Attach to Vol. No. :T589E-01

EX27u, 30u, 35u 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.

CONNECTOR TERMINAL LOCATIONS
(Drawing are shown in face view of the connection)

connectors

P Fuel Sensor ZO3F-GY

CN_E (Engine Herness Side) 7322-7544-40

O Engine (M side) Engine Harness Side 7322-4220-30

Relay a Work Light P&B VCFM-1002

Relay b Horn P&B VCFM-1002

Relay c Pilot Shut-Off P&B VCFM-1002

7323-3010

7323-2228

a Starter Relay2 7323-2040

b Glow Timer 7323-2262

Glow Relay

c Starter Relay1 7323-2857-30

K Cab Radio (opt) MWP-10F-B

CN_G BOX Side
Housing 6189-0376
Terminal 8100-0426
Rubber Plug 7165-0334

L Batterry(M Side) Harness side 7322-4210-30

L Batterry(FM Side) Main Harness side 7323-4210-30

CN_G Main Side
Housing 6188-0221
Terminal 8100-0459
Rubber Plug 7165-0334

A Battery Terminal (M Side) L02MB

B Alternator 7323-2735-60

C Stop Sol. 7323-2137

D Fuel Pump 7323-9021

CN_E (BOX Harness Side) 7323-7544-40

O Engine (FM Side) Battery Harness Side 7323-4220-30

I Gauge Pan AMP 174045-2

CN_F BOX Harness Side Fuse Box 7319-3130

S Heater 7323-2137

A Battery Terminal (FM Side) L02FB

H Glow (M Side) Box Harness Side 7323-4220-30

H Glow (M Side) Battery Harness Side 7322-4220-30

Key SW #4372453

p1 Lock SW(R) AMP 174352-2

p2 Lock SW(L) AMP 174352-2

Q Travel Mode ZO2F-GY

r Pilot Shut-Off ZO2M-GY

Gauge Panel 4403739

Buzzer
ILU
Power Circuit
Buzzer Circuit
LCD
Fuel
Coolant Temp
Hour
CPU
Relay Circuit
Relay Circuit
LED Circuit
Light SW
A/I SW
+ B SW
Glow
Charge
ENG Oil Press
Power (IG)
+B
ALT
Fuel
Thermo. SW
Coolant Temp
Low Fuel
A/I
Light

Heater SW 4294504

Heater 4289620

Compressor
Thermostat
Receiver Dryer
A/C
Change Over Valve
Relay
Relay
A/C SW
Fan SW
Resister
Blower Motor

Cab
Room Light
Window Washer
Wiper Motor
Wiper SW
Speaker L
Speaker R (FM)
Light

Fusible Link #4331898

Battery 75D26L-MF #4392984

Starter 12V

Alternator

Stop Sol. #4409422

Fuel Pump #4409424

Thermo Sensor #4355590

Pressure SW #4356051

Thermo SW #4403056

Glow Plug

QOS Sensor #4355589

Sol. Valve #4415398

Travel Mode Valve

Pilot shut-off

Aux, Power (Less than 5A)

Travel Mode SW #4326184

LOCK SW(R) #4355738

LOCK SW(L) #4355738

Horn SW #2033123

Horn #349452

Fuel Sensor #4358547

Work Light #4361457

Work Light #4361457

Starter Relay 2 #4355587

Glow Timer #4355586

Glow Relay #4355584

Starter Relay 1 #4288451

Relay a (Light) #4394590

Relay b (Horn) #4394590

Relay c (Pilot Shut-Off) #4394590

12V
Auto Idle
Decel
Accel
Motor(+)
Motor(–)
Accel Actuator

Auto Idle

Ground
Connecotor
Screw Terminal
Plug
Plate Terminal
Water Proof Plug
Plate Terminal With Lock

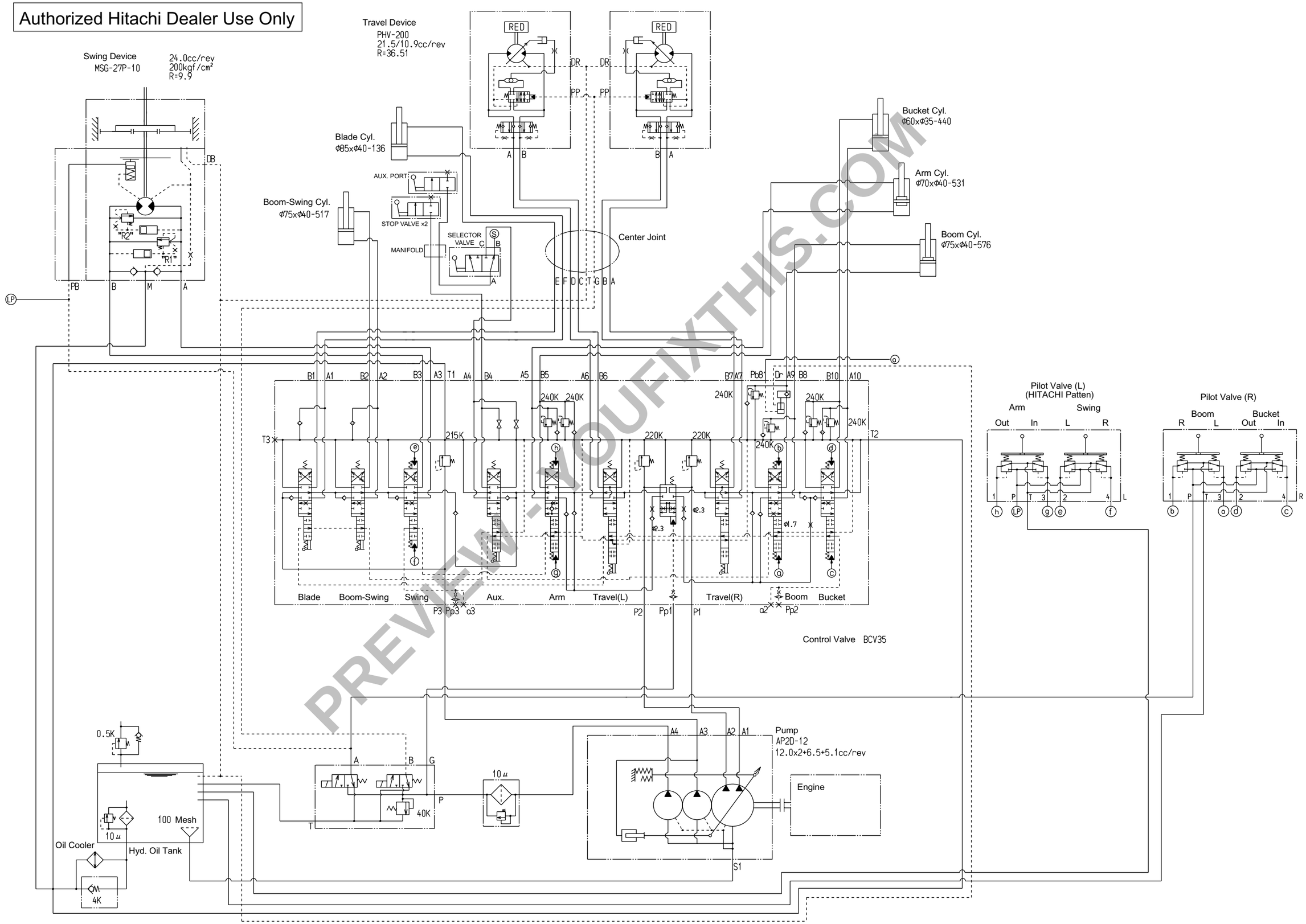
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Attach to Vol.No.: T589E-01

EX27u , 29uE HYDRAULIC CIRCUIT DIAGRAM

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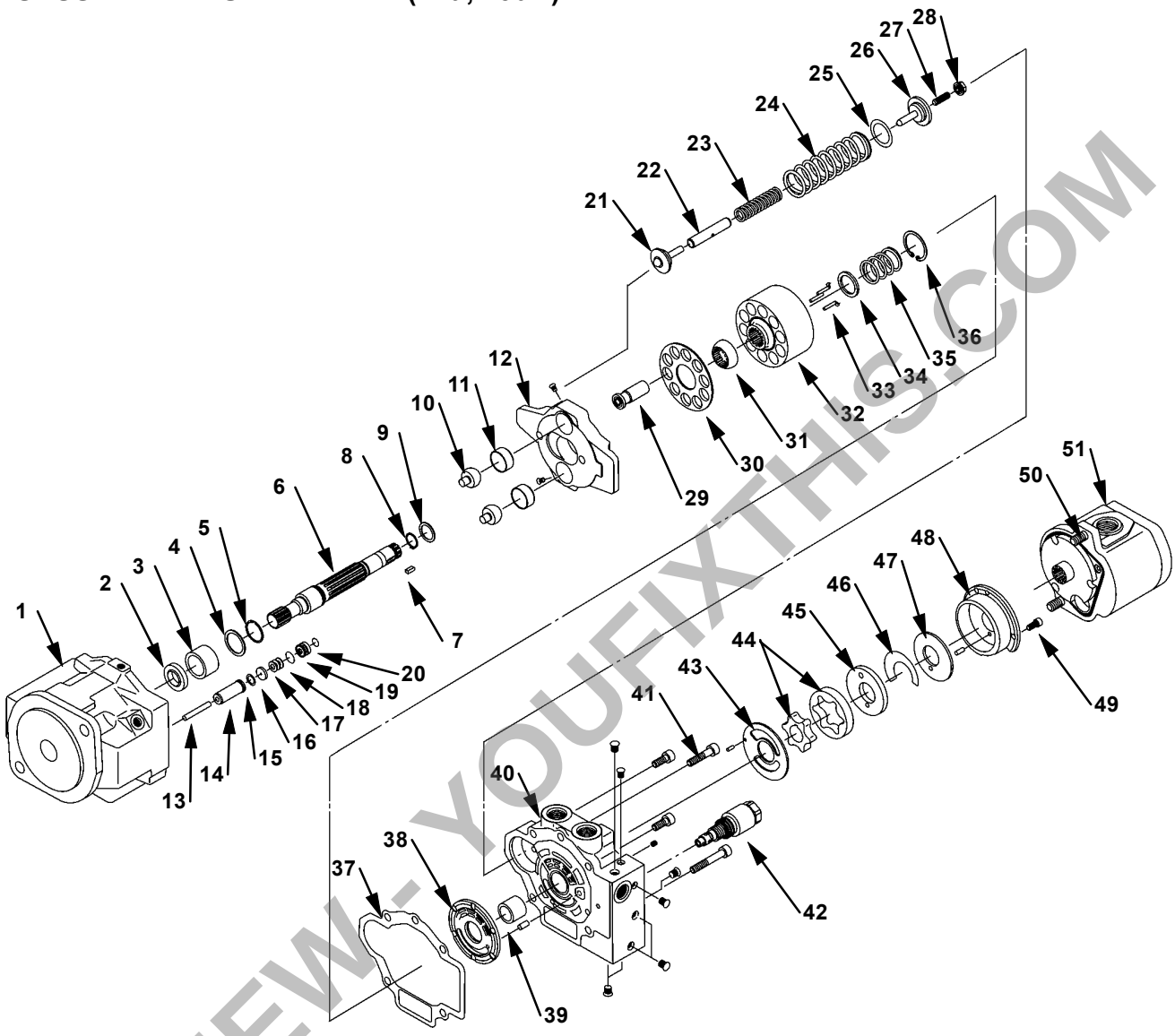


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DISASSEMBLE PUMP DEVICE (27u, 29uE)



W574-02-03-003

1 - Housing
2 - Oil Seal
3 - Bearing
4 - Shim
5 - Ring
6 - Shaft
7 - Key
8 - Retaining Ring
9 - Shim
10 - Guide
11 - Bushing
12 - Swash Plate
13 - Pin
14 - Sleeve
15 - Shim
16 - Distance Peace
17 - Coned Disc Spring
18 - O-Ring
19 - Piston
20 - O-Ring
21 - Spring Seat
22 - Guide
23 - Spring
24 - Spring
25 - Shim
26 - Spring Seat
27 - Set Screw
28 - Nut
29 - Plunger
30 - Retainer
31 - Holder
32 - Cylinder Block
33 - Pin
34 - Retainer
35 - Spring
36 - Retaining Ring
37 - Packing
38 - Valve Plate
39 - Bearing
40 - Cover
41 - Socket Bolt
42 - Relief Valve
43 - Side Plate
44 - Gear
45 - Side Plate
46 - O-Ring
47 - Plate
48 - Housing
49 - Socket Bolt
50 - Socket Bolt
51 - Gear Pump

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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 bolt		12	4	19	88	(9)	(65)
2	Engine bracket mounting bolt (Front) *		10	8	17	49	(5)	(36)
	Engine bracket mounting bolt (Rear)*		10	6	17	49	(5)	(36)
3	Hydraulic oil tank mounting bolt		12	4	19	88	(9)	(65)
4	Fuel tank mounting nut		10	2	17	20	(2)	(15)
	Fuel tank mounting bolt		8	1	13	9.8	(1)	(7.2)
5	Hydraulic hoses and union joints		PF 1/8		19	29.5	(3)	(22)
			PF 3/8		22	39	(4)	(29)
			PF 1/2		27	64	(6.5)	(47)
6	Pump mounting bolt		12	2	19	88	(9)	(65)
7	Pump cover mounting bolt		10	6	17	49	(5)	(36)
8	Control valve mounting bolt		10	4	17	49	(5)	(36)
	Control valve bracket mounting bolt		10	4	17	49	(5)	(36)
9	Swing device mounting bolt		14	6	22	137	(14)	(101)
10	Battery mounting nut		6	2	10	5	(0.5)	(3.7)
	Battery mounting bolt		10	3	17	49	(5)	(36)
11	Canopy mounting bolt		16	4	24	205	(21)	(151)
12	Cab mounting bolt		16	4	24	205	(21)	(151)
13	Swing bearing mounting bolt	Swing Device	12	24	19	108	(11)	(80)
		Track	12	20	19	108	(11)	(80)
14	Travel device mounting bolt *	27u, 29uE	12	18	19	108	(11)	(80)
		30u, 32uE	12	22	19	108	(11)	(80)
		35u, 36uE	12	22	19	128	(13)	(94)
15	Sprocket mounting bolt*	27u, 29uE	12	18	19	108	(11)	(80)
		30u, 32uE	12	22	19	108	(11)	(80)
		35u, 36uE	12	22	19	128	(13)	(94)
16	Upper roller mounting bolt		14	2	22	137	(14)	(101)
17	Lower roller mounting bolt*		14	16	22	137	(14)	(101)
18	Cover mounting bolt		8		13	9.8	(1)	(7.2)
			10		17	49	(5)	(36)
19	Counterweight mounting bolt		22	2	32	540	(55)	(400)

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.

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ENGINE SYSTEM TROUBLESHOOTING

Starter does not rotate

- Be sure to inspect connection prior to trouble shooting.

Check if battery voltage and electrolyte density are normal.
- Voltage: 12 volts or more
- Density: 1.28 or more

YES

With key switch positioned as shown in the table below, check if each terminal voltage on starter is normal.

Unit: V

Terminal \ Key Switch	OFF	ON	START
B (M8)	12	12	12
#50 (S)	0	0	12

YES

No voltage or less than 12 V at terminal B.

NO

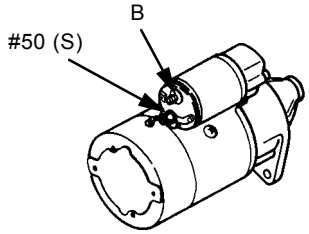
No voltage or less than 12 V at terminal No. #50 (S) with key switch at START position.
- Key switch: START

NO

(When key switch is turned to the START position, if voltage at terminal B is lower than 9 volts, battery may be faulty.)

Starter voltage check

1. Turn key switch to the ON or START position.
2. Contact minus (−) probe of a circuit tester to the machine (ground to unpainted area like bolt head) and plus (+) probe terminals to the starter terminal respectively, and check voltages.
   (Measure with the harness connected.)



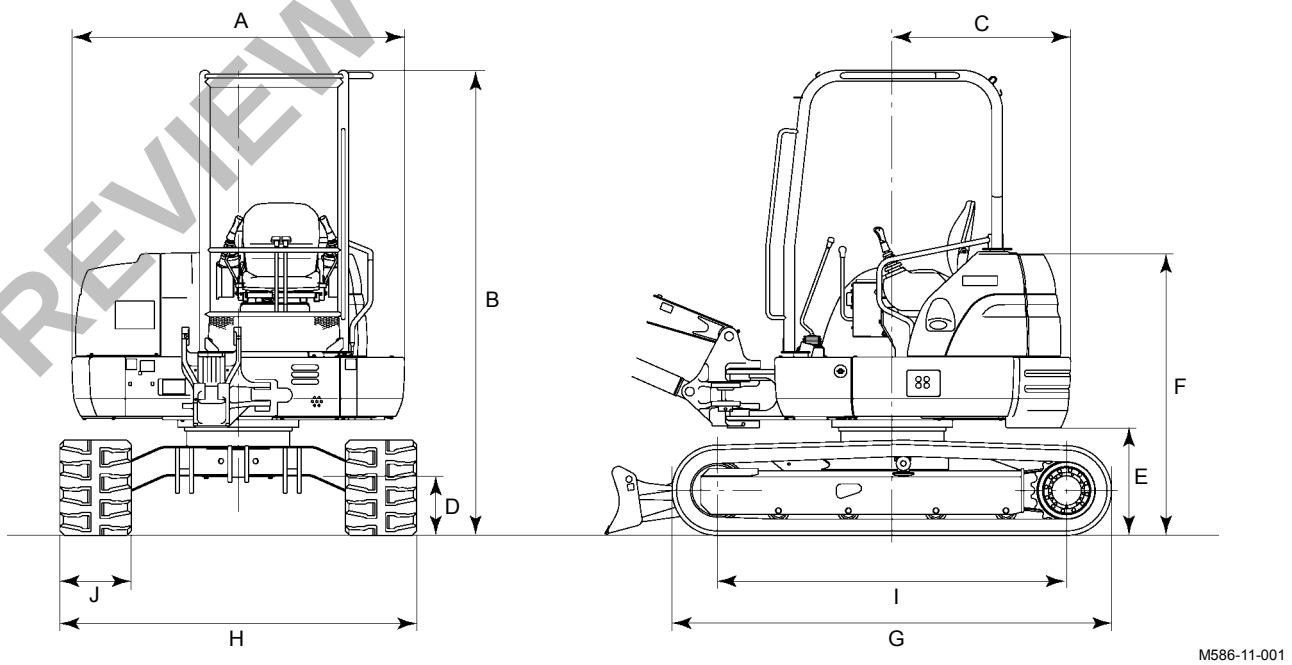
T533-07-02-001

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SPECIFICATIONS

(EX27u, EX29uE)

Item	Unit	4-pillar Canopy	Cab
Front Attachment	–	Boom swing type	
Bucket Capacity (Heaped)	m^3	0.08 (0.10 yd^3)	
Operating Weight	kg (lb)	2850 (6280)	2980 (6570)
Base Machine Weight	kg (lb)	2150 (4740)	2280 (5030)
Engine	–	ISUZU 16.9 kW/2450 min^{-1} (23 PS/2450 rpm)	
A: Overall Width	mm (ft in)	1490 (4′ 11″)	
B: Cab Height	mm (ft in)	2550 (8′ 4″)	2640 (8′ 8″)
C: Rear End Swing Radius	mm (ft in)	775 (2′ 7″)	
D: Minimum Ground Clearance	mm (ft in)	325 (1′ 0.8″)	
E: Counterweight Clearance	mm (ft in)	540 (1′ 9″)	
F: Engine Cover Height	mm (ft in)	1510 (4′ 11″)	
G: Undercarriage Length	mm (ft in)	1920 (6′ 4″) (Rubber Crawler)	
H: Undercarriage Width	mm (ft in)	1550 (5′ 1″)	
I: Sprocket Center to Idler Center	mm (ft in)	1500 (4′ 11″)	
J: Track Shoe Width	mm (ft in)	300 (12″) (Rubber Crawler)	
Ground Pressure	kPa (kgf/cm^2, psi)	28.3 (0.29, 4.1)	29.6 (0.30, 4.3)
Swing Speed	min^{-1} (rpm)	8.1	
Travel Speed (Fast/Slow)	km/h (mph)	4.0/2.4 (2.5/1.45)	
Gradeability	% (deg.)	58 (30)	



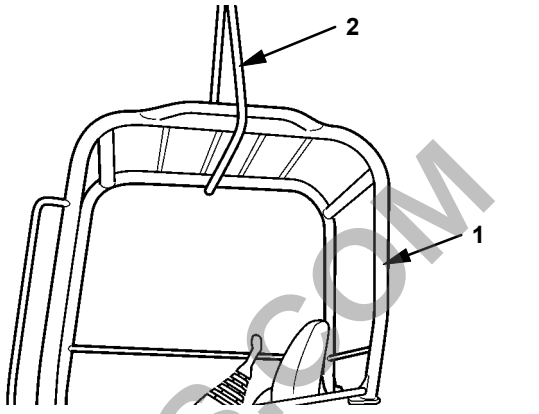
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REMOVE AND INSTALL CANOPY

Removal

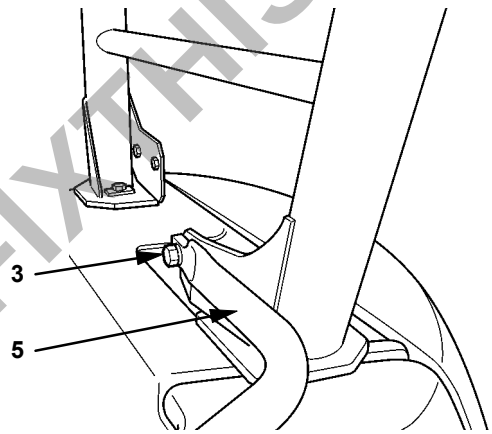
1. Attach sling belt (2) to canopy (1).



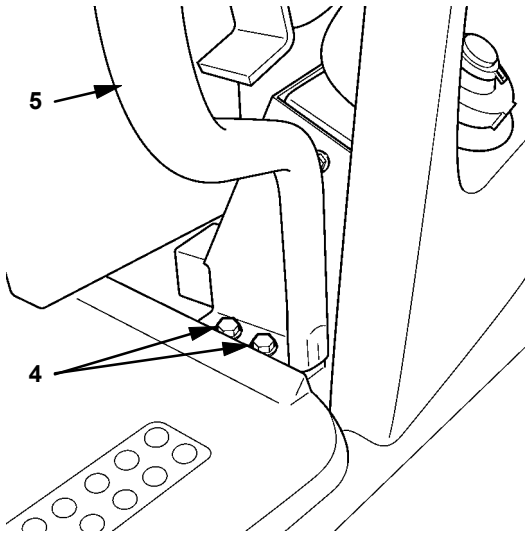
W571-02-01-001

2. Loosen bolts (3) and (4) (2 used) to remove handrail (5).

: 17 mm



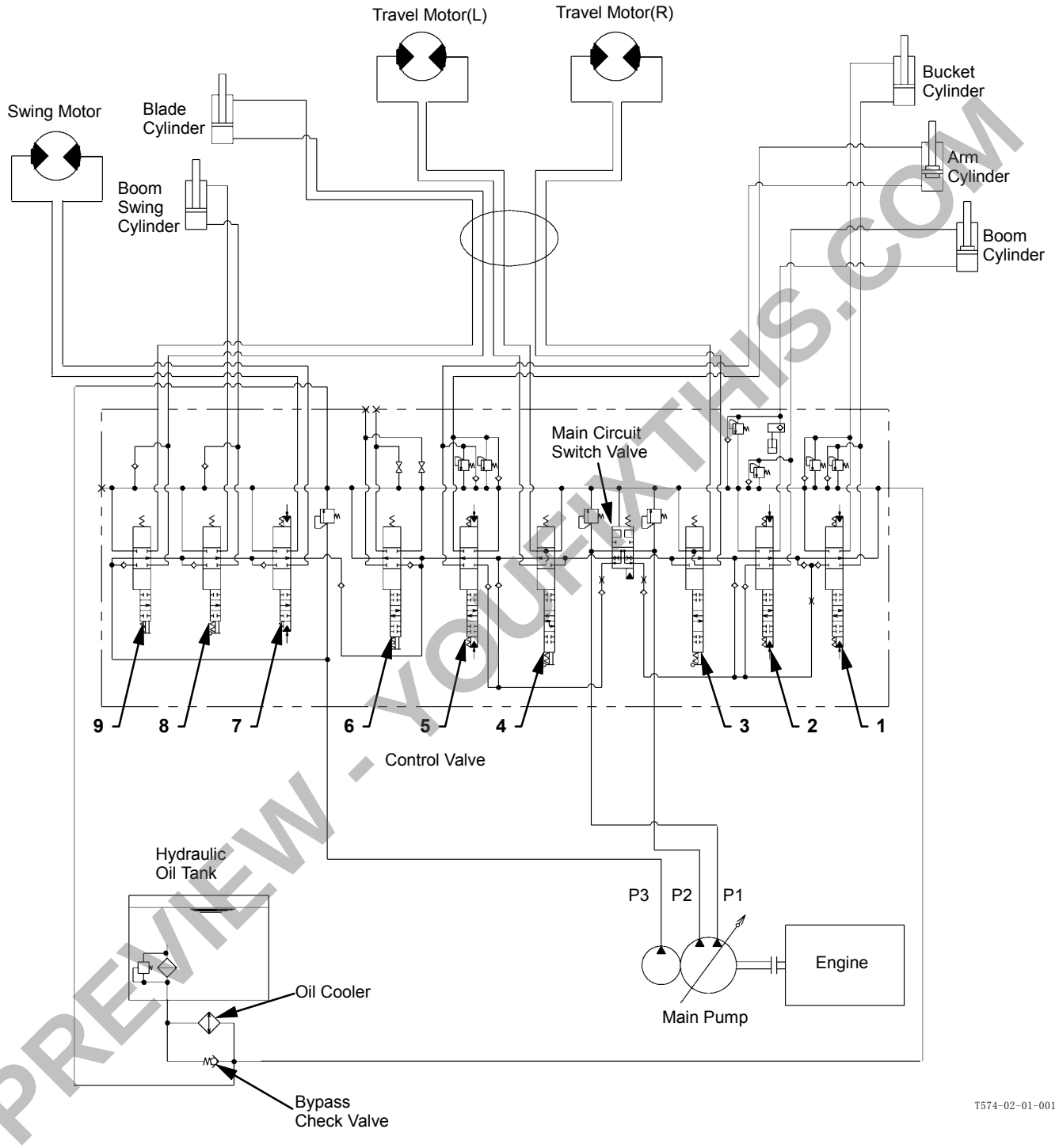
W571-02-01-002



W571-02-01-006

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1 - Bucket
2 - Boom
3 - Travel (R)
4 - Travel (L)
5 - Arm
6 - Aux.
7 - Swing
8 - Boom Swing
9 - Blade

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MAIN DATA AND SPECIFICATIONS

1. MODELS 3LA1 AND 3LB1

Item \ Engine model(s)			3LA1	3LB1
Type			In-line water cooled 4-cycle type, OHV: diesel engine	
Timing drive system			Gear drive	
Number of piston rings			Compression rings 2, and oil ring 1	
No. of cylinders - bore × stroke (mm)			3 – 70 × 79.7	3 – 77.4 × 79.7
Displacement (cc)			920	1124
Compression ratio			22 : 1	
Type of combustion chamber			Swirl chamber	
Overall length × width × height (mm)			* 537 × 475 × 553	
Dry weight (kg)			* 115	
Fuel injection timing (BTDC) (when at stop)			* 19°	
Firing order			1 – 3 – 2	
Fuel			Highspeed diesel fuel (SAE No.2)	
Idling speed (r.p.m)			* 850	
Compression pressure (kg/cm^2)			31 or more/250 r.p.m.	
Valve clearance (cold) (mm)		Intake	0.20	
		Exhaust	0.20	
Valve operating timing	Intake valve	Open (BTDC)	15°	
		Close (ABDC)	29°	
	Exhaust valve	Open (BBDC)	40°	
		Close (ATDC)	16°	
Injection pump			Bosch type	
Governor			Mechanical type	
Nozzle			Throttle type	
Injection pressure (kg/cm^2)			* 135	
Oil pump			Trochoid type	
Oil filter			Cartridge type	
Lubricant capacity: In total (l)			* About 5.1	
Generator output (V – A)			* 12 – 20	
Starter output (V – KW)			* 12 – 1.0	

(Note) These specifications may be subject to change without notice.
Figures in the column with an asterisk (*) are different for each machine. Refer to the specifications provided by machine manufacturers.

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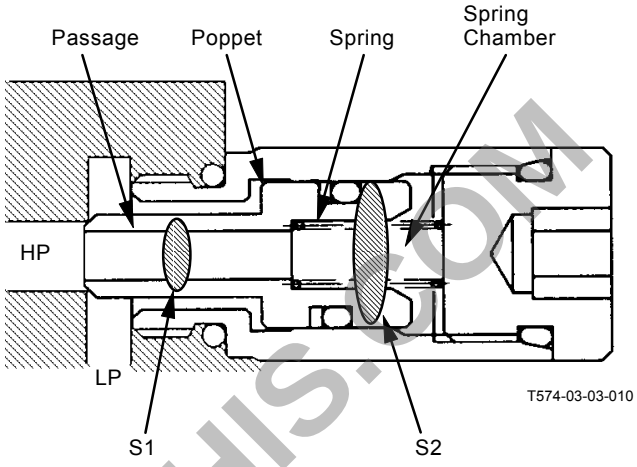
MAKE-UP VALVE

The make-up valve prevents cavitation in the main circuit.
It is provided in the travel (30u, 32uE, 35u, 36uE) and blade.

The pressure on port HP acts on spring chamber through poppet passage, so the pressure on port HP and spring chamber become equal. Accordingly, when the pressure on port HP is higher, the closing force [Pressure in Spring Chamber × Pressurized Area S2] becomes larger than the opening force of poppet [Port HP × Pressurized Area S1], which closes the poppet.

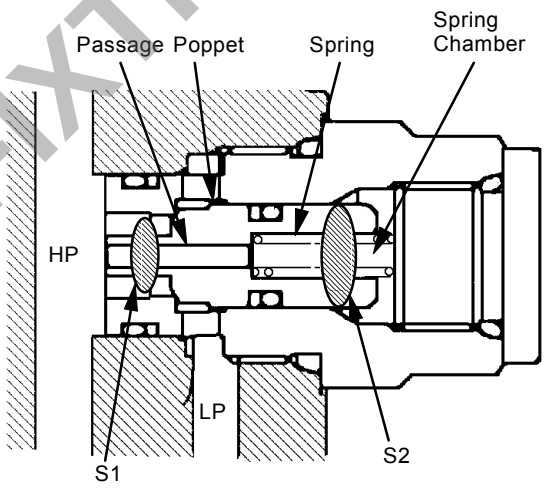
When the pressure on port HP is lower than the pressure on port LP (pressure on port HP is almost zero), the closing force of the poppet becomes only by the spring force. Therefore, when the opening force of poppet [Pressure on Port LP x (Pressurized Area S2 - S1)] becomes larger than the closing force [Spring Force], which opens the poppet to supply hydraulic oil to port HP. Thereby, cavitation at the port HP side is prevented.

27u, 29uE:



T574-03-03-010

30u, 32uE, 35u, 36uE:



T563-02-04-004

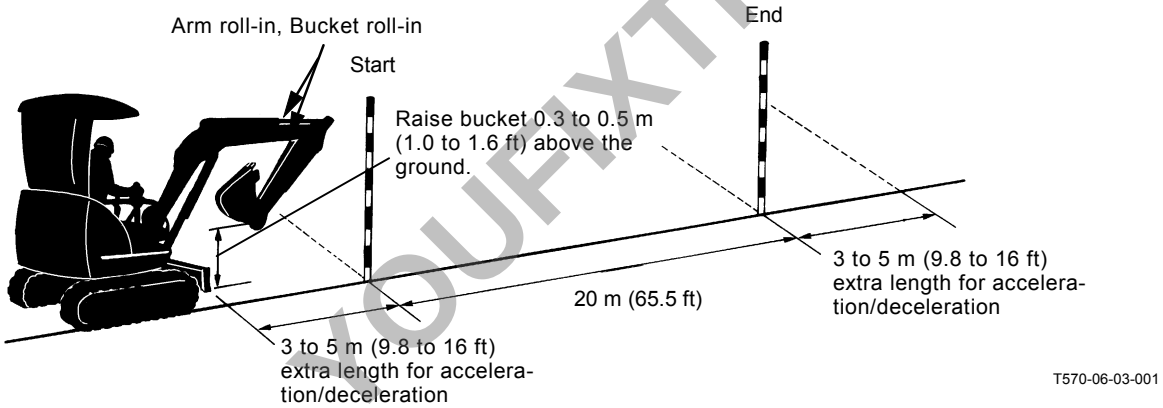
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TRAVEL SPEED

Summary:
To check overall performance of travel drive system (between main pump and travel motor), measure the time required for the excavator to travel a test track.

Preparation:
1. Adjust the track sag of both tracks to be equal.
2. Prepare a level and solid test track 20 m (65.5 ft) in length, with an extra length of 3 to 5 m (9.8 to 16 ft) on both ends for machine acceleration and deceleration.
3. Hold the bucket 0.3 to 0.5 m (1.0 to 1.6 ft) above the ground with the arm and bucket rolled in.
4. Maintain the hydraulic oil temperature at 50±5 °C (122±9 °F).



Measurement:
1. The test should be performed with each mode (slow and fast travel speeds) in the fast-idle speed.
2. Start traveling the machine in the acceleration zone with the travel levers at full stroke.
3. Measure the time required to travel 20 m (65 ft 7 in).
4. After measuring the forward travel speed, turn the upperstructure 180° and measure the reverse travel speed.
5. Repeat steps (2) and (4) three times in each direction and calculate the mean values.

Evaluation:
Refer to T4-5 Standard.

Remedy:
Refer to T5-2 "Troubleshooting A".

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OPERATIONAL PERFORMANCE STANDARD

This Operational Performance Standard values are listed below.
Refer to the correspondence section in T4-2 and after for the details of measurement method.

The value in ( ) is shown for reference only.
* The standard measurement condition is as follows;
  Engine Speed Control Lever: Full Stroke
  Hydraulic Oil Temperature: 50±5 °C

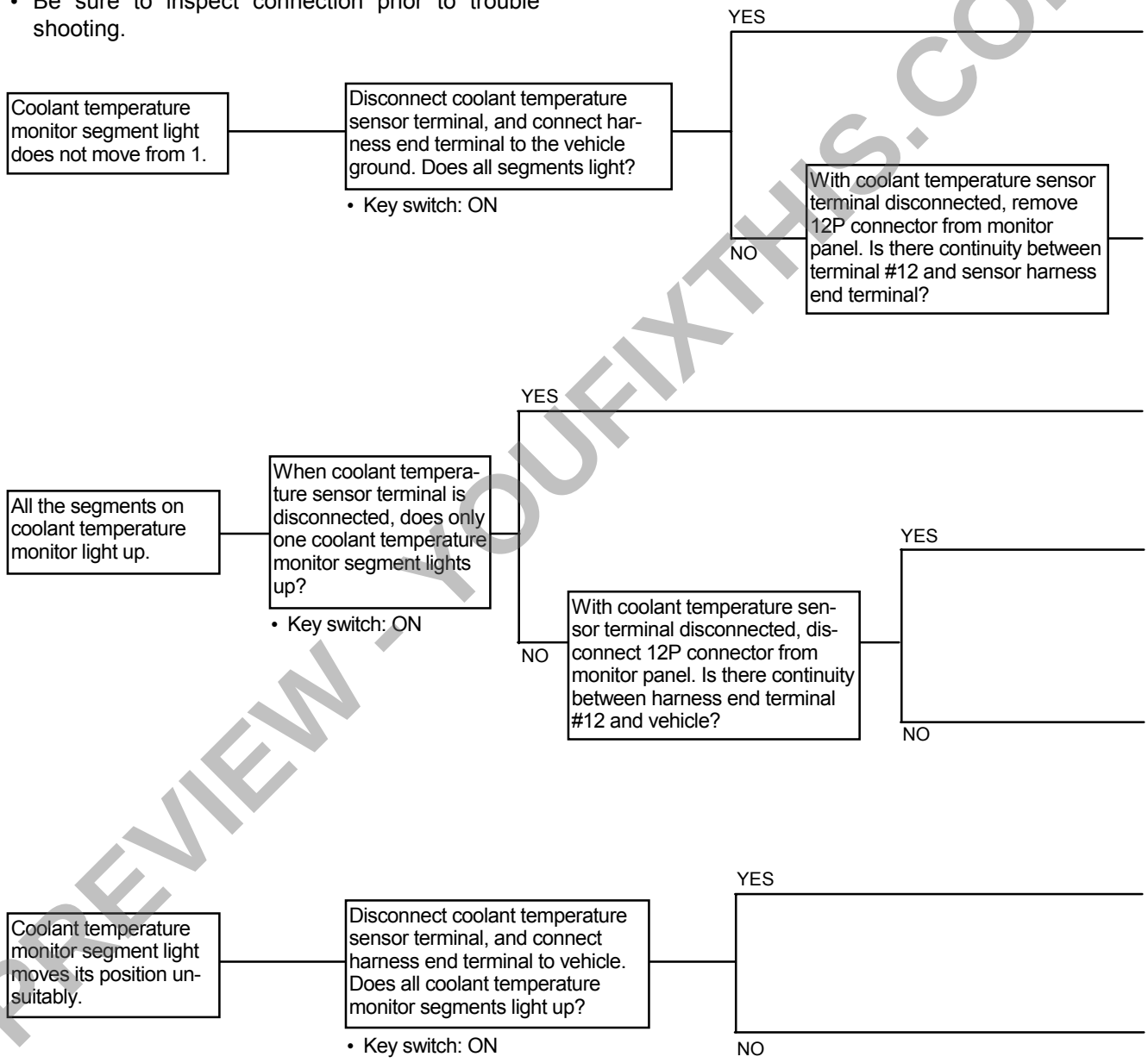
Item	27u, 29uE	30u, 32uE	35u, 36uE	Remarks
ENGINE SPEED min^{-1}				
Slow Idle Speed	1225 ± 50	1075 ± 50	1075 ± 50	
Fast Idle Speed	2550^{+50}_{-25}	2350^{+50}_{-25}	2550^{+50}_{-25}	
Fast Idle Speed (one main pump is fully loaded)	2500^{+50}_{-25}	2280^{+50}_{-25}	2500^{+50}_{-25}	
Fast Idle Speed (two main pumps are fully loaded)	2500^{+50}_{-25}	2280^{+50}_{-25}	2500^{+50}_{-25}	
Fast Idle Speed (three main pumps are fully loaded)	2480^{+50}_{-25}	2225^{+50}_{-25}	2480^{+50}_{-25}	
ENGINE COMPRESSION PRESSURE MPa (kgf/cm^2)	3.0 (31) or more	←	←	
VALVE CLEARANCE (IN, EX) mm	0.2	←	←	
NOZZLE INJECTION PRESSURE MPa (kgf/cm^2)	13.2 (135)	←	←	
INJECTION TIMING (Before Top Dead Center) deg.	16°	←	←	
TRAVEL SPEED sec/20 m				
Fast Speed Mode (Rubber Crawler/Steel Crawler)	18.5 ± 1.5/ 19.0 ± 1.5	16.9 ± 1.5/ 17.4 ± 1.5	16.5 ± 1.5/ 17.0 ± 1.5	
Slow Speed Mode (Rubber Crawler/Steel Crawler)	29.9 ± 1.5/ 30.8 ± 1.5	23.4 ± 1.5/ 24.0 ± 1.5	23.6 ± 1.5/ 24.3 ± 1.5	
TRACK REVOLUTION SPEED sec/3 rev.				
Fast Speed Mode (Rubber Crawler/Steel Crawler)	11.4 ± 1.5/ 11.6 ± 1.5	10.7 ± 1.5/ 10.9 ± 1.5	10.9 ± 1.5/ 11.1 ± 1.5	
Slow Speed Mode (Rubber Crawler/Steel Crawler)	18.4 ± 1.5/ 18.8 ± 1.5	14.3 ± 1.5/ 14.5 ± 1.5	15.2 ± 1.5/ 15.4 ± 1.5	
MISTRACK (Fast Speed-Slow Speed) mm/20 m	200 or less	←	←	
TRAVEL MOTOR LEAKAGE mm/3 min	30 or less	←	50 or less	
SWING SPEED sec/3 rev.	22.3 ± 1.5	23.2 ± 1.5	21.1 ± 1.5	
SWING FUNCTION DRIFT mm/90°	135 or less	←	←	
SWING MOTOR LEAKAGE mm/5 min	0	←	←	
BOOM-SWING CYLINDER LEAKAGE mm/5 min	2 or less	3 or less	←	
MAXIMUM SWINGABLE SLANT ANGLE deg.	22 or possibly more	←	←	
SWING BEARING PLAY mm	(0.3 to 0.7)	←	←	Allowable Limit: (2.0)

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MALFUNCTION OF COOLANT TEMPERATURE GAUGE

NOTE: The troubleshooting here only covers the malfunction of the coolant temperature gauge. For the malfunction of the overheat indicator, refer to T5-3-8.

- Be sure to inspect connection prior to trouble shooting.



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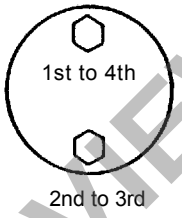
IMPORTANT: The following items are applied to both fine and coarse pitch threads.

1. **Apply lubricant (i. e. white zinc B dissolved Into Spindle oil) to nuts and bolts to reduce their friction coefficients.**
   The plated bolts require no lubricant.
2. **Torque tolerance is ±10 %.**
3. **Be sure to use bolts of correct length. Bolts that are too long cannot be tightened, as the bolt tip comes into contact with the bottom of the bolt hole. Bolts that are too short cannot develop sufficient tightening force.**
4. **The torques given in the chart are for general use only. Do not use these torques if a different torque is given for a specific application.**
5. **Make sure that nut and bolt threads are clean before installing.**
   Remove dirt or corrosion, if any.

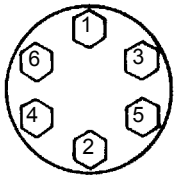
Bolt Tightening Order

When tightening two or more bolts, tighten them alternately, as shown, to ensure even tightening.

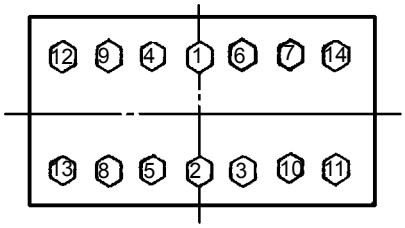
Equally tighten upper and lower



Tighten diagonally



Tighten from center and



W105-01-01-003

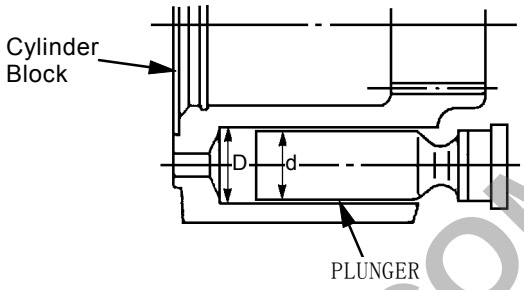
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MAINTENANCE STANDARDS

1. The clearance between the plunger diameter and the cylinder block bore diameter

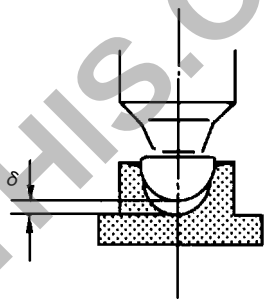
   (D-d): 0.050 mm (0.00197 in) or less.



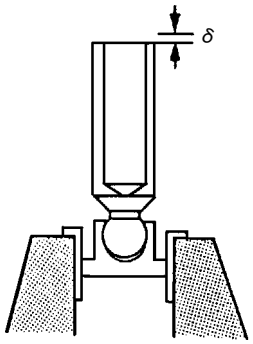
W507-02-04-009

2. The clearance between the plunger and the shoe

   δ : 0.2 mm (0.00787 in) or less.



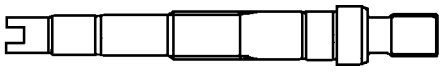
W107-02-06-140



W107-02-06-141

3. The wear amount of the oil seal mounting surfaces
   Make sure that there are no damage and / or abnormal wear.

   (D_0-D_1): 0.025 mm (0.000984 in) or less.



W507-02-04-010

D_0 D_1

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- Read PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING (W1-1-1) carefully before disassembling.

NOTE: The swing motors for 27u, 30u and 35u have identical structures.

IMPORTANT: Be careful not to allow valve plate (22) to fall when removing cover (26).

1. Loosen socket bolt (27), then remove cover (26), valve plate (22) and O-ring (21).

   : 12 mm

2. Remove bearing (24) and O-ring (28) from cover (26).

3. Remove disc spring (20) and spring sheat (19) from housing (1).

4. Remove brake piston (18) and O-rings (16) and (17) from housing (1).

IMPORTANT: Take care not to damage the sliding surface of swash plate (5).

5. Remove rotor (10), plunger (6) assembly, swash plate (5) and disc plate (15) from housing (1).

6. Remove plungers (6) (9 used), retainer (7), holder (8) and pins (9) (3 used) from rotor (10).

CAUTION: Always press spring (12) using a press when removing retaining ring (14).
If retaining ring (14) is removed without pressing spring (12), washer (13) and spring (12) may fly out, possibly causing serious injury.

7. Remove retaining ring (14) to remove washer (13), spring (12) and collar (11) from rotor (10).

8. Remove shaft (4) from housing (1) by tapping shaft (4) with a plastic hammer.

9. Remove bearing (3) from shaft (4) using a press.

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14. Remove retaining ring (25) from housing (31).



IMPORTANT: Do not remove bearing (27) unless replacement is required. Replace it with a new one if removed.

15. Remove ring gear (26) from housing (31) using a press.



16. Remove seal ring (30) and O-ring (29) from ring gear (26).

NOTE: Seal ring (30) and O-ring (29) are the floating seals. Refer to W1-1-3 for precautions for handling the floating seal.

17. Remove O-ring (29) and seal ring (30) from housing (31).

18. Remove oil seal (33) from housing (31).



19. Remove plug (49) from housing (55), then remove spring (51), ring (52) and spool (60).

 : 32 mm

20. Remove plug (59) from housing (55), then remove spring (56) and spool (57).

 : 8 mm

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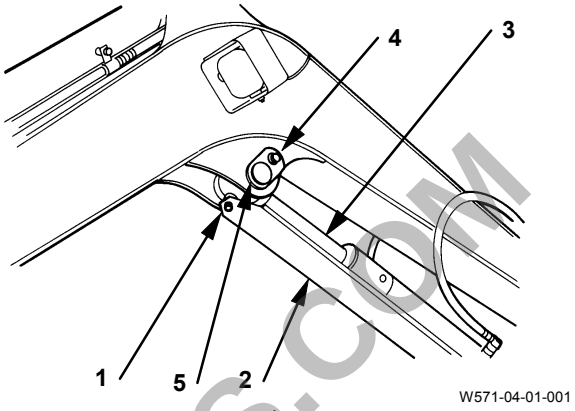
Remove Boom Cylinder

1. Loosen bolt (1) to remove cover (2).

   : 17 mm

2. Attach a sling belt to boom cylinder (3). While holding boom cylinder (3) using a crane, remove bolt (4) and pin (5).

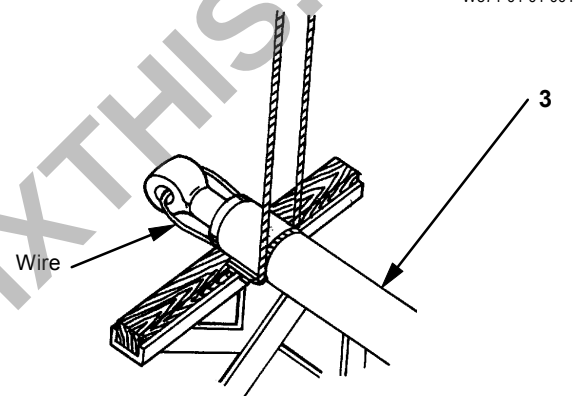
   : 19 mm



W571-04-01-001

CAUTION: Boom cylinder weight:
:29 kg (64 lb) (27u, 29uE)
:32 kg (71 lb) (30u, 32uE)
:37 kg (82 lb) (35u, 36uE)

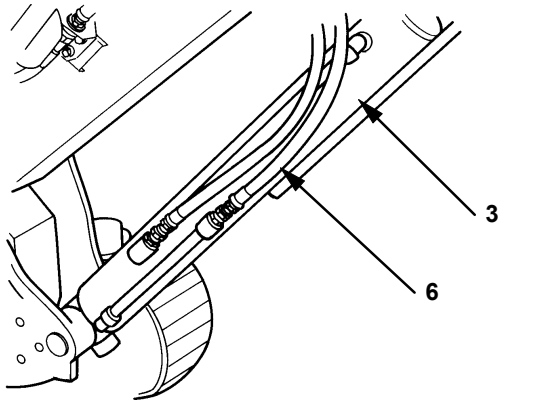
3. Place a support under the end of the cylinder tube. Operate the boom control lever to fully retract the rod. Thread a piece of wire through the rod hole, and tie it to the boom cylinder (3) tube to prevent the cylinder rod from extending.



W554-02-03-007

4. Disconnect hose (6) from boom cylinder (3). Cap disconnected hose (6) end.

   : 22 mm

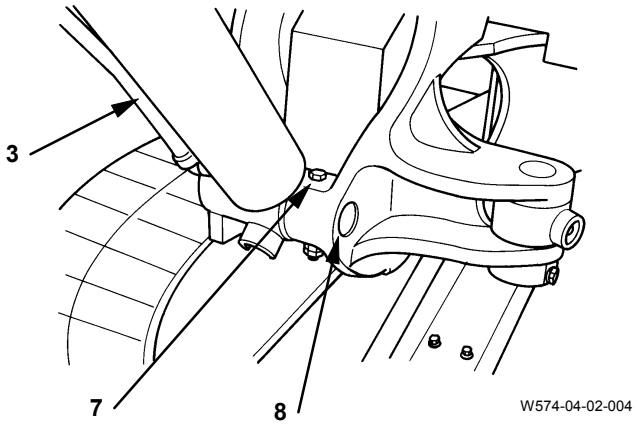


W574-04-02-003

5. Remove bolt (7) and pin (8).

   : 17 mm

6. Lift and remove boom cylinder (3) using a crane.



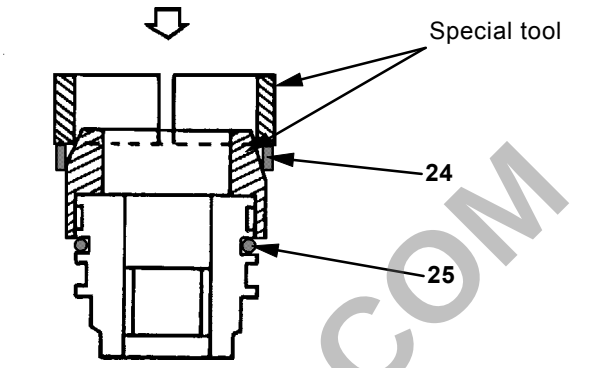
W574-04-02-004

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IMPORTANT: Be sure that O-ring (25) is not twisted after installation.

7. Install O-ring (25) and seal ring (24) onto piston (21), then correct the seating position using a special tool.
   For boom swing cylinder ST2936 (27u, 29uE)
   ST2938
   (30u, 32uE, 35u, 36uE)

8. Install a special tool onto piston (21), then correct the seating position of seal ring (24).



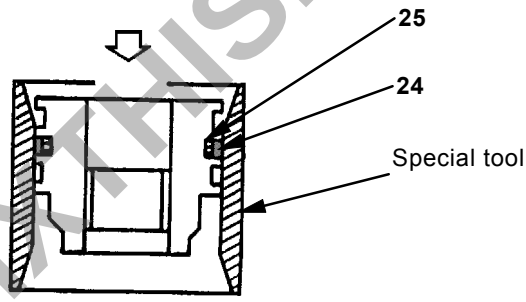
W506-04-02-014

IMPORTANT: Install the slide rings so that the slits are not aligned in the same position.

9. Install slide rings (26) and (20) onto piston (21).

10. Install cylinder head (3) onto piston rod (30).

11. Install cushion bearing (18) and piston (21) onto piston rod (30).



W506-04-02-015

: 46 mm
: 686 N·m (70 kgf·m, 504 lbf·ft) (27u, 29uE)
: 46 mm
: 981 N·m (100 kgf·m, 720 lbf·ft)
(30u, 32uE, 35u, 36uE)

IMPORTANT: After tightening set screw (23), mushroom the screw head in two places to lock it.

12. Insert steel ball (22) into piston (21). Install set screw (23).

: 3 mm
: 7 N·m (0.7 kgf·m, 5 lbf·ft)

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SECTION 2

ENGINE

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REASSEMBLY	59

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10.CRANKSHAFT AND CRANKSHAFT BEARING

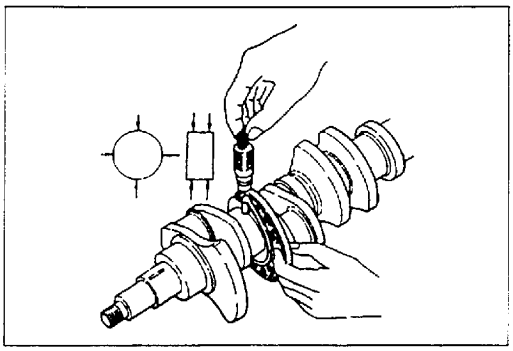


Fig. 106

Outside diameters of journal and pin

If worn beyond the limits-replace

Crank journal

mm (in.)

	Standard	Limit
3LA1 3LB1	52.0 (2.0472)	51.86 (2.0417)
3LD1	60.0 (2.3622)	59.86 (2.3567)

Crank pin

mm (in.)

	Standard	Limit
3LA1 3LB1	43.0 (1.6929)	42.87 (1.6878)
3LD1	49.0 (1.9291)	48.87 (1.9240)

Note:

When there occurs an uneven wear to the crankshaft, replace it with a new one without grinding it for reuse.

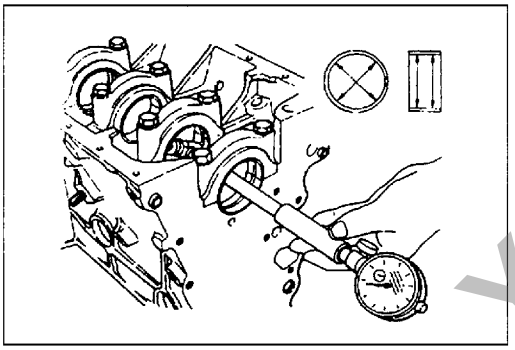


Fig. 107

Clearance between journal and bearing inside diameter with bearing installed and without

mm (in.)

		Standard	Limit
Clearance		0.029 – 0.072 (0.0011 – 0.0028)	0.12 (0.0005)
I.D. with bearing	3LA1 3LB1	52 (2.0472)	—
	3LD1	60 (2.3622)	—
I.D. without bearing	3LA1 3LB1	56 (2.2047)	—
	3LD1	64 (2.5197)	—

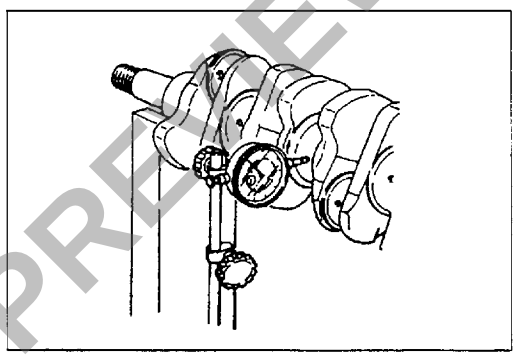


Fig. 108

Runout of crankshaft

Replace if beyond limit

mm (in.)

Standard	Limit
0.025 (0.001)	0.05 (0.002)

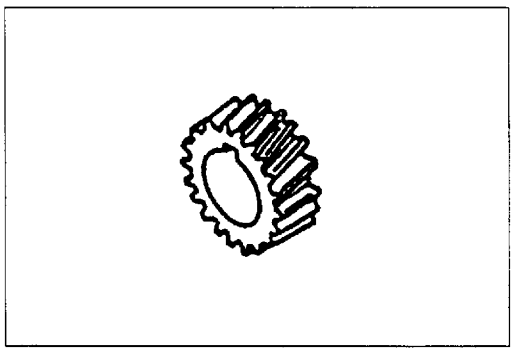


Fig. 109

Crankshaft gear

Check the crankshaft gear visually for damage and any other defects.

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REASSEMBLY

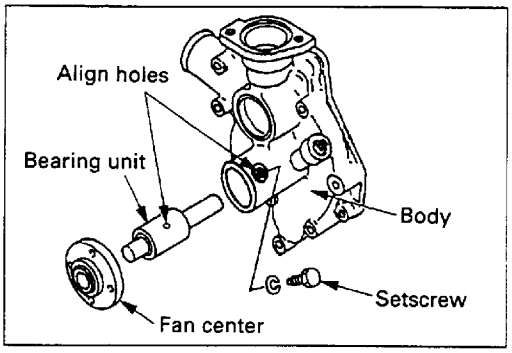


Fig. 184

Bearing unit

With a hole in the bearing unit set in line with one in the body, lock the bearing unit with a setscrew.

kg·m (ft. lbs.)

Set screw tightening torque	0.8 – 1.2 (6.0 – 9.0)

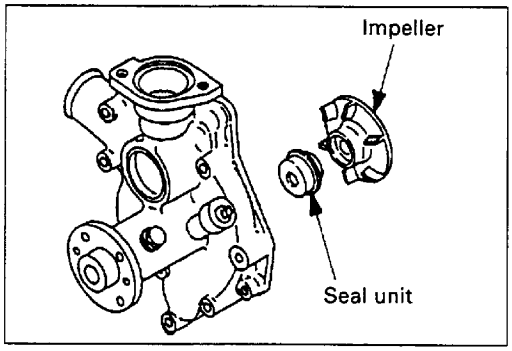


Fig. 185

Seal unit

Impeller

1. Apply BELCO bond No. 4 to the surface where the seal unit comes into contact with the body, and then assemble the seal unit.
2. Press in the impeller with a press until the clearance between the pump impeller and the body gets to the specified value.

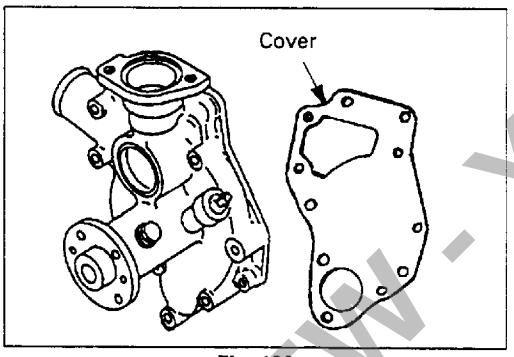


Fig. 186

Cover

1. Apply liquid gasket to the surface to which the cover is installed, and then install the cover.
2. Apply Screw-lock to the cover installation screws, and then tighten them.

Clearance, play and tightening allowance between parts

(1) Clearance between the pump impeller and the body

mm (in.)

Standard	0.53 – 2.17 (0.0209 – 0.0854)

(2) Play in the water pump ball bearing

mm (in.)

Standard	Limit
0.008 – 0.010 (0.0003 – 0.0004)	0.2 (0.0079)

(3) Tightening allowance between the fan center and the bearing shaft

mm (in.)

Standard	0.026 – 0.061 (0.001 – 0.0024)

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