Technical Manual

EX33u

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SECTION 1
GENERAL

—CONTENTS—

Group 1 Specification

Outline T1-1-1
Specifications T1-1-2
Working Ranges and Machine
Dimensions for Transportation T1-1-3
Engine Specifications T1-1-4

Group 2 Interchangeability

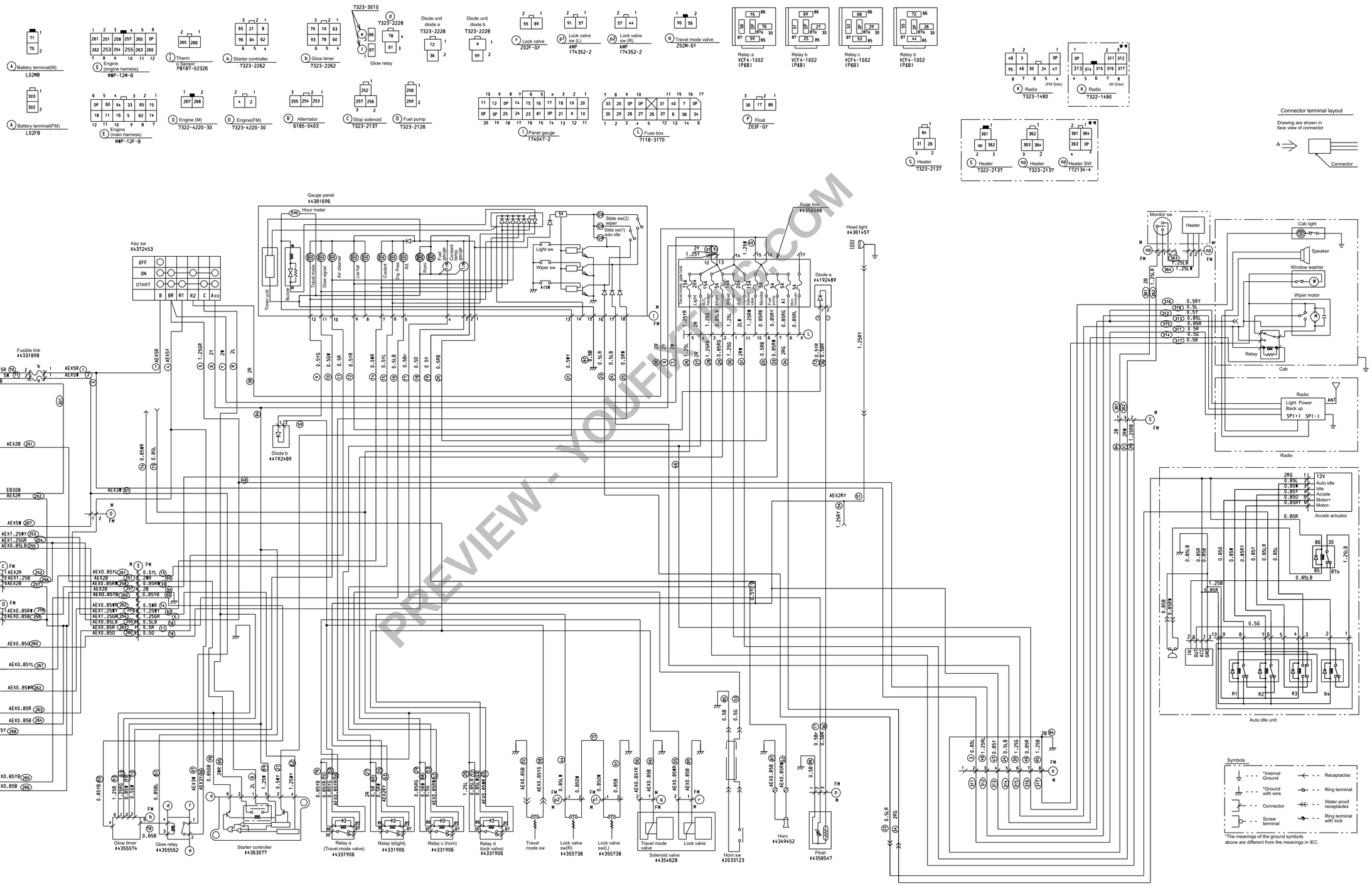
Component Interchangeability List T1-2-1

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EX33u ELECTRICAL CIRCUIT DIAGRAM

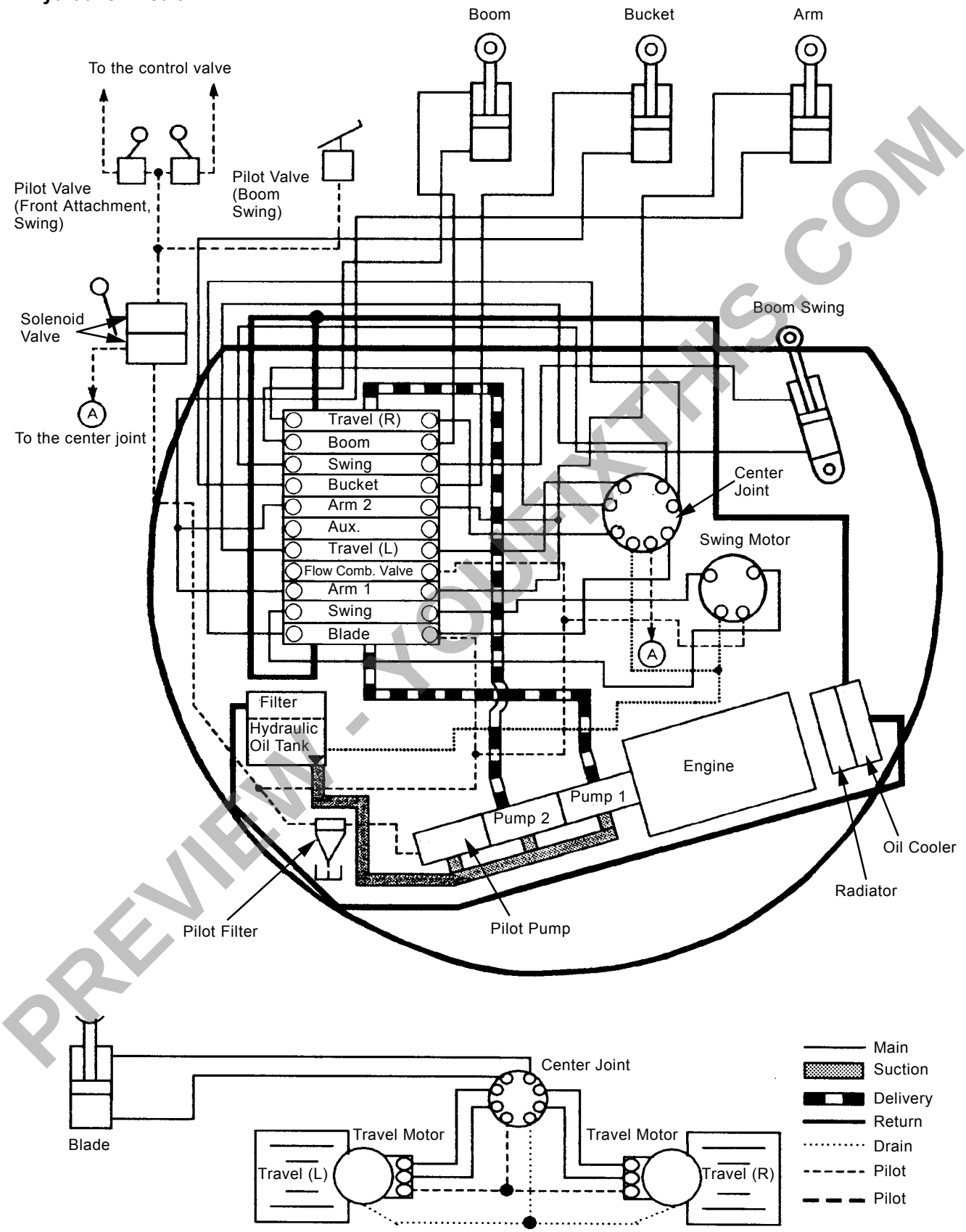
⚠CAUTION : Parts numbers on the drawing are provided only for reference purpose.
To order parts on the drawing,be sure to consult the Parts Catalog.



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Hydraulic Circuit

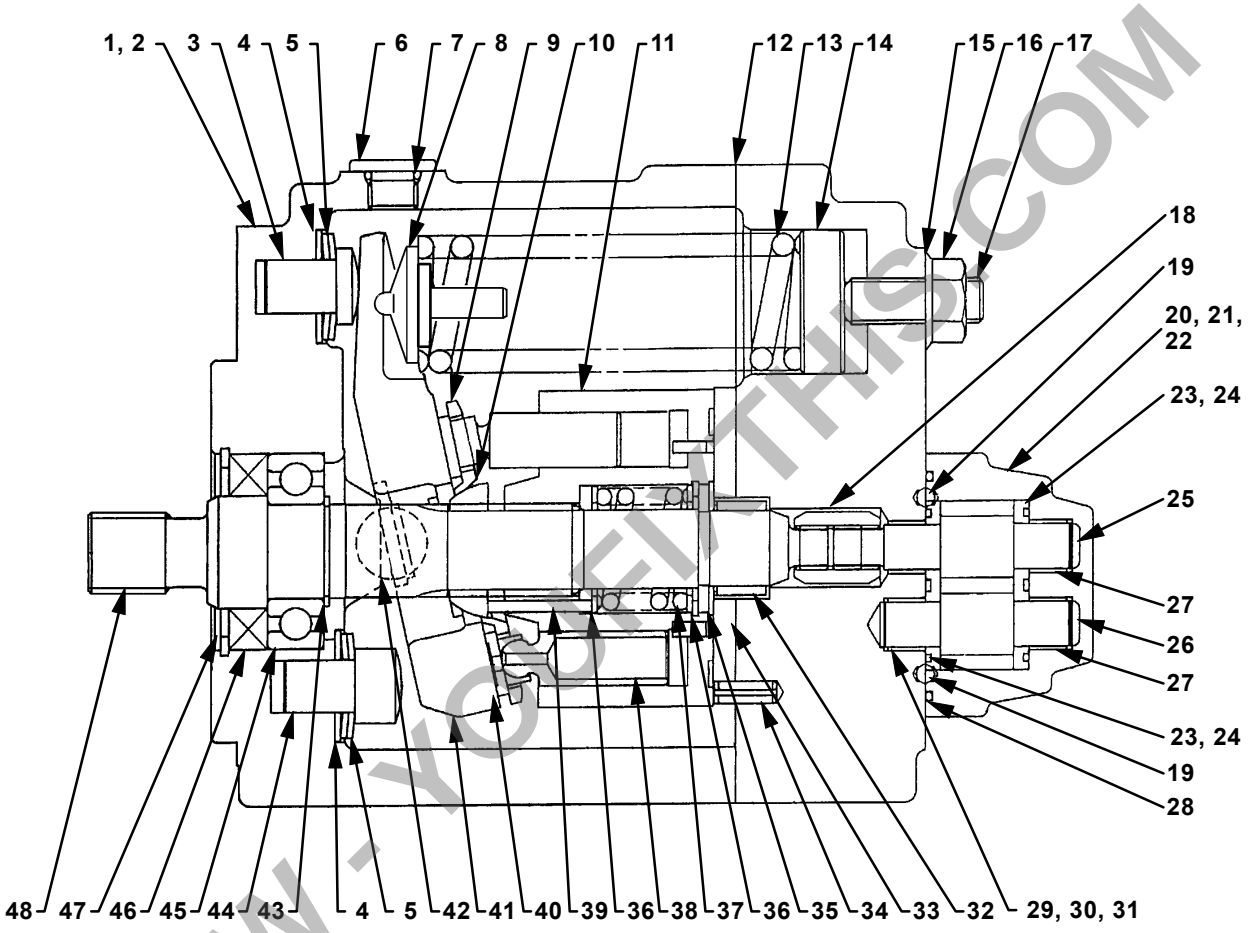


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DISASSEMBLE AND ASSEMBLE PUMP DEVICE



W532-02-03-001

1 - Housing S
2 - Pin (2 Used)
3 - Stopper Pin A
4 - Washer (2 Used)
5 - Disc Spring (4 Used)
6 - Plug
7 - O-Ring
8 - Spring Holder
9 - Retainer
10 - Holder
11 - Cylinder Block
12 - Packing
13 - Spring
14 - Spring Guide
15 - Seal Washer
16 - Nut
17 - Bolt
18 - Joint
19 - Steel Ball (2 Used)
20 - Spring Washer (4 Used)
21 - Socket Bolt (4 Used)
22 - Housing
23 - Side Plate (2 Used)
24 - Gasket (2 Used)
25 - Gear (A)
26 - Gear (B)
27 - Bushing (4 Used)
28 - O-Ring
29 - Housing H
30 - Socket Bolt (5 Used)
31 - Spring Washer (5 Used)
32 - Needle Bearing
33 - Valve Plate
34 - Spring Pin
35 - Retaining Ring
36 - Retainer (2 Used)
37 - Spring
38 - Plunger (10 Used)
39 - Needle (3 Used)
40 - Shoe
41 - Swash Plate
42 - Ceramic Ball (2 Used)
43 - Retaining Ring
44 - Stopper Pin B
45 - Ball Bearing
46 - Oil Seal
47 - Retaining Ring
48 - Shaft

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TIGHTENING TORQUE SPECIFICATIONS

Bolts and Nuts of Machine: Standard Torque Chart

No.	Descriptions	Bolt Dia mm	Q'ty	Wrench Size mm	Torque		
					N·m	(kgf·m)	(lbf·ft)
1	Engine cushion rubber mounting nut	14	4	22	137	(14)	(101)
	Engine cushion rubber mounting bolt, nut	12	7	19	88	(9)	(65)
2	Engine bracket mounting bolt (Front) *	12	8	19	88	(9)	(65)
	Engine bracket mounting bolt (Rear)*	10	6	17	49	(5)	(36)
3	Hydraulic oil tank mounting bolt	12	3	19	88	(9)	(36)
4	Fuel tank mounting bolt	10	4	17	20	(2)	(15)
5	Hydraulic hoses and union joints	UNF7/16-20		19	29.5	(3)	(22)
		UNF9/16-18		22	39	(4)	(29)
		UNF3/4-16		27	64	(6.5)	(47)
6	Pump mounting bolt	12	2	19	88	(9)	(65)
7	Pump cover mounting bolt	10 (Fine thread)	6	17	49	(5)	(36)
8	Control valve mounting bolt	10	4	17	49	(5)	(36)
	Control valve bracket mounting bolt	12	7	19	88	(9)	(36)
9	Swing device mounting bolt	12	6	19	88	(9)	(65)
10	Battery mounting nut	8	2	13	9.8	(1)	(7)
	Battery mounting bolt	10	1	17	49	(5)	(36)
11	Canopy mounting bolt	10	1	17	49	(5)	(36)
		14	3	22	137	(14)	(101)
12	Cab mounting bolt	14	4	22	137	(14)	(101)
13	Swing bearing mounting bolt — Upperstructure	12	21	19	108	(11)	(80)
	Swing bearing mounting bolt — Undercarriage	12	20	19	108	(11)	(80)
14	Travel device mounting bolt *	12	22	19	108	(11)	(80)
15	Sprocket mounting bolt*	12	22	19	108	(11)	(80)
16	Upper roller mounting bolt	14	2	22	137	(14)	(101)
17	Lower roller mounting bolt*	14	16	22	245	(25)	(181)
18	Cover mounting bolt	6		10	5	(0.5)	(3.6)
		8		13	9.8	(1)	(7.2)
		10		17	49	(5)	(36)
19	Counterweight mounting bolt	18	3	27	294	(30)	(217)

NOTE: (1) Apply lubricant (i.e. white zinc B dissolved into spindle oil) to reduce their friction coefficients.

(2) Remove rust, dirt, and dust before installing fasteners.

*(3) Apply LOCTITE to threads of fasteners indicated with * marks in the above chart.*

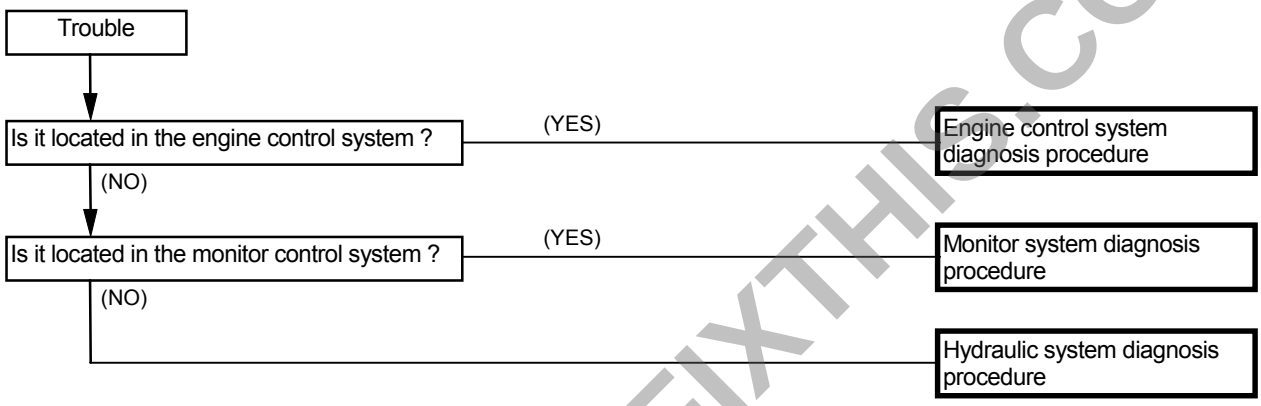
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INTRODUCTION

Troubleshooting charts shown in this section indicate the orderly procedures for inspecting and locating the cause(s) of problems in the machine. This section is comprised of three groups: engine control system diagnosis procedure, monitor system diagnosis procedure and hydraulic system diagnosis procedure.

Check in which group the system in trouble is located first, and refer to the group corresponding to the system involved.



DIAGNOSING PROCEDURE

Follow the five basic steps shown below for efficient troubleshooting.

1. Know the system

   Study the appropriate technical manuals. Know what the system is composed of and how it works, as well as the construction, functions and specifications of the system components.



T107-07-01-001

2. Ask the operator

   Before inspecting, get the full story of malfunctions from a witness --- the operator.

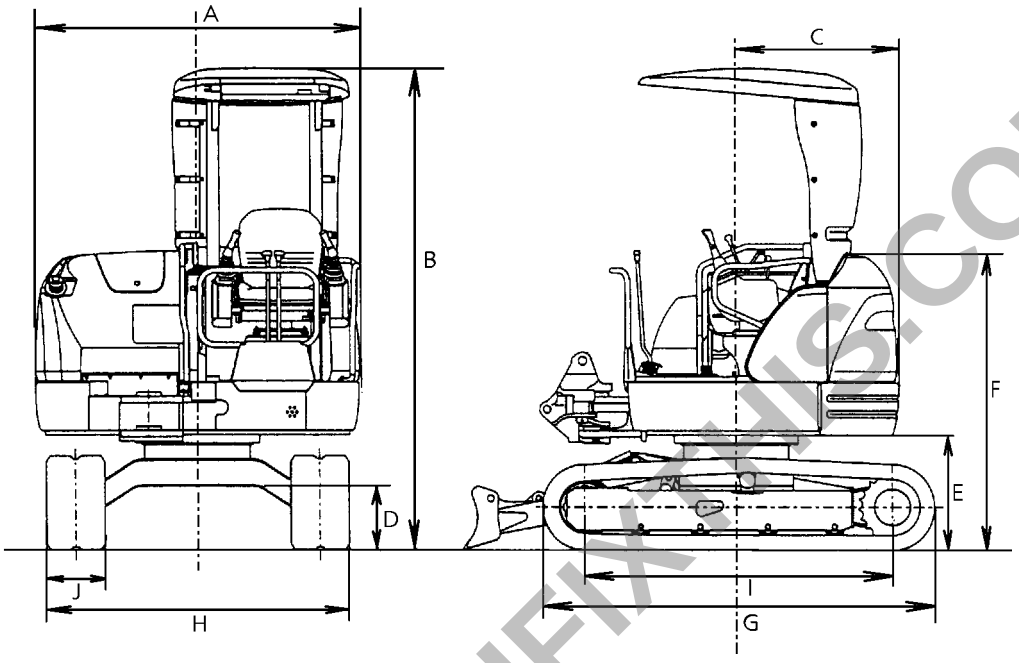
   - How the machine is used and serviced?
   - When was the trouble noticed, and what work was the machine doing at that time?
   - What is the character of the trouble? Did the trouble slowly get worse, or did it appear suddenly for the first time ?
   - Did the machine have any trouble previously? If so, which parts were repaired or replaced before?



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SPECIFICATIONS



M570-11-001

Description	Model	33u	
		Canopy	Cab
Type of Front-End Attachment	-	Boom Swing Type	
Bucket Capacity	m^3 (yd^3)	0.09 (∗ 0.08)	
Machine Weight	kg (lb)	2960 (6530)	3000 (6610)
Base Machine Dry Weight	kg (lb)	2330 (5140)	2360 (5200)
Engine	-	KUBOTA D1503-KA 17.6 kW/2100 min^{-1} (24 PS/2100 rpm)	
A: Overall Width	mm (ft in)	1670 (5′ 6″)	
B: Canopy Cab Height	mm (ft in)	2485 (8′ 2″)	2500 (8′ 2″)
C: Rear-End Swing Radius	mm (ft in)	845 (2′ 9″)	
D: Minimum Ground Clearance	mm (ft in)	330 (1′ 1″)	
E: Counterweight Clearance	mm (ft in)	595 (1′ 11″) (Rubber Crawler)	
F: Engine Cover Height	mm (ft in)	1540 (5′ 1″)	
G: Undercarriage Length	mm (ft in)	2015 (6′ 7″) (Rubber Crawler)	
H: Undercarriage Width	mm (ft in)	1560 (5′ 1″)	
I: Sprocket Center to Idler Center	mm (ft in)	1590 (5′ 3″)	
J: Track Shoe Width	mm (ft in)	300 (12″) (Rubber Crawler)	
Ground Pressure	kPa (kgf/cm^2)	27.8 (0.28)	28.2 (0.29)
Swing Speed	min^{-1} (rpm)	10.5	
Travel Speed (Fast/Slow)	km/h	4.1 / 2.5	
Gradeability	% (Degree)	58 (30)	

NOTE: ∗ CECE heaped

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PERIODIC REPLACEMENT OF PARTS

To ensure safe operation, be sure to conduct periodic inspection of the machine. In addition, the parts listed below, if defective, may pose serious safety/fire hazards. It is very difficult to gauge the extent of deterioration, fatigue, or weakening of the parts listed below simply by visual inspection alone. For this reason, replace these parts at the intervals shown in the table below. However, if any of these parts are found to be defective, replace before starting operation, regardless of the interval.
Also, when replacing hoses, check the clamps for deformation, cracks, or other deterioration, and replace as necessary.
Be sure to perform periodic inspection of all hoses, as shown below, and replace or retighten any defective parts found, as necessary.
Consult your authorized dealer for correct replacement.

Periodic Replacement Parts			Replacement Intervals
Engine		Fuel hose (Fuel tank to filter)	Every 2 years
		Fuel hose (Fuel tank to injection pump)	Every 2 years
		Heater hose (Heater to engine)	Every 2 years
Hydraulic System	Base Machine	Pump suction hose	Every 2 years
		Pump delivery hose	Every 2 years
		Swing hose	Every 2 years
	Front Attachment	Boom cylinder line hose	Every 2 years
		Arm cylinder line hose	Every 2 years
		Bucket cylinder line hose	Every 2 years
		Pilot hose	Every 2 years

NOTE: Be sure to replace seals, such as O-rings and gaskets, when replacing hoses.

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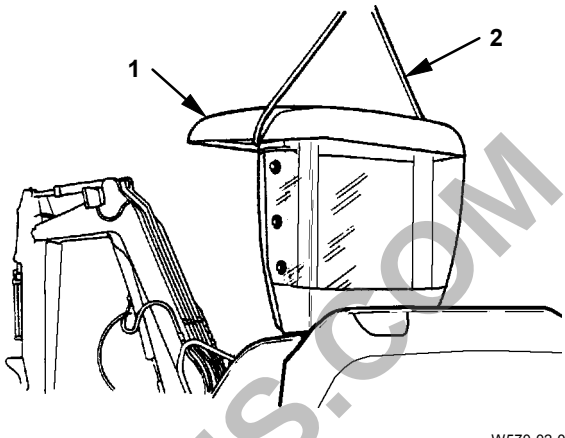
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REMOVE AND INSTALL CANOPY

Removal

CAUTION: Canopy weight: 60 kg (130 lb)

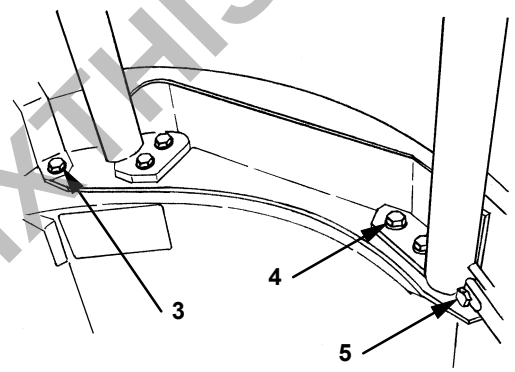
1. Attach sling belt (2) to canopy (1).



W570-02-01-001

2. Loosen four bolts (3, 4, 5) to remove canopy (1).

: 17 mm, 19 mm, 24 mm

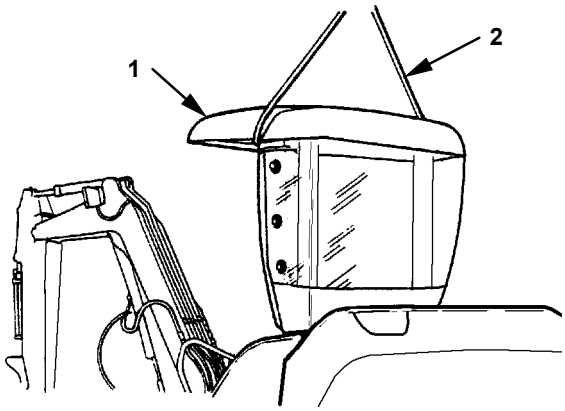


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Installation

CAUTION: Canopy weight: 60 kg (130 lb)

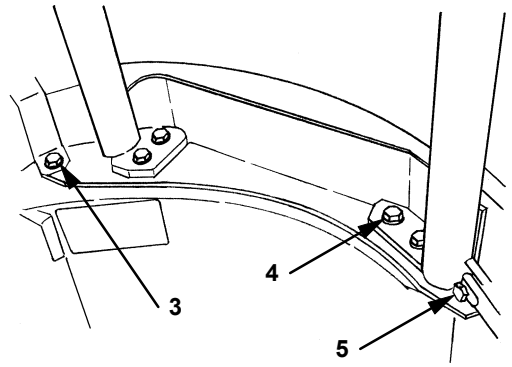
1. Attach sling belt (2) to canopy (1).
   Mount the canopy onto the frame with a crane.



W570-02-01-001

2. Loosen bolts (3, 4, 5) to remove canopy (1).

: 17 mm
: 49 N·m (5 kgf·m , 36 lbf·ft)
: 19 mm
: 88 N·m (9 kgf·m , 65 lbf·ft)
: 24 mm
: 205 N·m (21 kgf·m , 152 lbf·ft)

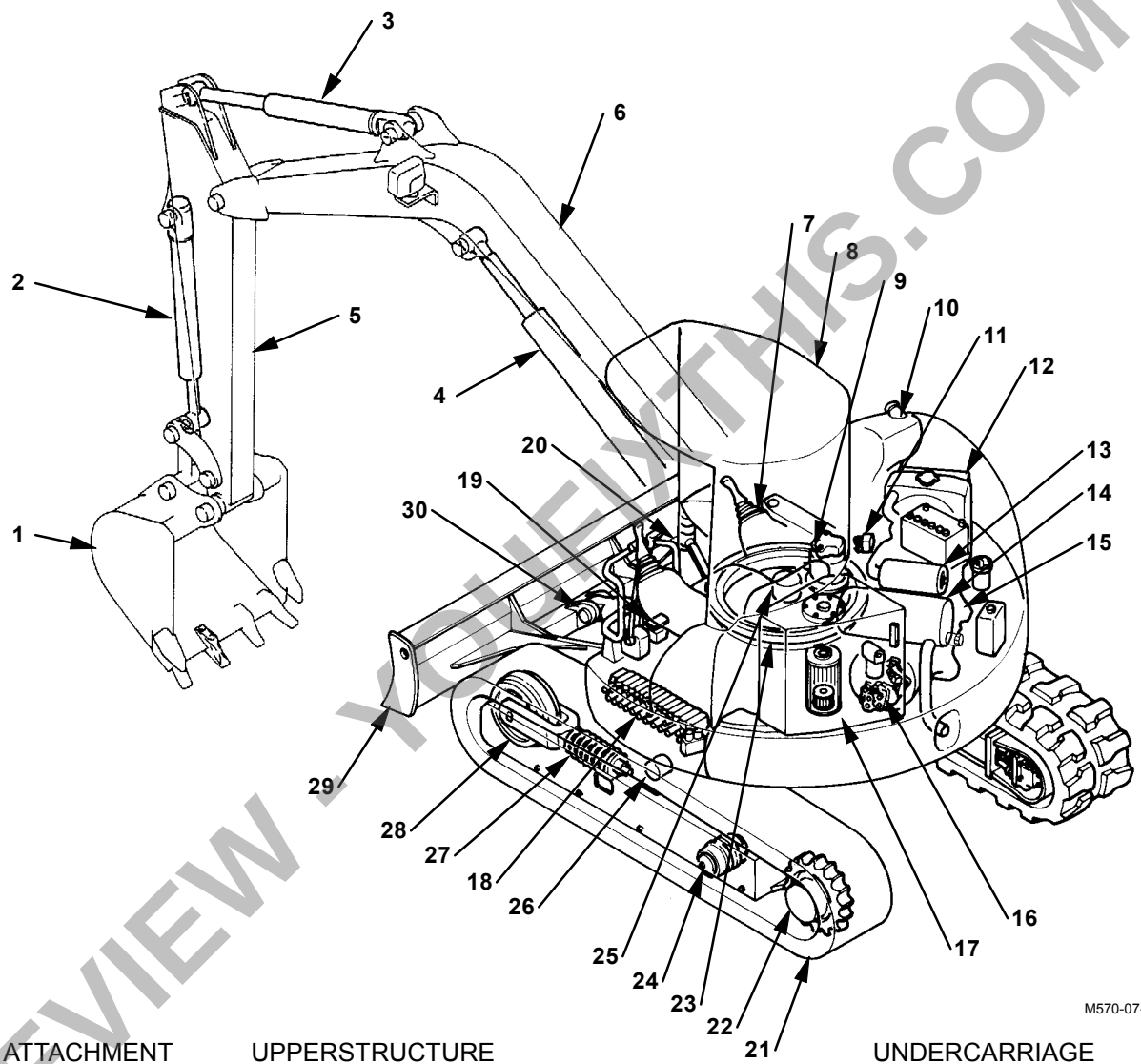


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OUTLINE

The hydraulic excavator consists of three main sections, front attachment, upper structure and undercarriage.



M570-07-030

FRONT ATTACHMENT

1 - Bucket
2 - Bucket Cylinder
3 - Arm Cylinder
4 - Boom Cylinder
5 - Arm
6 - Boom

UPPERSTRUCTURE

7 - Pilot Valve (Front Attachment)
8 - Canopy
9 - Swing Device
10 - Fuel Tank
11 - Solenoid Valve
12 - Radiator
13 - Air Filter
14 - Muffler
15 - Engine
16 - Pump Device
17 - Hydraulic Oil Tank
18 - Control Valve
19 - Pilot Valve (Swing)
20 - Boom-Swing Cylinder

UNDERCARRIAGE

21 - Track
22 - Travel Device
23 - Swing Bearing
24 - Lower Roller
25 - Center Joint
26 - Upper Roller
27 - Track Adjuster
28 - Front Idler
29 - Blade
30 - Blade Cylinder

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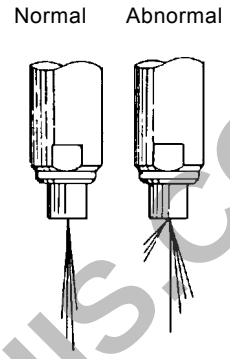
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Evaluation:
Refer to T6-5 Standard.

2. Perform chatter and spray pattern test.

(1) Attach the injection nozzle to the nozzle tester.
Forcibly operate the pump handle several times.
Observe the spray pattern.
For this test, do not activate the pressure gauge.



T523-06-02-001

Spray pattern standards
(1) No visibly coarse distribution
(2) No side distribution
(3) No post-injection dripping
(4) Gradual, detailed
(5) Correct injection angles

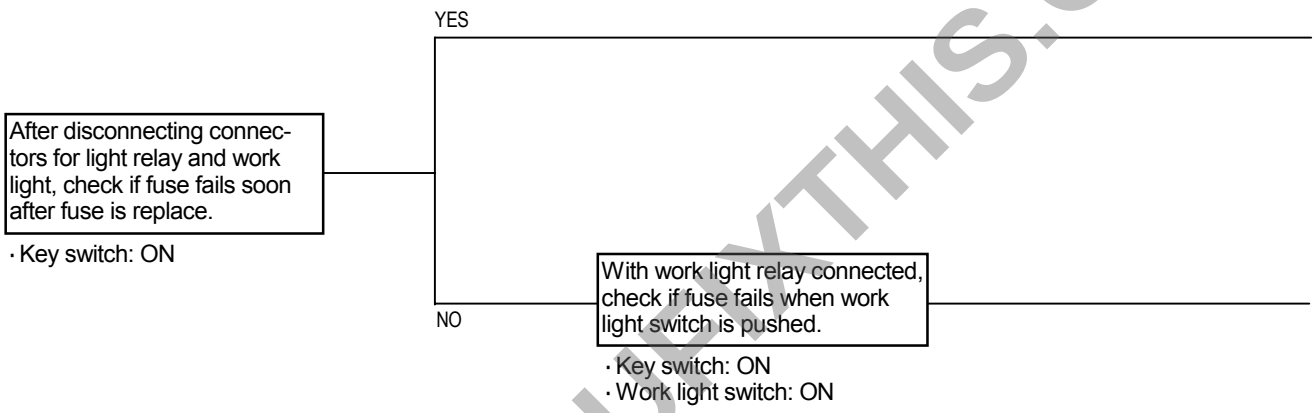
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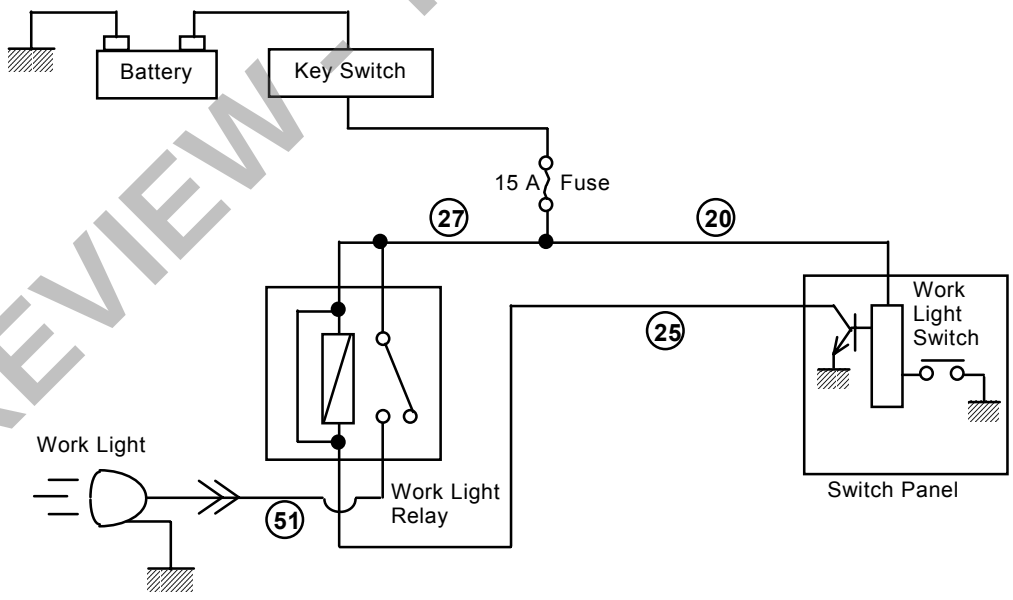
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FUSE FAILS

Fuse failure for work lights is explained here. Checking other fuse failures is done in the same way as explained here.

When a fuse fails soon after it is replaced, disconnect all parts related to the fuse from the circuit and check the circuit in the current flow direction, reconnecting each part one by one.





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Workshop Manual

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8. Install cylinder block (11) assembly, spring holder (8) and spring (13) in housing S (1).

9. Install valve plate (33) in housing S (1).

10. Install pins (2) and packing (12) on housing S (1).

11. Install joint (18) on shaft (48).

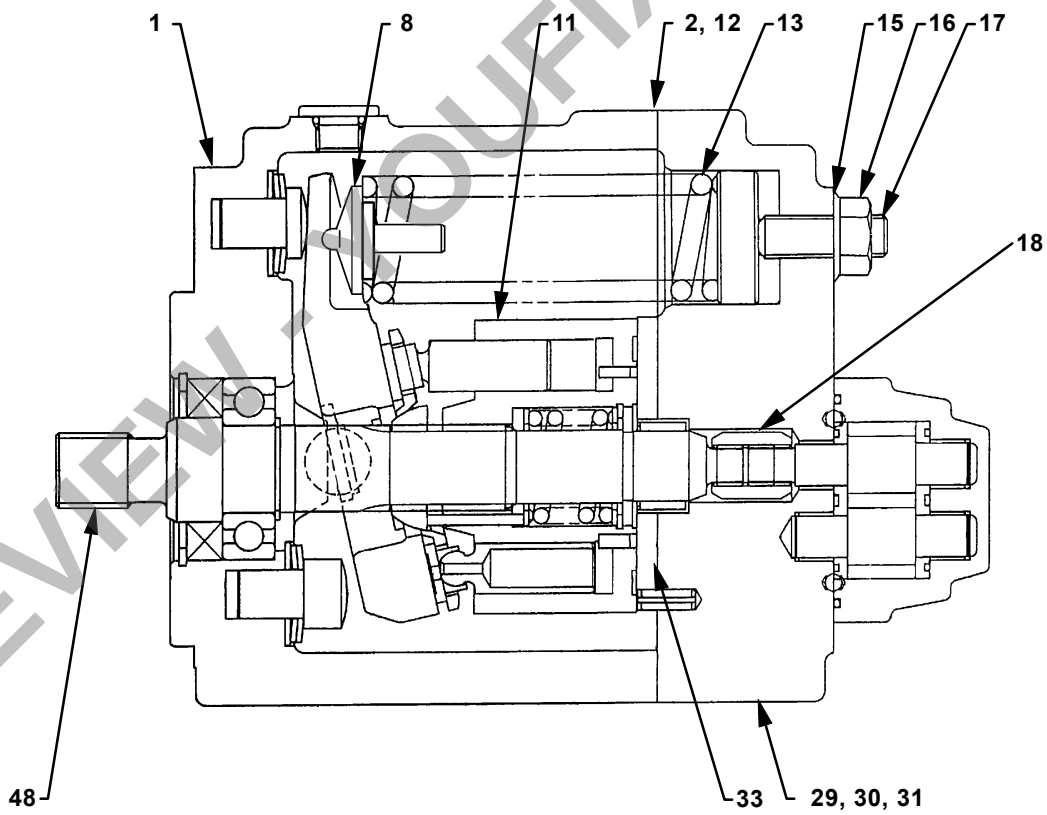
12. Place housing H (29) on housing S (1). Install and tighten two temporary fastening bolts (M10, Length: 65 mm) in the bolt holes on the spring (13) side.

13. Install three socket bolts (30) with spring washers (31). Lightly tighten socket bolts (30).

14. Remove one temporary fastening bolt (M10, Length: 65 mm) and install socket bolt (30) with spring washer (31). Lightly tighten bolt (30). Remove the other temporary fastening bolt (M10, Length: 65 mm) and install socket bolt (30) with spring washer (31). Lightly tighten bolt (30).

15. Tighten five socket bolts (30) to specification.
    : 8 mm
    : 54 to 64 N·m
    (5.5 to 6.5kgf·m , 40 to 47 lbf·ft)

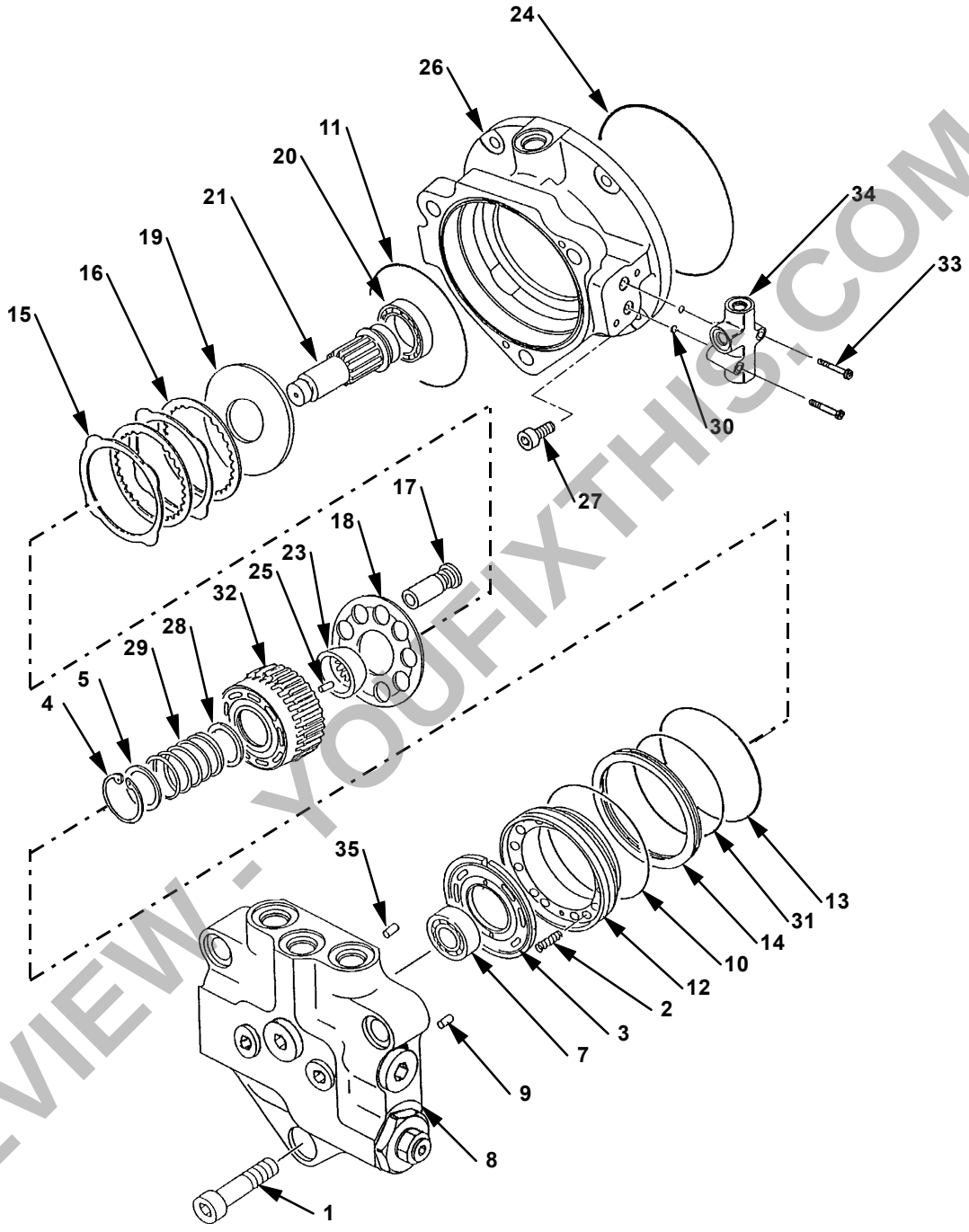
16. Install seal washer (15) and bolt (17) on housing H (29). Adjust the bolt (17) height from the housing face as it was before disassembling.
    After adjusting, tighten locknut (16).



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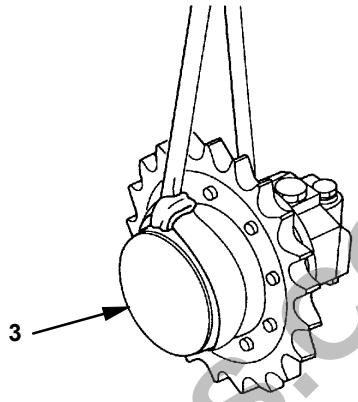
W527-02-05-005

1 - Socket Bolt (3 Used)
2 - Spring
3 - Valve Plate
4 - Retaining Ring
5 - Washer
7 - Ball Bearing
8 - Cover
9 - Pin
10 - O-Ring
11 - O-Ring
12 - Brake Piston
13 - O-Ring
14 - Collar
15 - Friction Plate (2 Used)
16 - Disc Plate (2 Used)
17 - Plunger (9 Used)
18 - Retainer
19 - Swash Plate
20 - Ball Bearing
21 - Shaft
23 - Holder
24 - O-Ring
25 - Pin (3 Used)
26 - Casing
27 - Socket Bolt (4 Used)
28 - Collar
29 - Spring
30 - O-Ring
31 - O-Ring
32 - Rotor
33 - Socket Bolt (2 Used)
34 - Parking Brake Switch Valve
35 - Pin (2 Used)

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CAUTION: Travel device weight: 45 kg (99 lb)

5. Remove travel device (3) using a crane, as illustrated.

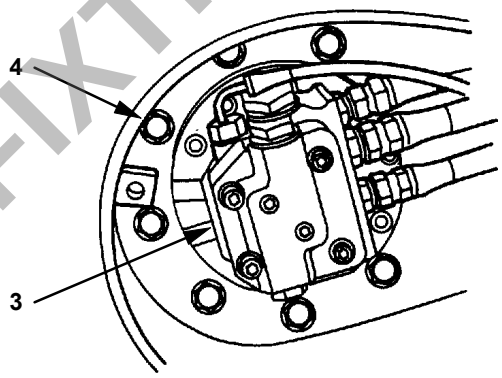


W507-03-02-004

Installation

1. Install the travel (3) and tighten bolts (4).
   - : 19 mm
   - : 108 N·m (11 kgf·m, 80 lbf·ft)

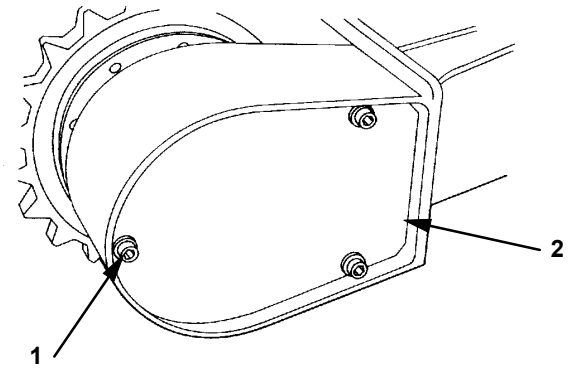
2. Connect all hoses to travel device (3).
   - : 19 mm
   - : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)
   - : 22 mm
   - : 39 N·m (4 kgf·m, 29 lbf·ft)
   - : 27 mm
   - : 64 N·m (6.5 kgf·m, 47 lbf·ft)



W554-03-02-005

3. Install cover (2) and tighten bolts (1).
   - : 8 mm
   - : 49 N·m (5 kgf·m, 36 lbf·ft)

IMPORTANT: After installing the travel motor, fill the motor with hydraulic oil. Be sure to perform break-in running test of the travel motor under the following conditions to avoid motor seizure.
Test Running Conditions:
(1) Engine speed: Slow speed
(2) Travel pedal: Low speed
(3) Time: Two minutes or more (Refer to W1-1-2)



W507-03-02-001

4. Install the track link assembly.

NOTE: Refer to "REMOVE AND INSTALL TRACK LINK ASSEMBLY".

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REMOVE AND INSTALL FRONT IDLER

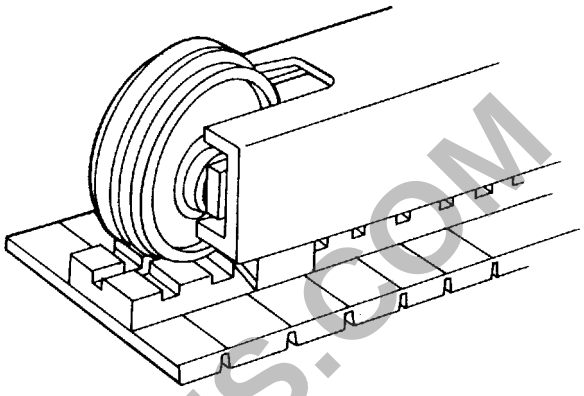
Removal

The procedures given here should be followed after removing the rubber tracks. Refer to “REMOVE AND INSTALL RUBBER TRACKS” in Group 7 for removal and installation of the rubber tracks.

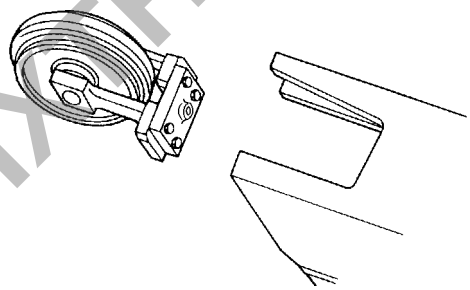
CAUTION: Front idler weight: 23.1 kg (50 lb)

CAUTION: When temporarily storing the front idler, lay it on square wooden blocks so that the front idler will not roll away.

1. Remove the front idler and yoke assembly from the track frame using a crowbar.



W507-03-05-001

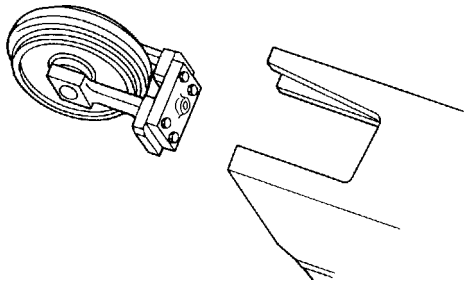


W562-03-05-001

Installation

1. To install the front idler, simply perform the removing procedures in reverse.

NOTE: Before installing, check that the top and bottom of the yoke is correctly positioned. Apply grease to the sliding surfaces of the track frame and bearing after cleaning them.



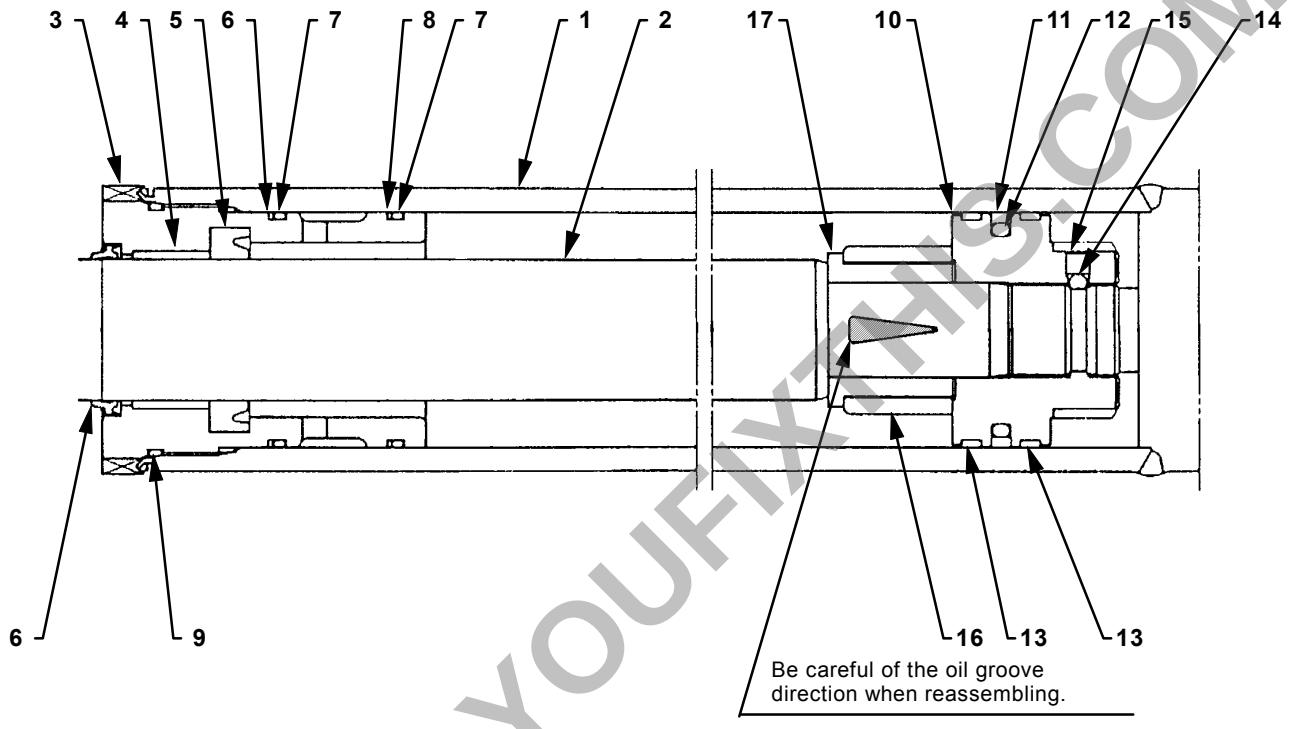
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DISASSEMBLE CYLINDER

Boom Cylinder



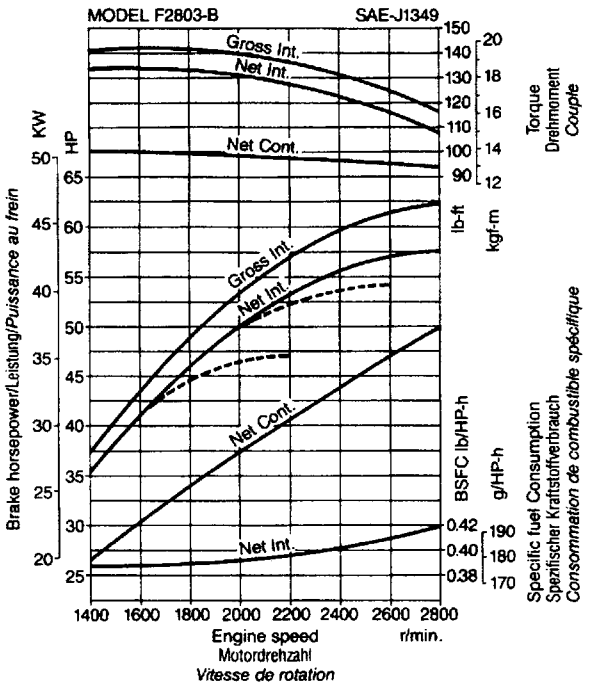
W527-04-02-012

1 - Cylinder Tube
2 - Piston Rod
3 - Cylinder Head
4 - Bushing
5 - U-Ring
6 - Wiper Ring
7 - O-Ring (2 Used)
8 - Backup Ring (2 Used)
9 - O-Ring
10 - Piston
11 - Seal Ring
12 - O-Ring
13 - Slide Ring (2 Used)
14 - Steel Ball
15 - Set Screw
16 - Cushion Bearing
17 - Spacer

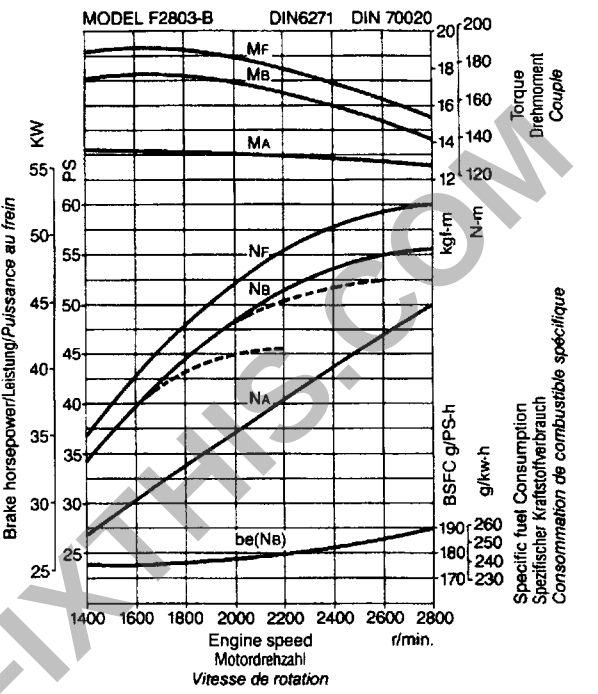
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F2803-B (E)



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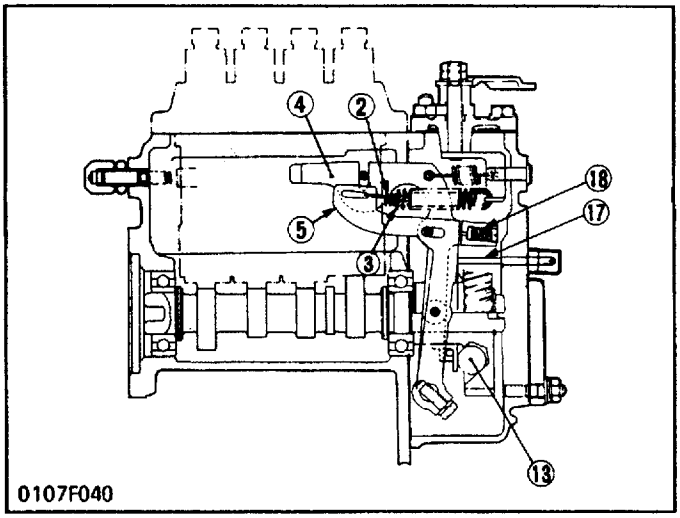


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■ At high speed running with overload



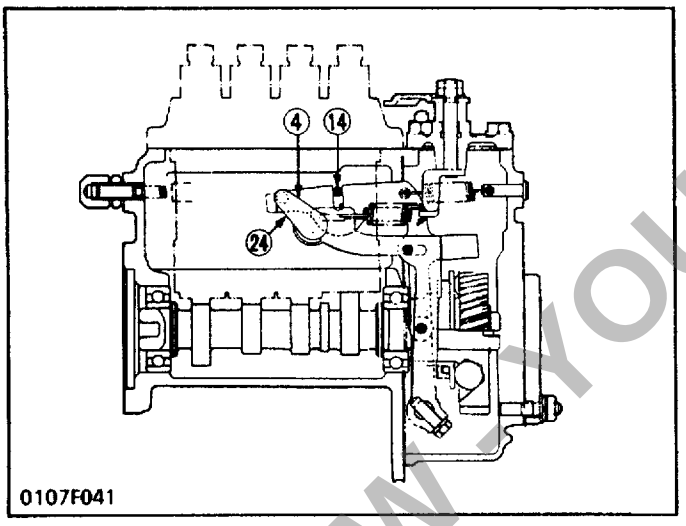
0107F040

When an overload is applied to the engine running at a high speed, the centrifugal force of steel ball (13) becomes small as the engine speed is dropped, and fork lever 2 (5) is pulled to the right by the governor springs 1 (2) and 2 (3), increasing fuel injection. Though, fork lever 2 becomes ineffective in increasing fuel injection when it is stopped by the adjusting bolt (17).

After that, when the force of torque spring (18) becomes greater than the centrifugal force of the steel ball, fork lever 1 (4) moves rightward to increase fuel injection, causing the engine to run continuously at a high torque.

(17) Adjusting Bolt
(18) Torque Spring

■ To stop engine



0107F041

When the stop lever (19) is moved to STOP position, fork lever 1 (4) is moved leftward and the control rack (14) is moved to the non-injection position, stopping the engine.

(19) Stop Lever

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(4) KRAFTSTOFFSYSTEM

Einspritzpumpe

Teil		Werkdaten	Zulässiger Grenzwert
Spritzeinstellung	D1403-B(E), D1703-B(E), V1903-B(E), V2203-B(E)	0,24 bis 0,27 rad. (17° bis 19°) vor O.T.	–
	F2803-B(E)	0,30 bis 0,33 rad (18° bis 20°) vor O.T.	–
Kraftstoffdichtigkeit des Pumpenelementes		–	150 kp/cm²
Kraftstoffdichtigkeit des Druckventils		10 Sekunden 14,7 → 13,7 MPa 150 → 140 kp/cm²	5 Sekunden 14,7 → 13,7 MPa 150 → 140 kp/cm²

Einspritzdüse

Kraftstoff-Einspritzdruck	13,73 bis 14,71 MPa 140 bis 150 kp/cm²	–
Kraftstoffdichtigkeit des Düsenventilsitzes	Bei einem Druck von 12,75 MPa (130 kp/cm²), darf kein Kraftstoff am Ventilsitz austreten.	–

(5) ELEKTRISCHES SYSTEM

Anlasser

Kommutator Außendurchmesser	30,0 mm	29,0 mm
Glimmer-Unterschneidung	0,5 bis 0,8 mm	0,2 mm
Bürstenlänge	15,0 mm	10,0 mm

Wechselstromdynamo

Leerlaufspannung		14 V, 35 A / 4000 U/Min.	–
Widerstand Rotor	V2203-B(E)	4 Ω	–
	D1403-B(E), D1703-B(E), V1903-B(E), F2803-B(E)	2,9 Ω	
Schleifring Außendurchmesser	V2203-B(E)	32,5 mm	32,1 mm
	D1403-B(E), D1703-B(E), V1903-B(E), F2803-B(E)	14,4 mm	14,0 mm
Bürstenlänge	V2203-B(E)	12,5 mm	5,5 mm
	D1403-B(E), D1703-B(E), V1903-B(E), F2803-B(E)	10,5 mm	4,5 mm

Glühkerze

Widerstand Glühkerze	0,8 Ω	–

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Pignon de renvoi et arbre à cames

1. Enlever le pignon de renvoi (1).
2. Aligner le trou rond du pignon de came et la vis de fixation de butée d'arbre à cames.
3. Enlever le pignon de came (4) et l'arbre à cames (5).

(Au remontage)

- Enduire l'arbre à cames et les bagues du pignon de renvoi d'une légère couche d'huile moteur avant de le remonter.

■ IMPORTANT

- **Pour la mise en place du pignon de renvoi, bien s'assurer que l'on ligne les repères d'alignement des pignons.**

(1) Pignon de renvoi
(2) Collier 2 de pignon de renvoi
(3) Circlip extérieur
(4) Pignon de came
(5) Arbre à cames

Arbre à came d'alimentation et Ens. levier à chape

1. Enlever le couvercle d'arbre à came.
2. Enlever les boulons de fixation du porte-levier à chape.
3. Enlever la butée d'arbre à came d'alimentation.
4. Enlever l'arbre à came, et arbre de levier de fourche en même temps.

(1) Porte-levier à chape
(2) Butée d'arbre à came d'alimentation
(3) Pignon de pompe d'injection
(4) Arbre à came d'alimentation
(5) Ensemble levier à chape

Leerlaufgetriebe und Nockenwelle

1. Die das Leerlaufgetriebe (1) entfernen.
2. Die runde Öffnung am Nockengetriebe mit der Befestigungsschraube des Nockenwellenbegrenzers ausrichten.
3. Das Nockengetriebe (4) und die Nockenwelle (5) entfernen.

(Beim Wiedereinbau)

- Vor dem Einbau die Nockenwelle und Leerlaufbuchse mit einer dünnen Schicht Motoröl versehen.

■ WICHTIG

- **Beim Einbau des Leerlaufgetriebes darauf achten, daß die Markierungen auf den Zahnrädern zueinander ausgerichtet sind.**

(1) Leerlaufgetriebe
(2) Leerlaufmanschette 2
(3) Äußere Klemme
(4) Nockengetriebe
(5) Nockenwelle

Kraftstoff-Nockenwelle und Gabelhebel

1. Den Kraftstoff-Nockenwellendeckel entfernen.
2. Die Befestigungsbolzen der Gabelhebel halterung entfernen.
3. Den Kraftstoff-Nockenwellen begrenzer entfernen.
4. Den Kraftstoff-Nockenwelle mit den Gabelhebel entfernen.

(1) Gabelhebel haltenung
(2) Kraftstoff-Nockenwellenbegrenzer
(3) Einspritzpumpengetriebe
(3) Einspritzpumpengetriebe
(4) Kraftstoff-Nockenwelle
(5) Gabelhebel

Pompe à huile et Pignon de lancement

1. Retirer le pignon d'entraînement (1) de la pompe à huile avec un extracteur.
2. Enlever les vis de fixation de la pompe à huile.
3. Enlever la pompe à huile (2).
4. Enlever le pignon de lancement avec le jeu d'extraction spécial (Référence 07916-09032).
5. Enlever la clavette du vilebrequin.

(Au remontage)

- Vérifier que la clavette se trouve sur le vilebrequin.
- Chauffer le pignon de lancement à environ 80 °C et le monter sur le vilebrequin.

(1) Pignon d'entraînement de la pompe à huile
(2) Pompe à huile
(3) Pignon de lancement

Ölpumpe und Kurbelgetriebe

1. Den Ölpumpenantrieb (1) mit Hilfe einer Abziehvorrichtung entfernen.
2. Die Befestigungsschrauben der Ölpumpe entfernen.
3. Die Ölpumpe (2) herausnehmen.
4. Das Kurbelgetriebe mit Hilfe einer Spezial-Abziehvorrichtung (Code Nr. 07916-09032) entfernen.
5. Den Federkeil auf der Kurbelwelle entfernen.

(Beim Wiedeereinbau)

- Prüfen, ob der Federkeil auf der Kurbelwelle aufsitzt.
- Das Kurbelgetriebe auf etwa 80 °C erwärmen und auf der Kurbelwelle einsetzen.

(1) Ölpumpenantrieb (2) Ölpumpe (3) Kurbelgetriebe

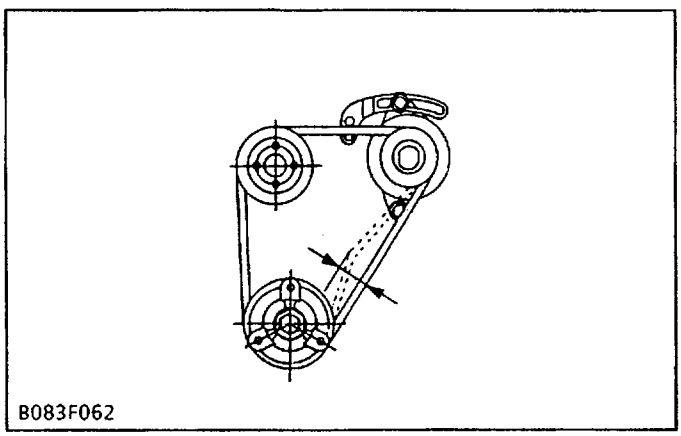
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3 COOLING SYSTEM

CHECKING

[1] FAN BELT



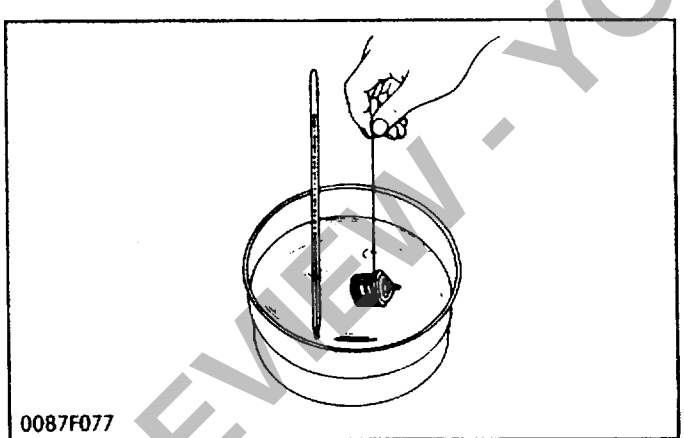
Fan Belt Tension

1. Press the fan belt between fan pulley and pulley at force of 10 kgf (98N, 22 lbs).
   Check if the fan belt deflection is 10 to 12 mm (0.394 to 0.472 in.)
2. If the deflection is not within the factory specifications, loosen the bolt and nuts, and relocate the alternator to adjust.

[2] RADIATOR

CAUTION

- **When removing the radiator cap, wait at least ten minutes after the engine has stopped and cooled down. Otherwise, hot water may gush out, scalding nearby people.**



Thermostat's Valve Opening Temperature

1. Push down the thermostat valve and insert a string between the valve and the valve seat.
2. Place the thermostat and a thermometer in a container with water and gradually heat the water.
3. Hold the string to suspend the thermostat in the water. When the water temperature rises, the thermostat valve will open, allowing it to fall down from the string.
   Read the temperature at this moment on the thermometer.
4. Continue heating the water and read the temperature when the valve has risen by about 8 mm (0.315 in.).
5. If the measurement is not acceptable, replace the thermostat.

Thermostat's valve opening temperature	Factory spec.	69.5 to 72.5°C 157.1 to 162.5°F
Temperature at which thermostat completely opens	Factory spec.	85°C 185.5°F

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