

2. SPECIFICATIONS

2.5 SPECIFICATIONS AND PERFORMANCE

2.5.1 SPEED AND CLIMBING CAPABILITY

Item / Model	E80BMSR
Swing speed : min-1 {rpm}	11.5 {11.5}
Travel speed (1-speed/2-speed) : km/h	2.8 / 5.3
Gradeability : % (degree)	70 (35)

2.5.2 ENGINE

Engine model	ISUZU AU-4LE2X
Type	Water-cooled, 4-cycle, direct injection type diesel engine with intercooler turbo-charger
Number of cylinders-BoreXStroke	4-85 mm X 96 mm (3.35 in X 3.78 in)
Total displacement	2,179 cc (133 cu-in)
Rated output / Engine speed	net 41 kW / 2,200 min ⁻¹ (56 PS / 2,200 rpm) (ISO 9249) net 42 kW / 2,200 min ⁻¹ (57 PS / 2,200 rpm) (ISO 14396)
Maximum torque / Engine speed	net 200 N-m (148 lbs-ft) / 1,600 min ⁻¹ (ISO 9249) net 211 N-m (156 lbs-ft) / 1,600 min ⁻¹ (ISO 14396)
Starter	24 V / 3.2 kW
Alternator	24 V / 0.72 kW

2.5.3 HYDRAULIC COMPONENTS

Hydraulic pump	Variable displacement axial piston + gear pump
Hydraulic motor (swing)	Axial piston motor
Hydraulic motor (travel)	2-speed axial piston motor
Control valve	8-spool control valve
Cylinder (Boom, arm, Bucket and Dozer)	Double action cylinder
Oil cooler	Air-cooled type

2.5.4 WEIGHT

Unit : kg (lbs)

Fully equipped weight	8,730 (19,250)
Upper structure	4,470 (9,860)
Lower machinery (With 450 mm (17.7 in) grouser shoe)	2,830 (6,240)
Attachment [Boom + 2.13m (7ft-0in) Arm + 0.22m ³ (0.29 cu-yd) bucket]	1,200 (2,650)

31. DISASSEMBLING AND ASSEMBLING

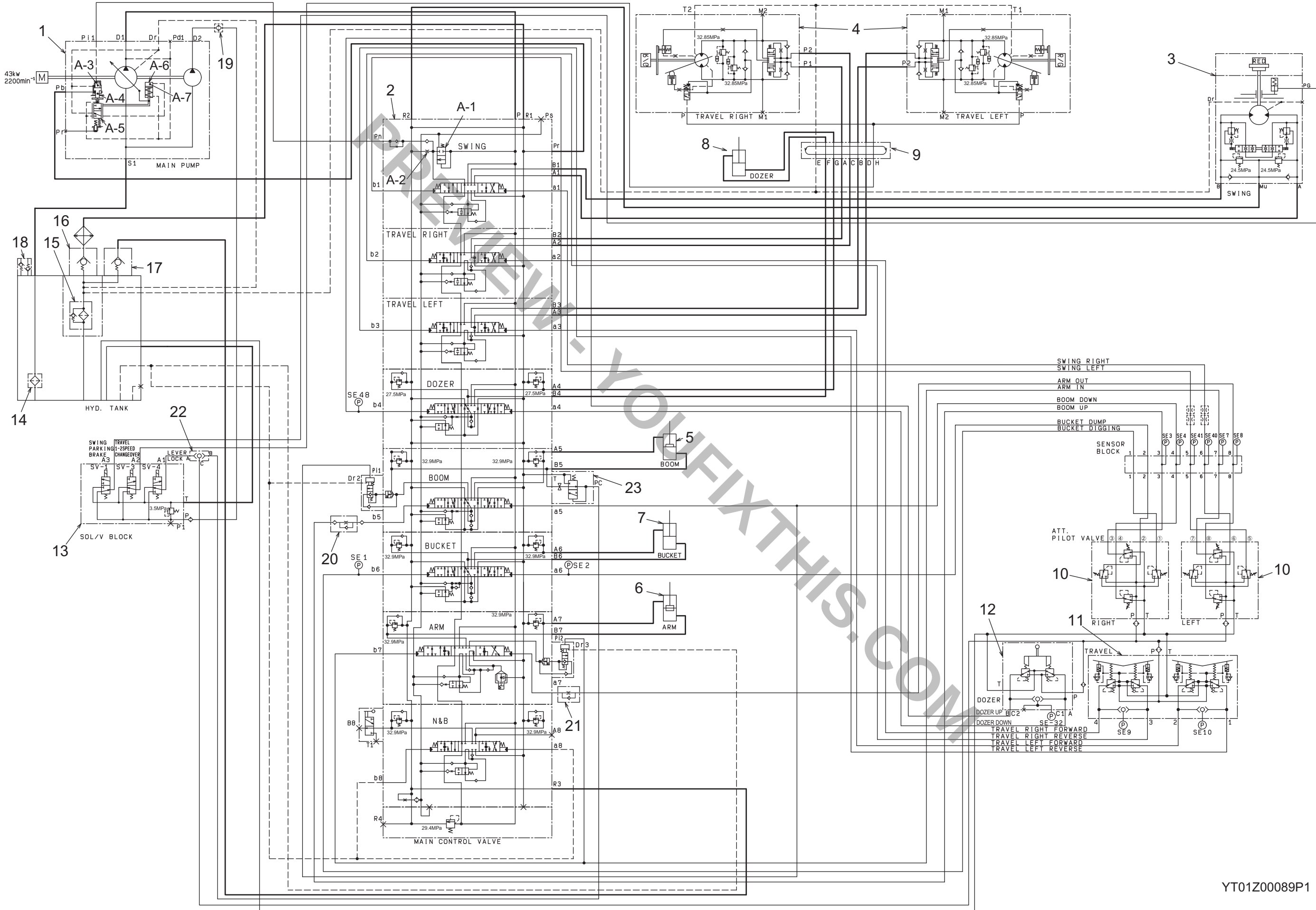
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46. TROUBLE SHOOTING (BY ERROR CODES)

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11.1 TIGHTENING TORQUES FOR CAPSCREWS AND NUTS

Tables Table "Metric coarse thread (Not plated)" and Table "Metric fine thread (Not plated)" indicate tightening torques applicable to cases where no special note is given.

Overtightening of bolts may result in a twist-off and a fracture under load.

Insufficient tightening may lead to a loosening or loss of bolts. Always tighten bolts to proper torques.

		Unit : N•m (lbf•ft)					
Classification		4.8T		7T		10.9T	
Nominal size		No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M6	P=1	4.4±0.5 (3.2±0.4)	3.7±0.4 (2.7±0.3)	9.6±1.0 (7.1±0.7)	8.1±0.8 (6.0±0.6)	17.4±1.8 (12.8±1.3)	14.7±1.5 (10.8±1.1)
M8	P=1.25	10.7±1.1 (7.9±0.8)	9.0±0.9 (6.6±0.7)	23.5±2.0 (17.3±1.5)	19.6±2.0 (14.5±1.5)	42.2±3.9 (31.1±2.9)	35.3±3.9 (26.0±2.9)
M10	P=1.5	21.6±2.0 (15.9±1.4)	17.9±1.8 (13.2±1.3)	46.1±4.9 (34.0±3.6)	39.2±3.9 (28.9±2.9)	83.4±8.8 (61.5±6.5)	70.6±6.9 (52.1±5.1)
M12	P=1.75	36.3±3.9 (26.8±2.9)	31.4±2.9 (23.2±2.1)	79.4±7.8 (58.6±5.8)	66.7±6.9 (49.2±5.1)	143±15 (105±11)	121±12 (89.2±8.9)
M14	P=2	57.9±5.9 (42.7±4.4)	49.0±4.9 (36.1±3.6)	126±13 (92.9±9.6)	106±10 (78.2±7.4)	226±20 (167±15)	191±19 (141±14)
M16	P=2	88.3±8.8 (65.1±6.5)	74.5±6.9 (55.0±5.1)	191±20 (141±15)	161±16 (119±12)	343±39 (253±29)	284±29 (209±21)
M18	P=2.5	122±12 (90.0±8.9)	103±10 (75.8±7.2)	265±29 (195±21)	226±20 (167±15)	481±49 (355±36)	402±39 (297±29)
M20	P=2.5	172±17 (127±13)	144±14 (106±10)	373±39 (275±29)	314±29 (232±21)	667±69 (492±51)	559±59 (412±44)
M22	P=2.5	226±20 (167±15)	192±20 (142±15)	500±49 (369±36)	422±39 (311±29)	902±88 (665±65)	755±78 (557±58)
M24	P=3	294±29 (217±21)	235±29 (173±21)	637±69 (470±51)	520±49 (383±36)	1160±118 (856±87)	941±98 (694±72)
M27	P=3	431±39 (318±29)	353±39 (260±29)	941±98 (694±72)	765±78 (564±58)	1700±167 (1250±123)	1370±137 (1010±101)
M30	P=3.5	588±59 (434±44)	490±49 (361±36)	1285±127 (948±94)	1079±108 (796±80)	2300±235 (1700±173)	1940±196 (1430±145)
M33	P=3.5	794±78 (586±58)	667±69 (492±51)	1726±177 (1270±131)	1451±147 (1070±108)	3110±314 (2290±232)	2610±265 (1930±195)
M36	P=4	1030±98 (760±72)	863±88 (637±65)	2226±226 (1640±167)	1863±186 (1370±137)	4010±402 (2960±297)	3360±333 (2480±246)

Tightening torque for metric coarse threads (not plated)

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E70BSR

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OPT.		

TO THE READER

- This manual has been written for a skilled technician, in order to give him the information necessary to repair this machine.

Read this manual carefully for correct information about repair procedures.

For any question or comment, or in case you notice a mistake in this manual content, please contact:

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San Mauro Torinese (TO)
10099 ITALIA
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ADDITIONAL REFERENCE MANUALS

- In addition to this Workshop Manual, refer also to the following:
Operation and maintenance instruction manual
Spare parts catalog

DESCRIPTION OF THE WORKSHOP MANUAL

- This repair manual consists of one single volume, identified with:
E70BSR - Workshop Manual "Hydraulic excavator"

- The "Hydraulic excavator" Workshop Manual contains the technical information necessary for machine service and repair, the service equipment, the information on maintenance standards, the removal and installing procedures, and the disassembly and assembly procedures.
- The complete Workshop Manual for the model *E70SR* consists of the following volume identified by print number as shown herebelow:

VOLUME	MACHINE TYPE	PRINT No.
Workshop Manual - "Hydraulic excavator"	E70BSR	84365679

11. TOOLS

Issue	Date of Issue	Applicable Machines	Remarks
First Edition	July, 2009	SK70SR-2 : YT06-18001~	S5YT1112E01 (SE Asia & Oceania)
↑	August, 2009	SK80MSR-2 : LF06-04501~	↑ (Oceania)
↑	June, 2010	SK80CS-2 : LF06-04501~	↑ (NA)
↑	↑	E80BMSR : LF06-04501~	↑ (NHK)
↑	↑	E70BSR : YT06-18001~	↑ (NHK-EUR)
↑	↑	SK70SR-2 : YT06-18001~	↑ (NA)

13. MAINTENANCE STANDARD AND TEST PROCEDURE

13.7 MEASURING ATTACHMENT OPERATING PERFORMANCES

13.7.1 OPERATING TIME OF CYLINDERS

(1) Purpose

Measure the operating time of the boom, arm and bucket and confirm the performances between the hydraulic pump and the cylinder of the attachment drive system.

(2) Condition

Hydraulic oil temperature; 45 to 55C degrees (113 to 131F degrees)

Engine revolution; Hi idle

Operating time excluding the cushion stroke

(3) Preparation

Firm level ground with the bucket empty

(4) Measurement 1; Boom up and down

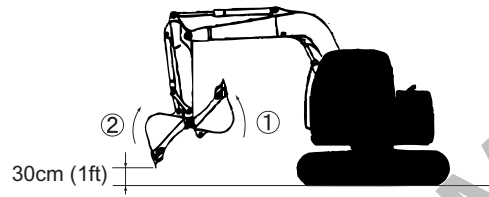
With the boom operating lever at full stroke, measure the required operating time of the bucket between the ground surface and its highest position.

Measurement 2; Arm in and out, bucket digging and dump

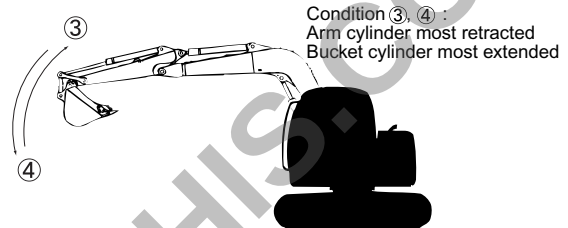
In a position in which the tooth of the bucket rises to a level of about 30 cm (1 ft) above ground, measure the full stroke operating time required with the arm and bucket operating levers at full stroke.

Measurement 3;

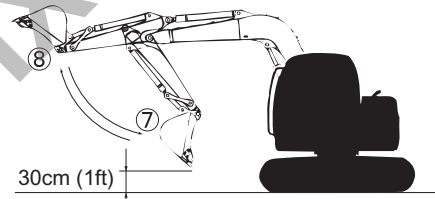
Use the attachment to press on the ground and lower the boom until the lower frame of dozer side is raised off the ground. Under this condition, move the dozer blade up and down with full stroke. And measure each one-way cycle time of dozer.



Measuring position for bucket digging and dump



Measuring position for boom up and down motions



Measuring position for arm in and out motions

Cylinder Operating time

Unit : sec

Measuring position	Standard value	Reference value for remedy	Service limit
①	2.7~3.3	3.5~4.2	4.5~
②	1.9~2.5	2.4~3.2	3.3~
③	3.0~3.6	3.8~4.6	5.0~
④	2.9~3.5	3.7~4.5	4.8~
⑦	2.6~3.2	3.3~4.1	4.4~
⑧	2.5~3.1	3.2~4.0	4.2~
Dozer down	1.6~2.2	2.0~2.8	2.9~
Dozer up	1.1~1.7	1.4~2.2	2.3~



When lowering the boom, allow the bucket onto a soft ground or cushioning such as rubber tires ; never put the bucket against concrete or other solid material.

22. HYDRAULIC SYSTEM

22.3.4 BUCKET CIRCUIT

22.3.4.1 BUCKET DIGGING PILOT CIRCUIT

(1) Operation

Start bucket digging operation, and pilot proportional secondary pressure is output through port (1) of right pilot V (10), and flows into C/V (2) b6 port, and switches bucket spool.

22.3.4.2 AUTO ACCEL OPERATION

(1) Principle

Start operating with signal output by low pressure sensor.

(2) Operation

[Lever in neutral position]

If the pilot primary pressure does not be detected for 4 seconds or more, even if the accel dial position is in maximum, the engine speed becomes 1200 rpm. In this case, this pilot primary pressure was led from P1 port of solenoid valve (13) to Pg port of control valve (2) when the control lever was in neutral position.

[Lever in operation position]

With lever operation, the operation pressure of actuator is generated in the passage (B-2), and the pressure acts on the deceleration valve (B-1), and this valve is switched. Consequently, the pilot pressure, which is connected with the oil tank, is blocked, and the pressure is generated at sensor (SE39), These action returns engine speed to set speed of acceleeration dial.

22.3.4.3 ENGINE OVERLOAD PREVENTION BY PUMP POWER SHIFT CONTROL

(1) Operation

1. As the pump delivery pressure rises, the pressure (self-pressure) exerted on control piston (C-1) of power shift is also raised, and when the pressure rises to the pressure which resists to the thrust of piston U (C-2) and piston (pressure compensation) (C-3), the piston is pushed back.
2. After the piston is pushed back to the position where piston U self-pressure balances the negative control pressure, the self-pressure pushes back piston rod (C-4) and is led to internal pressure of piston chamber (C-6) of power piston (C-5).
3. Then, the tilting angle becomes smaller and reduces the delivery flow rate of the pump, and it helps to prevent engine overload.

22.3.4.4 BUCKET DIGGING MAIN CIRCUIT

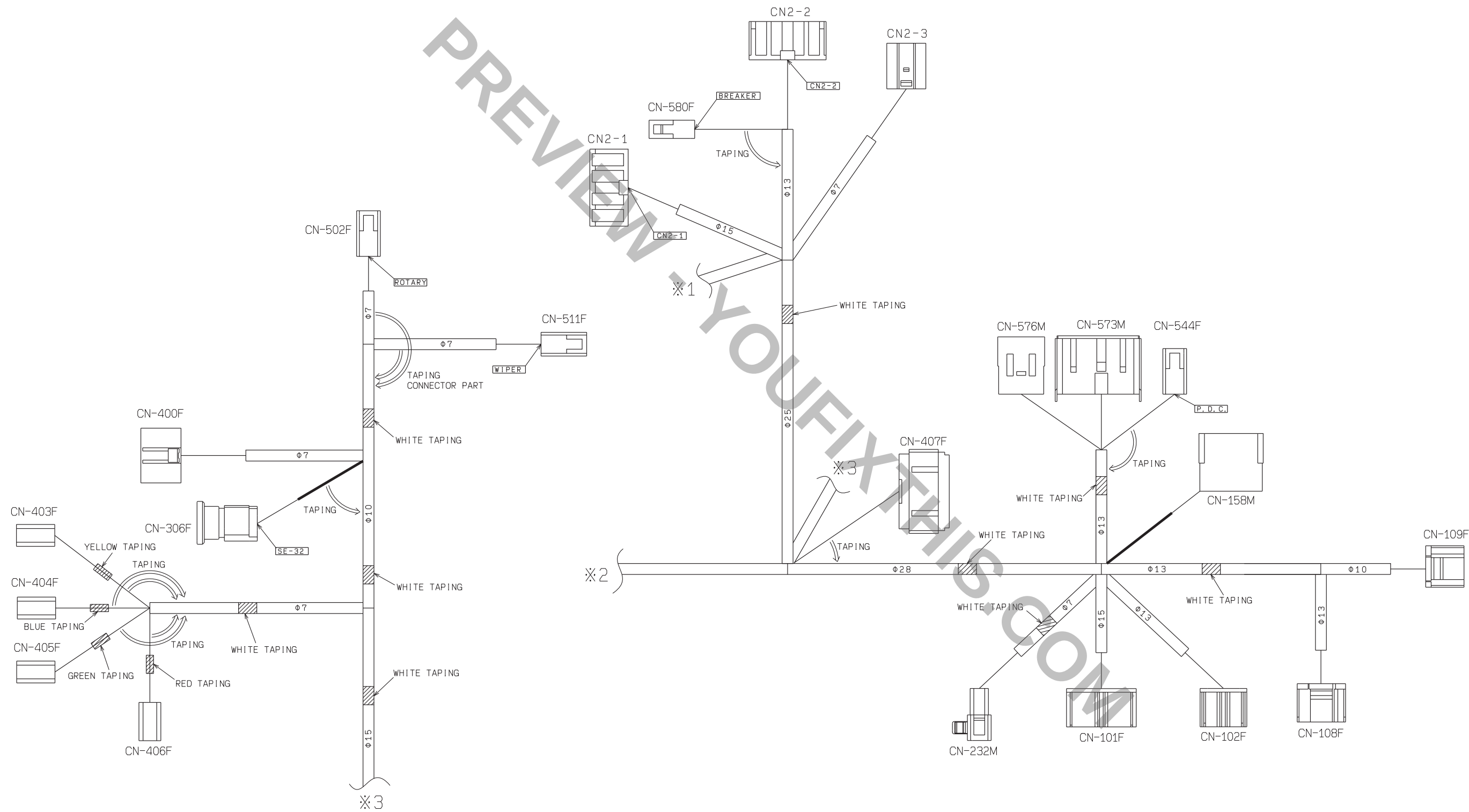
(1) Operation

With pilot operation, the pressurized oil switches the bucket spool, and is fed into bucket cylinder H side through C/V (2) B6 port. And the return oil from cylinder R side flows into tank circuit from A6 port while being restricted by bucket spool.

23. ELECTRICAL SYSTEM

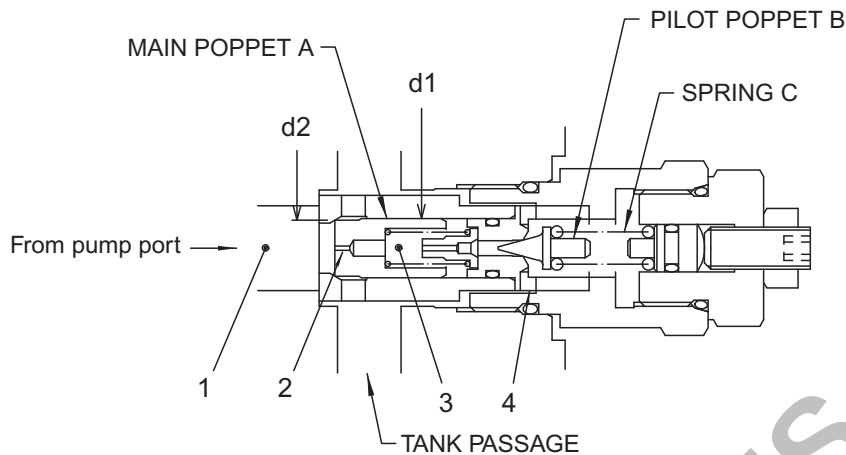
23.3.7.1 FLOOR HARNESS (1/3) : LF13E01057P2

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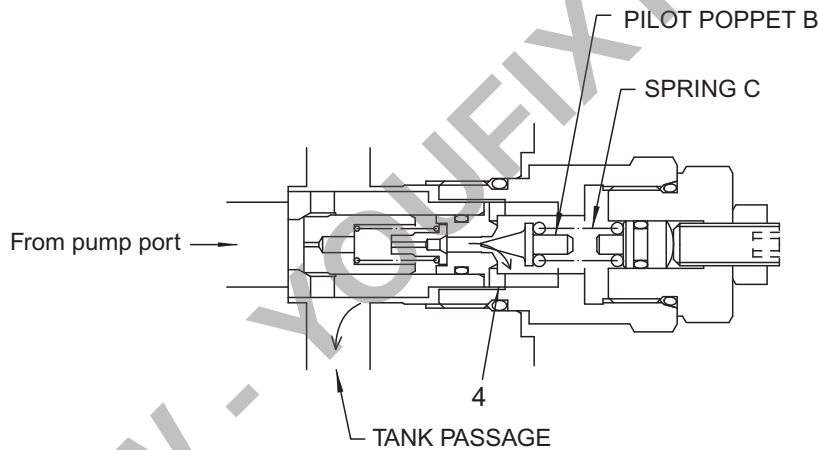


2) Main relief valve

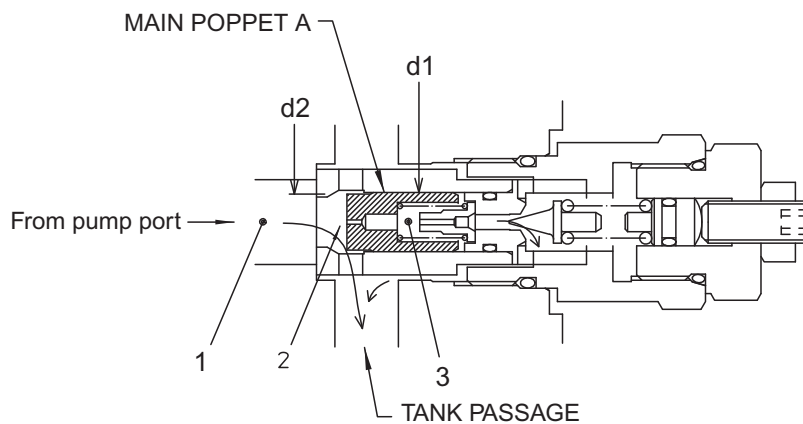
- a. The delivery oil from pump passes through orifice 2 of main poppet A and flows into chamber 3. The main poppet A is securely seated in $d1 > d2$ condition.



- b. When the pressure reaches the set pressure by the reaction force against spring C, pilot poppet B opens and the oil passes through the opening on the passage 4 and flows into tank passage.

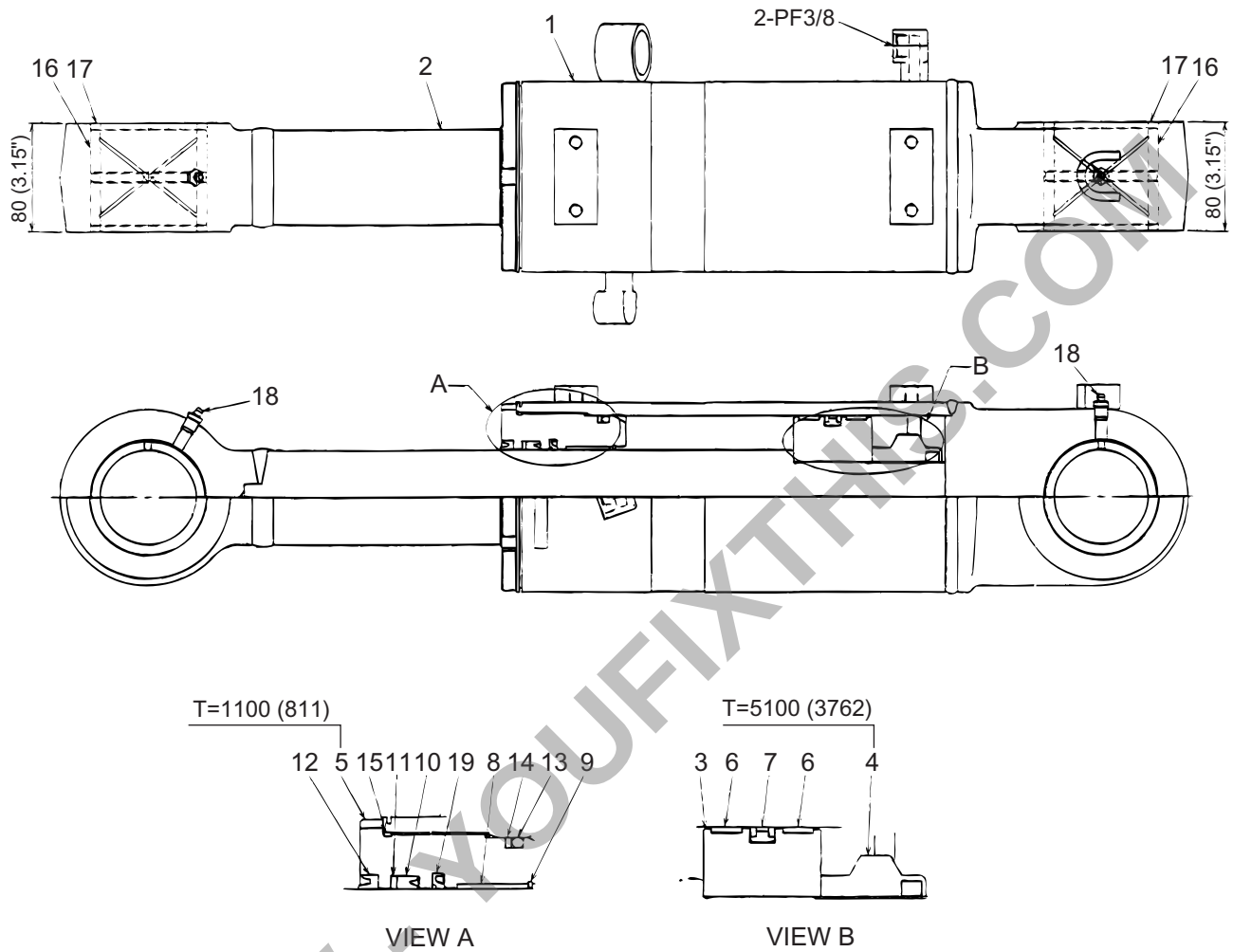


- c. The oil flow is formed and the pressure drops at front and rear of orifice 2, and main poppet opens in condition of pressure of "Chamber 1 X $d2$ area > pressure of chamber 3 X $d1$ area". And the pressure oil flows into tank passage and limits the circuit pressure to constant value.



(4) Dozer cylinder

Tightening torque : N·m (lb·ft) (Screw size)



VIEW A

VIEW B

Construction of dozer cylinder

No.	NAME	Q'TY	No.	NAME	Q'TY	No.	NAME	Q'TY
1	CYLINDER TUBE ASSY	1	8	BUSHING	1	15	O-RING	1
2	PISTON ROD ASSY	1	9	SNAP RING	1	16	PIN BUSHING	2
3	PISTON	1	10	U-RING	1	17	WIPER RING	4
4	NUT	1	11	BACKUP RING	1	18	FITTING	2
5	ROD COVER	1	12	WIPER RING	1	19	BUFFER RING	1
6	SLIDE RING	2	13	O-RING	1			
7	SEAL RING ASSY	1	14	BACKUP RING	1			

25.6.2 OPERATING PROCEDURE

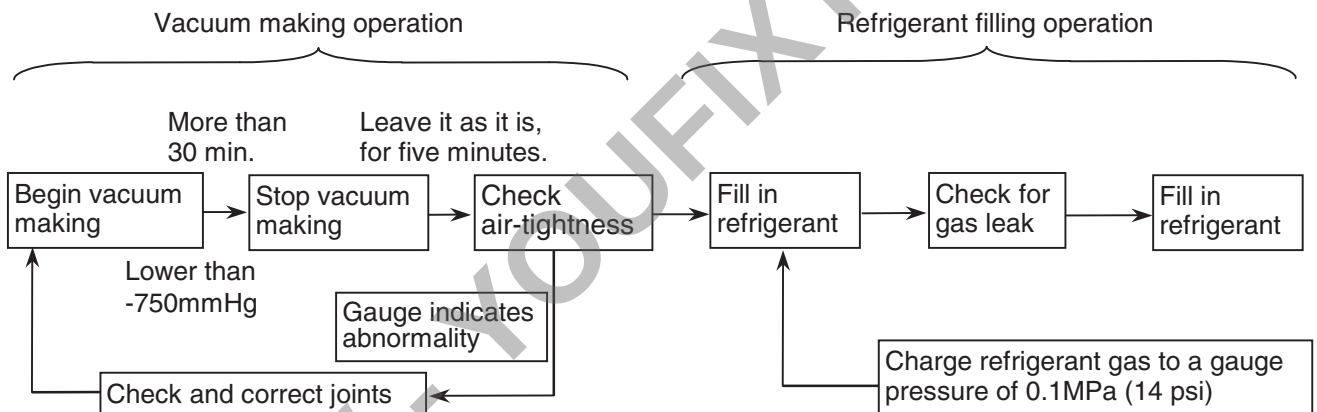
(1)

Refrigerant charge into the air-conditioner consists mainly of "vacuum making operation", and "gas charge operation".

1. The "vacuum making operation" consists of removing water in the air-conditioner circuit. If only a little water remains in the circuit, the small holes of the expansion valve are frozen during operation. This causes the circuit to clog up or rust, resulting in a variety of malfunctions. Therefore, before filling refrigerant in the circuit, make vacuum and allow the water in the circuit to boil and vaporize. Water in the circuit is thus eliminated.
2. The "gas charging operation" consists of filling refrigerant in the circuit after forming vacuum. Filling gas not only depends upon the cooling performances of the air-conditioner, but also affects the service life of the component parts of the circuit. Extreme overcharge will make the circuit pressure extremely high and causes the cooling performance to deteriorate. On the contrary, undercharge causes poor circulation of the lubricating oil of the compressor and causes seizure of the moving parts of the compressor.

The gas filling operation involves handling of high pressure gas; filling gas according to incorrect operation procedure is dangerous. Fill refrigerant correctly following the operation procedures and cautions stated in this manual.

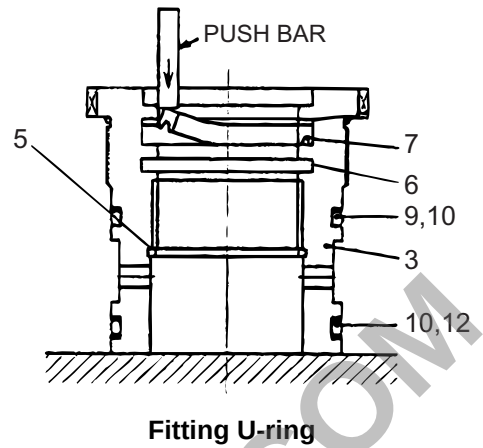
(2) Operation Chart



(3) Tools

No.	Parts	Q'ty	Sketch	Service	No.	Parts	Q'ty	Sketch	Service
1	Gauge manifold	1			4	Quick joint	1		Low pressure side
					5	T joint	1		For service can valve
2	Charging hose	3		Red : high pressure side Blue : low pressure side Yellow : vacuum pump side	6	Service can valve	2		For service can
3	Quick joint	1		High pressure side	7	Vacuum pump adapter	1		For vacuum pump

- (2) Fit snap ring (5).
- (3) Apply hydraulic oil on U-ring (7) and fit it on the U-ring groove.



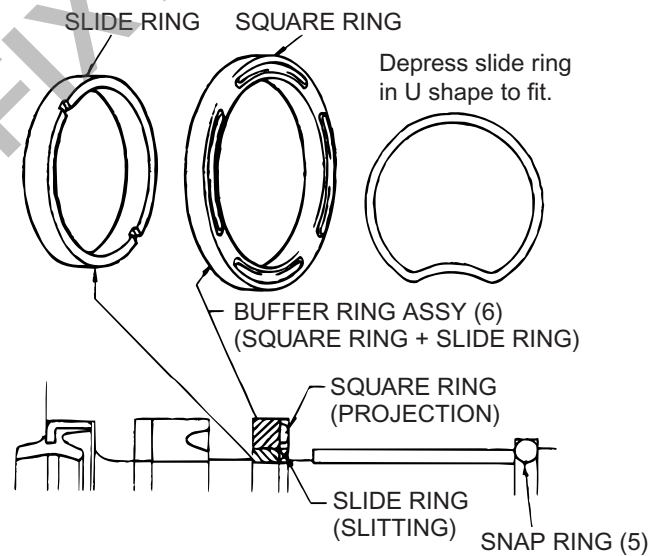
Note

- The U-ring is harder than other seals, so fit it in the groove by hand first, then press in with pushing bar until it is fitted with a click.
- Fitting U-ring paying attention to the direction.
- After fitting U-ring (7), check that they are free from the permanent set.

(4) Installing buffer ring assy

Buffer ring assy (6) is equipped with square ring and slide ring.

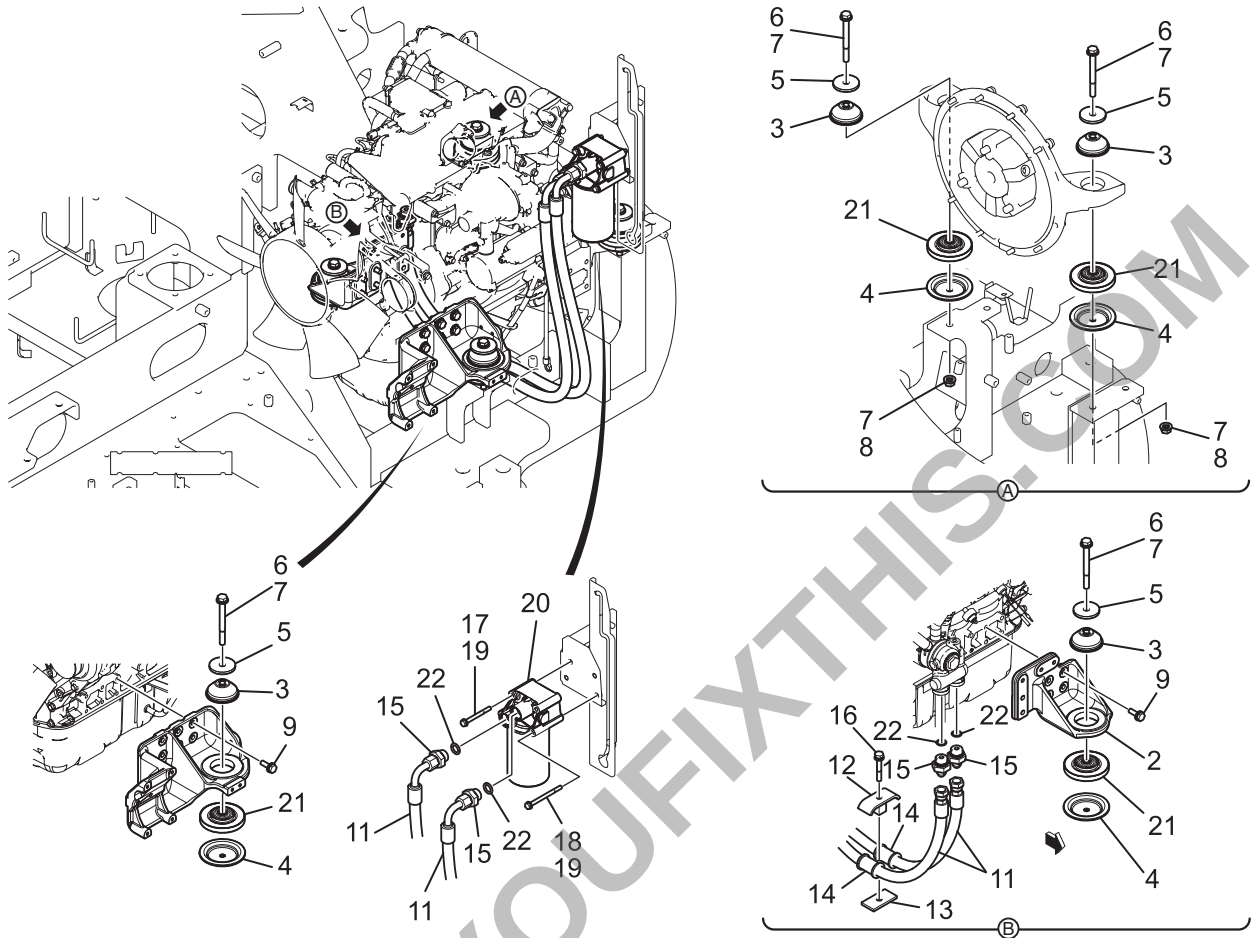
1. Fit square ring on the groove.
2. Depress slide ring in U shape by hand to house it in groove, and fit it pushing out to periphery.



Note

- Depress it R 6 mm (0.24 in) or more, because if the depressed R is too small, it may remain wrinkled.
- After fitting, check that it is free from wrinkles.
- Fit it giving attention to the seal fitting direction. Reverse fitting produces high pressure between U-ring and seal and may cause the deformation of rod cover.
- Fit slide ring so that the groove matches to the root section of square ring.

33.1.13.2 REMOVAL



Dismantling and mounting engine

(1) Remove hose of engine oil filter

Place oil pan under the connection of filter (1), and disconnect 2 hoses (11).

Tools: Spanner: 17mm

(2) Plug connector of filter side and hose

(3) Loosen engine mounting bolt of frame

1. Loosen 2 nuts (20) M12.

Tools: Socket: 19mm

2. Loosen 4 capscrews (6) M12X120.

3. Remove 4 plates (5).

4. Remove upper rubber mounts (3) 2 each.

(4) Slings engine body



Prepare a stand, which withstands the weight of the engine assy and can place the removed engine firmly. (Refer to "Tool".)

1. Sling engine hooking wire to lifting lugs on the front and rear sides.

Weight: Approx. 200kg (441lbs)

Wire: 6 dia. (0.236 in) X 1 m (3 ft 3 in) - 2 pcs.

- (5) Position engine on the stand stably.

33. UPPER SLEWING STRUCTURE

33.2.2.3 ASSEMBLY

(1) Cautions to be exercised in assembly

1. Exercise care the same way as in disassembly.
2. Before proceeding to assembly, clean parts free from metallic particles and foreign matter and make sure that the parts are free from burrs and dents. Eliminate burrs and dents with an oilstone or the like.
3. Replace O-rings and backup rings with new ones.
4. Handle O-rings and backup rings with care so as not to score them.
(Apply a small amount of grease to make the surface smooth.)
5. Tighten bolts and caps to specified torque.

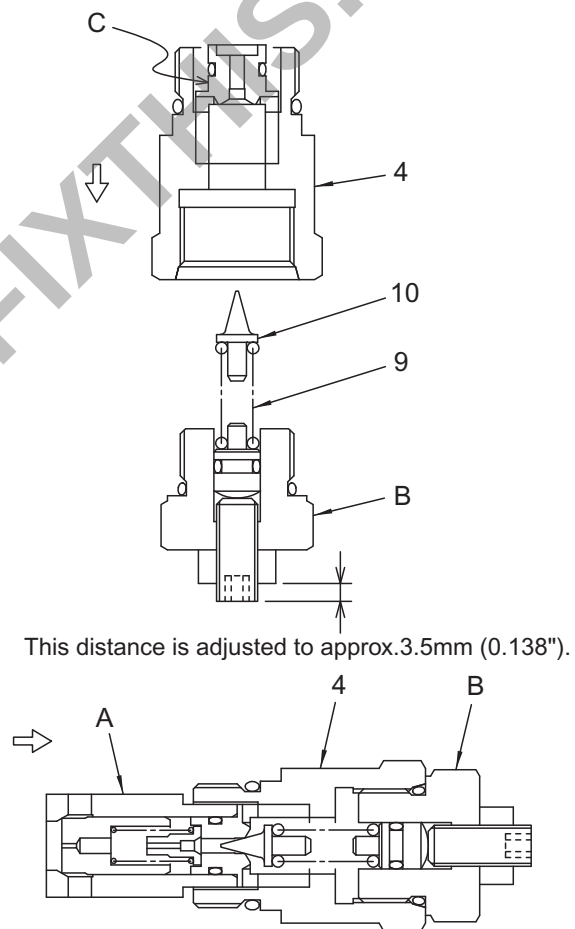
(2) Disassembly procedure

Assembly is the reverse order of disassembly.

33.2.2.4 PRESSURE SETTING OF MAIN RELIEF VALVE

(1) Assembly

1. Locate and confirm the set pressure "0" position.
Direct the pressure adjusting sub-assembly (B) downwards. And place spring (9) and pilot poppet (10) on the sub-assembly (B). Then cover the sub-assembly (B) with cap (4) and assemble them.
And tighten the cap (4) temporarily until the pilot poppet (10) comes in contact with the seat of pilot seat (C) and the pressure adjusting spring (9) begins to work.
2. Install main poppet sub-assembly (A) and assemble it as a cartridge.
3. Assemble the temporarily assembled cartridge to the valve body and tighten cap (4).
Tightening torque : 100 N-m (73.8 lbf-ft).
4. Tighten the cap of pressure adjusting sub-assembly (B).
Tightening torque : 60 N-m (44 lbf-ft)



Assembling of relief valve



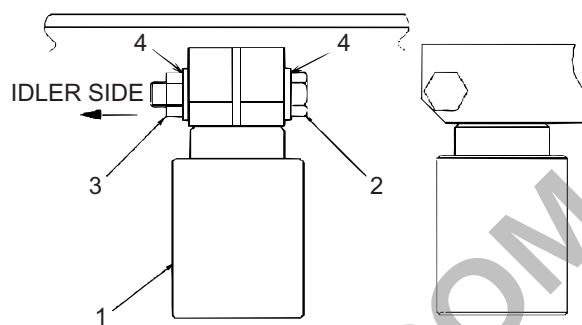
If the pressure of the relief valve is not set properly, the hydraulic device may be destroyed in some cases. This is dangerous. Therefore, do not raise the pressure above a level that is specified for each machine model.

34. TRAVEL SYSTEM

34.1.3 UPPER ROLLER

34.1.3.1 UPPER ROLLER ASSY

ASSY PART No.			YT64D00002F1
No.	Parts	Q'ty	Remarks
1	ROLLER ASSY	2	YT64D01001F1
2	CAPSCREW	2	M16 X 90
3	NUT	2	M16
4	WASHER	4	



Upper roller assy

34.1.3.2 REMOVING

(1) Preparation for removal

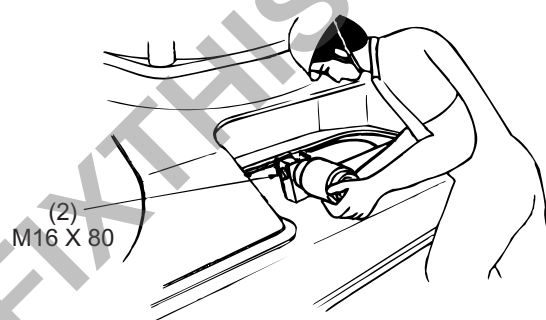
Remove crawler (Above mentioned).

(2) Removing upper roller (1)

1.

Remove nuts on support tightening section, and also remove cap screw (2) M16X90.

Tools: Socket: 24 mm



Removing upper roller (1)

34.1.3.3 INSTALLING

Installing is done in the reverse order of removing.

(1) Inspection

Before reassembling, check it that it rotates smooth manually and for leak.

(2) Installing upper roller (1)

1.

Fit it directing nut toward idler side.

2.

Insert it until collar comes in contact with support.

3.

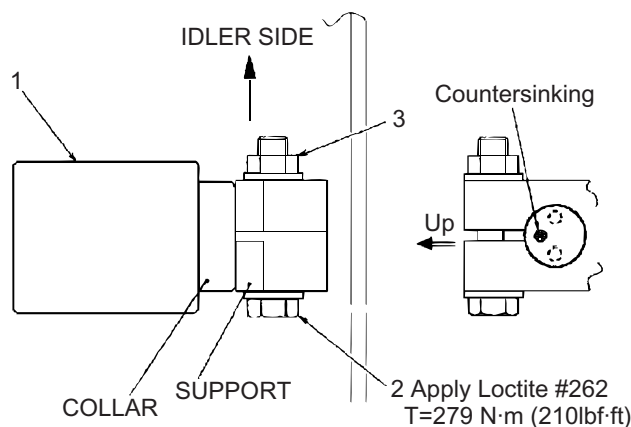
Fit it directing the countersinking mark of shaft end upward.

4.

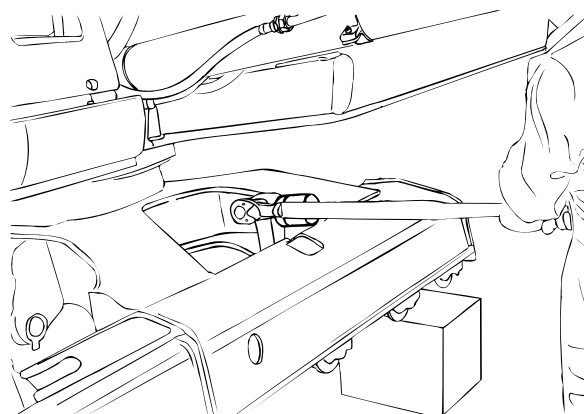
Apply Loctite #262 on cap screw M16X90, and tighten it to the specified torque.

Tools: Socket: 24 mm

Tightening torque: 279 N-m (210 lbf-ft)



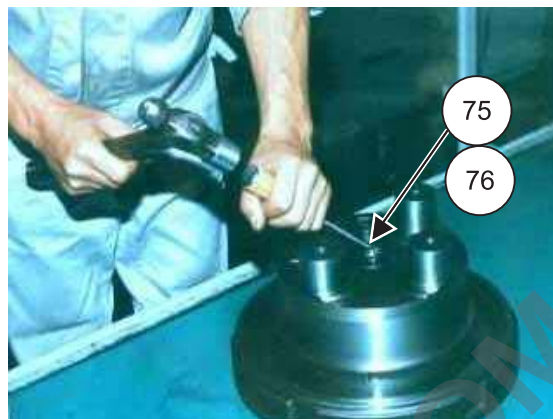
Installing upper roller (1)



Installing upper roller (1)

34. TRAVEL SYSTEM

45. Remove the bearing (75) from the body casing, if required.
And remove the oil seal (76) from the body casing.



46. Remove the bearing (75) from the shaft (74), if required.



This completes disassembly.

46. TROUBLE SHOOTING (BY ERROR CODES)

Table46-56

Error code	R134		
Trouble	Swing flasher right relay error		
Judging condition	The mechatro controller output line to swing flasher right relay is short-circuited with the power source.		
Symptom	Right swing flasher does not light.		
Control in the event of failure	Relay output is stopped.		
Returned in normal condition	When the power is OFF		
Service diagnosis checking screen	Screen No.	22	D13
	Screen No.		
	Screen No.		
Checking object		Checking contents and remedy	
1	• Swing flasher relay R-19	<p>When error is cancelled after removing connector (CN-74F) of swing flasher relay, check relay unit for failure, replace it with new one if failed.</p> <p>When resistance between relays (HB) and (HC) is 0 Ω, it is in abnormal condition.</p> 	
2	• Wiring between swing right flasher relay and controller CN-74F, CN-109F	<p>When R134 is left displayed with the relay removed</p> <p>Check that no power 24V is produced on relay (-) line (as shown right upper figure C) according to the wiring checking procedure and replace it if necessary.</p>	
3	• Mechatro controller	Check that the error is corrected after replacement of controller.	

Table46-57

Error code	R144		
Trouble	Swing flasher left relay error		
Judging condition	The mechatro controller output line to swing flasher left relay is short-circuited with the power source.		
Symptom	Left swing flasher does not light.		
Control in the event of failure	Relay output is stopped.		
Returned in normal condition	When the power is OFF		
Service diagnosis checking screen	Screen No.	22	D14
	Screen No.		
	Screen No.		
Checking object		Checking contents and remedy	
1	• Swing flasher relay R-19	<p>When error is cancelled after removing connector (CN-74F) of swing flasher relay, check relay unit for failure, replace it with new one if failed.</p> <p>When resistance between relays (HB) and (HC) is 0 Ω, it is in abnormal condition.</p> 	
2	• Wiring between swing left flasher relay and controller CN-74F, CN-109F	<p>When R144 is left displayed with the relay removed</p> <p>Check that no power 24V is produced on relay (-) line (as shown right upper figure B) according to the wiring checking procedure and replace it if necessary.</p>	
3	• Mechatro controller	Check that the error is corrected after replacement of controller.	

Taper screw from connectors (brass)

N·m {kgf·m}				
Screw size	PT (R) 1/8	PT (R) 1/4	PT (R) 3/8	PT (R) 1/2
—	2.0 — 14.7 {0.2 — 1.5}	4.9 — 15.7 {0.5 — 1.6}	9.8 — 16.7 {1.0 — 1.7}	9.8 — 17.7 {1.0 — 1.8}

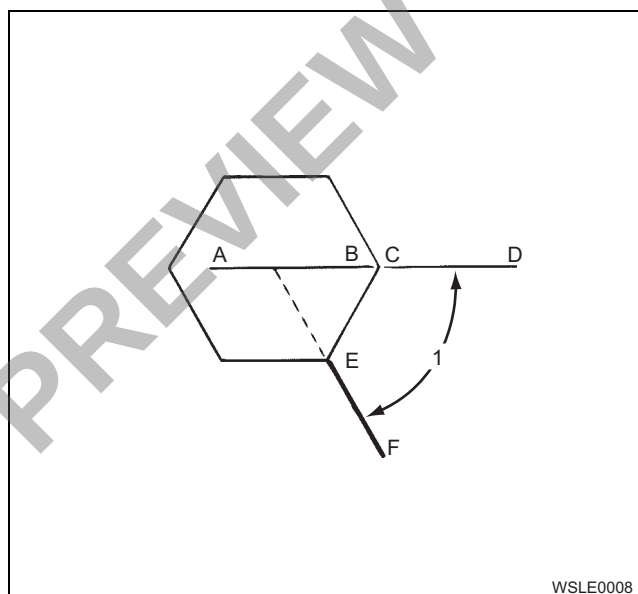
About angle method tightening

Though the general and current way to tighten bolts and nuts is torque indication, using this way results in large unevenness of shaft power to indicated torque. Therefore, bolts may be damaged at upper limit when you try to ensure minimal shaft power.

To ensure shaft power with small unevenness, it is necessary to tighten bolts measuring stretch amount of bolts, but this is actually impossible. So the angle method focuses on screw pitch as equivalent to bolt stretch, and controls using the screw rotation amount. The method can reduce the unevenness of shaft power by tightening to plastic range.

How to tighten

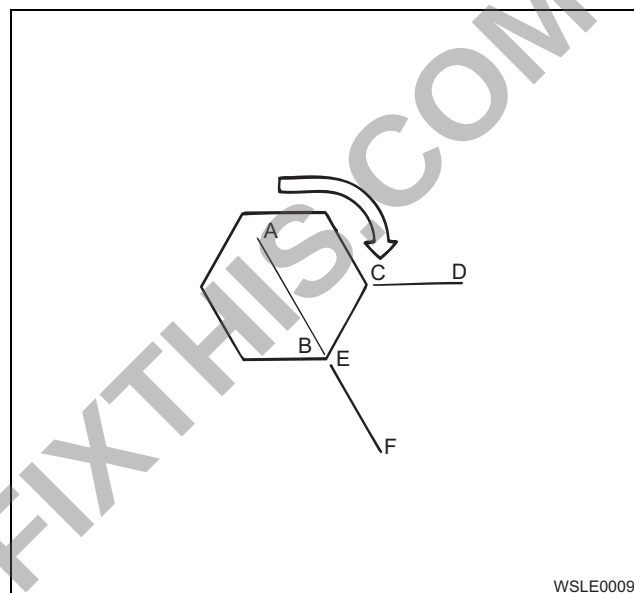
1. Apply molybdenum disulfide or engine oil to the threads and the seating surface of the bolt following the instruction.
2. Tighten all bolts to the pre-indicated tightening torque.
3. Draw lines on the surface of the parts you tighten: the lines which pass through the bolt's center (A — B: bolt side) (C — D: parts side) and the line at the specified tightening angle from the bolt's center (E — F).



Name

1. Specified Tightening Torque

4. Tighten the bolt with wrench until the line on the bolt (A — B) aligns with the specified angle line (E — F on the surface of the parts).



Be sure to check the mark to see whether you tighten the bolt to the specified angle or not. If you fail this, you may tighten the bolt by the angle method again by accident and damage the bolt. Take extreme care.

Important:

- Follow the instructed order to tighten bolts.
- Do not retighten if you tighten by the angle method.

Bolt angle gauge (5-8840-0266-0), the tool for tightening bolts by the angle method, is set.

Special tool classification**A; Essential tool**

Servicing operation cannot be done with any other tools than the essential tool.

B; Recommend tool

Servicing work can be done with a general-purpose tool commercially available. However, it is advisable to use the recommended tool as much as possible for a reduced work time and an improved safety in work operations.

C; Available tool

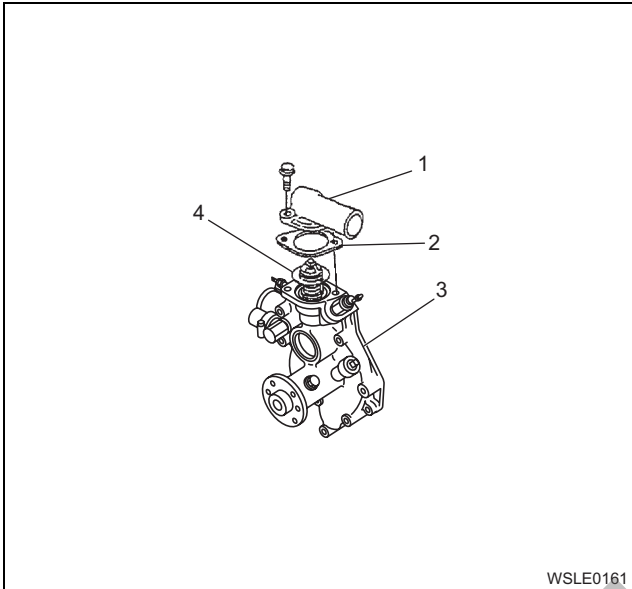
Although it takes a more working time, servicing operations can be made with a tool commercially available as substitute for the available tool.

16. Connect the water outlet pipe.

- a. Assemble the thermostat, install the packing and the water outlet pipe, and tighten it to the specified torque.

Tightening torque:

18.6 — 28.4 N·m {1.9 — 2.9 kgf·m/13.7 — 20.9 lb·ft}

**Name**

1. Water Outlet Pipe
2. Packing
3. Water Pump
4. Thermostat

17. Install the exhaust manifold to the cylinder head.

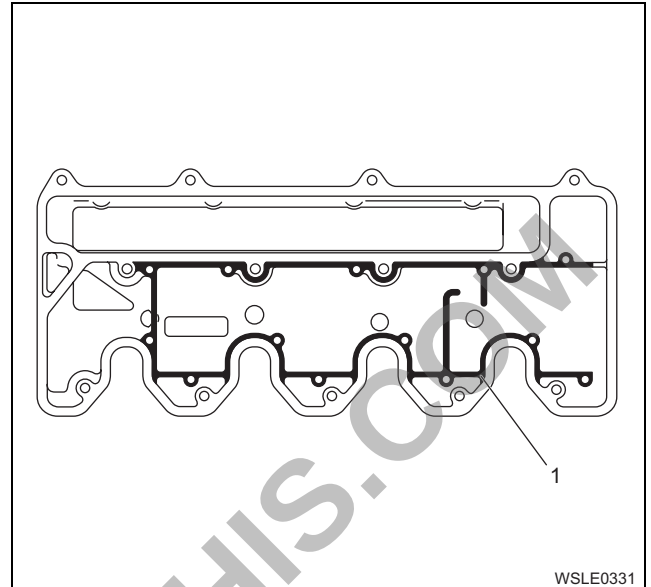
- Insert the gasket and tighten to the specified torque.

Tightening torque:

18.6 — 28.4 N·m {1.9 — 2.9 kgf·m/13.7 — 20.9 lb·ft}

18. Install the cylinder head cover.

- a. Apply the liquid gasket (TB1207B) to the position in the cylinder head cover shown in the figure, and install the baffle plate to the cylinder head cover.

**Name**

1. Liquid Gasket Applied Area

- b. Install the gasket to the cylinder head cover.

Note:

Take care not to slide or distort the gasket when installing.

- c. Install the cylinder head cover to the rocker arm bracket and tighten it to the specified torque.

Tightening torque:

7.8 — 11.8 N·m {0.8 — 1.2 kgf·m/5.8 — 8.7 lb·ft}

19. Install the intake chamber to the cylinder head cover.

- Insert the gasket and tighten to the specified torque.

Tightening torque:

7.8 — 11.8 N·m {0.8 — 1.2 kgf·m/5.8 — 8.7 lb·ft}

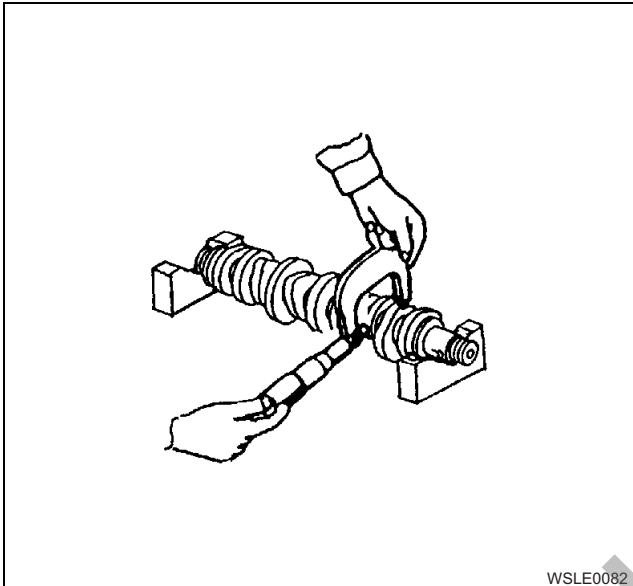
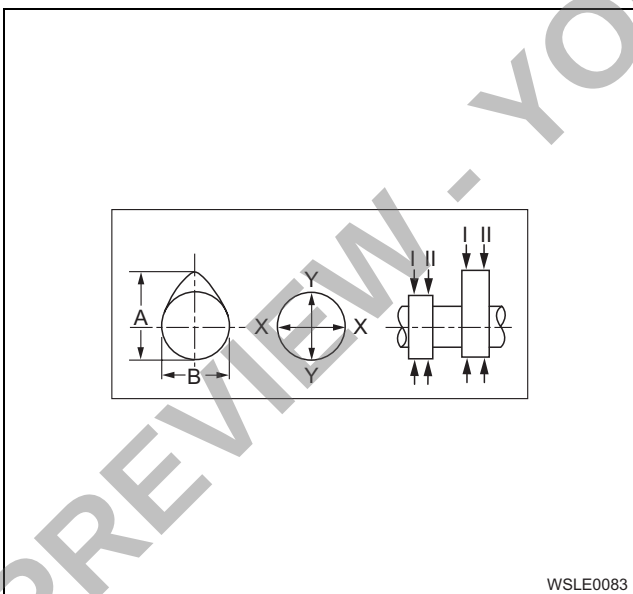
20. Apply the liquid gasket (TB1207C) to the air inlet pipe and install it.

Tightening torque:

7.8 — 11.8 N·m {0.8 — 1.2 kgf·m/5.8 — 8.7 lb·ft}

3. Uneven wear of the journal (the difference between the measurements in X – X and Y – Y directions)

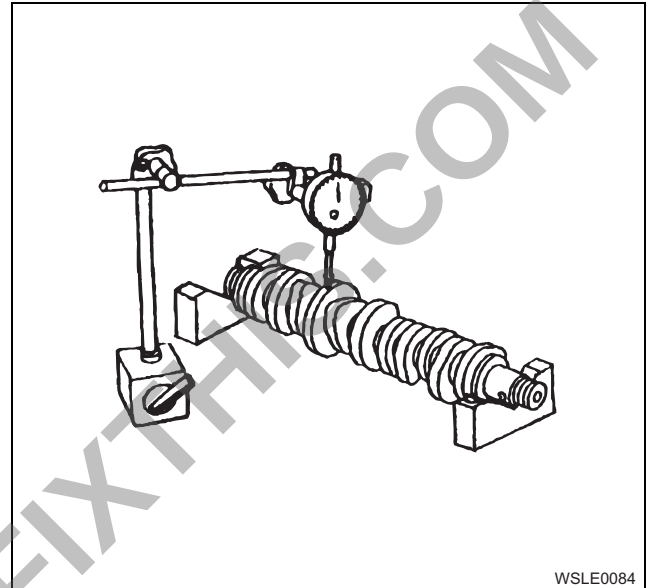
mm {in}		
Nominal dimension	Service limit	Repairing procedure
$\phi 52$ {2.047}	0.05 {0.002}	Replace.



Inspection of camshaft runout

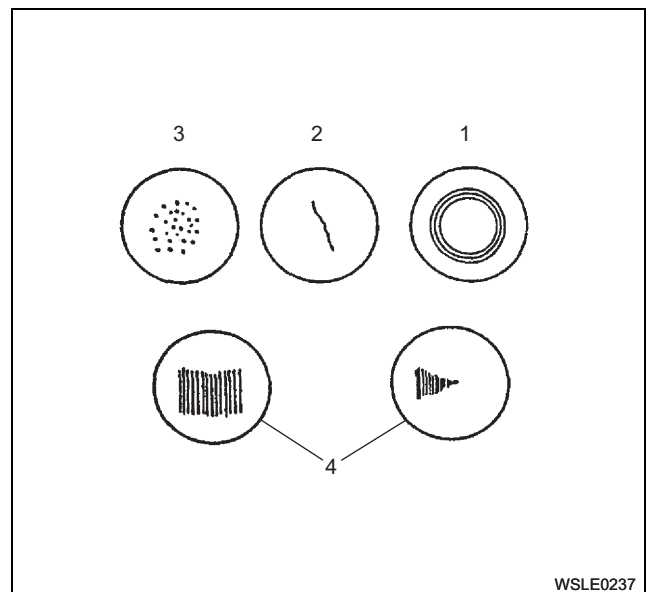
- Put the camshaft on the V block.
- Place the dial gauge to the center journal part.
- Rotate the camshaft once and read the deflection of the indicator.
If the measured value exceeds the limit, replace the camshaft.

mm {in}		
Standard value	Service limit	Repairing procedure
0.02 {0.0008} or less	0.1 {0.0039}	Replace.



Inspection of tappet

Check the contact surface with the camshaft.
If there is pitching, defective contact, vermiculation, or crack, replace the tappet.

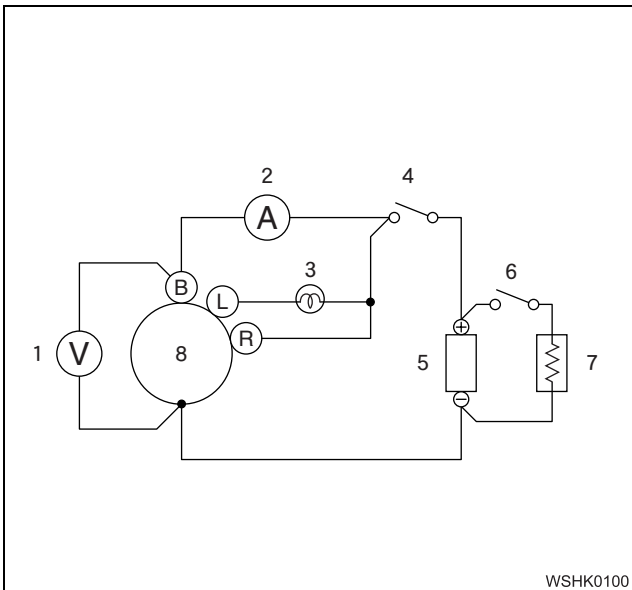


Name

- Normal
- Cracks
- Pitching
- Abnormal Contact

Regulated voltage check

1. Wire as shown in the illustration.
Use an ammeter with 100 A rating and a voltmeter with 30 V rating.

**Name**

1. Voltmeter
2. Ammeter
3. Lamp (24 V, 3 W or less)
4. Switch 1
5. Battery (24 V)
6. Switch 2
7. Load Resistance
8. Generator

Output current test

Output current test is performed to check if the generator generates rated output.

1. After checking regulated voltage, decrease the generator speed until it stops.
2. Close the switch 1. The lamp should come on.
3. Set the value of no load resistance to maximum (minimum current) and close the switch 2.
4. Increase the generator speed to 5,000 r/min and keep it. Adjust the load resistance so that output current becomes maximum. Keep this condition for 15 minutes and increase in temperature of the generator. 15 minutes later, set the generator speed to the specified speed (1,800 r/min) and then adjust the load resistance so that output current becomes maximum in this condition. In this time, if indication of ammeter is within specified value, the generator is normal. If it is the specified value or less, check the generator again according to "Inspection".

2. Close the switch 1. Leave the switch 2 open.
In this time, the lamp comes on.
If it does not, check the voltage on L terminal.
If the voltage is almost the same as battery voltage, check the generator.
If the voltage is low, lamp or the circuit is open.
3. Increase the generator speed gradually.
Make sure that the lamp goes off before the speed reaches approx. 1,300 r/min.
Notice the voltage. If the voltage is not controlled and exceeds 30 V, the IC regulator may be faulty.
If the voltage does not exceed battery voltage, the generator does not generate electric power.
Check the generator again.
If the lamp does not go off, check the generator again.
4. Set the generator speed to approx. 5,000 r/min and read an ammeter. If the value is 5 A or less, read indication on a voltmeter. This is regulated voltage.
If an ammeter shows 5 A or more, keep charging for a while until it shows below 5 A or replace the battery with full-charged one.
If regulated voltage is out of specified value, replace the regulator.

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