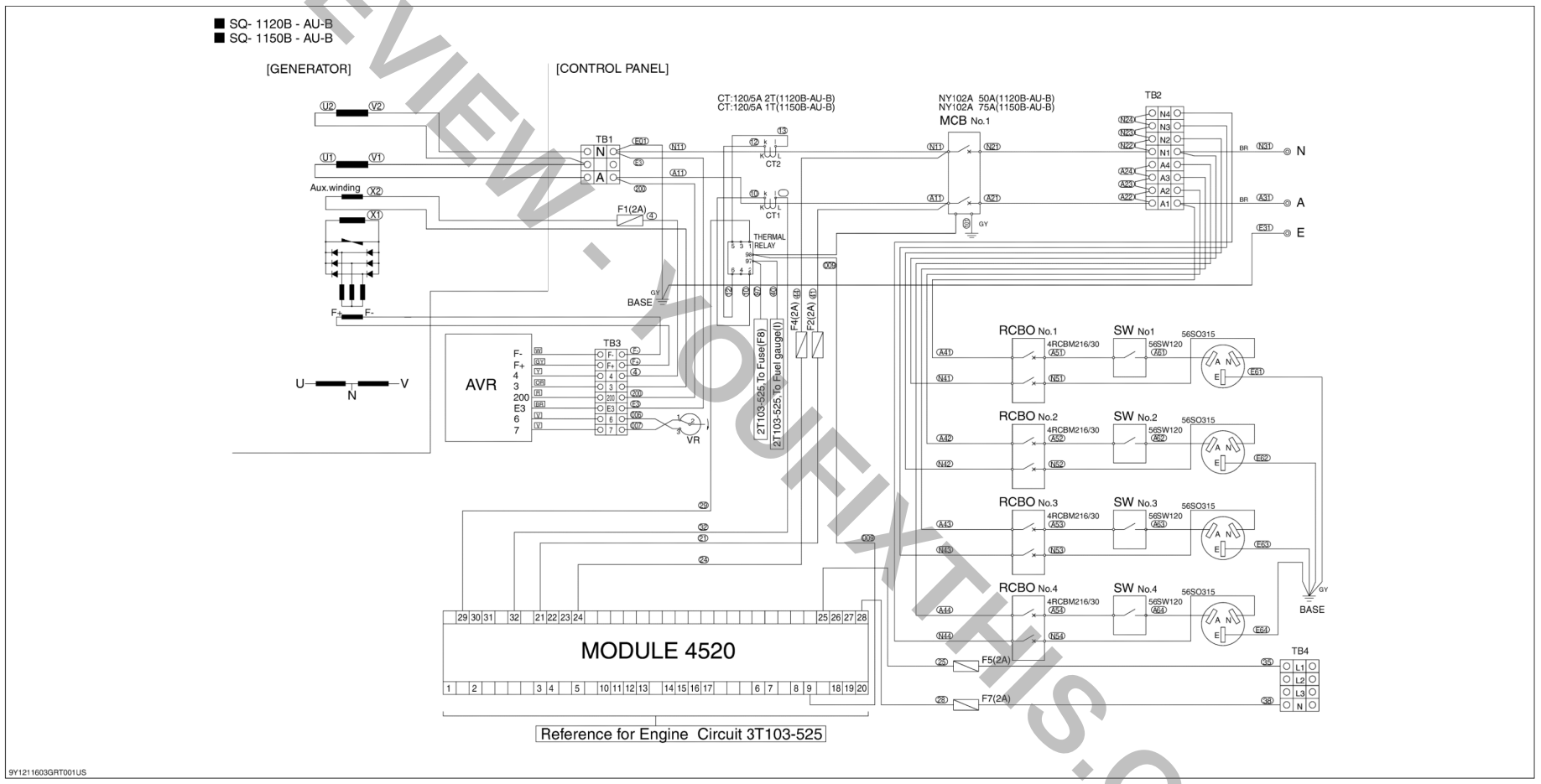
8. WIRING DIAGRAM

[1] GENERATOR DIAGRAM

SQ-1120B-AU-B (240 V), SQ-1150B-AU-B (240 V)



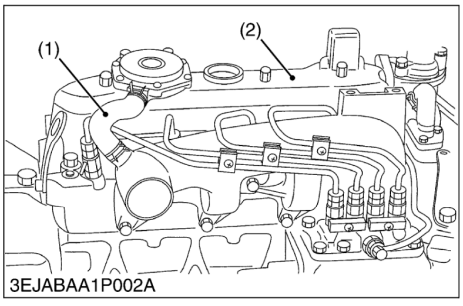
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5. DISASSEMBLING AND ASSEMBLING

[1] D1703-EBG, V2203-EBG

(1) Cylinder Head and Valves



Cylinder Head Cover

1. Remove the breather pipe (1).
2. Remove the cylinder head cap nuts from the cylinder head cover.
3. Remove the cylinder head cover (2) and the gasket from the cylinder head.

(When reassembling)

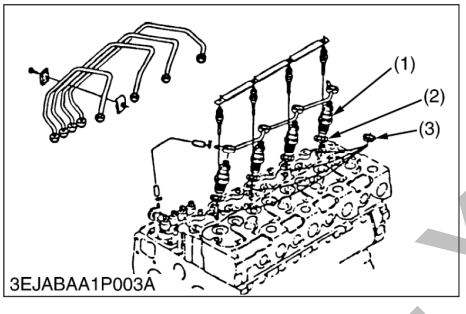
Tightening torque	Cylinder head cover cap nut	6.9 to 8.8 N·m 0.7 to 0.9 kgf·m 5.1 to 6.5 lbf·ft

■ **NOTE**

- **When the cylinder head has been reassembled or when the valve clearance has been readjusted, apply an enough amount of oil to the intake and exhaust valves, push rod and rocker arm just before fitting the head cover in position.**

(1) Breather Pipe (2) Cylinder Head Cover

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Injection Pipe and Nozzle Holder

1. Remove the injection pipes and overflow pipes.
2. Remove the glow plugs.
3. Remove the nozzle holder (1) and copper gaskets (2).
4. Remove the heat seal (3).

(When reassembling)

- Check to see that the cylinder head cover gasket is not defective.
- Remove the copper gasket and heat seal with new one.
- Be sure to place the heat seal (3).

Tightening torque	Injection pipe retaining nut	19.6 to 24.5 N·m 2.0 to 2.5 kgf·m 14.5 to 18.1 lbf·ft
	Glow plug	19.6 to 24.5 N·m 2.0 to 2.5 kgf·m 14.5 to 18.1 lbf·ft
	Nozzle holder	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 lbf·ft

(1) Nozzle Holder (3) Heat Seal
(2) Copper Gasket

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5. TIGHTENING TORQUES

Tighten screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual according to the table below.

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[1] GENERAL USE SCREWS, BOLTS AND NUTS

Indication on top of bolt	 No-grade or 4T						 7T						 9T		
Indication on top of nut	 No-grade or 4T												 6T		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6	7.9 to 9.3	0.80 to 0.95	5.8 to 6.8	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8	18 to 20	1.8 to 2.1	13 to 15	17 to 19	1.7 to 2.0	13 to 14	24 to 27	2.4 to 2.8	18 to 20	18 to 20	1.8 to 2.1	13 to 15	30 to 34	3.0 to 3.5	22 to 25
M10	40 to 45	4.0 to 4.6	29 to 33	32 to 34	3.2 to 3.5	24 to 25	48 to 55	4.9 to 5.7	36 to 41	40 to 44	4.0 to 4.5	29 to 32	61 to 70	6.2 to 7.2	45 to 52
M12	63 to 72	6.4 to 7.4	47 to 53	–	–	–	78 to 90	7.9 to 9.2	58 to 66	63 to 72	6.4 to 7.4	47 to 53	103 to 117	10.5 to 12.0	76.0 to 86.7
M14	108 to 125	11.0 to 12.8	79.6 to 92.5	–	–	–	124 to 147	12.6 to 15.0	91.2 to 108	–	–	–	167 to 196	17.0 to 20.0	123 to 144
M16	167 to 191	17.0 to 19.5	123 to 141	–	–	–	197 to 225	20.0 to 23.0	145 to 166	–	–	–	260 to 304	26.5 to 31.0	192 to 224
M18	246 to 284	25.0 to 29.0	181 to 209	–	–	–	275 to 318	28.0 to 32.5	203 to 235	–	–	–	344 to 402	35.0 to 41.0	254 to 296
M20	334 to 392	34.0 to 40.0	246 to 289	–	–	–	368 to 431	37.5 to 44.0	272 to 318	–	–	–	491 to 568	50.0 to 58.0	362 to 419

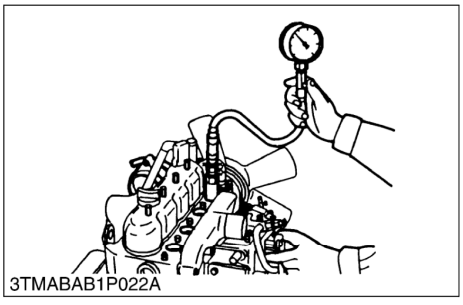
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4. CHECKING AND ADJUSTING

[1] ENGINE BODY


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Compression Pressure

1. After warming up the engine, stop it and remove the air cleaner, the muffler and all nozzle holders.
2. Install a compression tester (Code No: 07909-30207) for diesel engines to nozzle holder hole.
3. After making sure that the speed control lever is set at the stop position (Non-injection), run the engine at 200 to 300 min^{-1} (rpm) with the starter.
4. Read the maximum pressure. Measure the pressure more than twice.
5. If the measurement is below the allowable limit, check the cylinder, piston ring, top clearance, valve and cylinder head.
6. If the measurement is below the allowable limit, apply a small amount of oil to the cylinder wall through the nozzle hole and measure the compression pressure again.
7. If the compression pressure is still less than the allowable limit, check the top clearance, valve and cylinder head.
8. If the compression pressure increases after applying oil, check the cylinder wall and piston rings.

■ **NOTE**

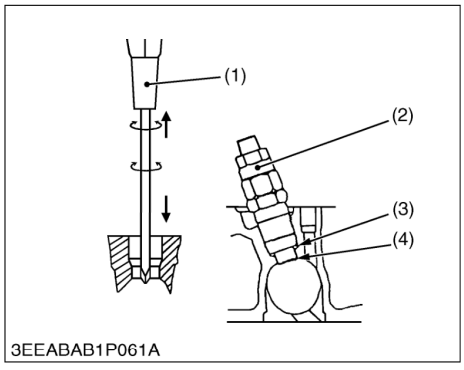
- **Check the compression pressure with the specified valve clearance.**
- **Always use a fully charged battery for performing this test.**
- **Variances in cylinder compression values should be under 10 %.**

Compression pressure	Factory specification	D1703 V2203	3.53 to 3.72 MPa / 250 min^{-1} (rpm) 36 to 38 kgf/cm^2 / 250 min^{-1} (rpm) 512 to 540 psi / 250 min^{-1} (rpm)
		V3300	4.32 MPa / 250 min^{-1} (rpm) 44 kgf/cm^2 / 250 min^{-1} (rpm) 626 psi / 250 min^{-1} (rpm)
	Allowable limit	D1703 V2203	2.55 MPa / 250 min^{-1} (rpm) 26 kgf/cm^2 / 250 min^{-1} (rpm) 370 psi / 250 min^{-1} (rpm)
		V3300	3.26 MPa / 250 min^{-1} (rpm) 33.2 kgf/cm^2 / 250 min^{-1} (rpm) 472 psi / 250 min^{-1} (rpm)

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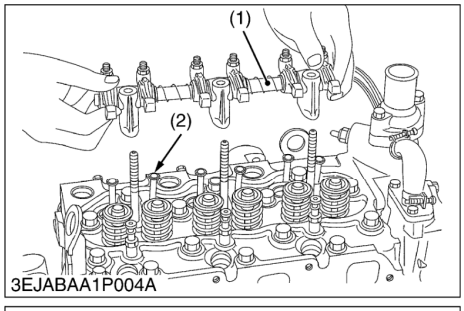
Nozzle Heat Seal Service Removal Procedure

■ **IMPORTANT**
- **Use a plus (phillips head) screwdriver that has a Dia. which is bigger than the heat seal hole (Approx. 6 mm (1/4 in.)).**

1. Drive screwdriver lightly into the heat seal hole.
2. Turn screwdriver three or four times each way.
3. While turning the screwdriver, slowly pull the heat seal out together with the injection nozzle gasket.
   If the heat seal drops, repeat the above procedure. Heat seal and injection nozzle gasket must be changed when the injection nozzle is removed for cleaning or for service.

(1) Plus Screwdriver
(2) Injection Nozzle
(3) Injection Nozzle Packin
(4) Heat Seal

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Rocker Arm Assembly and Push Rod

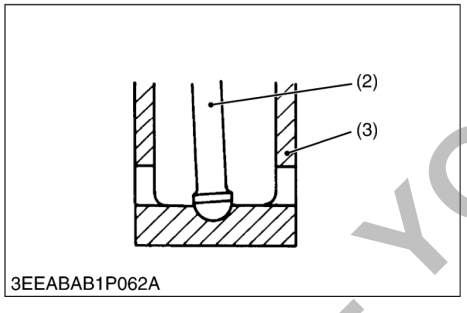
1. Unscrew the rocker arm bracket mounting nuts, and remove the rocker arm assembly (1).
2. Remove the push rods (2).

(When reassembling)
- Insert the push rods into the tappets securely.
- Adjust the valve clearance. (See page 1-S18.)

Tightening torque	Rocker arm bracket nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft

(1) Rocker Arm
(2) Push Rod
(3) Tappet

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3. SPECIFICATIONS

Model		SQ-1120B-AU-B	SQ-1150B-AU-B	SQ-3140B-AU-B
Generator	Type	Revolving field types self-exciting AC brushless generator		
	Insulation class	H		
	Frequency	50 Hz		
	Output	11.2 kVA (11.2 kW)	15 kVA (15 kW)	14 kVA (11.2 kW)
	Voltage	240 V		240 / 415 V
	Current	46.7 A	62.5 A	12.5 / 19.5 A
	Number of phases	Single		Three
	Number of poles	4		
	Power factor	100 %		80 %
Engine	Model	D1703-EBG	V2203-EBG	D1703-EBG
	Type	Vertical, water cooled, 4-cycle, diesel engine		
	Number of cylinders	3	4	3
	Bore × Stroke	87 × 92.4 mm (3.43 × 3.64 in.)		
	Total displacement	1647 cm^3 (100.51 cu.in.)	2197 cm^3 (134.07 cu.in.)	1647 cm^3 (100.51 cu.in.)
	Output rated	13.6 kW (18.2 HP)	18.4 kW (24.7 HP)	13.6 kW (18.2 HP)
	Speed	1500 min^{-1} (rpm)		
	Combustion system	Spherical combustion chamber		
	Compression ratio	23 : 1		
	Cooling system	Pressurized radiator, forced circulation with water pump		
	Lubricating system	Forced lubrication by trochoid pump		
	Lubricating oil	API service class CF or higher		
	Starting system	Electric type		
	Battery	80D26R (55 Ah)		
	Fuel tank capacity	72 L	100 L	72 L
	Cooling system capacity	6.6 L	7.4 L	6.6 L
	Crankcase oil capacity	5.6 L	7.6 L	5.6 L
Continuous operating hours (at 3/4 load)		20.7 hrs	15.1 hrs	21.4 hrs
Net weight		780 kg	915 kg	780 kg
Shutdown system		In case of abnormal: Oil pressure, water temperature, Emergency stop button, Engine Room Door Opened, Load Center Cover removed, Low fuel, Alternator charge Fail, Over Voltage/Frequency/Current/Power, Under voltage/Frequency		

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INFORMATION

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1. SAFETY FIRST

⚠ SAFETY FIRST

- **This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.**
- **It is essential that you read the instructions and safety regulations before you try to repair or use this unit.**

⚠ DANGER
- **Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**

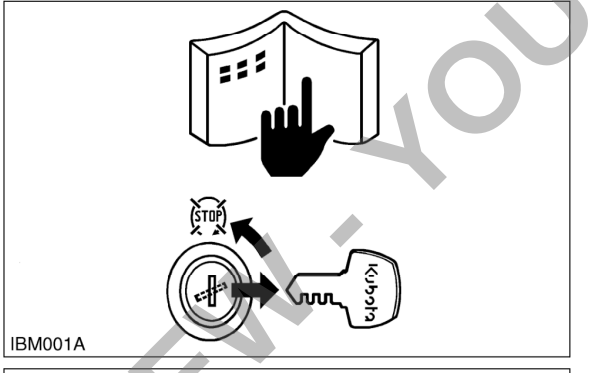
⚠ WARNING
- **Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

⚠ CAUTION
- **Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.**

■ IMPORTANT
- **Indicates that equipment or property damage could result if instructions are not followed.**

■ NOTE
- **Gives helpful information.**

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IBM001A


IBM011A

BEFORE YOU START SERVICE

- Read all instructions and safety instructions in this manual and on your engine safety decals.
- Clean the work area and engine.
- Park the machine on a stable and level ground.
- Let the temperature of the engine decrease before you start a job.
- Stop the engine, then remove the key.
- Disconnect the battery negative cable.
- Hang a **"DO NOT OPERATE"** tag in the operator station.

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START SAFELY

- Do not do the procedures below when you start the engine.
  - short across starter terminals
  - bypass the safety start switch
- Do not make unauthorized modifications to the engine. This can cause damage and decrease the engine life.

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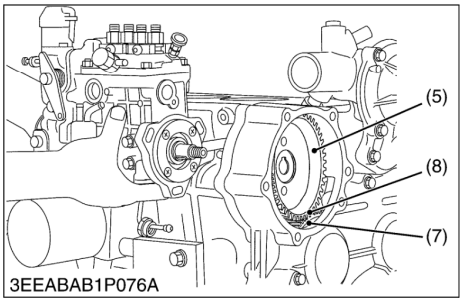
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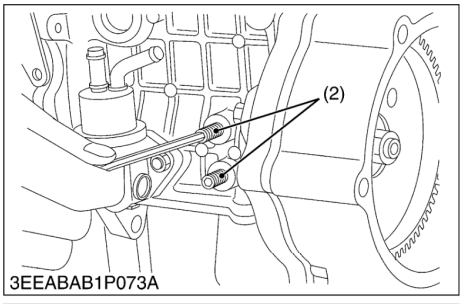
Item		Factory Specification	Allowable Limit
Timing Gear • Crank Gear to Idle Gear	Backlash	0.0415 to 0.1122 mm 0.0016 to 0.0044 in.	0.15 mm 0.0059 in.
• Idle Gear to Cam Gear	Backlash	0.0415 to 0.1154 mm 0.0016 to 0.0045 in.	0.15 mm 0.0059 in.
• Idle Gear to Injection Pump Gear	Backlash	0.0415 to 0.1154 mm 0.0016 to 0.0045 in.	0.15 mm 0.0059 in.
• Crank Gear to Oil Pump Gear	Backlash	0.0415 to 0.1090 mm 0.0016 to 0.0043 in.	0.15 mm 0.0059 in.
Idle Gear Shaft to Idle Gear Bushing	Clearance	0.020 to 0.054 mm 0.0008 to 0.0021 in.	0.10 mm 0.0039 in.
• Idle Gear Bushing	I.D.	28.000 to 28.021 mm 1.1024 to 1.1032 in.	–
• Idle Gear Shaft	O.D.	27.967 to 27.980 mm 1.1011 to 1.1016 in.	–
Idle Gear	Side Clearance	0.20 to 0.51 mm 0.0079 to 0.0200 in.	0.90 mm 0.0354 in.
Piston Pin Bore		25.000 to 25.013 mm 0.9843 to 0.9848 in.	25.05 mm 0.9862 in.
Compression Ring 2 to Ring Groove	Clearance	0.093 to 0.120 mm 0.0037 to 0.0047 in.	0.20 mm 0.0079 in.
Oil Ring to Ring Groove	Clearance	0.02 to 0.052 mm 0.0008 to 0.0020 in.	0.15 mm 0.0059 in.
Compression Ring 1	Ring Gap	0.30 to 0.45 mm 0.0118 to 0.0177 in.	1.25 mm 0.0492 in.
Compression Ring 2	Ring Gap	0.30 to 0.45 mm 0.0118 to 0.0177 in.	1.25 mm 0.0492 in.
Oil Ring	Ring Gap	0.25 to 0.45 mm 0.0098 to 0.0177 in.	1.25 mm 0.0492 in.
Connecting Rod	Alignment	–	0.05 mm 0.0020 in.
Piston Pin to Small End Bushing	Clearance	0.014 to 0.038 mm 0.0006 to 0.0015 in.	0.15 mm 0.0059 in.
• Piston Pin	O.D.	25.002 to 25.011 mm 0.9843 to 0.9847 in.	–
• Small End Bushing	I.D.	25.025 to 25.040 mm 0.9852 to 0.9858 in.	–
Crankshaft Journal to Crankshaft Bearing 1	Oil Clearance	0.040 to 0.118 mm 0.0016 to 0.0046 in.	0.20 mm 0.0079 in.
• Crankshaft Journal	O.D.	51.921 to 51.940 mm 2.0441 to 2.0449 in.	–
• Crankshaft Bearing 1	I.D.	51.980 to 52.039 mm 2.0465 to 2.0488 in.	–

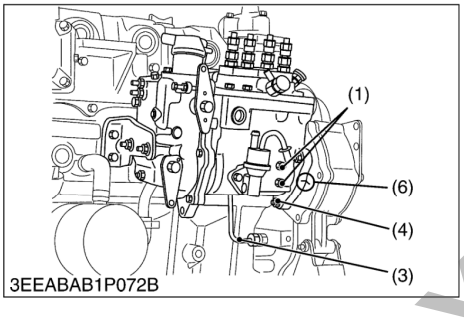
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(Continued)







(Reassembling the fuel injection pump unit)

1. Place the piston of the 4th cylinder at the top dead center in the compression stroke. Fix the flywheel with the flywheel stopper.
2. Place the injection pump gear (5) back into the gear case position. Make sure of aligning the align marks of the injection pump gear (5) and the idle gear 2 (7).
3. Install the injection pump unit to the injection pump gear (5).

■ **NOTE**

- **When installing the injection pump unit to the injection pump gear, make sure that the key is fit in the keyway of injection pump gear.**

4. Temporarily tighten the injection pump gear mounting nut by hand.
5. Fix the injection pump unit and tighten the injection pump gear mounting nut to the specified torque.
6. Take off the fuel cam shaft lock screws (2) and tighten the flange bolts (1) for plugging.
7. Loose the injection pump unit mounting flange nuts (4) for aligning the injection timing.
8. Moving the injection pump unit clockwise (viewed from gear case side), align the injection timing marks (6) on the injection pump unit and on the gear case.
9. Tighten the injection pump unit mounting flange nut (4) to the specified torque.
10. Reconnect the lubricating oil pipe (3) and place the injection pump unit support and the gear cover of the injection pump unit.
11. Remove the flywheel stopper.
12. Check the injection timing.
    (See the "Injection Timing (V3300-EBG)").)
13. If the injection timing is not within the specification, repeat (7) to (12) again.

Tightening torque	Injection pump gear mounting nut	73.6 to 83.4 N·m 7.5 to 8.5 kgf·m 54.2 to 61.5 lbf·ft
	Injection pump unit mounting flange nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft

(1) Flange Bolt
(2) Lock Bolt
(3) Lubricating Oil Pipe
(4) Flange Nut
(5) Injection Pump Gear
(6) Align Mark
(7) Idle Gear 2
(8) Align Mark of the Injection Gear

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MECHANISM

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