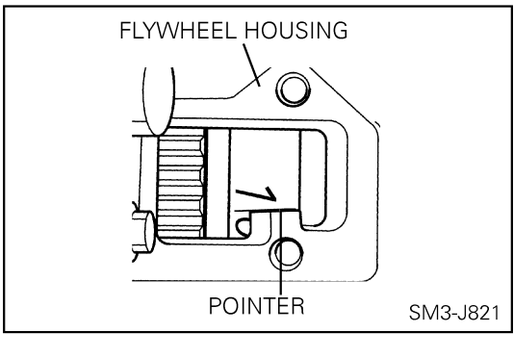
ENGINE TUNEUP

VALVE CLEARANCE CHECKING AND ADJUSTING PROCEDURES

Valve clearance adjustment is performed only when the checking result is not within the specified value.

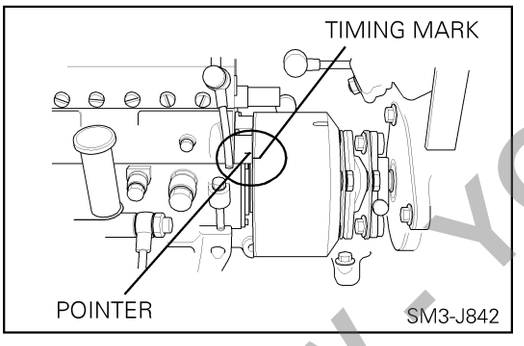


PREPARATION OF CHECKING AND ADJUSTMENT.

1. Positioning the No.1 or No.6 piston at Top Dead Center of the compression stroke.

   1) Turn the crankshaft counterclockwise (viewed from the flywheel side) to align mark 1/6 on the outer periphery of the flywheel with the pointer of the flywheel housing.

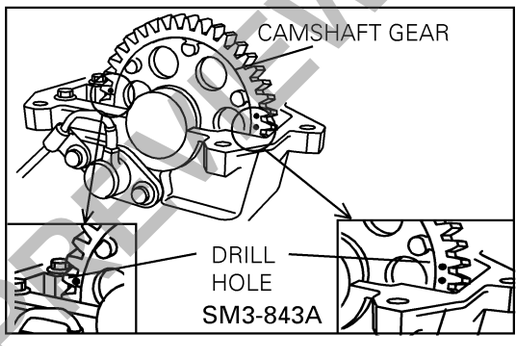
NOTE: o **Always turn the crankshaft counterclockwise (viewed from the flywheel side).**
o **In this position the No.1 or No.6 piston is at the Top Dead Center of the compression stroke.**



   2) Confirm whether No.1 or No.6 piston is at the Top Dead Center of the compression stroke by the following two steps.

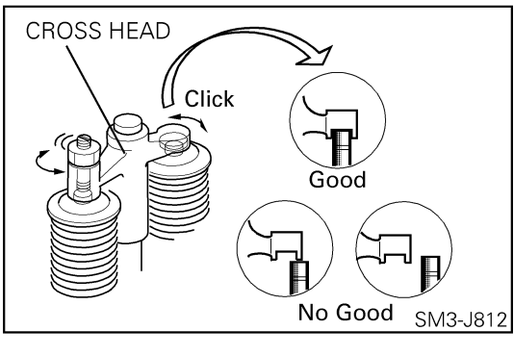
- If the timing mark is nearly aligned with the pointer, the No.1 piston is at the Top Dead Center of the compression stroke.

NOTE: **When the timing mark of the timer is at the rear (180° opposite), the No.6 piston is at the Top Dead Center of the compression stroke.**



- Among three drill holes on the camshaft gear, when two drill holes are on horizontal position, and the rest of the drill hole is visible, the No.1 piston is at the Top Dead Center of the compression stroke.

NOTE: **If the rest of the drill hole is invisible by camshaft housing, the No.6 piston is at the Top Dead Center of the compression stroke.**



2. Make sure that the valve stem is correctly inserted in the cross head.

NOTE: **Move the cross head with fingers right and left to confirm the valve stem is correctly inserted in the cross head by listening to the clicking sound.**

3. Confirm that there is no foreign particles or dust between the cross head and the valve stem.

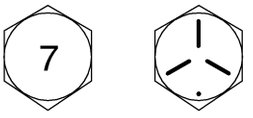
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SPECIFIED TORQUE FOR STANDARD BOLTS

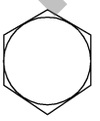
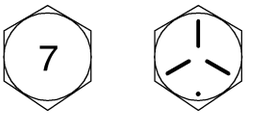
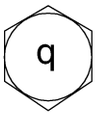
1. FLANGE BOLT

Unit: N·m {kgf·cm, lbf·ft}

Class	7T	9T
Representation / Diameter X Pitch		
M8 X 1.25	28.5 {290, 21.0}	36 {370, 26.8}
M10 X 1.25	60 {610, 44.1}	74.5 {760, 55.0}
M10 X 1.5	55 {560, 40.5}	68.5 {700, 50.6}
M12 X 1.25	108 {1,100, 79.6}	136 {1,390, 100.5}
M12 X 1.75	97 {990, 71.6}	125 {1,280, 92.6}
M14 X 1.5	171.5 {1,750, 126.6}	216 {2,210, 159.8}
M14 X 2	154 {1,570, 113.6}	199 {2,030, 146.8}

2. BOLT WITH WASHER

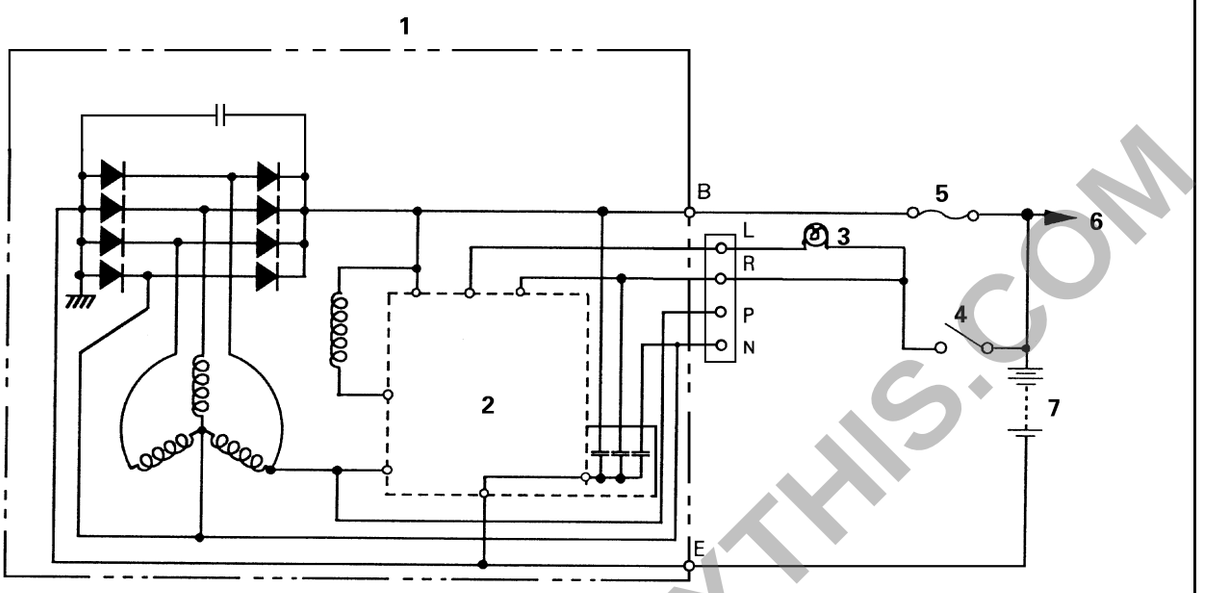
Unit: N·m {kgf·cm, lbf·ft}

Class	4T	7T	9T
Representation / Diameter X Pitch	 No Mark		
M6 X 1	6 {60, 4.3}	10 {100, 7.2}	13 {130, 9.4}
M8 X 1.25	14 {140, 10.1}	25 {250, 18.1}	31 {320, 23.1}
M10 X 1.25	29 {300, 21.7}	51 {520, 37.6}	64 {650, 47.0}
M10 X 1.5	26 {270, 19.5}	47 {480, 34.7}	59 {600, 43.4}
M12 X 1.25	54 {550, 39.8}	93 {950, 68.7}	118 {1,200, 86.8}
M12 X 1.75	49 {500, 36.2}	83 {850, 61.5}	108 {1,100, 79.6}
M14 X 1.5	83 {850, 61.5}	147 {1,500, 108.5}	186 {1,900, 137.4}
M14 X 2	74 {750, 54.2}	132 {1,350, 97.6}	172 {1,750, 126.6}

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CHARGING SYSTEM CIRCUIT



SM21-002D

1. Alternator
2. I.C. regulator
3. Charging warning lamp
4. Starter switch
5. Fuse
6. Load
7. Battery

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TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
Engine overheating	**Coolant**	
	• Insufficient coolant	Add coolant.
	• Defective thermostat	Replace thermostat.
	• Coolant overflow due to leakage of exhaust into cooling system	Repair.
	• Coolant leakage from cylinder head gasket	Replace gasket.
	• Defective coolant pump	Repair or replace.
	Abnormal combustion	
	• Incorrect injection timing	Adjust injection timing.
	• Reduced injection pressure	Adjust injection pressure.
	• Poor fuel	Use good quality fuel.
	• Poor nozzle spray	Adjust or replace nozzle.
	Other problems	
	• Defective or deteriorated engine oil	Change engine oil.
	• Unsatisfactory operation of oil pump	Replace or repair.
	• Insufficient oil	Add oil.
Excessive oil consumption	**Pistons, cylinder liners, and piston rings**	
	• Wear of piston ring and cylinder liner	Replace piston rings and cylinder liner.
	• Worn, sticking or broken piston rings	Replace piston rings and cylinder liner.
	• Insufficient tension on piston rings	Replace piston rings and cylinder liner.
	• Unsatisfactory braking in of piston rings	Replace piston rings and cylinder liner.
	• Unsuitable oil (viscosity too low)	Change oil as required and replace piston rings and cylinder liners.
	• Incorrectly fitted piston rings (upside down)	Replace piston rings.
	• Gaps of piston rings in line with each other	Reassemble piston rings.

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SPECIFICATIONS

DIESEL ENGINE FOR INDUSTRIAL USE

HINO J08C-TI

7.961 liters, 4-cycle 6-cyl., water-cooled turbocharged

● **PERFORMANCE (STD. specs.)**

GENERAL USE (JIS)					
J08CUD-KJGA,J08CUD-KJGD		J08CUD-KJGB,J08CUD-KJGE, J08CUD-KJGG		J08CUD-KJGC,J08CUD-KJGH	
Output kW{PS} at r/min	Max.Torque N・m{kg・m} at r/min	Output kW{PS} at r/min	Max.Torque N・m{kg・m} at r/min	Output kW{PS} at r/min	Max.Torque N・m{kg・m} at r/min
148{202}/2,400	740{76}/1,400	165{224}/2,200	860{87}/1,400	184{250}/2,200	970{99}/1,400

● **ENGINE DESCRIPTION**

1.	Type	Diesel, 4-cycle, 6cyl., in-line, overhead camshaft, 24valves, water-cooled, Turbocharged
2.	Combustion system	Direct injection
3.	Bore x Stroke	114 x 130 mm {4.49 x 5.12 in.}
4.	Displacement	7.961 liters {485.8 cu. in.}
5.	Compression ratio	18.0
6.	Direction of rotation	Counterclockwise viewed from flywheel
7.	Dimensions (L x W x H)	Approx. L1,140 x W808 x H1,019 mm (W: from turbo to oil level gauge) {44.9x 31.8 x 40.1 in.}
8.	Dry weight	Approx. 580kg {1,279 lb}

● **FEATURES**

1.	Cylinder block	Mono block cast iron with replaceable dry liner
2.	Cylinder head	Single piece cast iron
3.	Crankshaft	Induction-hardened, die forged special steel with counter weights
4.	Piston and rings	Heat-resistance aluminum alloy Two compression rings, chrome plated One oil ring , chrome plated with coil expander
5.	Camshaft	Induction hardened carbon steel
6.	Valves	Heat resistance steel

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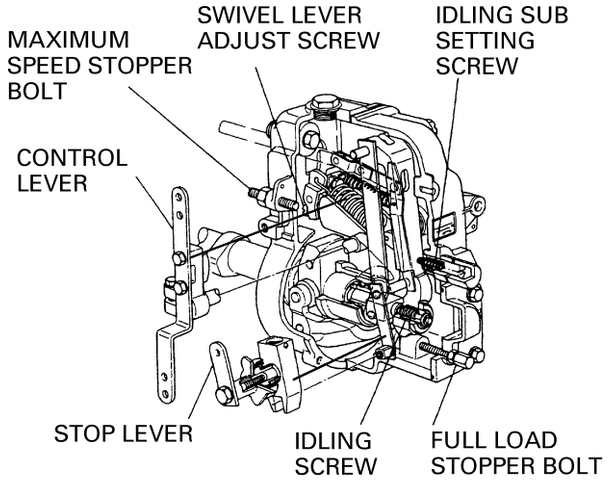
INJECTION PUMP NUMBER : 22020-6410 **C-Y411E-01**

INJECTION PUMP SPECIFICATION	Engine model		J08CUD-KJGA,J08CUD-KJGD
	Injection pump part number		22020-6410
	Injection pump type		NP-PE6MD105/410LS2
	Governor type		NP-EP/RSV200-1350
	Timer type		—
	Feed pump type		NP-FP/KEP-AD
INJECTION VOLUME ADJUSTMENT	Test nozzle and nozzle holder		105780-8140
	Test nozzle opening pressure		17.2 MPa{175 kgf/cm², 2,489 lbf/in².}
	Injection pipe	Outer diameter	6.0 mm {0.236 in.}
		Inner diameter	2.0 mm {0.079 in.}
		Length	600 mm {23.6 in.}
	Calibration	Type of fuel	SAE J967C
		Fuel temperature	40-45° C {104-113° F}
	Fuel feed pressure		255 kPa {2.6 kgf/cm², 37 lbf/in².}
OVERFLOW VALVE	Overflow valve opening pressure		255kPa {2.6 kgf/cm², 37 lbf/in²}
INJECTION TIMING	Rotation		Counterclockwise viewed from drive side
	Injection order		1 - 4 - 2 - 6 - 3 - 5
	Injection interval		60° ±15'
	Pre-stroke		3.77-3.83 mm {0.149-0.150 in.}

	Rack position mm {in.}	Pump revolution r/min	Measuring strokes	Injection volume cm³ {cu.in.}	Variation limit %	Boost pressure kPa {mmHg,inHg}
INJECTION VOLUME						
A	9.5{0.374}	700	500	50.0-52.0 {3.051-3.173}	±3.5	23.3 {175,7} or more
B	(9.5{0.374})	1,200	500	50.0-53.0 {3.051-3.234}	—	23.3 {175,7} or more
D	6.0 {0.236}	420	500	3.5-4.5 {0.214-0.274}	±10	—
E	—	100	500	70.0-80.0 {4.272-4.881}	—	—

GOVERNOR ADJUSTMENT

ADJUSTING POSITION



SM4-070

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IMPORTANT POINTS – DISASSEMBLY

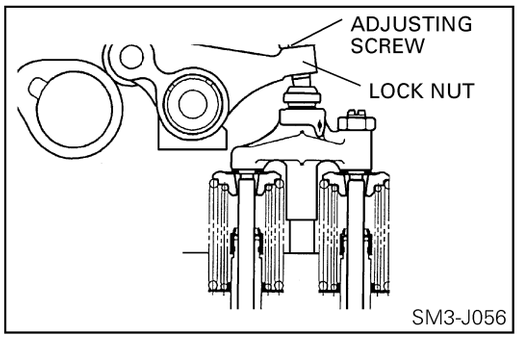
DISASSEMBLE THE CYLINDER HEAD.

1. Clean parts around the nozzle holder and fuel system connections.

NOTE: Entry of foreign particles into the combustion chamber may result in engine trouble.

2. Remove the nozzle holder assembly.

NOTE: Refer to FUEL SYSTEM.

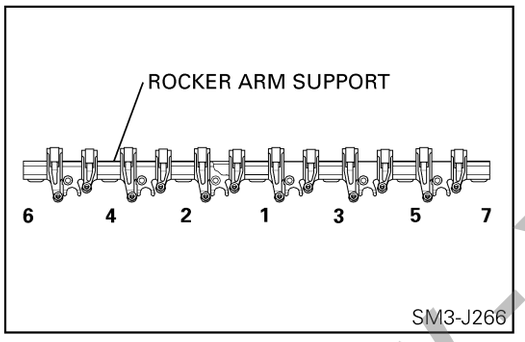


3. Remove the rocker arm assembly.

a. Loosen the lock nut at the end of the rocker arm and screw in the adjusting screw completely.

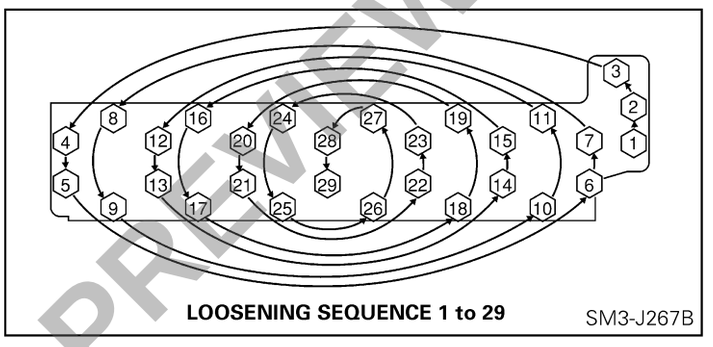
NOTE: Not tightening the adjusting screw may result in a bent rocker shaft.

b. Loosen the nozzle clamp bolt.

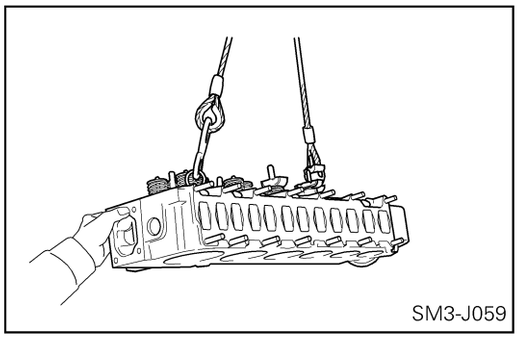


c. Loosen the rocker arm support bolt as shown in the figure.

NOTE: If the cross head is removed from the valve during disassembly of the rocker arm assembly, reassemble the cross head as it was.



4. Remove the cylinder head bolts.
Gradually loosen bolts three times in the order shown in the figure.



5. Lift and remove the cylinder head using the special tool and hoist.

Special tools: Eye bolt (09433-1070)
Wire (09491-1010)

NOTE: Do not damage the cylinder head lower surface or cylinder block upper surface during removal of the cylinder head.

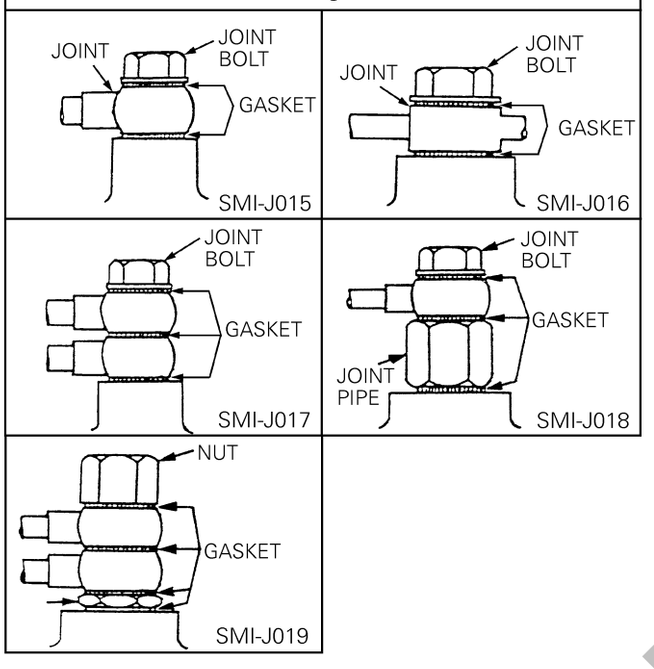
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PROCEDURE FOR INSTALLING JOINTS AND GASKETS OF ENGINE PIPE

1. Gasket seal type (aluminum + rubber, asbestos or copper).

Location of gasket seal

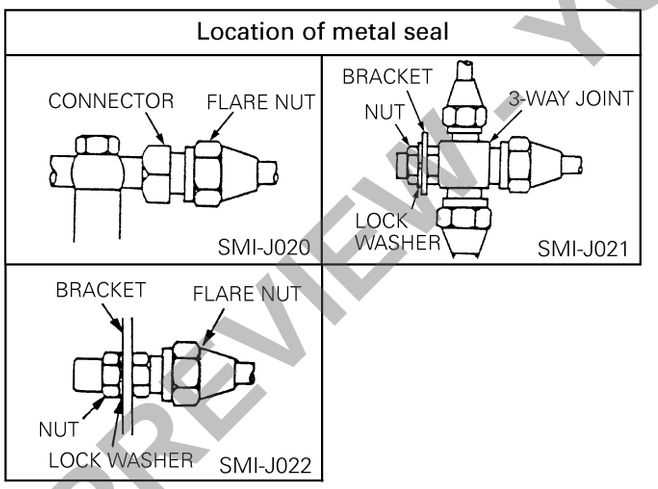


Tightening torque chart

Clamping screw size (Diameter) mm {in.}	Tightening torque N·m {kgf·cm, lbf·ft}
8 {0.315}	13 {130, 9}
10 {0.394}	20 {200, 14}
12 {0.472}	25 {250, 18}
14 {0.551}	25 {250, 18}
16 {0.630}	29 {300, 22}
18 {0.709}	39 {400, 29}
20 {0.787}	*39 {400, 29}
24 {0.945}	69 {700, 51}
28 {1.102}	127 {1,300, 94}

2. Metal seal type (Flare connector type).

Location of metal seal



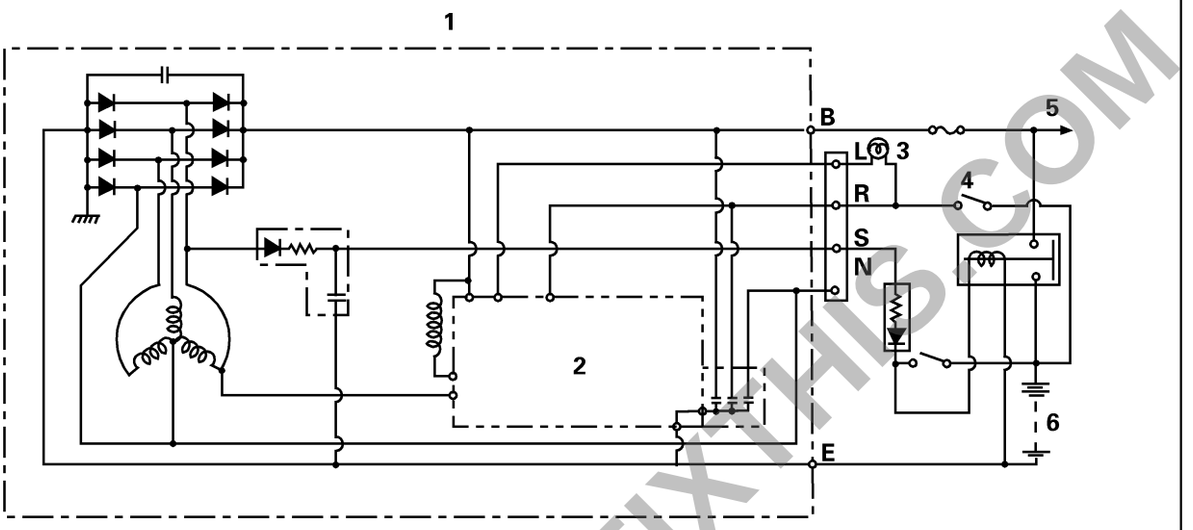
Tightening torque chart

Clamping screw size (Diameter) mm {in.}	Tightening torque N·m {kgf·cm, lbf·ft}
12 {0.472}	20 {200, 14}
14 {0.551}	31 {320, 23}
16 {0.630}	39 {400, 29}
18 {0.709}	59 {600, 43}
20 {0.787}	64 {650, 47}

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CHARGING SYSTEM CIRCUIT



SM21-J155

1. Alternator
2. I.C. regulator
3. Charging warning lamp
4. Starter switch
5. Load
6. Battery

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Symptom	Possible cause	Remedy/Prevention
Excessive oil consumption	Valve and valve guides	
	• Worn valve stem	Replace valve and valve guide.
	• Worn valve guide	Replace valve guide.
	• Incorrectly fitted valve stem oil seal	Replace the oil seal.
	• Excessive lubricant on rocker arm	Check clearance of rocker arm and shaft.
	Excess oil feed	
	• Defective oil level gauge	Replace oil level gauge.
	• Oil level too high	Drain excess oil.
	Other problems	
	• Overcooled engine (low temperature wear)	Warm up engine before operating. Check cooling system.
	• Oil leakage from miscellaneous parts	Repair.
Piston seizure	Operation	
	• Abrupt stoppage of engine after running at high speed	Operate engine properly.
	Oil	
	• Insufficient oil	Add oil.
	• Dirty oil	Change oil.
	• Poor quality oil	Replace with proper engine oil.
	• High oil temperature	Repair.
	• Low oil pressure	Repair.
	• Defective oil pump	Repair oil pump.
	• Reduced performance due to worn oil pump	Replace oil pump.
	• Suction strainer sucking air	Add oil and/or repair strainer.
	Abnormal combustion	See Symptom: “Engine overheating”.
	Coolant	See Symptom: “Engine overheating”.
Lack of power	Injection pump	Refer to CHAPTER IP, FUEL INJECTION PUMP.
	Intake	
	• Clogged air cleaner	Clean element or replace element.
	Overheating	See Symptom: “Engine overheating”.

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DATA AND SPECIFICATION

Model		J08CUD
Type		Diesel, 4 cycle, vertical, 6 cylinder, in-line overhead camshaft, water-cooled, direct injection
Aspiration		Turbocharged and intercooled
Bore and stroke		114 x 130 mm {4.49 x 5.11 in.}
Piston displacement		7.961 L {485.8 cu.in.}
Compression ratio		18:1
Firing order		1-4-2-6-3-5 (The cylinder numbers are counted in order from the crankshaft pulley side)
Direction of rotation		Counterclockwise viewed from flywheel
Idling revolution (Engine unit)		840- 890 r/min
Dry weight		Approximately 580 kg {1,279 lb}
Valve seat angle	Intake	30°
	Exhaust	45°
Valve face angle	Intake	30°
	Exhaust	45°
Valve timing (flywheel travel)	Intake opens	14° before top dead center
	Intake closes	30° after bottom dead center
	Exhaust opens	54° before bottom dead center
	Exhaust closes	13° after top dead center
Valve clearance (when cold)	Intake	0.30 mm {0.0118 in.}
	Exhaust	0.45 mm {0.0177 in.}
Engine oil pump Type Drive		 Full forced pressure feed by gear pump By gear
Engine oil cooler		Multi-plate type, water cooled
Injection nozzle Type Valve opening pressure		 Type:Two spring type Valve opening pressure 1st:16.7 MPa{170 kgf/cm^2, 2,417 lbf/in.^{2}} 2nd:21.6 MPa{220 kgf/cm^2, 3,128 lbf/in.^{2}}
Coolant pump Type Drive		 Forced circulation by volute pump By V-belt
Thermostat Type		 Wax.type, bottom bypass system
Injection timing (flywheel travel)		9° before top dead center for No. 1 cylinder of the compression stroke

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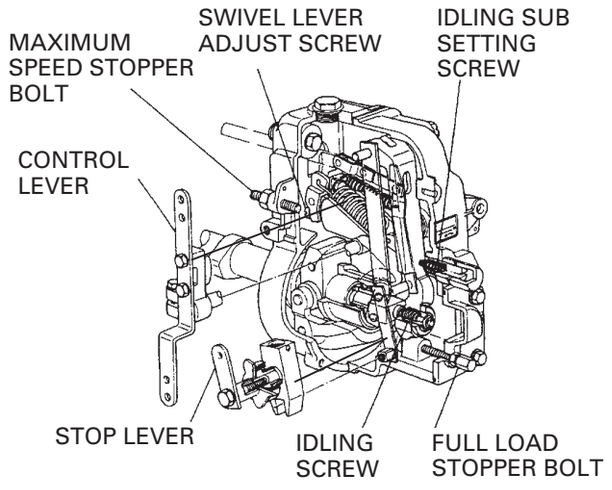
INJECTION PUMP NUMBER : 22020-6400 **C-Y412E-01**

INJECTION PUMP SPECIFICATION	Engine model E		J08CUD-KJGB,J08CUD-KJGE,J08CUD-KJGG
	Injection pump part number		22020-6400
	Injection pump type		NP-PE6MD105/410LS2
	Governor type		NP-EP/RSV200-1350
	Timer type		—
	Feed pump type		NP-FP/KEP-AD
INJECTION VOLUME ADJUSTMENT	Test nozzle and nozzle holder		105780-8140
	Test nozzle opening pressure		17.2 MPa{175 kgf/cm^2, 2,489 lbf/in^2.}
	Injection pipe	Outer diameter	6.0 mm {0.236 in.}
		Inner diameter	2.0 mm {0.079 in.}
		Length	600 mm {23.6 in.}
	Calibration	Type of fuel	SAE J967C
		Fuel temperature	40-45˚ C {104-113˚ F}
	Fuel feed pressure		255 kPa {2.6 kgf/cm^2, 37 lbf/in^2.}
OVERFLOW VALVE	Overflow valve opening pressure		255kPa {2.6 kgf/cm^2, 37 lbf/in^2}
INJECTION TIMING	Rotation		Counterclockwise viewed from drive side
	Injection order		1 - 4 - 2 - 6 - 3 - 5
	Injection interval		60˚ ±15'
	Pre-stroke		3.77-3.83 mm {0.149-0.150 in.}

INJECTION VOLUME	Rack position mm {in.}		Pump revolution r/min	Measuring strokes	Injection volume cm^3 {cu.in.}	Variation limit %	Boost pressure kPa {mmHg,inHg}
	A	10.0{0.394}	700	500	58.75-60.75 {3.585-3.707}	±3.5	28.0 {210,8} or more
	B	(10.0{0.394})	1,100	500	58.75-61.75 {3.585-3.768}	—	28.0 {210,8} or more
	D	6.0 {0.236}	420	500	3.5-4.5 {0.214-0.274}	±10	—
	E	—	100	500	70.0-80.0 {4.272-4.881}	—	—

GOVERNOR ADJUSTMENT

ADJUSTING POSITION



SM4-070

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