil API-GL-4	SAE 90	After first 500 hrs.* Every 1000 hrs.	1.8 L
Track Roller A	Diesel engine oil API service CD	SAE 30	—	180 mL
Track Roller B	Mobil gear SHC 680	——	—	170 mL
Idler		——	—	170 mL
Working equipment	Lithium grease EP-2 NLGI No. 2	——	Daily or erery 10 hrs.	As required
Levers		——	When required	

* If the percentage of the traveling time within the 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 manufacture's instructions to determine the mixture ratio.



T7B002

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3.13 Periodic Maintenence 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.

○: Inspection ◎: Parts replacement

Classification	Item	Daily	Maintenance period				
			Every 50 hours	Every 250 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
Fuel oil system	Fuel tank level check and fuel supply	○					
	Fuel tank draining		○				
	Water separator draining (Option)		○ Every 100 hours				
	Water separator cleaning (Option)				○		
	Fuel filter element replacement				◎		
Lubricating oil system	Lube oil level check	○					
	Lube oil replacement		◎ 1st time	◎ 2nd time and thereafter			
	Lube oil filter replacement						
Cooling water system	Cooling water level check and replenish	○					
	Radiator fin cleaning			○			
	Cooling fan V-belt tension check	○					
	Cooling water replacement					◎	
	Cooling water path flushing and maintenance						○
Fuel oil, lube oil and cooling water leakage check		○					
Rubber hose	Fuel pipe and cooling water pipe inspection and maintenance						○
Air intake system	Air cleaner cleaning and element replacement			○	◎		
	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					○	
Fuel injection pump and valve	Fuel injection valve pressure inspection					○	
	Fuel injection timing inspection						○

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DISASSEMBLY AND ASSEMBLY

Removing the Engine

1. Disconnect the negative battery cable from the battery.

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

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

4. Disconnect the electrical wiring from the air cleaner. Next, remove the bracket (1) together with the air cleaner.

5. Remove the radiator.
   ☞ "Removing the Radiator"

6. Disconnect the coolant drain hose (2).

7. Remove the hydraulic pump.
   ☞ "Removing the Hydraulic Pump"

8. Remove the valves (3) and the filter (4).

9. Remove the fuel inlet pipe (5).

10. Disconnect the fuel hoses (6).

11. Disconnect the battery cable (7) and all the connections on the engine side of the electric wirings (8).
    - Attach identification labels to individual wirings.
    - Disconnect the wirings from the clamp and the band.

12. Disconnect the engine ground cable (9).

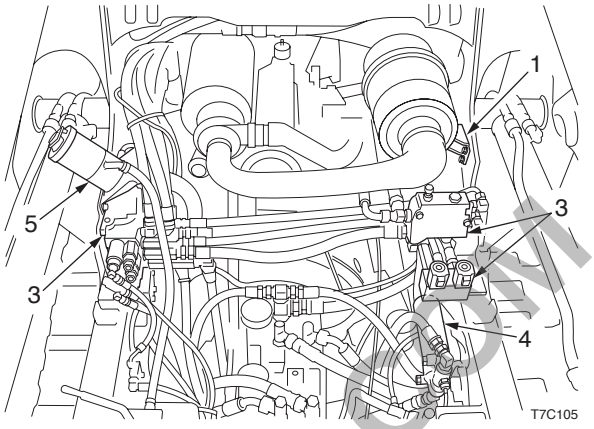
13. Remove the bracket (10) and accelerator wire (11) from the engine.

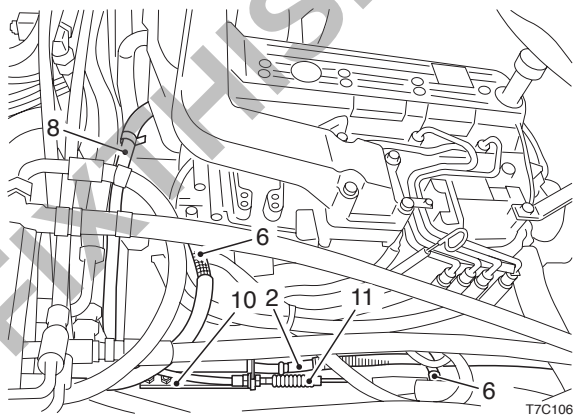
14. Remove the bolts (12) and then the cushion rubbers.
    ⊂⊃ Bolt: 256N·m; Apply thread-locking compound.

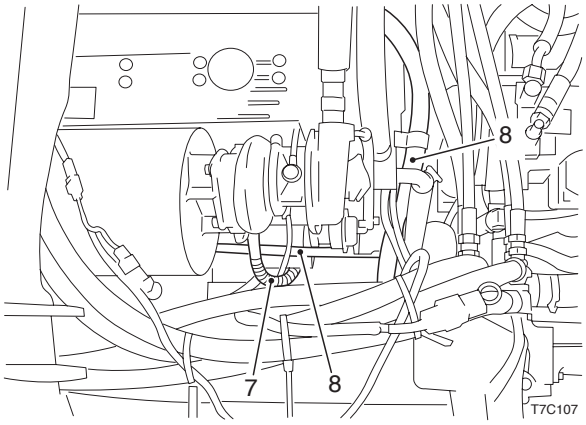
15. Suspend the engine temporarily, and remove the engine.
    ⏢ Engine: 340 kg

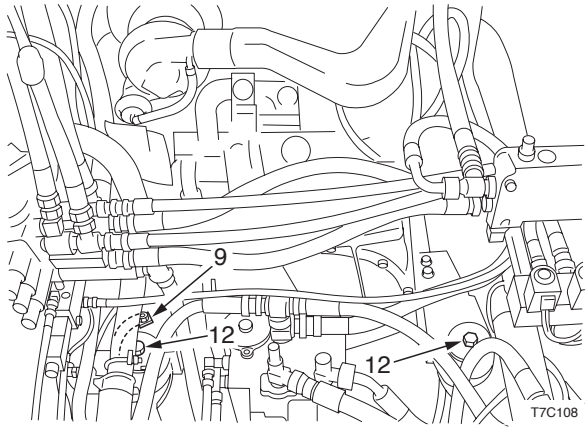
Installing the Engine

Follow the same procedure as for removal in the reverse order.









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FOREWORD

This manual is intended for persons who engage in maintenance operations, and explains procedures for disassembly and reassembly of the machine, check and maintenance procedures, maintenance reference values, troubleshooting and outline specifications, etc. Please use this manual as a reference in service activities to improve maintenance techniques.
Further, please be advised that items contained in this manual are subject to change without notice due to design modifications, etc.

MACHINE FRONT AND REAR, LEFT AND RIGHT

The end where the bucket is mounted is the front and the end with the travel motors is the rear. Also the right and left sides of the operator when he is seated in the driver's seat are the right and left sides of the machine.

MACHINE SERIAL NUMBER

The machine serial number is stamped on the identification plate. When sending reports and inquiries, and when ordering parts, etc., be sure to include this number.

MANUAL CONTROL

Information on those to whom this manual is distributed is recorded in the ledger in the section in charge at this company, so please decide on a person to be in charge of it and control it. When there are updates or additions, etc., we will notify the person in charge.

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INSPECTION AND ADJUSTMENT

Adjusting the Throttle Lever

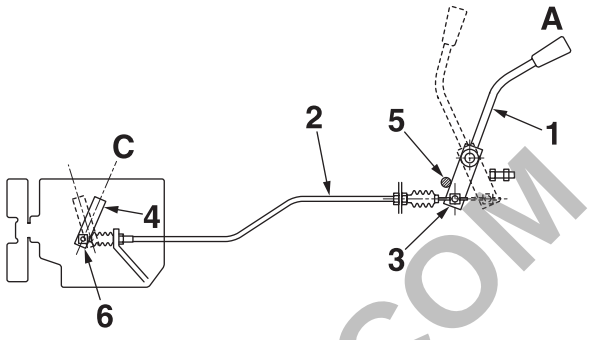
Engine Speed

1. Fasten the wire (2) to the throttle lever (1) by using the wire lock pin (3).

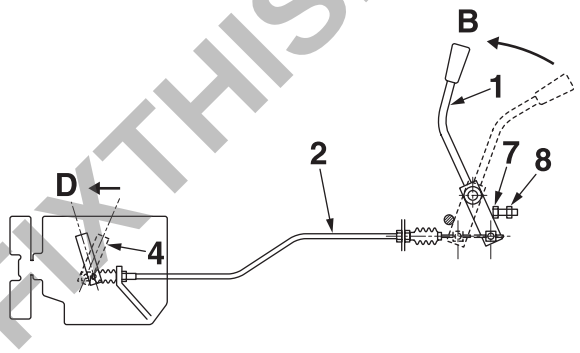
2. Move the throttle lever (1) to the A (low idle) position and the governor control (4) to the C position (idle).
   - Make sure that the throttle lever (1) hits against the stopper (5).

3. Secure the wire (2) with the wire lock pin (6).

4. Move the throttle lever (1) to the B (full throttle) position and the governor control (4) to the D (full throttle) position.
   - Adjust the stopper (7) so that the throttle lever (1) hits against the stopper (7), and tighten the lock nut (8) to fasten the stopper.



T8C157



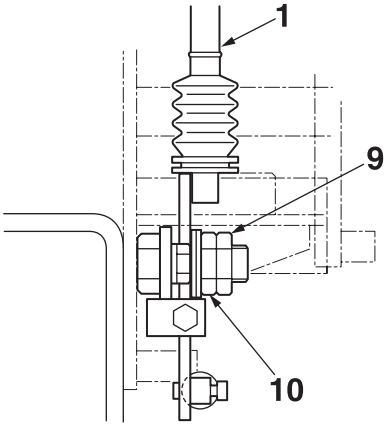
T8C158

Control Force

1. Loosen the lock nut (9), and turn the nut (1) to adjust the control force.
   Control force: 44.1 N

2. Upon completion of the adjustment, tighten the lock nut (9) by holding the nut (10) to prevent it from turning.

3. Operate the throttle lever (1) again, and make sure that the control force is stable.



T8C159

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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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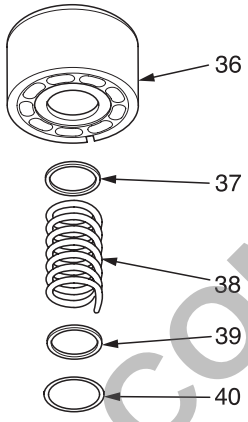
21. Disassemble the cylinder block.

⚠WARNING

Always wear appropriate protective items such as safety goggles, as component parts can jump out and cause serious bodily injury.

Do not disassemble the cylinder block unless required.

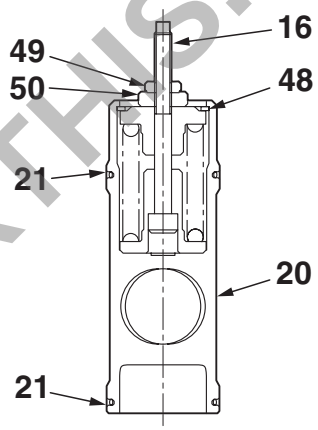
a. Remove the retaining ring (40) while compressing the spring.
b. Remove the washer (39), the spring (38) and the washer (37) from the cylinder block (36).



T6D132

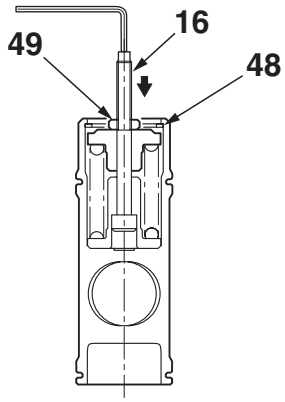
22. Disassemble the servo piston.
The servo piston should not be disassembled unless required for cleaning up foreign matter or replacing damaged components.

a. Remove the piston rings (21) from the servo piston (20).
b. Remove the nuts (49 and 50) from the tie bolt (16).



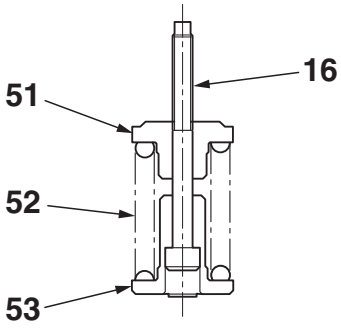
S3F318

c. Attach the nut (49) to the tie bolt (16), and tighten the nut (49) manually to compress the spring.
   - Hold the tie bolt by an cap wrench to prevent it from turning.
   - Tighten the nut until no load is applied to the snap ring (48).
d. Remove the snap ring (48).
e. Remove the spring assembly.
f. Remove the nut (49).



S3F319

g. Remove the spring guide (51), the spring (52), and the spring guide (53) from the tie bolt (16).

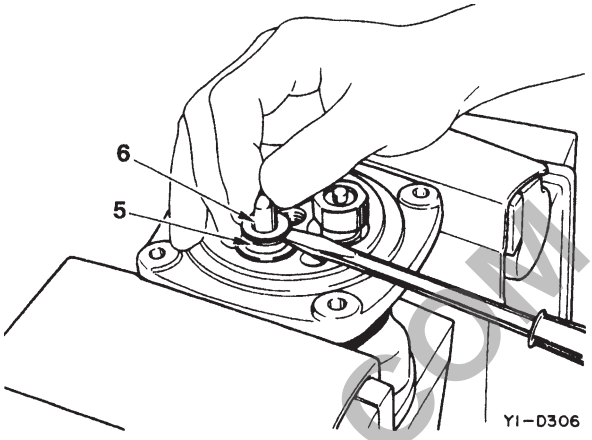


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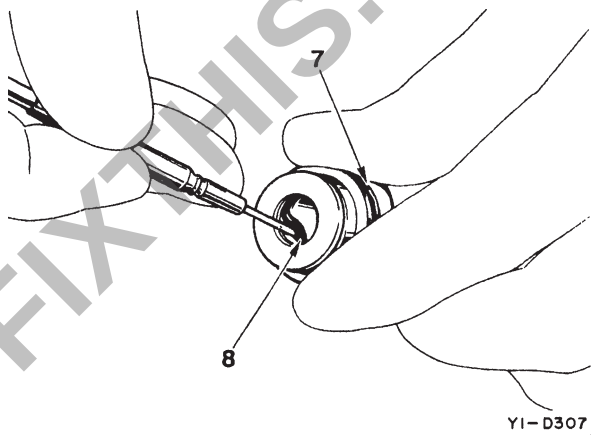
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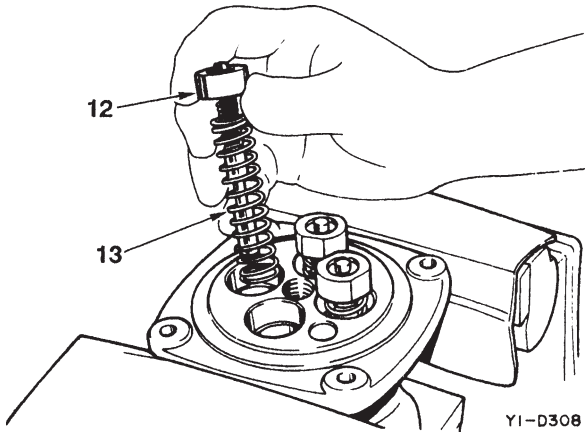
3. Take out the plug (5) then remove the push rod (6) from the plug (5).
   - If the plug is difficult to remove, use (–) screw driver to remove it.
   - Be careful not to let the plug fly out from the spring's force.



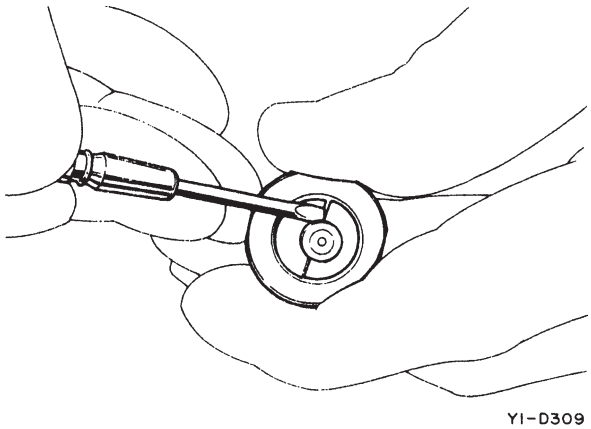
4. Remove the O-ring (7) and seal (8) from the plug.



5. Remove the reducing valve (12) and spring (13).
   - Make match marks on the reducing valve and casing hole so they can be placed in the same position when they are reassembled.



6. Disassembled the reducing valve.
   a. Remove washer 1.
      - Stand the valve on a flat work bench with the bottom of the spool down, then push the spring seat down. (It cannot be pushed down more than 6 mm.)



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1. Inspect the hydraulic oil level.
   ☞ "III. Machine Configuration, Hydraulic Tank"

2. Hydraulic pump is emitting an unusual level of noise.
   The cause of the problem is probably a fault in the suction line which has caused the pump to dry out. Check according to the following procedure.
   a. Check the lines sucking the hydraulic oil.
      • Apply grease or oil to the area which seems to be the cause of the problem and watch to see what happens. (Check to see if air is being drawn into the system.)
   b. Check to see if the suction strainer is clogged.

3. Inspect the line filter.
   Remove the case, take out the filter element and check to see if the filter is clogged.

4. Inspect the control valve (sub).
   ☞ "V-6"

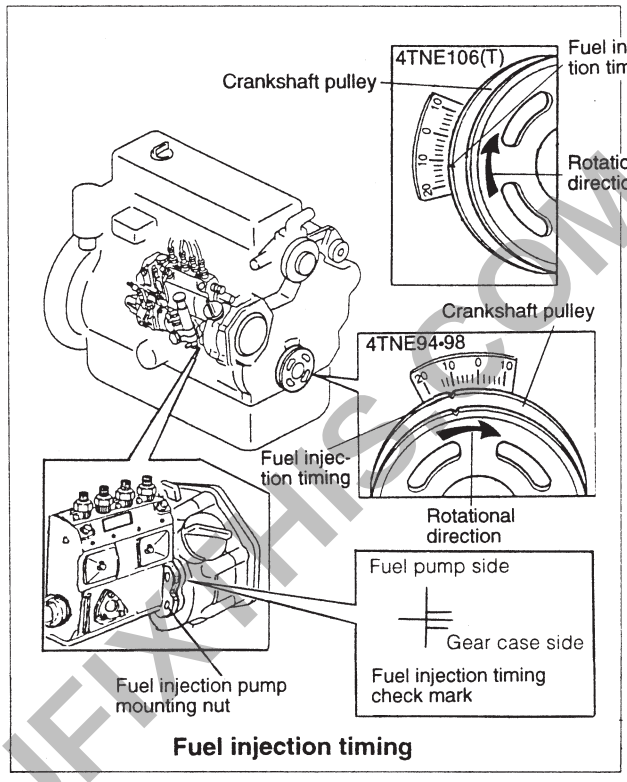
5. Hydraulic pump at fault.
   When the inside of the pump is excessively worn or has been damaged, the possibility exists that metal filings will work their way into the hydraulic oil. If this is the case, take the following action:
   • Replace the line filter and spin filter element.
   • Replace or flush the hydraulic oil (any oil of NAS Grade 9 or above may be used).
   • When replacing the hydraulic oil, always be sure to clean the inside of the hydraulic tank and the suction strainer.
   ☞ "III. Machine Configuration, Hydraulic Tank"
   If the pump seal has been damaged, replace it.
   ☞ "IV. Hydraulic Units, Hydraulic Pump"

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3.7 Fuel Injection Timing Inspection and Adjustment

1) Set the engine ready for starting. (Complete air bleeding from the fuel line.)
2) See that the fuel injection timing check mark on the fuel pump mounting flange and gear case are aligned.
3) Set the control valve at the operating position.
4) Disconnect the high pressure tube for the No.1 cylinder on the fuel pump side. (Do not remove the delivery valve.)
5) Check fuel discharge from the delivery holder while turning the crankshaft (clockwise as seen from the radiator), and stop turning it when the fuel comes out.
6) Check the crankshaft pullet top mark position on the timing scale. The No.1 piston can be checked at its top dead center when the position is between 10° before the top (10 graduations on the left from 0) and 10° after the top.



Fuel injection timing

7) Then wipe the outlet of the delivery holder clean. Turn the crankshaft in the opposite direction to return to approx. 20° before the top.
8) Slowly turn the crankshaft clockwise. As the oil surface in the deliver holder rises, stop rotation upon rising and check the position on the timing scale. The injection timing is normal if the top mark is positioned in the timing scale range shown in the table below on the left side from 0.

	4TNE94•98	4TNE106	4TNE106T
Standard: Degrees bTDC (FID)	10~12	13~15	11~13

9) Repeat steps 6) to 8) a few times.

(Note)
Injection timing check for one cylinder is generally sufficient. If it is to be checked for all four cylinders, turn the crankshaft 180° each time and check in the order of cylinders No.1, No.3, No.4, No.2 and No.1. (The No.1 cylinder is positioned furthest from the radiator.)
The cylinder to be checked is not limited to the No.1 cylinder but any desired one may be checked.

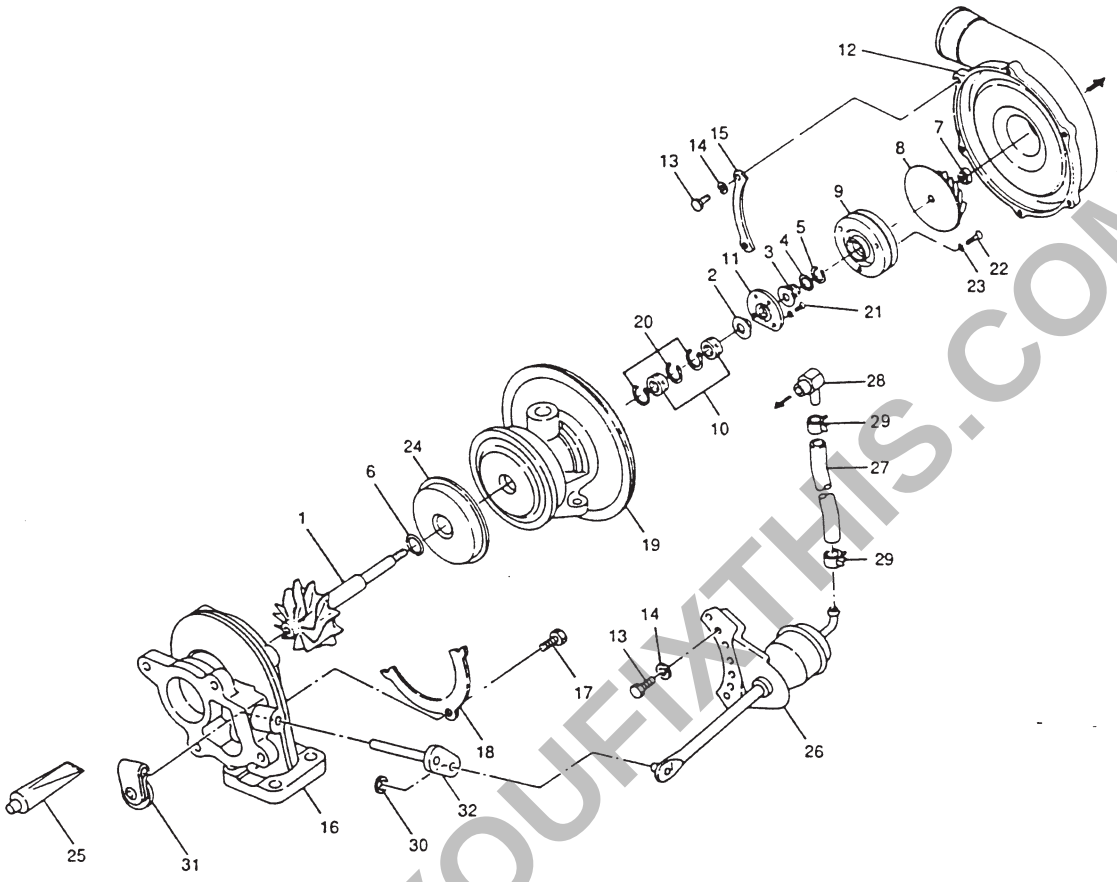
10) If the ignition timing is outside the standard, loosen the fuel pump mounting nut and rotate the fuel pump toward or away from the engine for adjustment. Rotate toward the engine to advance the timing, and away from the engine to delay the timing.
(One graduation on the gear case scale corresponds to one degree in ignition timing.)

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(3) Components



No.	Part name	No.	Part name
1	Turbine shaft	17	Bolt
2	Thrust bushing	18	Lock plate
3	Oil thrower	19	Bearing housing
4	Seal ring	20	Retaining ring
5	Seal ring	21	Screw
6	Seal ring (turbine side)	22	Screw
7	Lock nut	23	Lock washer
8	Impeller	24	Heat protector
9	Seal plate	25	Liquid gasket
10	Journal bearing	26	Waste gate actuator
11	Thrust bearing	27	Hose
12	Compressor housing	28	Adapter
13	Flanged bolt	29	Clip
14	Spring washer	30	Retaining ring
15	Clamp	31	Waste gate valve
16	Turbine housing	32	Link plate

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10.2 For 4TNE106(T)

10.2.1 Specifications

(1) Specifications

Manufacturer and model: Hitachi	–	LR160-735B
Yanmar code	–	123900-77210
Rating	–	Continuous
Battery voltage	V	12
Nominal output	–	12 V 60 A
Rated rpm	rpm	5000
Operating rpm	rpm	1050 to 18000
rpm for generating 13.5 V (cold at 20°C)	–	1050
Polarity	–	⊖ Ground
Direction of rotation (as seen from pulley)	–	Clockwise
Weight	kg	4.2
Regulated voltage	V	14.4
Standard temperature gradient	V/°C	–0.01
Rotor coil resistance	Ω	2.33
V pulley outside diameter	mm	82
Belt type	–	B type

(2) Characteristic

Output current (13.5 V hot at 20°C)	A/rpm	56/5000

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2.2 Periodic inspection and maintenance procedure

2.2.1 Check before daily operation

Be sure to check the following points before starting an engine every day.

No.	Inspection Item
(1)	Visual check around engine
(2)	Fuel tank level check and fuel supply
(3)	Lube oil level check and replenishment
(4)	Coolant water level check and replenishment
(5)	Fuel pipe and coolant water pipe inspection and maintenance
(6)	Inspection and adjustment of governor lever and accelerator
(7)	Warning lamp & instruments function check

(1) Visual check around engine

If any problem is found, do not use before the engine repairs have been completed.

- Oil leak from the lubrication system
- Fuel leak from the fuel system
- Coolant water leak from the cooling water system
- Damaged parts
- Loosened or lost bolts
- Fuel, radiator rubber hoses, V belt cracked, loosened clamp

(2) Fuel tank level check and fuel supply

Check the remaining fuel oil level in the fuel tank and refuel the recommended fuel if necessary. (Refer to 1.3.(1))

(3) Lube oil level check and replenishment

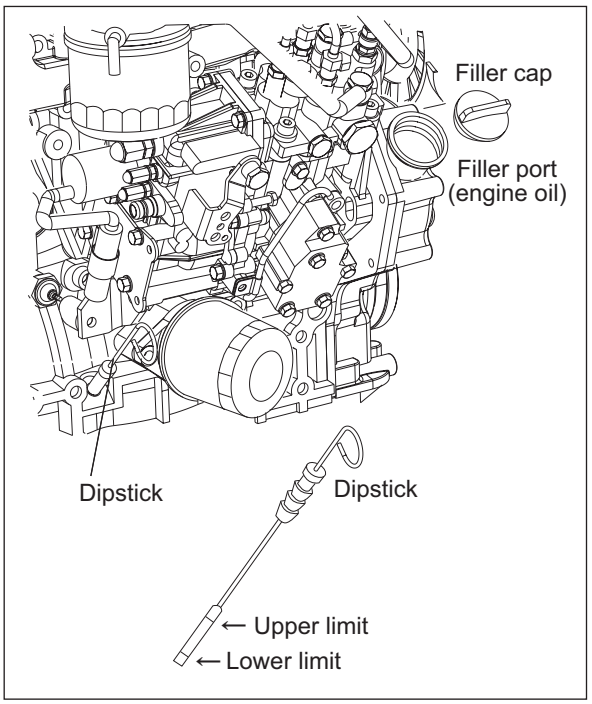
(a)Checking oil level

Check the lube oil level with the dipstick, after adjusting the posture of the machine unit so that an engine may become a horizontality. Insert the dipstick fully and check the oil level. The oil shall not be contaminated heavily and have appropriate viscosity. No coolant water or diesel fuel shall be mixed.

When lube oil is supplied after the engine running, check the lube oil level after about 10 minutes pass after the engine shutdown so that the lube oil inside may be retuned the oil pan.

Standard

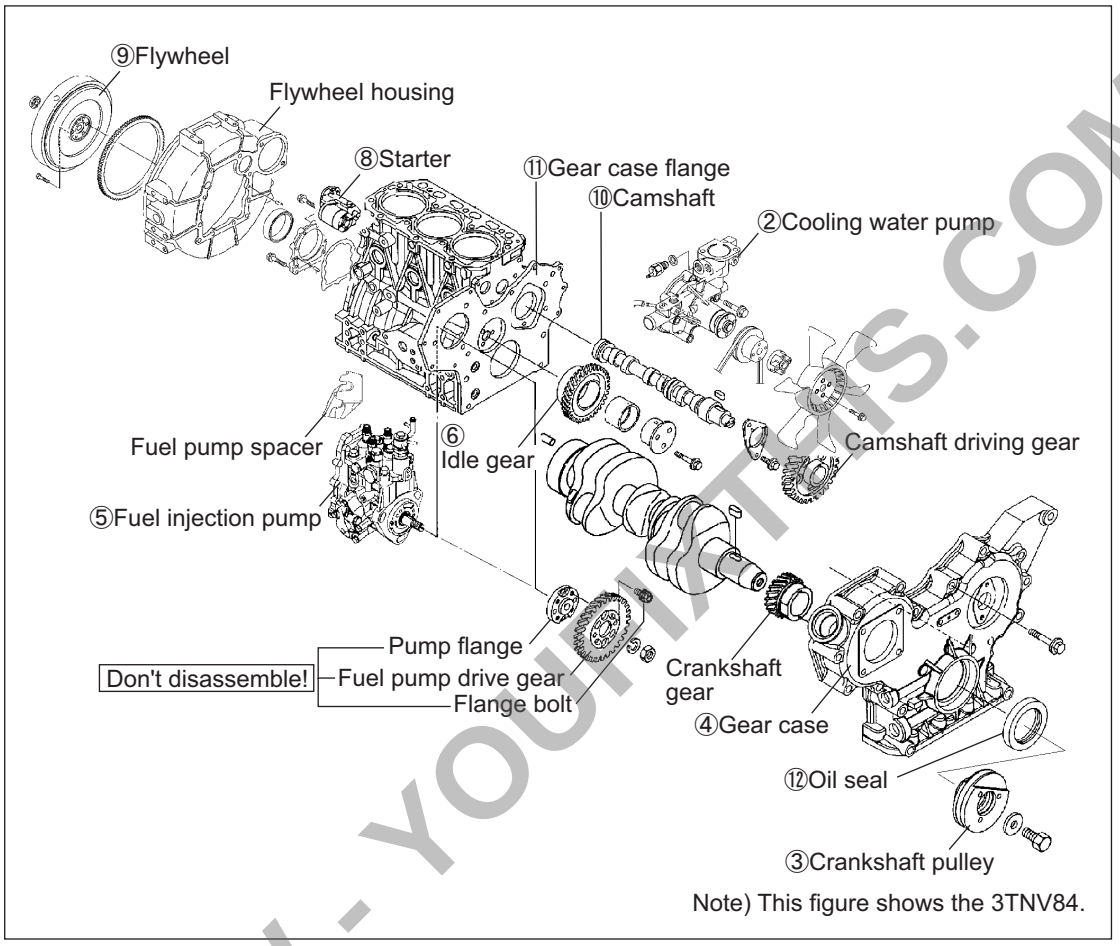
The level shall be between the upper and lower limit lines on the dipstick.



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4.3 Gear train and camshaft

4.3.1 Components



Note) This figure shows the 3TNV84.

4.3.2 Disassembly procedure:

Disassemble in the order of the numbers in the illustration.

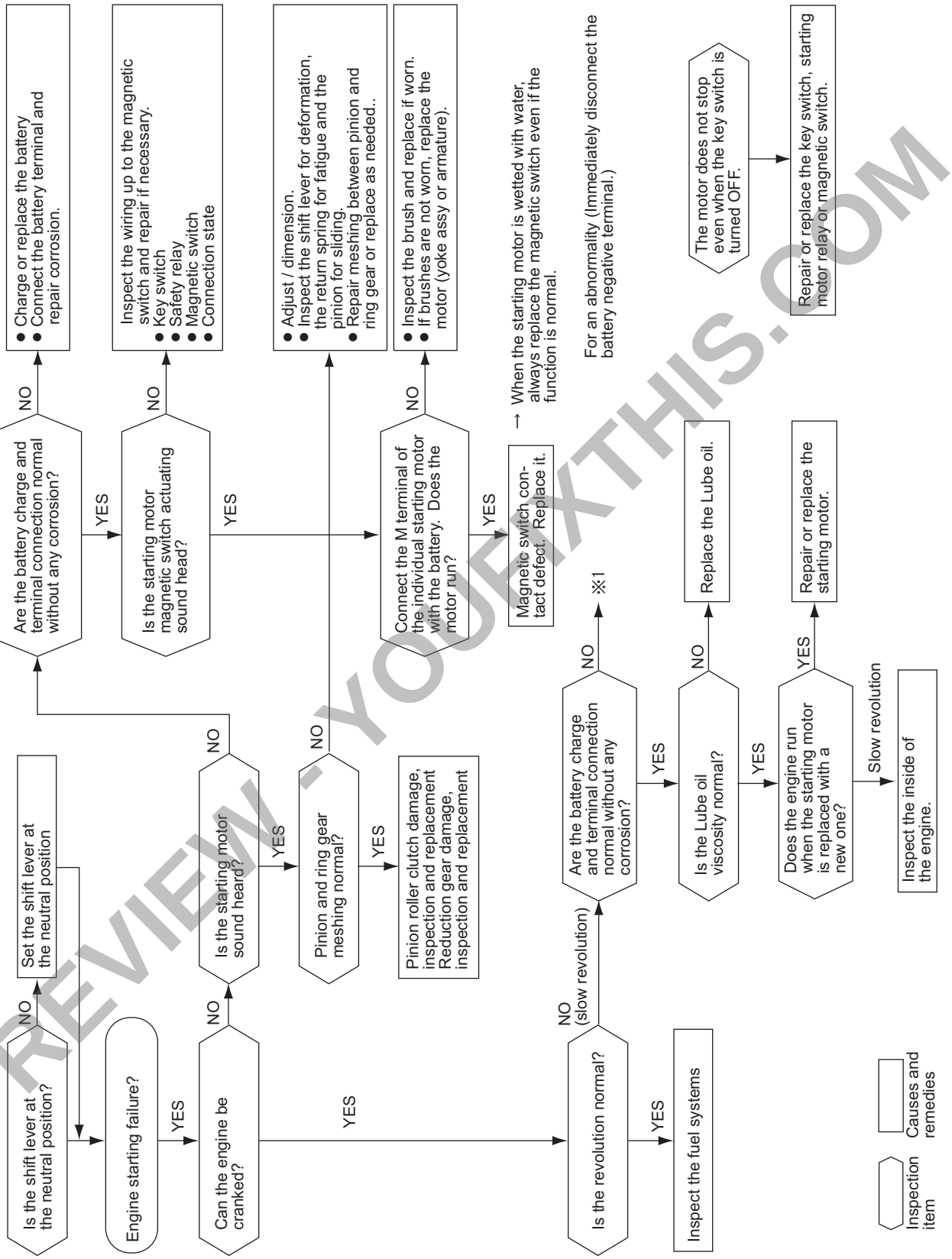
1)Perform steps 1) to 12) of the cylinder head disassembly procedure.
2)Remove the cooling water pump.
3)Remove the crankshaft pulley. (See **Point 1** of 4.3.4)
4)Remove the gear case cover. (See **Point 2** of 4.3.4)
5)Remove the fuel injection pump. (See **Point 3** of 4.3.4)
6)Remove the idle gear assy. (See **Point 4** of 4.3.4)
7)Remove the PTO drive gear. (See **Point 5** of 4.3.4)
8)Remove the starting motor.
9)Remove the flywheel. (See **Point 6** of 4.3.4)
10) Remove the camshaft assy. (See **Point 7** of 4.3.4)
11) Remove the gear case. (See **Point 8** of 4.3.4)
12) Remove the oil seal from the gear case cover. (See **4.3.6**)

4.3.3 Reassembly procedure:

Reverse of the disassembly procedure.

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9.1.3 Troubleshooting



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Introduction

This document describes the features, disassembly, reassembly and adjustment procedure of the fuel injection unit (Model YPD-MP2,MP4) for Yanmar Diesel Engine Model TNV.

Fuel injection unit is an essential mechanism of diesel engines, and thus, has to be designed to allow fine adjustment to the engine load.

Therefore, the components of the fuel injection pumps are required to be given high-precision. To meet this requirement, we process and assemble them very accurately.

Accordingly, when performing disassembly and adjustment works in the market, keep the workbenches and their environment clean to surely prevent dirt and dust from attaching to the components of the unit, and take special care that the components are not rusted.

Please note that the specifications of the components are revised to improve the quality of the product, and thus, the details of the changed specifications will be notified through the correction table every time the change occurs.

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