# TB108

## Compact Excavator

BOOK No. CB5E002

# WORKSHOP MANUAL

Serial No. 10820001~

TAKEUCHI

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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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# SPECIFICATION TABLES

## SPECIFICATIONS

| Serial Number | | 10820001~ | |
|---|---|---|---|
| Machine Type | | With Canopy | Canopy Less |
| Machine Mass (not including operator) | | | |
| Rubber Crawler | kg | 855 | 810 |
| Steel Crawler | kg | — | — |
| Engine Rated Output | kW/min$^{-1}$ | 7.1/2400 | ← |
| Bucket Capacity (Standard Bucket) | | | |
| Rated Capacity | m$^3$ | 0.018 | ← |
| Struck Capacity | m$^3$ | 0.013 | ← |
| Performance | | | |
| Slew Speed | min$^{-1}$ | 9.3 | ← |
| Travel Speed: Rubber Crawler 1st/2nd | km/h | 2.0/3.9 | ← |
| Steel Crawler 1st/2nd | km/h | — | — |
| Gradeability | % (degree) | 47 (25) | ← |
| Ground Pressure: Rubber Crawler | kPa | 25.1 | 23.8 |
| Steel Crawler | kPa | — | — |
| Noise Level: Sound-power level | dB (A) | LwA 93 | ← |
| Sound-pressure level | dB (A) | LpA 80 | ← |
| Auxiliary Hydraulic Flow Rate | L/min | 21.4 | ← |
| Dimensions | | | |
| Overall Length in Transport Position | mm | 2710 | ← |
| Overall Width | mm | 900 | ← |
| Overall Height | mm | 2110 | 1375 |
| Dimensions of Base Machine | | | |
| Tail Swing Radius | mm | 800 | ← |
| Distance of Rearmost Upper Structure from Axis of Rotation | mm | 790 | ← |
| Clearance Height under Upper structure | mm | 385 | ← |
| Crawler base | mm | 900 | ← |
| Crawler: Overall Length | mm | 1220 | ← |
| Overall Width | mm | 900/680 | ← |
| Crawler Shoe Width | mm | 180 | ← |
| Minimum Ground Clearance | mm | 160 | ← |

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## DISASSEMBLY AND ASSEMBLY

### Removing the Engine

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

2. Remove the canopy.

3. Remove the engine hood, center cover, side cover L and R.
   ☞ "Removing the Covers"

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

5. Remove the fuel tank.
   ☞ "Removing the Fuel Tank"

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

7. Disconnect the control cable (2) from the engine.

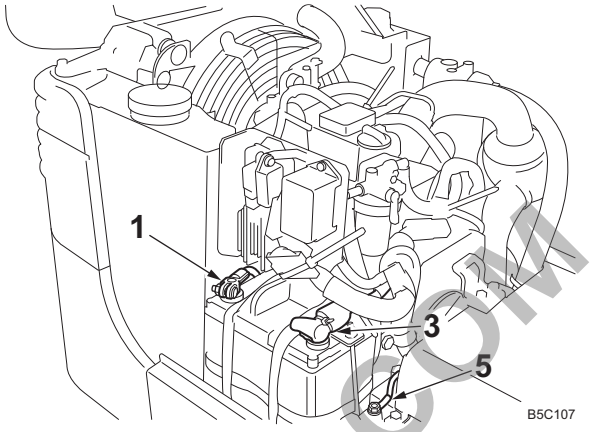
8. Disconnect the battery cable (3) and all the connections on the engine side of the electric wirings (4).
   - Attach identification labels to individual wirings.
   - Disconnect the wirings from the clamp and the band.

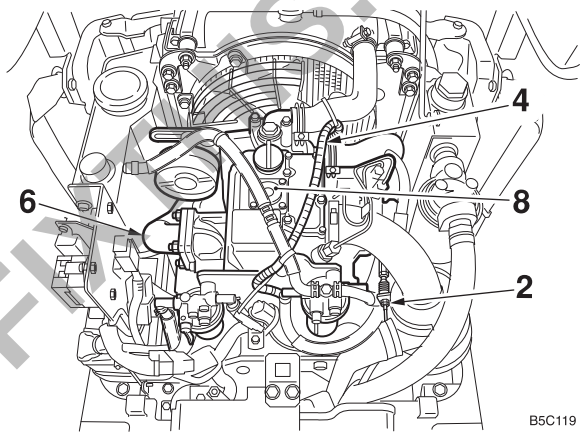
9. Disconnect the engine ground cable (5).

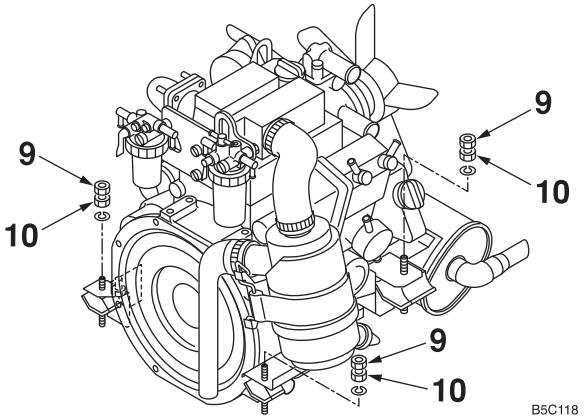
10. Remove the muffler pipe (6).

11. Remove the cushion rubber tightening double nuts at the three feet of the engine foot, engine foot RR and RL.
    ⊂⊃ Nut (9): 26 N·m
    ⊂⊃ Nut (10): 21 N·m

12. Suspend the engine (8) remove it.




### Installing the Engine

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

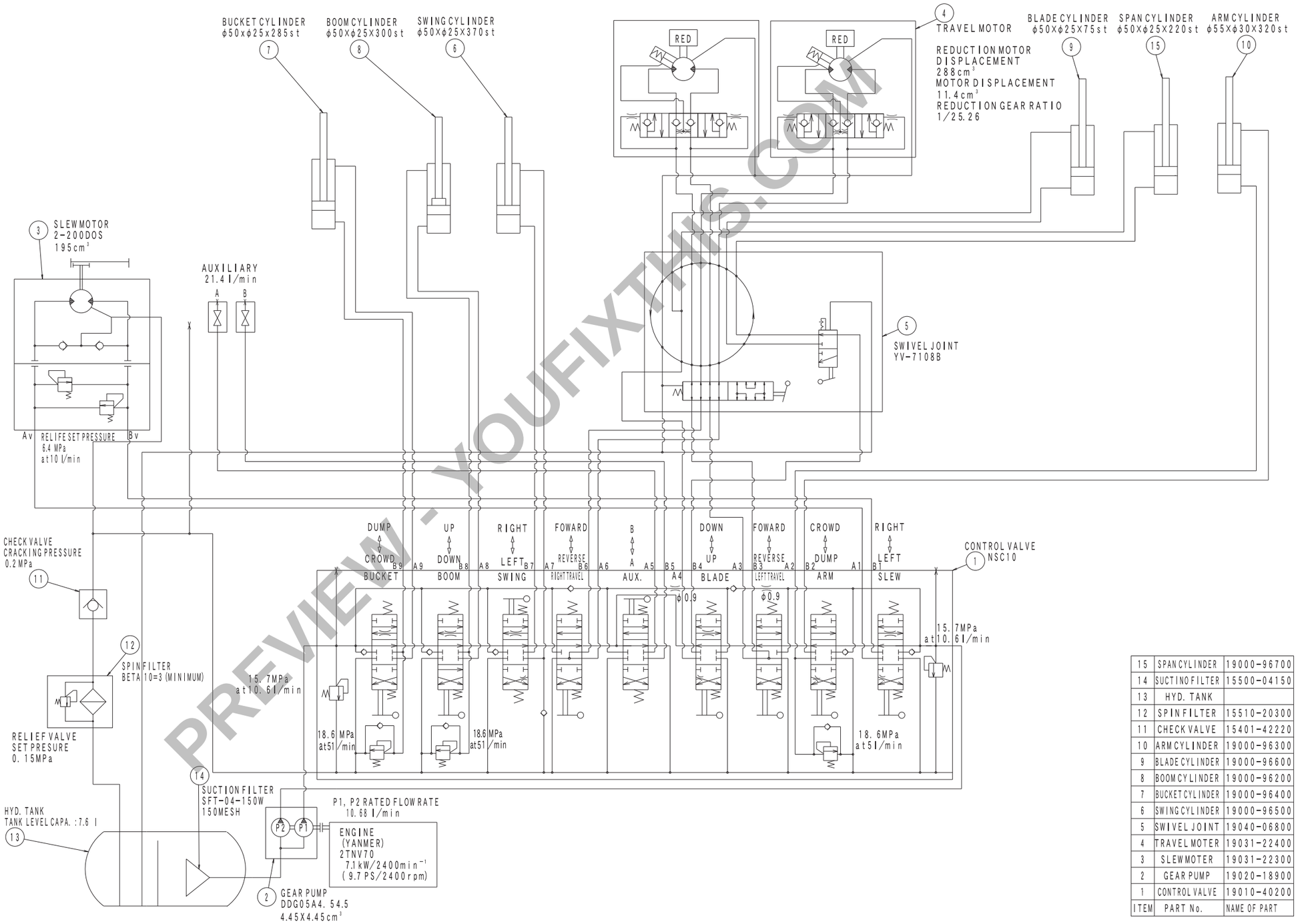
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# HYDRAULIC SYSTEM

## HYDRAULIC CIRCUIT DIAGRAM




| ITEM | PART No. | NAME OF PART |
|---|---|---|
| 15 | SPAN CYLINDER | 19000-96700 |
| 14 | SUCTION FILTER | 15500-04150 |
| 13 | HYD. TANK | |
| 12 | SPIN FILTER | 15510-20300 |
| 11 | CHECK VALVE | 15401-42220 |
| 10 | ARM CYLINDER | 19000-96300 |
| 9 | BLADE CYLINDER | 19000-96600 |
| 8 | BOOM CYLINDER | 19000-96200 |
| 7 | BUCKET CYLINDER | 19000-96400 |
| 6 | SWING CYLINDER | 19000-96500 |
| 5 | SWIVEL JOINT | 19040-06800 |
| 4 | TRAVEL MOTER | 19031-22400 |
| 3 | SLEW MOTER | 19031-22300 |
| 2 | GEAR PUMP | 19020-18900 |
| 1 | CONTROL VALVE | 19010-40200 |

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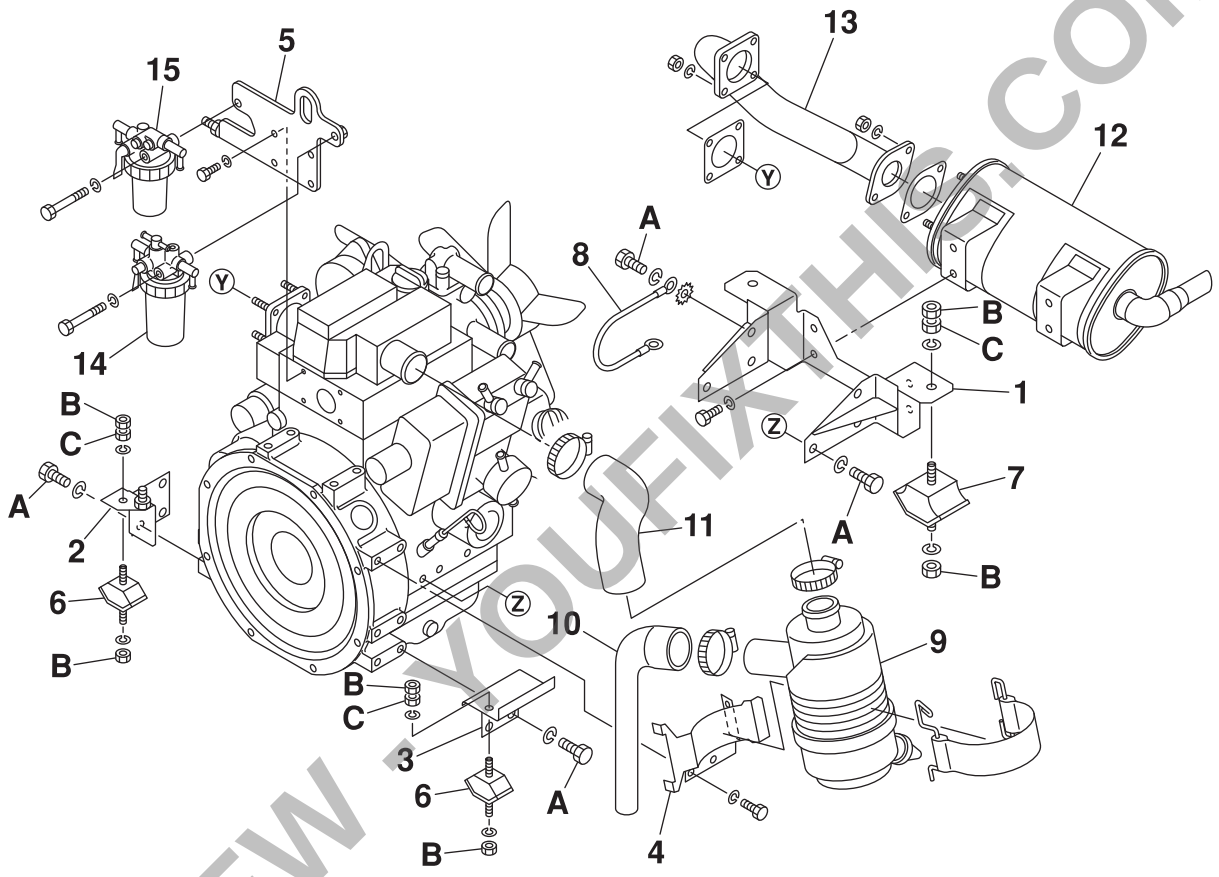


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# DRIVE SYSTEM

## CONSTRUCTION

### Engine Mount




B5C114

A: 66 N·m
Apply thread-locking compound.
B: 26 N·m
C: 21 N·m

1. Engine Foot
2. Engine Foot RR
3. Engine Foot RL
4. Bracket
5. Plate
6. Cushion Rubber
7. Cushion Rubber
8. Ground Cable
9. Air Cleaner
10. Pipe
11. Pipe
12. Muffler Pipe
13. Pipe
14. Fuel Filter
15. Water Separator

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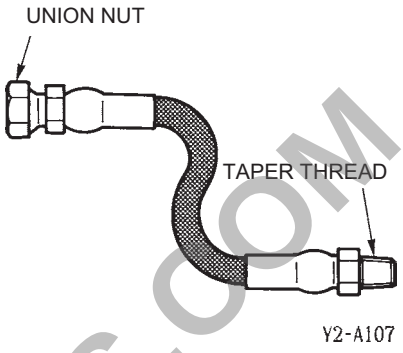


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## TIGHTENING TORQUES

### Hydraulic Hoses

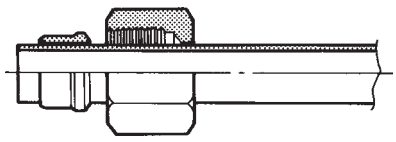
| Hose Fitting Size | Torque | | | |
|---|---|---|---|---|
| | Union Nut (G) | | Taper Thread (R) | |
| | N·m | ft-lb | N·m | ft-lb |
| 1/8 | 9.8 $^{+4.9}_{0}$ | 7.3 $^{+3.5}_{0}$ | 11.8 ±1.2 | 8.7 ±0.8 |
| 1/4 | 24.5 $^{+4.9}_{0}$ | 18.1 $^{+3.5}_{0}$ | 29.4 ±2.9 | 21.7 ±2.1 |
| 3/8 | 49 $^{+4.9}_{0}$ | 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 |



Y2-A107

### 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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**TROUBLESHOOTING**

| Symptom | Probable Causes | Remedy |
|---|---|---|
| Pump won't discharge. | • Direction of rotation is reversed. | • Run the pump in the specified direction. |
| | • Oil level in the tank is low. | • Replenish the oil to the specified level. |
| | • Suction side pipe or suction filter is clogged. | • Clean the pipes. |
| | • Hydraulic oil's viscosity is too high. | • Replace the hydraulic oil with oil of the proper viscosity. |
| | • Speed is low. | • Run the pump at the specified speed. |
| Noise level is high. Abnormal noise is generated. | • Suction side hose is crushed, the suction filter is clogged or cavitation is occurring. | • Remove the dirt or eliminate the crushed condition of the hose. |
| | • Suction side joint is loose and air is being sucked in. | • Tighten all the joint. |
| | • Hydraulic oil's viscosity is too high, and cavitation is occurring. | • Replace the hydraulic oil with oil of the proper viscosity. |
| | • Pump and engine are out of center with respect to each other. | • Correct the centering between the pump and engine. |
| | • There are bubbles in the hydraulic oil. | • Investigate the cause of the bubbles and correct it. |
| Oil leaks from oil seals. | • Oil seal is worn, damaged or deformed. | • Replace the oil seal. |
| Oil leaks from mating surfaces between housing and flange and between housing and cover. | • Body seal is damaged or worn by rubbing. | • Replace with a new part. |
| Discharge volume is low. | • Bushing seal is damaged. | • Replace the bushing. |
| | • Cavitation is occurring. | • Clean the suction filter and suction side piping. |
| | • Aeration is occurring. | • Check for insufficient tightening of pipes, etc. and repair. |
| | • Viscosity of the hydraulic oil is too low. | • Replace the hydraulic oil with oil of the proper viscosity. |

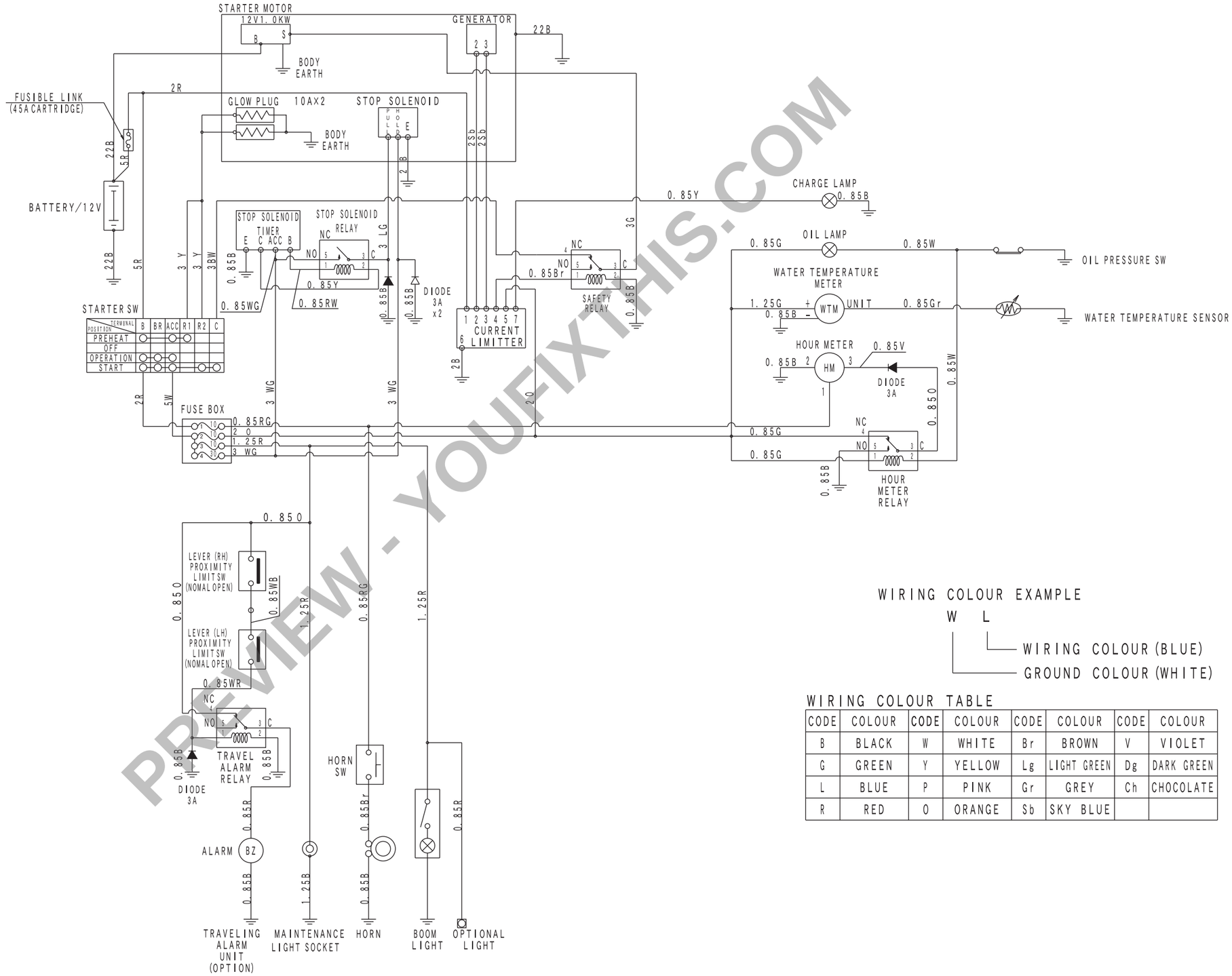
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# ELECTRICAL SYSTEM

## ELECTRICAL WIRING DIAGRAM




WIRING COLOUR EXAMPLE

W L

WIRING COLOUR (BLUE)

GROUND COLOUR (WHITE)

WIRING COLOUR 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 | GREY | Ch | CHOCOLATE |
| R | RED | O | ORANGE | Sb | SKY BLUE | | |

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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 dozer blade 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 operator'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

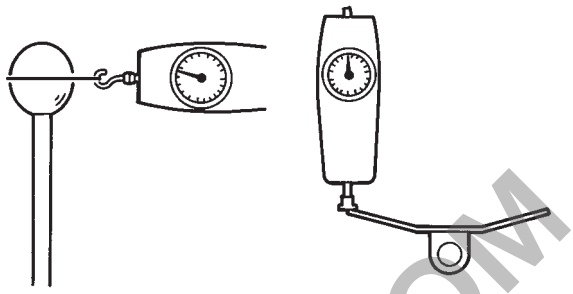
Information on those to whom this manual is distributed is recorded in the ledger in the section in charge at this company, so please decide on a person to be in charge of it and control it. When there are updates or additions, etc., we will notify the person in charge.

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### Lever Operating Force

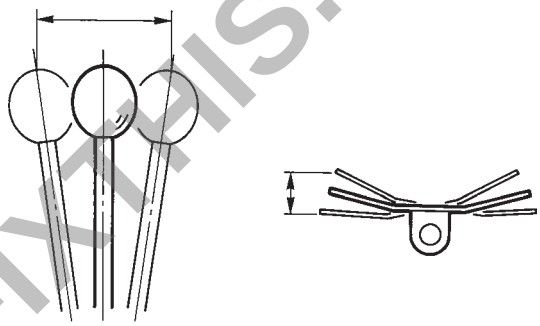
- With the engine stopped, attach a push-pull scale to the center of the operation lever's handle grip, or in the case of a pedal, position a push-pull scale to its tip and record the measurement at the point the lever/pedal reaches full stroke.



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### Lever Play

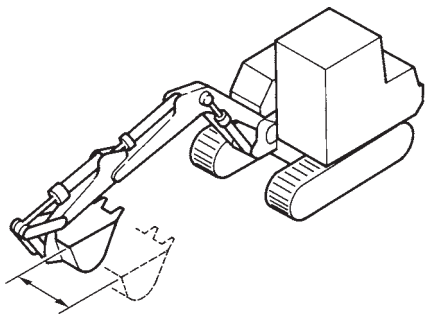
- Measure any discernible play at the tip of the lever (pedal).



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### Backlash

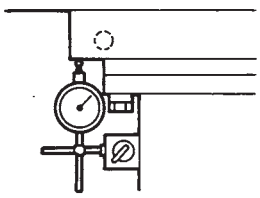
- Measurement Posture : Completely retract the arm cylinder and fully extend the bucket cylinder.
- Move the tips of the bucket teeth from side to side (left and right) and measure the play.

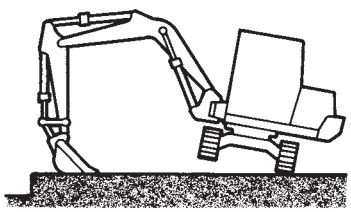


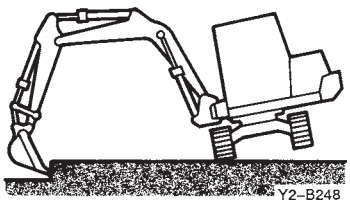
Y2-B247

### Slew Bearing Play

1. Attach a dial gauge to the bottom face of the slew bearing's race located near the front of the upper machinery.
2. Raise the crawler on one side off the ground and set the dial gauge to zero.
3. Then raise the opposite crawler and read the dial gauge.







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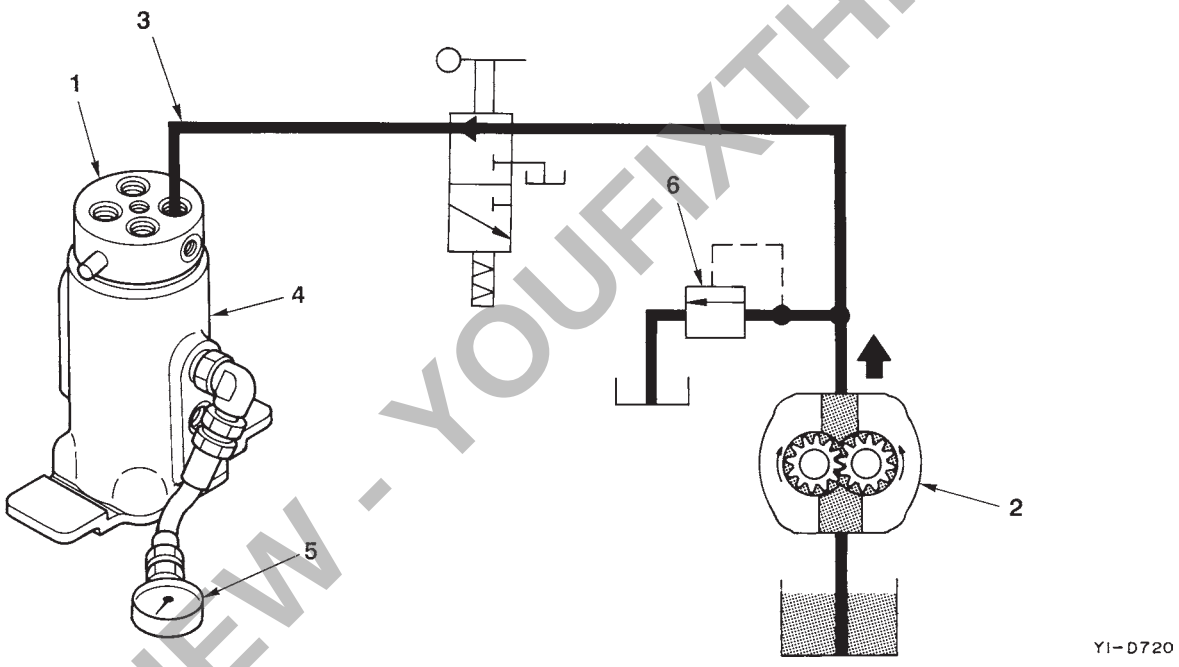

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Thrust Ring

| Judgment Standard | Treatment |
|---|---|
| • Parts which are worn 0.5 mm or more, or abnormally worn parts | Replace with new parts |
| • Parts with less than 0.5 mm of wear | Repair so that it is smooth |
| • Parts with scratches due to seizing, biting in or foreign matter, etc., which are within the wear limit of 0.5 mm and which can be repaired | Repair so that it is smooth |

### Inspection after Assembly

After assembly is completed, carry out a leak check of each circuit using the apparatus shown in the figure.




1. Connect a pipe (3) from the hydraulic pump (2) to the shaft (1) side port.
2. Connect a pressure gauge (5) to the hub (4) side.
3. Increase the pressure gradually to 20.6 MPa while adjusting the relief valve (6), then perform a 1 minute leak test.
   - Release the neighboring ports on both sides and check visually for leakage from the ports.
   - Check for external leakage, etc., by a color check.

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# PREFACE

This manual describes the service procedures for the TNV series engines of indirect injection system that have been certified by the US EPA, California ARB and/or the 97/68/EC Directive for industrial use.

Please use this manual for accurate, quick and safe servicing of the said engine. Since the explanation in this manual assumes the standard type engine, the specifications and components may partially be different from the engine installed on individual work equipment (power generator, pump, compressor, etc.). Please also refer to the service manual for each work equipment for details.

The specifications and components may be subject to change for improvement of the engine quality without notice. If any modification of the contents described herein becomes necessary, it will be notified in the form of correction information each time.

## California Proposition 65 Warning

**Diesel engine exhaust and some of its constituents are known to the State of**

## California Proposition 65 Warning

**Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm.**
**Wash hands, after handling.**

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(R.1)

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g)When filling with the cooling water for the first time or replacing, the air contains in the cooling water system. So as the air in the cooling water system is made self-bleeding during engine operation, the cooling water level in the radiator and coolant recovery tank will be lowered. Replenish the cooling water into the radiator and coolant recovery tank until it reaches the FULL mark of the coolant recovery tank.

**⚠ CAUTION**

## Beware of scalding by hot water

Wait until the temperature goes down before draining the cooling water. Otherwise, hot water may splash to cause scalding.

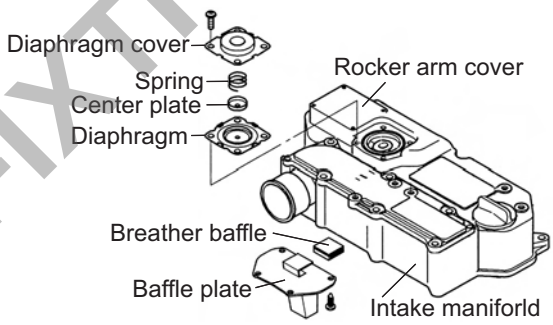


### (2) Diaphragm assy inspection

Inspect the diaphragm assy on the rocker arm cover every 1000 hours or **2 years,** whichever comes first. Refer to 4.2.4 point 6 for the function of the diaphragm.

1)Loosen screws, and remove a diaphragm assy, and check whether oil and so on doesn't enter between the diaphragm and the cover. If oil and so on enters into the diaphragm assy, the diaphragm doesn't work well.

2)Check the damages of the diaphragm rubber and the spring. If necessary, replace with new ones.




Breather system componert

[NOTICE]

- When a diaphragm is damaged, pressure control inside the crankcase becomes insufficient, and troubles such as combustion defect and so on occur.
- At lube oil replacement or lube oil supply the amount of lube oil isn't to be beyond the standard upper limit. If the lube oil quantity is beyond the upper limit or an engine is operated beyond the allowable maximum angle of an engine, the amount of oil mist may be inducted in the combustion chamber and the oil hammer sometimes may occur.

### (3) Intake/exhaust valve clearance adjustment

Make measurement and adjustment while the engine is cold.

(a)Valve clearance measurement

1)Remove the rocker arm cover above cylinder head.

2)Set the No.1 cylinder in the compression TDC

Turn the crankshaft to bring the piston of the No.1 cylinder to its compression top dead center while watching the rocker arm motion, timing scale and the top mark position of the crankshaft pulley.

(Position where both the intake and exhaust valves are closed.)

Notes:

- The crankshaft shall be turned clockwise as seen from the radiator side.
- The No.1 cylinder position is on the opposite side of the radiator.
- Since there is a clearance between the rocker arm and valve at the compression top dead center, the position of TDC can be checked by hand. Also see that the top mark on the crankshaft pulley aligns with the mark on the gear case. If there is no valve clearance, disassemble and inspect around the valve seat, since the valve seat may be worn abnormally.



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## 4.4.2 Disassembly procedure:

Disassemble in the order of the numbers in the illustration.

1)Perform steps 1) to 15) in the cylinder head disassembly procedure.
2)Perform steps 1) to 12) in the gear train disassembly procedure.
3)Remove the oil pan and the spacer. (See **Point 1** of 4.4.6)
4)Remove the lube oil suction pipe.
5)Remove the piston w/rod. (See **Point 2** of 4.4.6)
6)Remove the mounting flange. (See **Point 3** of 4.4.6)
7)Remove the bearing metal caps. (See **Point 4** of 4.4.6)
8)Remove the crankshaft. (See **Point 5** of 4.4.6)
9)Remove the tappets.
10)Remove the rings from the piston. (See **Point 6** of 4.4.6)
11)Remove the oil seal from the flywheel housing. (See **4.4.8**)

## 4.4.3 Reassembly procedure:

Reverse of the disassembly procedure.

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