

Shop Manual

ENGINE

95E -7 SERIES

KOMATSU

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

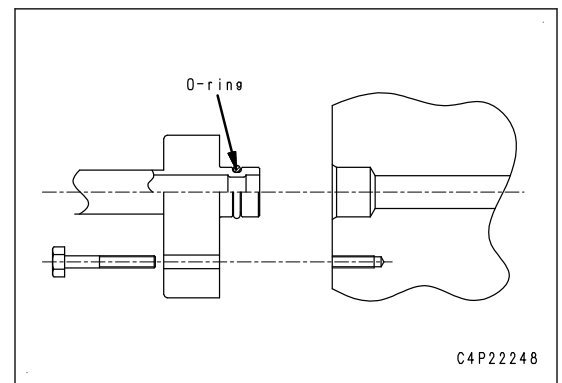
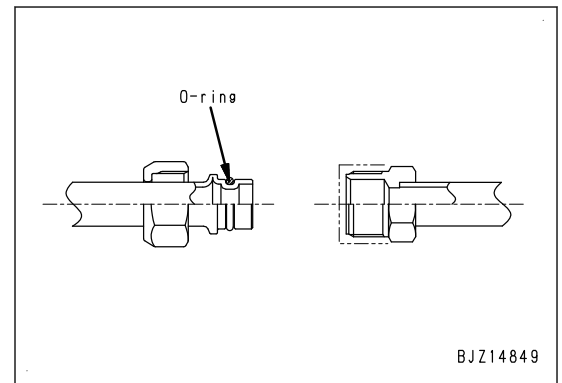
CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

Abbreviation	Actual word spelled out
S/T	Steering
STRG	
SIG	Signal
SOL	Solenoid
STD	Standard
OPT	Option
OP	
PRESS	Pressure
SPEC	Specification
SW	Switch
TEMP	Temperature
T/C	Torque Converter
T/M	Transmission

REMARK

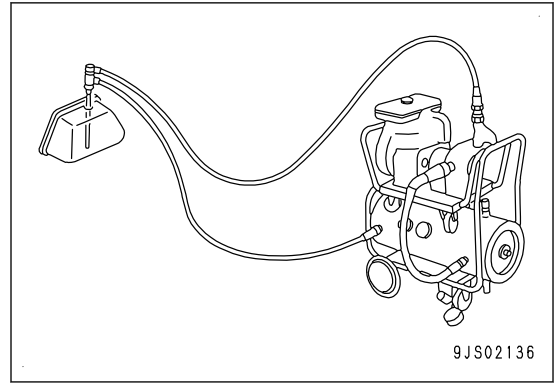
- The figure shows an example of fitting of O-ring.
- An O-ring is fitted to every joint of the air conditioner piping.

For tightening torques, see THE OTHER INFORMATION, "Precautions for disconnection and connection of air conditioner piping".



REMARK

The oil cleaning equipment can remove the ultra fine (approximately 3 μm) particles that the filter built in the hydraulic equipment cannot remove. So, it is very effective device.



PRECAUTIONS FOR HANDLING FUEL SYSTEM EQUIPMENT

The machines equipped with common rail fuel injection system (CRI) consists of more precise parts than the parts used in the conventional fuel injection pump and nozzle. If foreign material enters this system, it may cause a failure. Use special care to prevent entry of the foreign material when servicing the fuel system.

Select an appropriate workplace

Avoid the work of adding hydraulic oil, replacing filters, or repairing the machine in rainy or windy weather, or in dusty environment.

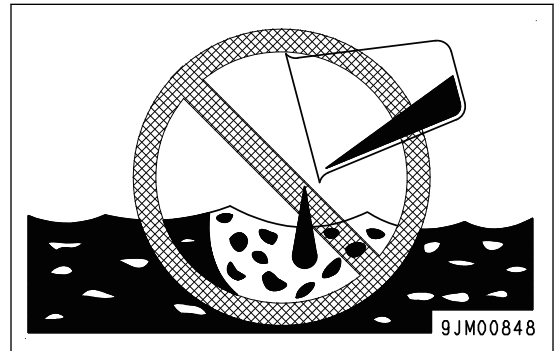
Sealing the opening

Plug the removed pipes and the openings of the removed components with the caps, tapes, plastic bags, etc. to prevent foreign material from entering.

NOTICE

Do not expose the openings or stuff it, otherwise foreign material may enter or leaked oil may pollute the environment.

Do not discard the oil inconsiderately. Ask the customer for disposal or bring it back to dispose it appropriately.



How to clean parts when dirt is stuck

If any dirt or dust sticks the parts of the fuel system, clean it off thoroughly with clean fuel.

Precautions for replacing fuel filter cartridge

Be sure to use the Komatsu genuine fuel filter cartridge.

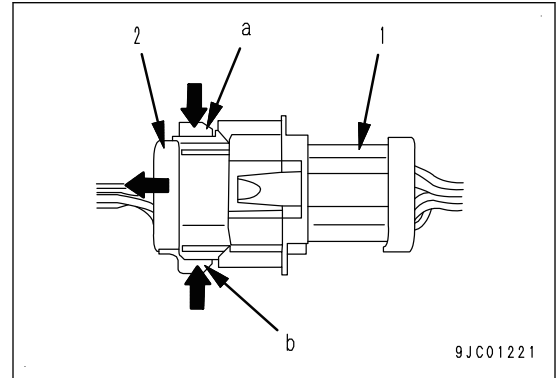
NOTICE

The machine equipped with common rail fuel injection system (CRI) consists of more precise parts than the parts used in the conventional fuel injection pump and nozzle. In order to prevent foreign material from entering this system, the filter employs a specially high performance of filter element. If a filter other than a Komatsu genuine filter is used, fuel system contamination and damage may occur. Therefore Komatsu recommends using only Komatsu fuel filters and install them following the procedures in the shop manual.

METHOD FOR DISCONNECTING AND CONNECTING DEUTSCH CONNECTOR

Method for disconnecting Deutsch connector

While pressing locks (a) and (b) from each side respectively, pull out female connector (2).

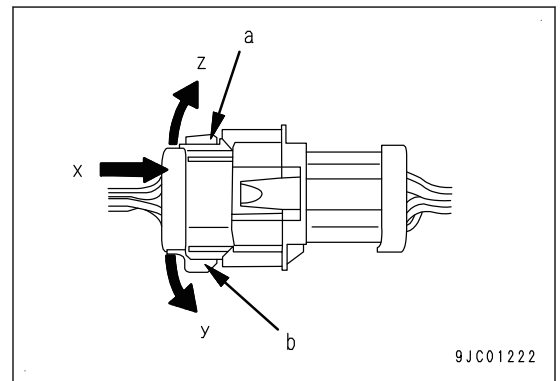


Method for connecting Deutsch connector

1. Push in female connector (2) horizontally, and insert it straight until it clicks. (Arrow: x)
2. In order to check whether locks (a) and (b) are completely inserted, insert female connector (2) by rocking it vertically (in the arrow z direction). (Arrow: x, y, z)

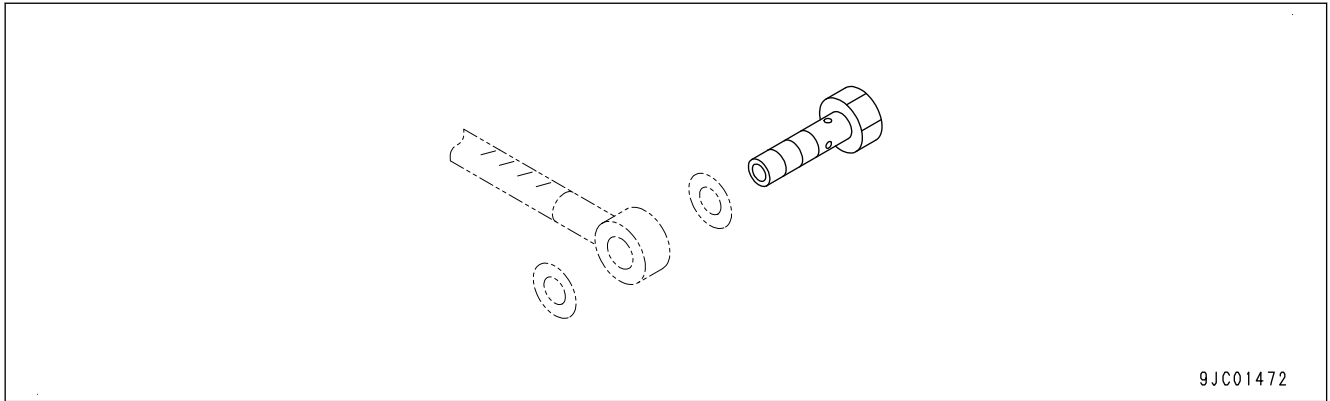
REMARK

Lock (a) in the figure is pulled down (not set completely), and lock (b) is set completely.



Types of circuits and color codes

Type of wire		AVS, AV, CAVS						AEX	
Type of circuit	Charge	R	WG	-	-	-	-	R	-
	Ground	B	-	-	-	-	-	B	-
	Start	R	-	-	-	-	-	R	-
	Light	RW	RB	RY	RG	RL	-	O	-
	Instrument	Y	YR	YB	YG	YL	YW	Y	Gr
	Signal	G	GW	GR	GY	GB	GL	G	Br
	Others	L	LW	LR	LY	LB	-	L	-
		Br	BrW	BrR	BrY	BrB	-	-	-
		Lg	LgR	LgY	LgB	LgW	-	-	-
		O	-	-	-	-	-	-	-
		Gr	-	-	-	-	-	-	-
		P	-	-	-	-	-	-	-
		Sb	-	-	-	-	-	-	-
Dg		-	-	-	-	-	-	-	
Ch	-	-	-	-	-	-	-		



Thread diameter (mm)	Tightening torque (Nm {kgfm})
6	8±2 {0.81±0.20}
8	10±2 {1.02±0.20}
10	12±2 {1.22±0.20}
12	24±4 {2.45±0.41}
14	36±5 {3.67±0.51}

Tightening torque table for tapered screws on 102, 107, and 114 series engines (National taper pipe thread (NPT))

REMARK

Tighten the National taper pipe threaded (NPT) screws used on the 102, 107, and 114 series engines to the torques shown in the following table unless otherwise specified.

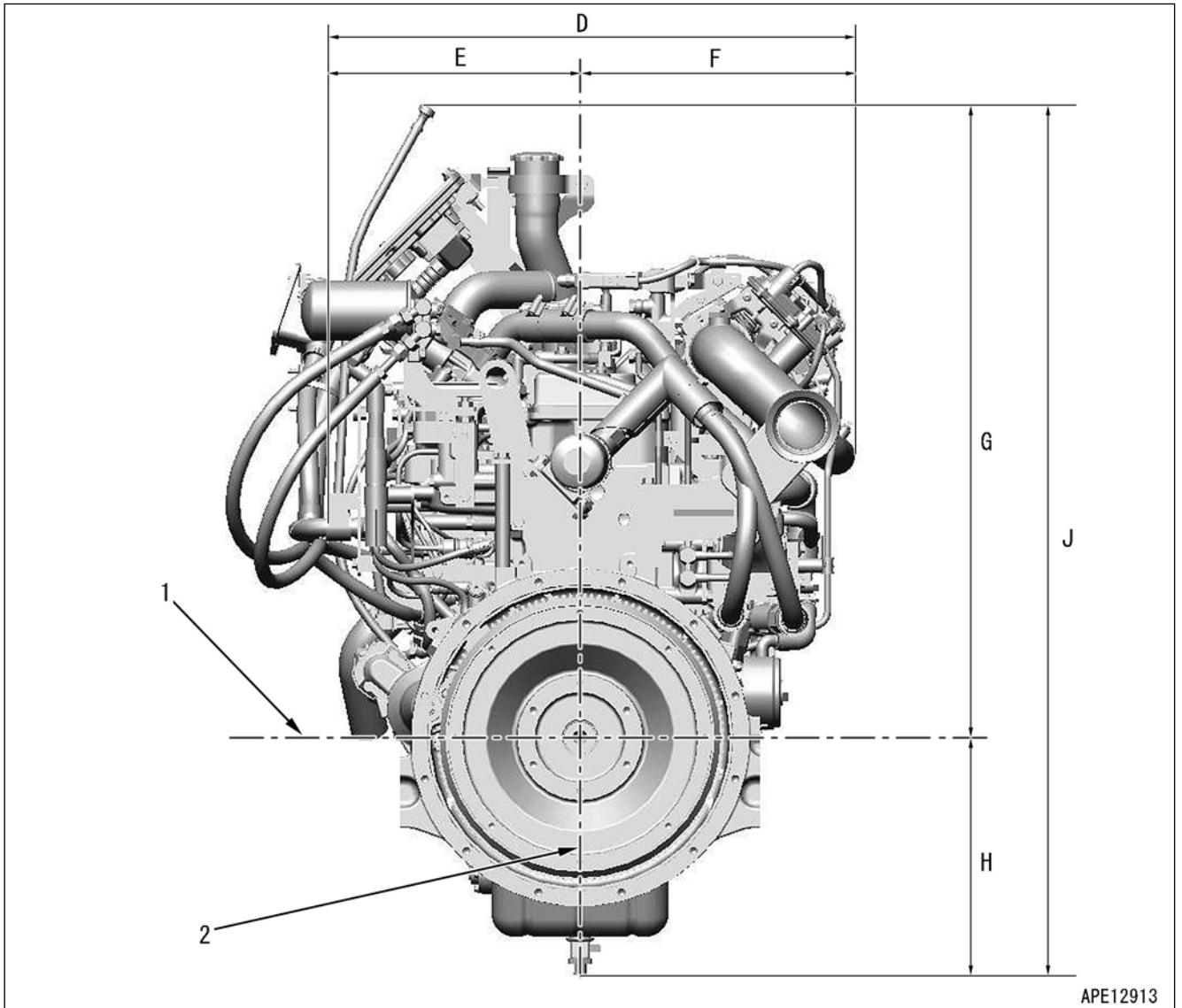
Material of female screw	In cast iron or steel	In aluminum
Nominal thread size	Tightening torque (Nm {kgfm})	Tightening torque (Nm {kgfm})
$1/16$	15±2 {1.53±0.20}	5±1 {0.51±0.10}
$1/8$	20±2 {2.04±0.20}	15±2 {1.53±0.20}
$1/4$	25±3 {2.55±0.31}	20±2 {2.04±0.20}
$3/8$	35±4 {3.57±0.41}	25±3 {2.55±0.31}
$1/2$	55±6 {5.61±0.61}	35±4 {3.57±0.41}
$3/4$	75±8 {7.65±0.82}	45±5 {4.59±0.51}

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
ICT	Information and Communication Technology	Communication and electronic control	A general term for the engineering and its socially applied technology of information processing and communication.
IMA	Inlet Metering Actuator	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump fuel discharged volume. (Same as IMV)
IMU	Inertial Measurement Unit	Engine	This is a device to detect the angle (or angular velocity) and acceleration of the 3 axes that control motions.
IMV	Inlet Metering Valve	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump combustion discharged volume. (Same as IMA)
KCCV	Komatsu Closed Crankcase Ventilation	Engine	This is a mechanism that burns the blowby gas again by separating oil from blowby gas and returning it to the intake side. It primarily consists of filters.
KCSF	Komatsu Catalyzed Soot Filter	Engine	This is a filter that captures soot in exhaust gas. It is built in to KDPF.
KDOC	Komatsu Diesel Oxidation Catalyst	Engine	This is a catalyst that is used for purifying exhaust gas. It is built in to KDPF or assembled with the muffler.
KDPF	Komatsu Diesel Particulate Filter	Engine	This is a component that is used to purify the exhaust gas. KDOC (catalyst) and KCSF (filter to capture soot) are built-in it. It is installed instead of the conventional muffler.
KTCS	Komatsu Traction Control System	Travel and brake (HM)	This is a function that performs braking with the optimum force and recovers the driving force of the wheels by actuating the inter-axle differential lock when the wheels runs idle while the machine travels on the soft ground.
LCD	Liquid Crystal Display	Machine monitor	This is an image display equipment such as a monitor in which the liquid crystal elements are assembled.
LED	Light Emitting Diode	Electronic parts	This is a semiconductor element that emits light when the voltage is applied in forward direction.
LIN	Local Interconnect Network	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
LS	Load Sensing	Hydraulic system	This is a function that detects differential pressure of pump, and controls discharged volume corresponding to load.
LVDS	Low Voltage Differential Signaling	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
MAF	Mass Air Flow	Engine	This indicates engine intake air flow. This is not used independently but is used as combined with sensor. Mass air flow sensor can be called as MAF sensor.

SPECIFICATIONS: SAA4D95LE-7 (D39EX-24, D39EXI-24, D39PX-24, D39PXI-24)

Engine model		SAA4D95LE-7	
No. of cylinders - bore x stroke		mm	4-95 x 115
Piston displacement		ℓ {cc}	3.260 {3260}
Firing order		-	1-2-4-3
Dimensions	Overall length	mm	1120
	Overall width	mm	697
	Overall height (excluding exhaust pipe)	mm	-
	Overall height (including exhaust pipe)	mm	1223
Performance	Rated horsepower (Gross)	kW {HP}/ min ⁻¹ {rpm}	80 {107}/2200{2200}
	Max. torque (Gross)	Nm {kgfm}/ min ⁻¹ {rpm}	415 {42.3}/1600{1600}
	Max. speed with no load (high idle speed)	min ⁻¹ {rpm}	2370±50{2370±50}
	Min. speed with no load (low idle speed)	min ⁻¹ {rpm}	1075±25{1075±25}
	Fuel consumption ratio at rated horsepower	g/kWh {g/HPh}	230 {172}
Dry weight (aftertreatment devices are not included)		kg	653
Fuel injection system		-	High-pressure common rail type
Control of fuel injection system		-	Electronic control type
Quantity of lubricating oil (refill capacity)		ℓ	12.5 (11.5)
Quantity of coolant		ℓ	(5.5 only engine)
Alternator		-	24 V, 85 A
Starting motor		-	24 V, 4.5 kW
Variable flow turbocharger		-	TD04M4t-09KYRCN-SVFT

Rear view



APE12913

1: Center of the crankshaft

Dimension (D): 706 mm

Dimension (E): 339 mm

Dimension (F): 367 mm

2: Center of the cylinder

Dimension (G): 840 mm

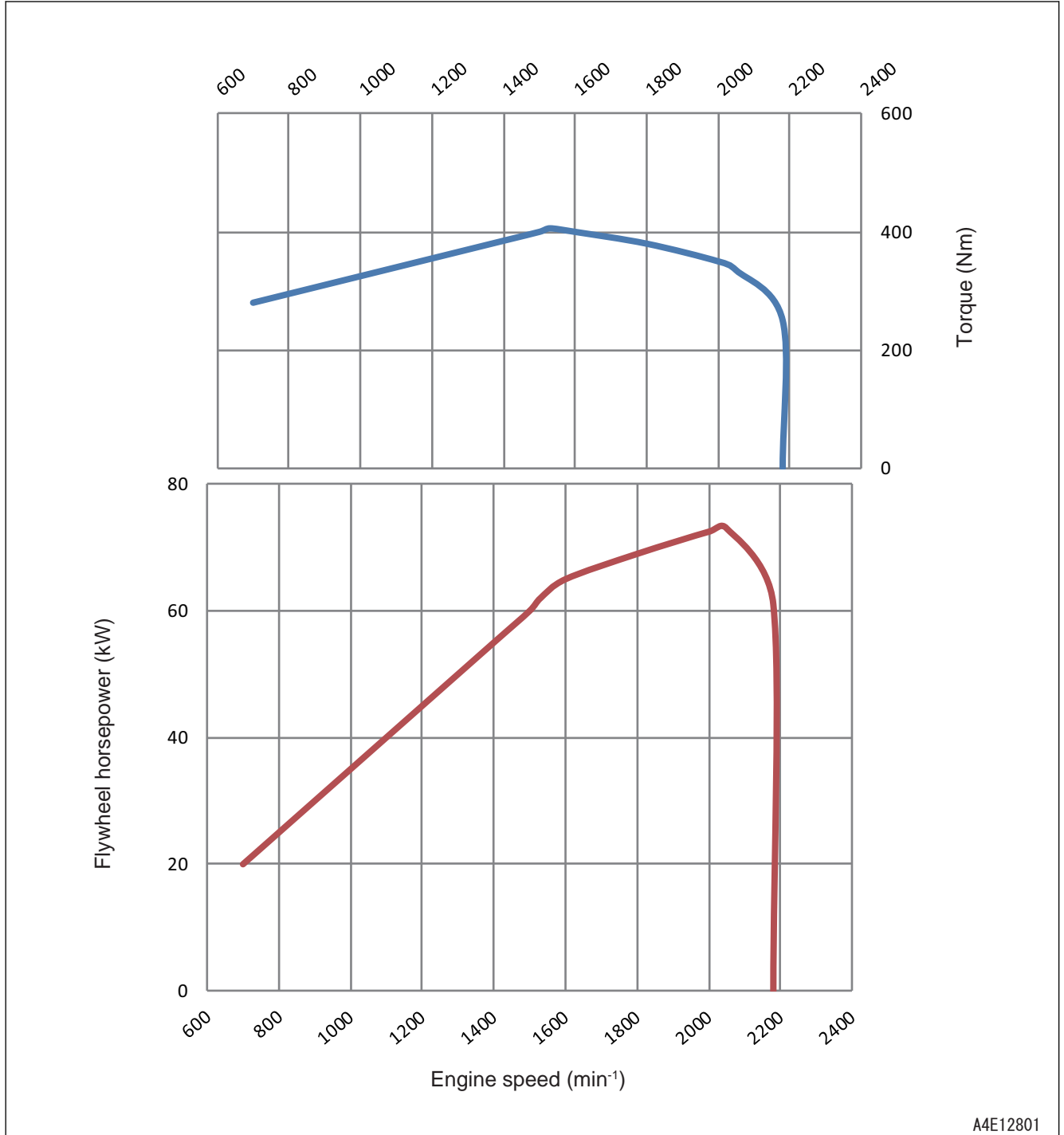
Dimension (H): 323 mm

Dimension (J): 1163 mm

ENGINE PERFORMANCE CURVE: SAA4D95LE-7(PC138US-11, PC138USLC-11, PC138US-11E0)

Rated output: 72.6±3.6 kW {97.3±4.9 HP} / 2050 min⁻¹ {2050 rpm} (Gross)

Max. torque: 406±20 Nm {41.4±2.1 kgfm} / 1530 min⁻¹ {1530 rpm} (Gross)



Abbreviation	Actual word spelled out
S/T	Steering
STRG	
SIG	Signal
SOL	Solenoid
STD	Standard
OPT	Option
OP	
PRESS	Pressure
SPEC	Specification
SW	Switch
TEMP	Temperature
T/C	Torque Converter
T/M	Transmission

*3: These percentages show a torque reduction ratio from the full torque curve, and a speed reduction ratio from the rated speed.







*4: Construction equipment with crawler










*5: Construction equipment with wheel

*6: After progressed "Severe Inducement" the status advances to "Final Inducement" with in 1 hour.

INDUCEMENT STRATEGY WHEN ABNORMALITY IS FOUND IN THE UREA SCR SYSTEM DEVICES (FOR NORTH AMERICA)

- AdBlue/DEF system caution lamp lights up on machine monitor, and an action level is displayed when an abnormality occurs in quality in AdBlue/DEF or in urea SCR system. In addition to the caution by the AdBlue/DEF system caution lamp, alarm sounds as time passes after the abnormality occurred. Then, inducement strategy starts so that the engine output is lowered.
- The Inducement strategy status and the categories of abnormalities can be checked on the "SCR Information" screen of the machine monitor.
- The table shows warning indications and engine power derations by each Inducement strategy status.

Status	Elapsed time (*1)	Machine monitor					Engine deration (*5)
		Message of SCR Information	Caution lamp (Action level)	Tone of audible alert	Failure code for abnormality (*2),(*3)	Failure code for Inducement strategy status (*4)	
1 Warning	1 hour	1: Please inspect and maintain SCR system.	Yellow  APP14417 Yellow  APP14412	No sound	CA3571 CB3571	No indication	No deration
2 Escalated Warning (Warning 2)	2 hours	2: Without treatment, engine power will be derated.	Yellow  APP14417 Yellow  APP14412	Triplet (*6) Short intermittently (*7)	CA3571 CB3571	AS00R2 (Warning 2 (SCR Device Abnormality))	No deration
3 Mild Inducement (Inducement 1)	3 hours	3: Engine power is under deration.	Red  APP14415 Red  APP14414	Long intermittently	CA3571 CB3571	AS00R3 (Inducement 1(SCR Device Abnormality))	Torque: over 25%

Status	Length of time (*1)	Display on machine monitor					Engine de-ration (*4)
		Message of SCR Infor-mation	Caution lamp Action level	Alarm buz-zer sound	Failure code for current abnormality (*2)	Failure code for Induce-ment strategy status (*3)	
2 Continuous Warning (Warning 2)	10 hours	2: Without treatment, engine power will be derated.	Red  APP14418 Yellow  APP14417 Red  APP14414	Triple-beep alarm (*5)	CA5391	AS00R2 (Warning 2 (SCR Device Abnormality))	Torque re-duction rate: 25% or more
3 Low-Level Inducement (Induce-ment 1)	20 hours	3: Engine power is under dera-tion.	Red  APP14418 Red  APP14415 Red  APP14414	Long inter-mittently	CA5391	AS00R3 (Inducement 1 (SCR De-vice Abnor-mality))	Torque re-duction rate: 25% or more
4 Severe In-ducement (Induce-ment 2)	Until abnor-mality is re-paired	4: Engine power is under heavy dera-tion.	Red  APP14418 Red  APP14415 Red  APP14413	Continuous alarm	CA5391	AS00R4 (Inducement 2 (SCR De-vice Abnor-mality))	Torque re-duction rate: 50% or more Engine speed re-duction rate: 40% or more

*1: Length of time of each stage is accumulated time to go to the next stage after "Warning" stage is started.

AdBlue/DEF INJECTOR

STRUCTURE OF AdBlue/DEF INJECTOR

A: Pressurized sending from AdBlue/DEF pump

B: Coolant inlet

C: Coolant outlet

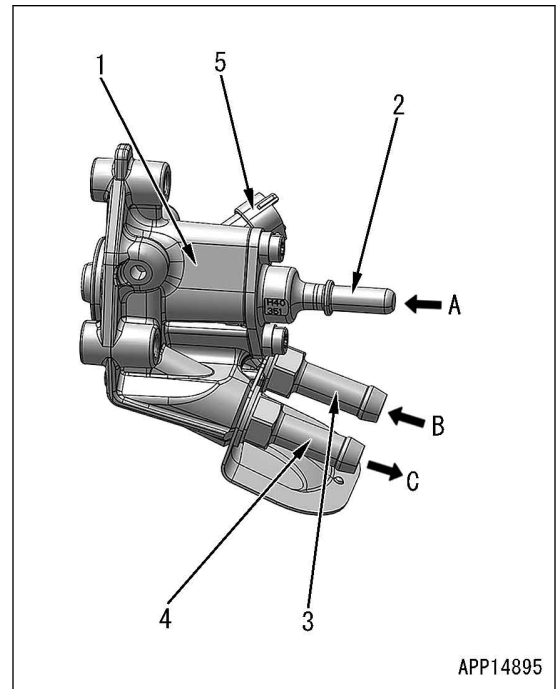
1: AdBlue/DEF injector

2: AdBlue/DEF inlet connector

3: Coolant inlet connector

4: Coolant outlet connector

5: Electric connector



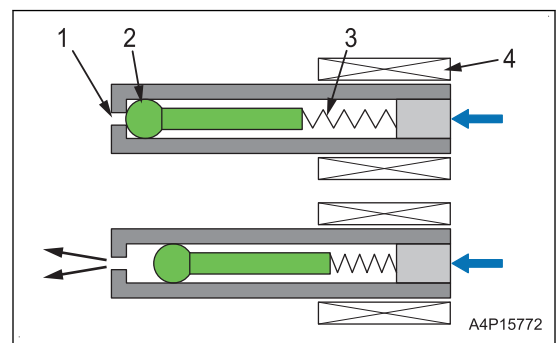
FUNCTION OF AdBlue/DEF INJECTOR

- It injects AdBlue/DEF which is pressurized by AdBlue/DEF pump into AdBlue/DEF mixing tube.
- The injection amount is controlled by the valve opening or closing time while the pressure is constant.
- It circulates the engine coolant to prevent it from being heated by the heat from the exhaust pipe.

OPERATION OF AdBlue/DEF INJECTOR

Principle of injection of the injector is described. Following figure shows the state of injection.

1. Engine controller sends the electrical signal to control AdBlue/DEF injector.
2. Solenoid (4) moves seal ball (2), and seal ball (2) leaves from injection port (1) to make opening state. Pressurized AdBlue/DEF by AdBlue/DEF pump is injected.
3. When the electrical signal is not sent, seal ball (2) closes injection port (1) with spring force (3), so AdBlue/DEF is not injected.



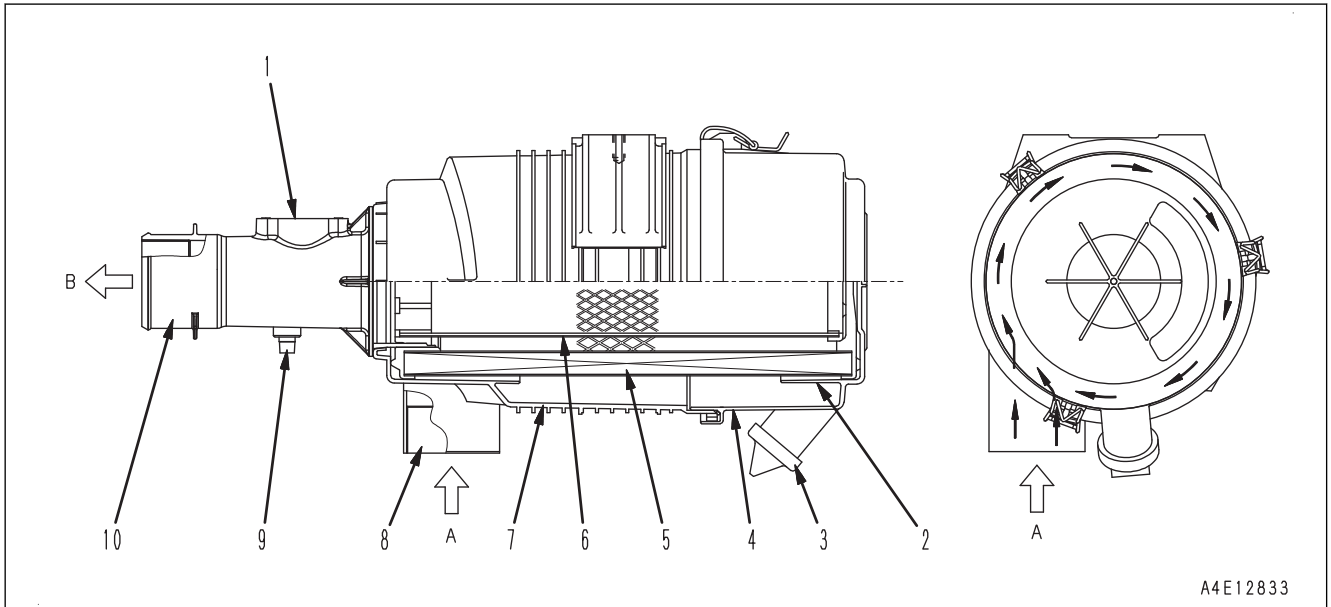
AIR CLEANER

STRUCTURE OF AIR CLEANER

REMARK

The shape may vary depending on the machine models.

General view and sectional view



A: Intake air inlet

1: Air flow and temperature sensor mounting portion

2: Guide vane

3: Vacuator valve

4: Dust pan

5: Outer element

B: Intake air outlet

6: Inner element

7: Body

8: Inlet

9: Dust indicator mounting portion

10: Outlet

SPECIFICATIONS OF AIR CLEANER

Type: CYCLOPAC

Filtering area (outer cylinder): 4.29 m²

Filtering area (inner cylinder): 0.096 m²

FUNCTION OF AIR CLEANER

Air cleaner is a device that separates dust by centrifugal separation effect of guide vane (2) when air with dust is sucked into the air cleaner through inlet (8).

OPERATION OF AIR CLEANER

1. The intake air swirls along the guide vane and generates a centrifugal force since the inlet (8) is placed in the tangential direction.
2. The dust in the intake air is separated by the centrifugal effect.
3. The inner element (6) removes dust 99.9 % or more, and cleaner air passes through outer element (5) and is sucked into engine through outlet (10).
4. The dust and water which are removed during the air intake process swirl along the inside wall of body (7), and is discharged out automatically through vacuator valve (3).

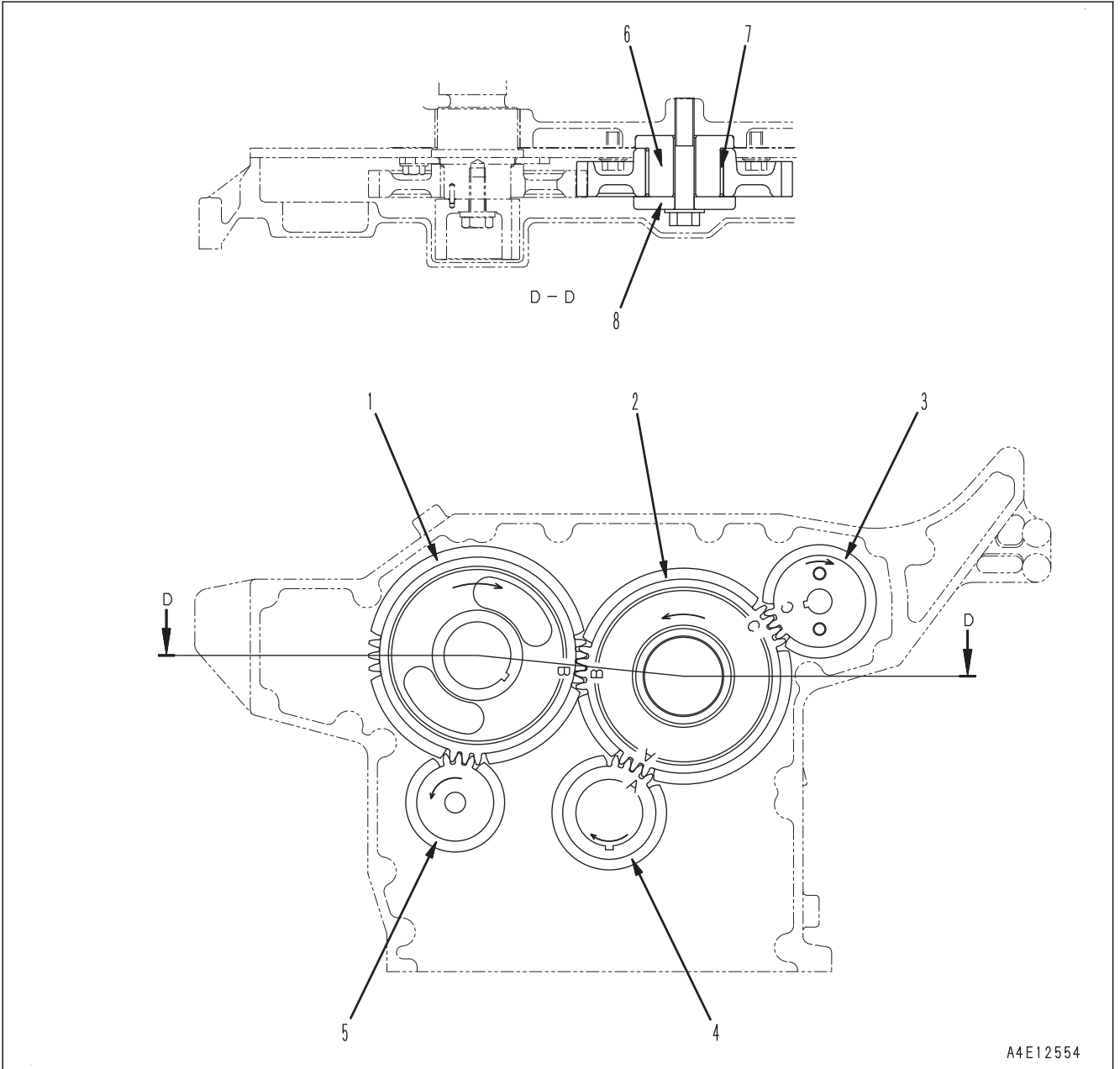
TIMING GEAR

STRUCTURE OF TIMING GEAR

REMARK

The shape may vary depending on the machine models.

Structural view



A, B, C: Gear matchmarks

1: Cam gear (number of teeth: 52)

2: Idler gear (number of teeth: 52)

3: Supply pump drive gear (number of teeth: 26)

4: Crank gear (number teeth: 26)

5: Engine oil pump drive gear (number of teeth: 22)

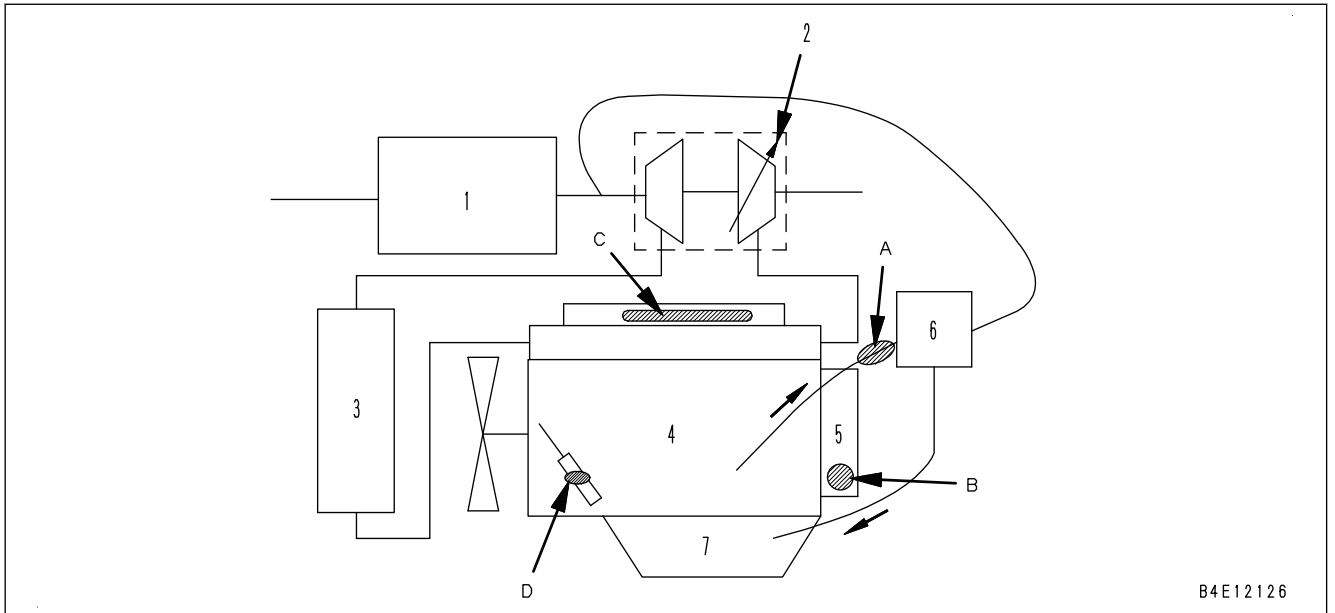
6: Shaft

7: Bushing

8: Thrust plate

- The open/close position of flow control valve (4) is controlled by driving the actuator according to the command from the engine controller.

FORMING OF CONDENSED WATER AND EMULSION IN KCCV SYSTEM



B4E12126

A: Inside of KCCV piping

B: Inside of breather

1: Air cleaner

2: Variable flow turbocharger

3: Aftercooler

4: Engine

C: Back of head cover

D: Level gauge

5: Breather

6: KCCV ventilator

7: Engine oil pan

Structure

- The KDPF has a function to introduce the exhaust gas and consists of the inlet unit (1) that stores the oxidation catalyst (KDOC), KCSF unit (4) that stores the soot collecting filter with the catalyst, and outlet unit (5) that discharges the exhaust gas.
- The inlet unit (1) stores the KDOC which consists of the ceramic honeycomb with the oxidation catalyst.
- The ceramic honeycomb is used to optimize the 2 functions. The first is to oxidize NO (nitrogen monoxide) contained in the exhaust gas into NO₂ (nitrogen dioxide). The second is to burn the sprayed fuel during the automatic regeneration or manual stationary regeneration. (Automatic regeneration is a method that purifies (oxidize) the soot accumulated on the soot collecting filter (KCSF) in the KDPF.)
- The ceramic honeycomb is protected by a special fiber mat to prevent ceramic breakage caused by the engine and body vibrations. It also prevents the high temperature around the KDPF caused by the high temperature heat from the ceramics during operation.
- The KCSF unit (4) consists of the ceramic honeycomb with the oxidation catalyst same as the KDOC. The ceramic honeycomb catches the soot. The KCSF unit (4) consists of many cells divided by the ceramic walls inside. The cells blocked on the inlet side and the cells blocked on the outlet side are put alternately.
- On the KDPF, the KDPF temperature sensor and the differential pressure sensor are installed. The KDPF temperature sensor is an integrated unit that consists of the KDOC inlet temperature sensor, KDOC outlet temperature sensor, and KDPF outlet temperature sensor. The differential pressure sensor is an integrated unit that consists of the KDPF differential pressure sensor and KDPF outlet pressure sensor. With the combination of the temperature values measured by the 3 temperature sensors, the KDPF temperature sensor judges that the KCSF unit (4) and KDOC operate normally. It is also used for different types of troubleshooting. The differential pressure sensor senses the pressure difference between the two sides of the KCSF unit (4) and monitors the soot accumulated in the KCSF unit (4). It is also used for different types of troubleshooting, similarly to the temperature sensor.

FUNCTION OF KDPF

A: Flow of exhaust gas

1: KDOC (oxidation catalyst)

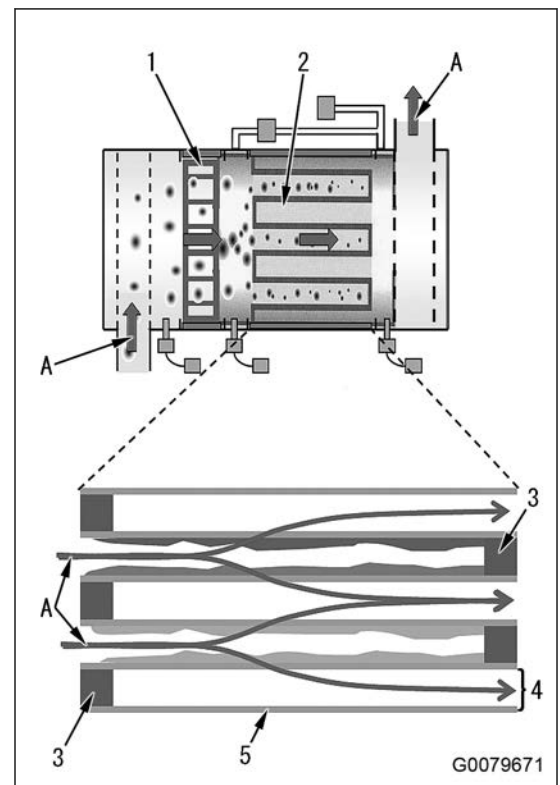
2: KCSF

3: Seal (ceramic made)

4: Cell

5: Ceramics honeycomb

- The KDPF catches most of PM that is contained in the exhaust gas and purifies it. PM is particulate material such as soot, or chains of the particulate soot.
- The KDOC (oxidation catalyst) (1) oxidizes NO (nitrogen monoxide) contained in the exhaust gas into NO₂ (nitrogen dioxide) and regenerates (*1) the soot accumulated in the KCSF.
- The KCSF (2) catches soot.
- In the operation range where the temperature of exhaust gas is relatively high, the accumulated soot in the KCSF (2) is naturally oxidized and decreased by the effect of the KDOC (oxidation catalyst) (1). (This is "passive regeneration".)



CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

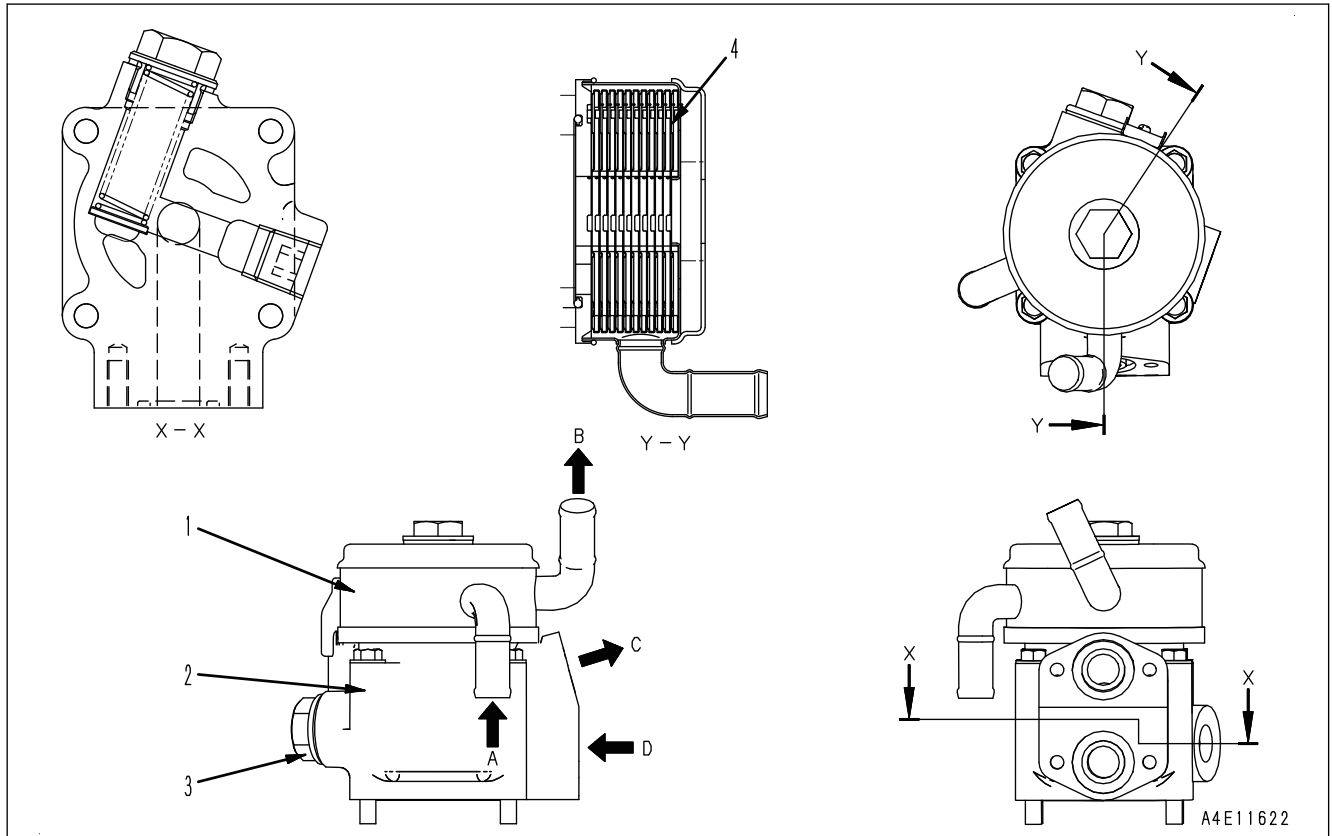
ENGINE OIL COOLER

STRUCTURE OF ENGINE OIL COOLER

REMARK

The shape may vary depending on the machine models.

General view and sectional view



A: Water inlet

B: Water outlet

1: Engine oil cooler

2: Adapter

C: Oil outlet

D: Oil inlet

3: Safety valve

4: Engine oil cooler core assembly

SPECIFICATIONS OF ENGINE OIL COOLER

Core type: Water-cooled multiple disc type

Number of core layers: 11

FUNCTION OF ENGINE OIL COOLER

Engine oil cooler is installed to cool the engine oil lubricating the inside of engine. It is located between the engine oil pump and engine oil filter circuit.

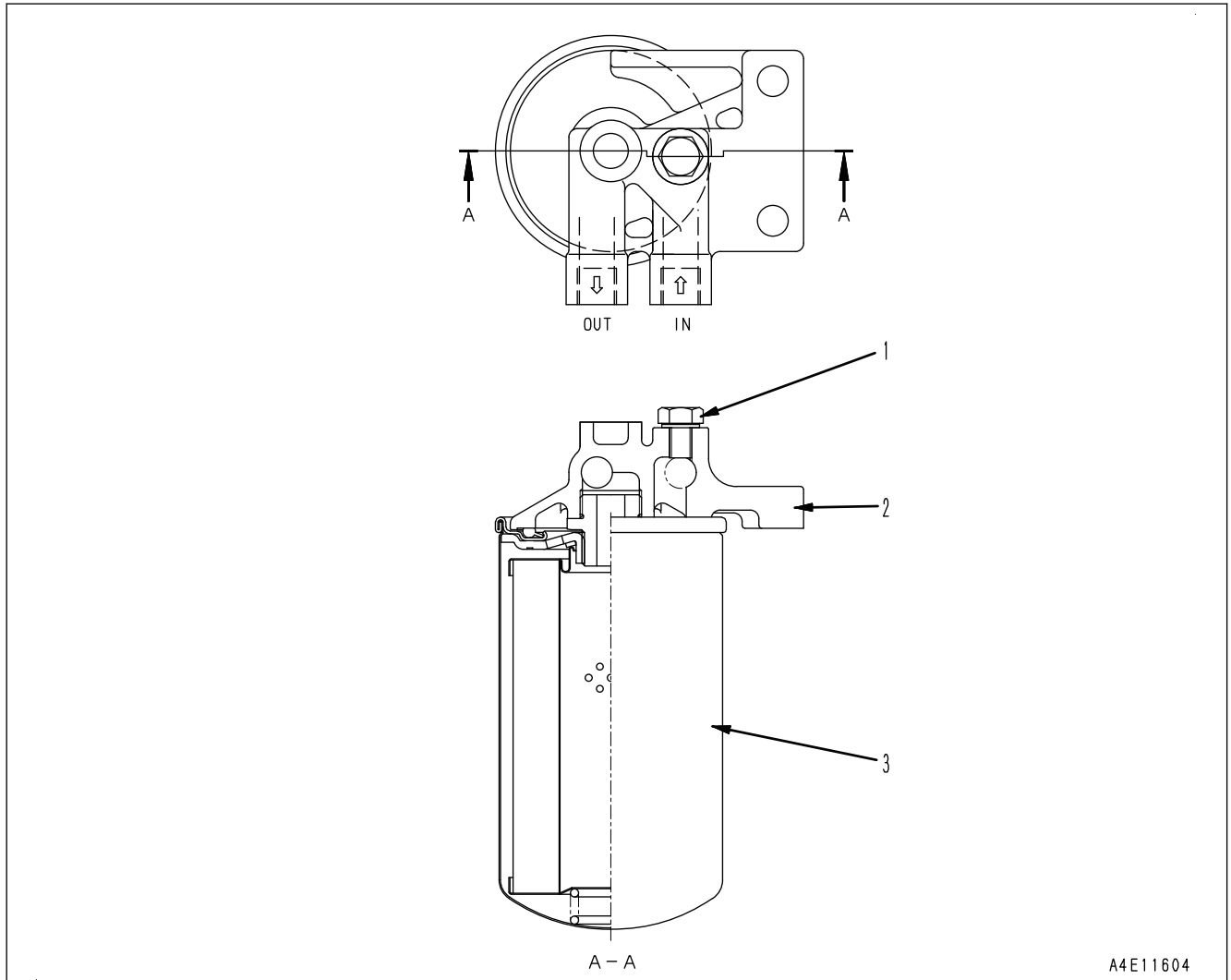
FUEL MAIN FILTER

STRUCTURE OF FUEL MAIN FILTER

REMARK

The shape may vary depending on the machine models.

General view and sectional view



1: Plug

2: Filter head

3: Cartridge

FUNCTION OF FUEL MAIN FILTER

- The fuel flows from the feed pump (low-pressure pump) to the supply pump (high-pressure pump) through the fuel main filter.
- The fuel main filter removes impurities mixed in the fuel.
- It is remote-mounted on some machine models for ease of replacement of the cartridge.

ELECTRICAL SYSTEM

COMPONENT PARTS OF ELECTRICAL SYSTEM

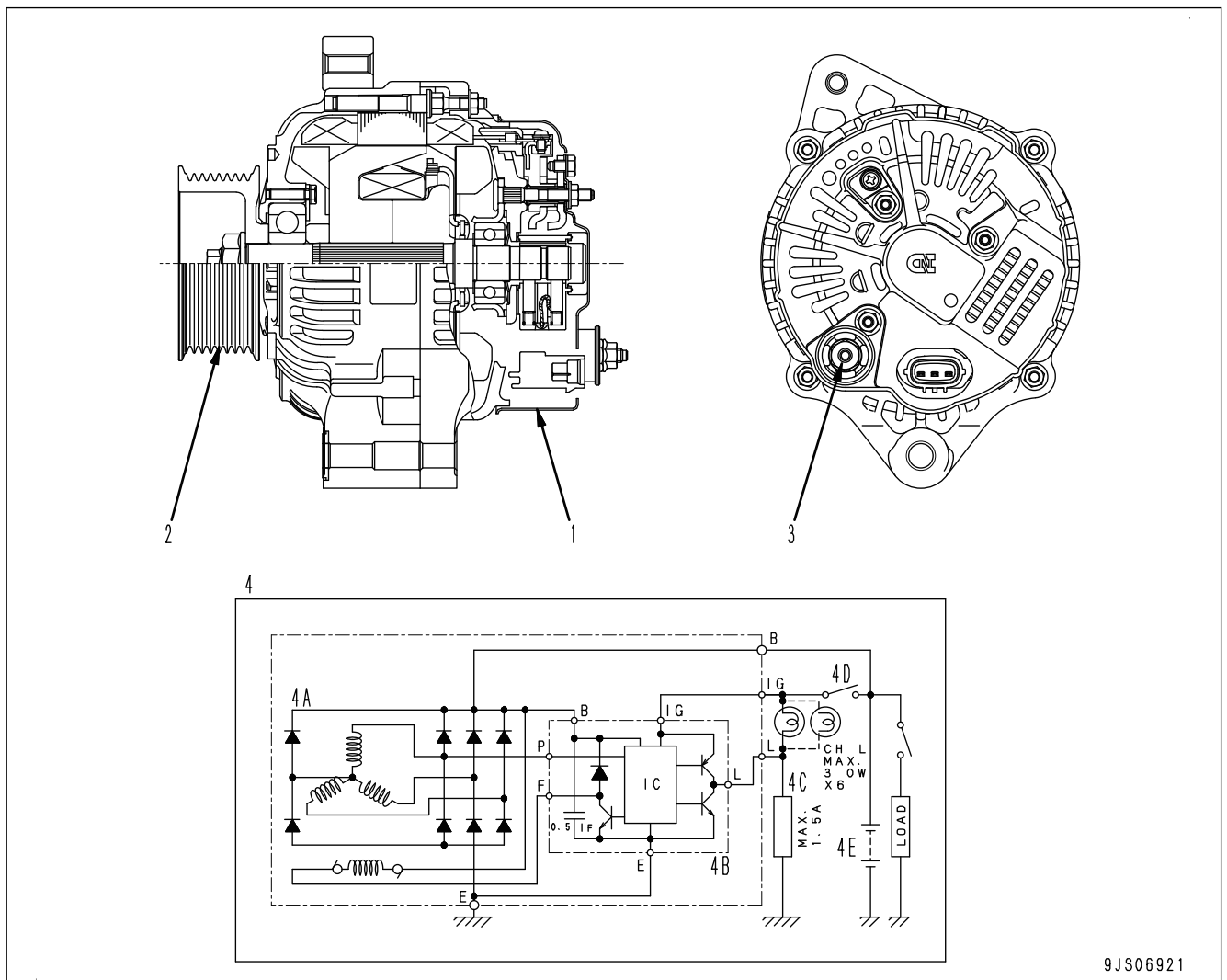
ALTERNATOR

STRUCTURE OF ALTERNATOR WITH BUILT-IN REGULATOR (OPEN TYPE, 60A)

REMARK

The shape may vary depending on the machine models.

General view and circuit diagram



9JS06921

1: Alternator (body)

2: Alternator pulley

3: Terminal B

4: Internal wiring diagram

4A: Alternator assembly

4B: Regulator

4C: Load on terminal L

4D: Starting switch

4E: Battery

SPECIFICATION OF ALTERNATOR WITH BUILT-IN REGULATOR (OPEN TYPE, 60A)

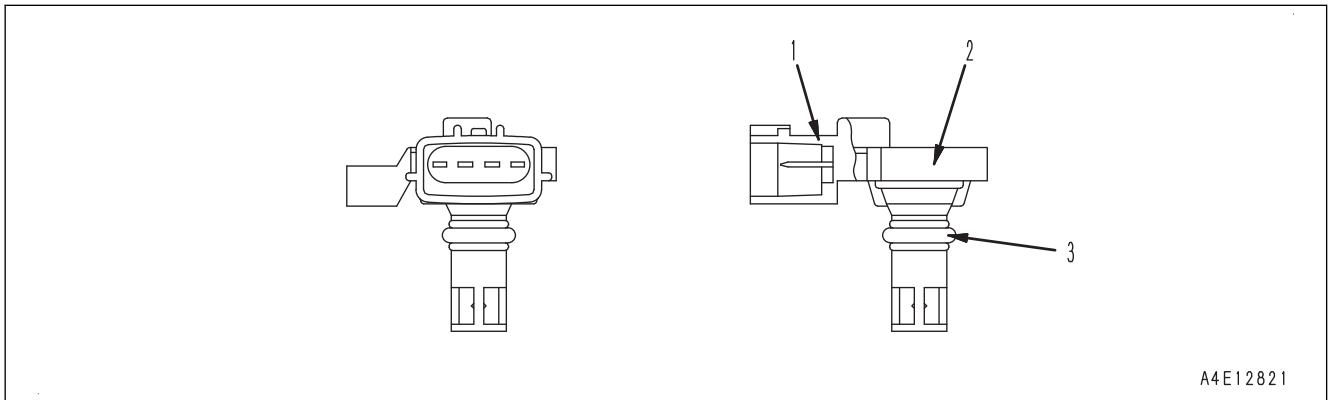
Type: Manufactured by DENSO, open type

Pin No.	Signal name	Input/output signal
43	(*1)	-
44	Ambient pressure sensor	Input
45	Charge pressure sensor	Input
46	EGR position (V)	Input
47	EGR position (U)	Input
48	EGR motor (W)	Output
49	(*1)	-
50	Injector #3 (+)	Output
51	Injector #2 (+)	Output
52	Oil pressure switch	Input
53	(*1)	-
54	GND	Ground/Shield/ Return
55	GND	Ground/Shield/ Return
56	GND	Ground/Shield/ Return
57	GND	Ground/Shield/ Return
58	GND	Ground/Shield/ Return
59	(*1)	-
60	(*1)	-
61	Intake air temperature sensor	Input
62	Charge temperature sensor	Input
63	Crankcase pressure sensor	Input
64	(*1)	-
65	(*1)	-
66	(*1)	-
67	(*1)	-
68	(*1)	-
69	Datalink2 (+) (Variable flow turbocharger drive controller)	Communication
70	Datalink3 (+) (KOMNET/r)	Communication
71	Exhaust throttle valve (-)	Ground/Shield/ Return
72	Exhaust throttle valve (+)	Output
73	(*1)	-
74	Injector #3 (-)	Ground/Shield/ Return
75	Injector #2 (-)	Ground/Shield/ Return

STRUCTURE OF CHARGE (BOOST) PRESSURE AND TEMPERATURE SENSOR

This is installed to the intake manifold of the engine.

General view



1: Connector (SUMITOMO-4P)

3: O-ring

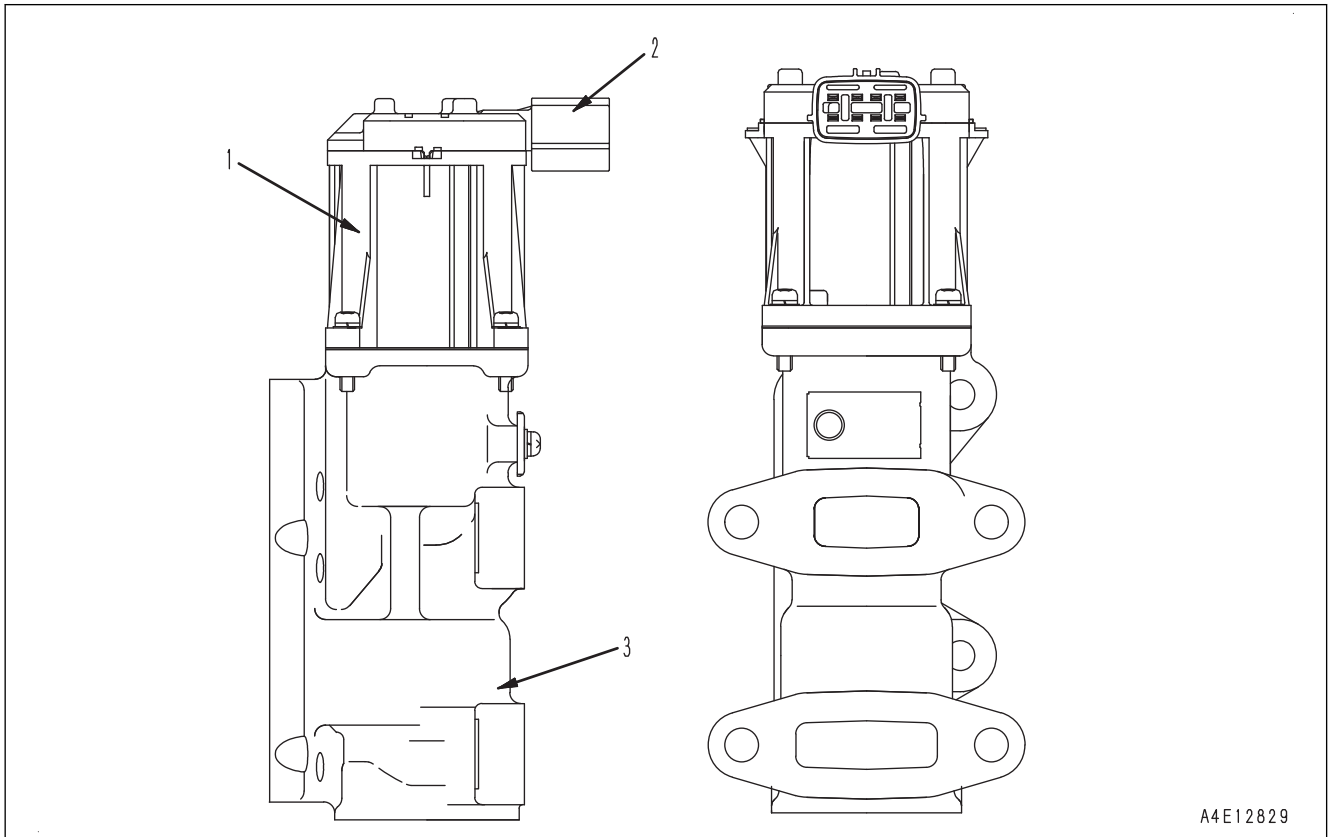
2: Sensor

FUNCTION OF CHARGE (BOOST) PRESSURE AND TEMPERATURE SENSOR

This detects engine air intake pressure and temperature, and outputs a variable voltage signal for pressure and a resistance change signal for temperature.

REMARK

“Charge pressure and temperature” means the pressure and temperature of the intake air in a turbocharged engine turbocharger, and it is also called “Boost pressure and temperature” or “Intake pressure and temperature”.

STRUCTURE OF EGR VALVE (WITH BUILT-IN POSITION SENSOR)**General view**

1: EGR valve motor (with built-in position sensor)

3: Body

2: Connector (SUMITOMO-8P)

A4E12829

FUNCTION OF EGR VALVE (WITH BUILT-IN POSITION SENSOR)

- EGR valve is small-sized EGR valve which is driven by DC motor.
- EGR valve motor has a built-in position sensor, which detects the valve opening position.

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
TOPS	Tip-Over Protective Structure	Cab and canopy	This is a protective structure that intended to protect the operator wearing seat belt from suffering injury which may be caused if the cab is crushed when the machine tips over. (Roll-over protective structure of hydraulic excavator) This performance is standardized as ISO 12117.
TWV	2-Way Valve	Hydraulic system	This is a solenoid valve that switches over direction of flow.
VGT	Variable Geometry Turbocharger	Engine	This is a turbocharger on which the cross-section area of the exhaust passage is variable.
VHPC	Variable Horse Power Control	Engine control	This is a function that finely controls the maximum output of the machine so that high work efficiency and low fuel consumption rate are both achieved.

*1: Code for applicable machine model

D: Bulldozer

HD: Dump truck

HM: Articulate dump truck

PC: Hydraulic excavator

WA: Wheel loader

List of abbreviations used in the circuit diagrams

Abbreviation	Actual word spelled out
A/C	Air Conditioner
A/D	Analogue-to-Digital
A/M	Air Mix Damper
ACC	Accessory
ADD	Additional
AUX	Auxiliary
BR	Battery Relay
CW	Clockwise
CCW	Counter Clockwise
ECU	Electronic Control Unit
ECM	Electronic Control Module
ENG	Engine
EXGND	External Ground
F.G.	Frame Ground
GND	Ground
IMA	Inlet Metering Actuator
NC	No Connection

**RUNNING-IN STANDARD AND PERFORMANCE TEST STANDARD:
SAA4D95LE-7(D39EX-24,D39EXI-24,D39PX-24,D39PXI-24)****Running-in standard**

Engine		SAA4D95LE-7				
Item		Procedure				
		1	2	3	4	5
Running time	min	2	10	2	3	3
Engine speed	min ⁻¹ {rpm}	1075{1075}	1075{1075}	1200{1200}	1600{1600}	2200{2200}
Dynamometer load	N{kgf}	0{0}	98{10}	147{15}	245{25}	484{49.4}
Output	kW{HP}	0{0}	8.1{10.8}	13.2{17.7}	29.4{39.4}	80{107}

REMARK

- This table shows the values when the fan is not installed.
- The loads for the dynamometer in this table shows the value when the dynamometer arm is 716 mm long.

Performance test standard

Engine		SAA4D95LE-7			
Test item		Rated horsepower	Max. torque	Max. speed with no load	Min. speed with no load
Specification value (Gross value)	-	80 kW/2200 rpm {107 HP/ 2200 rpm}	415 Nm/1600 rpm {42.3 kgfm/ 1600 rpm}	2370±50 rpm	1075±25 rpm
Engine speed	min ⁻¹ {rpm}	2200±5{2200±5}	1600±100{1600±100}	-	-
Dynamometer load	N {kgf}	460 to 509 {46.9 to 51.9}	550 to 609 {56.1 to 62.1}	-	-
Output (Gross value)	kW {HP}	76 to 84 {102 to 113}	-	-	-
Torque (Gross value)	Nm {kgfm}	-	394 to 436 {40.2 to 44.5}	-	-
Fuel consumption	sec/ 200 cc	-	-	-	-
Coolant temperature	°C	75 to 94	75 to 94	75 to 94	75 to 94
Lubricating oil temperature	°C	90 to 120	90 to 120	90 to 120	90 to 120
Lubricating oil pressure	kPa {kgf/cm ² }	340 to 690 {3.5 to 7.0}	-	-	Min.150 {Min.1.5}
Exhaust temperature	°C	Max. 640	Max. 670	-	-

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
ICT	Information and Communication Technology	Communication and electronic control	A general term for the engineering and its socially applied technology of information processing and communication.
IMA	Inlet Metering Actuator	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump fuel discharged volume. (Same as IMV)
IMU	Inertial Measurement Unit	Engine	This is a device to detect the angle (or angular velocity) and acceleration of the 3 axes that control motions.
IMV	Inlet Metering Valve	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump combustion discharged volume. (Same as IMA)
KCCV	Komatsu Closed Crankcase Ventilation	Engine	This is a mechanism that burns the blowby gas again by separating oil from blowby gas and returning it to the intake side. It primarily consists of filters.
KCSF	Komatsu Catalyzed Soot Filter	Engine	This is a filter that captures soot in exhaust gas. It is built in to KDPF.
KDOC	Komatsu Diesel Oxidation Catalyst	Engine	This is a catalyst that is used for purifying exhaust gas. It is built in to KDPF or assembled with the muffler.
KDPF	Komatsu Diesel Particulate Filter	Engine	This is a component that is used to purify the exhaust gas. KDOC (catalyst) and KCSF (filter to capture soot) are built-in it. It is installed instead of the conventional muffler.
KTCS	Komatsu Traction Control System	Travel and brake (HM)	This is a function that performs braking with the optimum force and recovers the driving force of the wheels by actuating the inter-axle differential lock when the wheels runs idle while the machine travels on the soft ground.
LCD	Liquid Crystal Display	Machine monitor	This is an image display equipment such as a monitor in which the liquid crystal elements are assembled.
LED	Light Emitting Diode	Electronic parts	This is a semiconductor element that emits light when the voltage is applied in forward direction.
LIN	Local Interconnect Network	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
LS	Load Sensing	Hydraulic system	This is a function that detects differential pressure of pump, and controls discharged volume corresponding to load.
LVDS	Low Voltage Differential Signaling	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
MAF	Mass Air Flow	Engine	This indicates engine intake air flow. This is not used independently but is used as combined with sensor. Mass air flow sensor can be called as MAF sensor.

SPECIAL TOOLS LIST

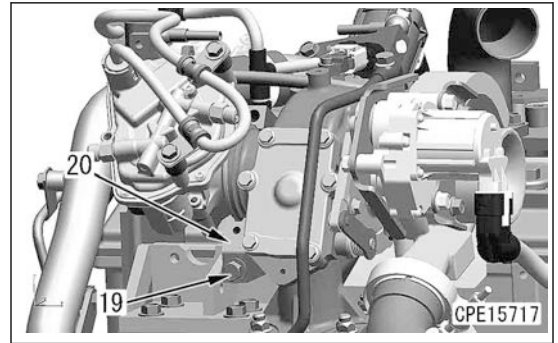
How to read the tool list

- Part No.:
Tools with part number 79*T-***-**** are not supplied (to be locally manufactured).
- Necessity:
 - : This is indispensable tool which is not substitutable. The work cannot be performed without this tool.
 - : This is extremely useful tool which can be substituted with commercially available tool.
- New/Redesign:
 - N: Tools with new part numbers, newly developed for this model.
 - R: Tools, with advanced part numbers, developed by improving existing tools for other models.
 - Blank: Tools already available for other models that can be used without any modification.
- Sketch:
 - : Tools marked with ○ in the sketch column have the sketches.
 Sketches are introduced in "SKETCHES OF SPECIAL TOOLS", and all sketches of "79*T-***-****" are described.

Disassembly and assembly of engine generally

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Details of work
A	Commercially available	Block	■	1			Disassembly and assembly of engine generally
B	790-501-2001	Engine repair stand	■	1			Disassembly and assembly of engine generally
C	790-901-1250	Bracket	■	1			
D	795T-221-2010	Plate	●	1	N	○	Clearance adjustment of exhaust throttle clamp
E	795-102-2102	Spring pusher (kit)	●	1			Removal and installation of valve cotter
	795-102-2110	• Handle		1			
	795-102-2150	• Bracket		1			
	795-102-2130	• Bracket		1			
	795-102-2170	• Stud		1			
	01016-50830	• Bolt		1			
	01580-10806	• Nut		2			
F	795-501-1110	Remover	●	1			Removal of valve guide
G	790-101-3000	Push puller	■	1			Removal of supply pump gear
H	Commercially available	Guide bolt	■	1			Removal and installation of flywheel
J	Commercially available	Slide hammer	■	1			Removal of front oil seal and rear oil seal
L	Commercially available	Dial gauge	■	1			Removal of piston and connecting rod assembly, installation of main cap, and installation of piston and connecting rod assembly
M	795-100-2800	Piston ring tool	■	1			Removal and installation of piston ring
N	795-921-1100	Piston holder	■	1			Insertion of piston

20. Remove the bolt (19), and remove the lower clamp (20).

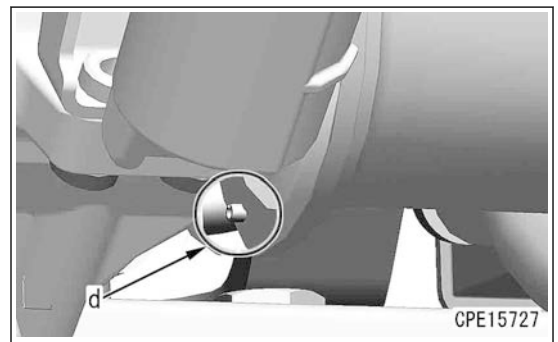
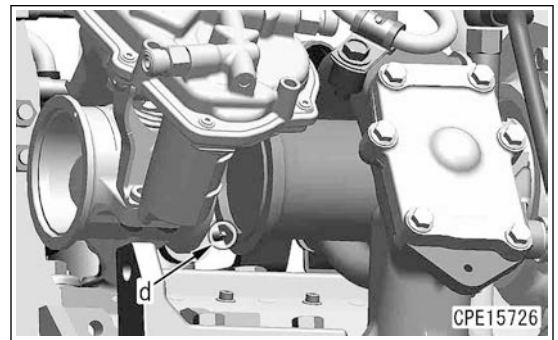
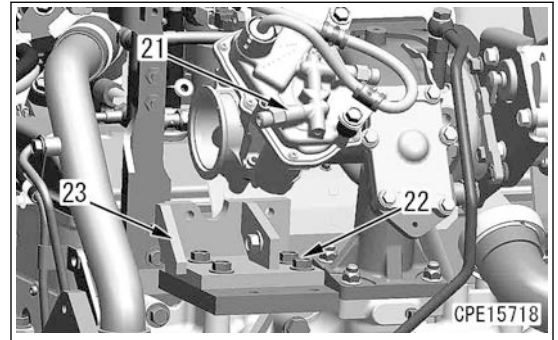


21. Remove the exhaust throttle valve (21).

NOTICE

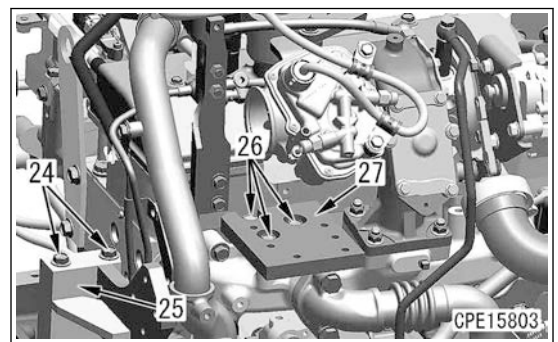
The pin is installed on the mounting part (d) at the turbocharger side. Remove the exhaust throttle valve (21) in a horizontal direction for the pin.

22. Remove the bolt (22), and remove the bracket (23).



23. Remove the bolts (24) (2 pieces), and remove the bracket (25).

24. Remove the bolts (26) (3 pieces), and remove the bracket (27).



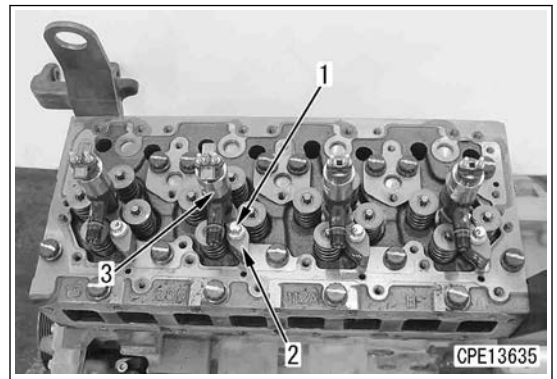
Fan belt

Injector assembly

90. Remove the bolts (1) (4 pieces), and remove the injector holders (2) (4 pieces).

REMARK

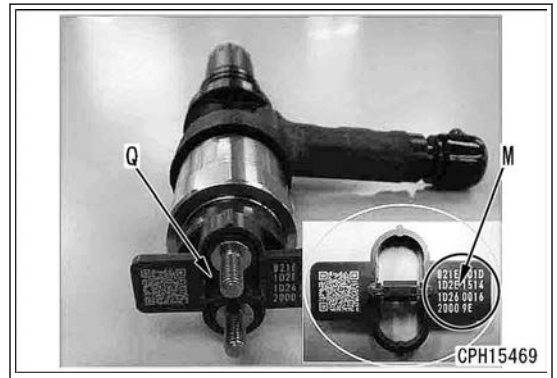
Do not use the bolts again. Replace them with new ones for reassembly.



91. Write down the number of the installed cylinder and the character string (M) shown on the QR code tab (Q) as a set.

REMARK

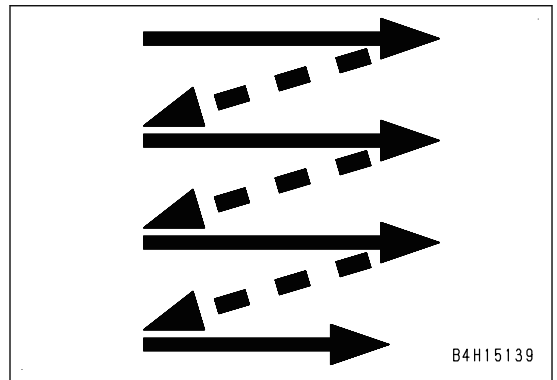
- Make sure that the recorded character strings (M) are correct.
- Read the character strings (M) in the order shown by the arrow in the figure.



92. Remove the injectors (3) (4 pieces).

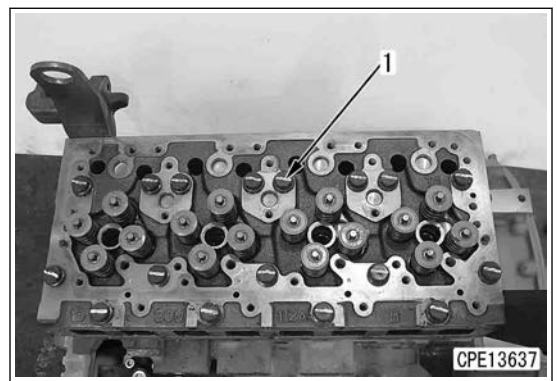
REMARK

- Do not remove the QR code tab (Q) on the injector head.
- Do not damage the QR code tab (Q) on the injector head.
(The QR code or character strings show the compensation value of the fuel injection for the injector. They are different for each injector.)



Cylinder head assembly

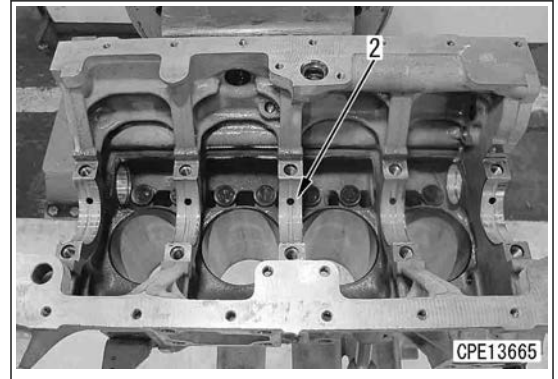
93. Remove the bolts (1) (17 pieces).



144. Remove the main bearings (2) (5 pieces).

REMARK

- Push down the end of the bearing to remove it.
- Make marks on the installation positions of the main bearing (2) and thrust bearing, and separate them by main cap number.

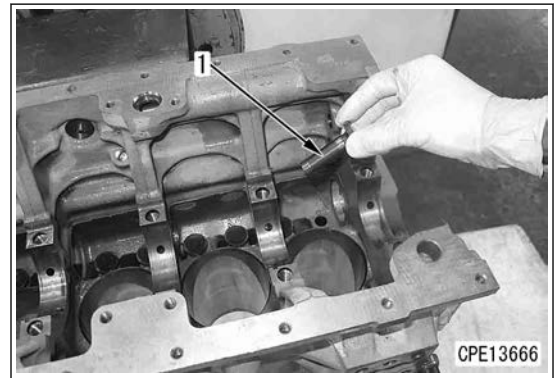


Tappet

145. Remove the tappets (1) (8 pieces) from the cylinder block.

REMARK

- Check the sliding part of the cam for wear.
- If the sliding part of the cam is worn, check the camshaft as the camshaft can be worn.




Cylinder block assembly

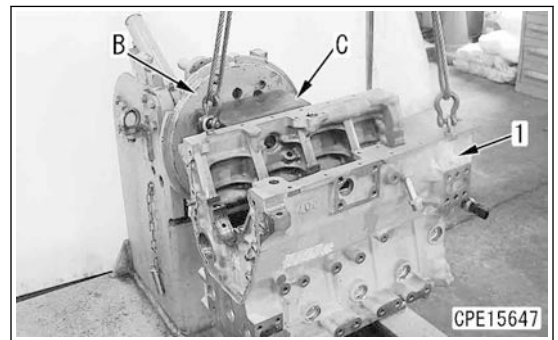
146. While you lift the cylinder block assembly (1) and hold it, remove the bolts of the bracket (C).

147. Lift the cylinder block assembly (1) and the bracket (C) together, and remove them from the engine repair stand (B).

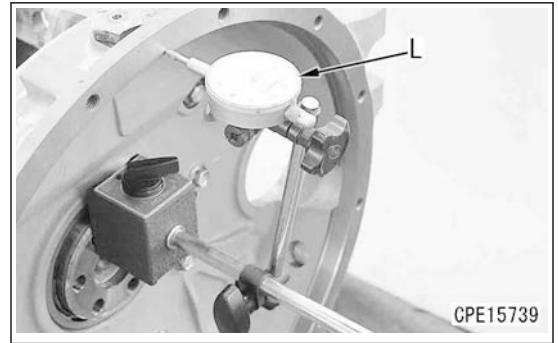
REMARK

Remove the bracket (C) after you lower the cylinder block assembly (1) on the block.

 Cylinder block assembly (1): 80kg



- Measure the facial runout.
Standard value: 0.30mm or less




Engine rear oil seal

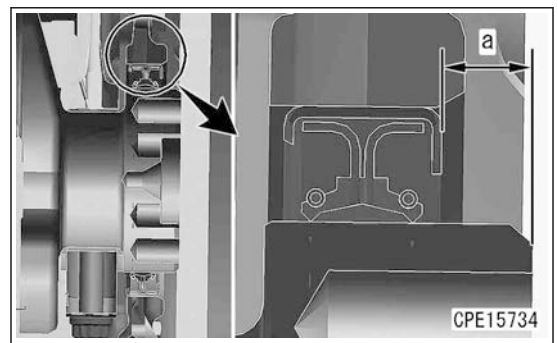
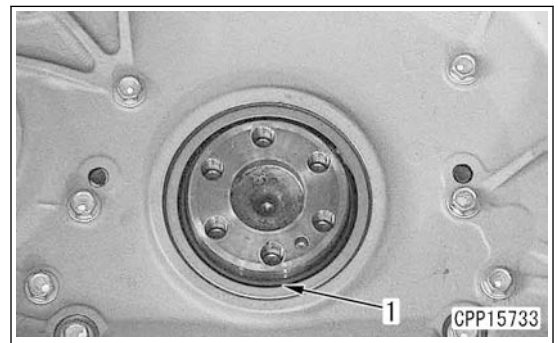
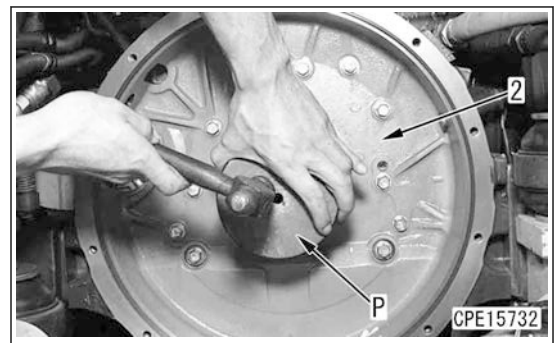
35. Install the flywheel housing to the cylinder block. Then, press-fit the rear oil seal (1) to the rear wheel housing (2) by the dimension (a) by use of the plate (P) and a hammer.
(a): 10mm

NOTICE

Before you install the rear oil seal, make sure that there is no damage, burrs, sharp edge, or rust on the end surface, corner, and lip sliding surface of the crankshaft.

36. After you press-fit the rear oil seal (1), apply approximately 3 cc of grease to the lip part of seal.

 Rear oil seal (1): Grease (G2-LI)





87. Tighten the bolts (12) in the order of [1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], [16], and [17] as shown in the figure and in the procedure that follows.

(F): Engine front side

(A): Engine intake side

(B): Engine exhaust side

 1st time: $68.6 \pm 9.8 \text{ Nm} \{7 \pm 1 \text{ kgfm}\}$

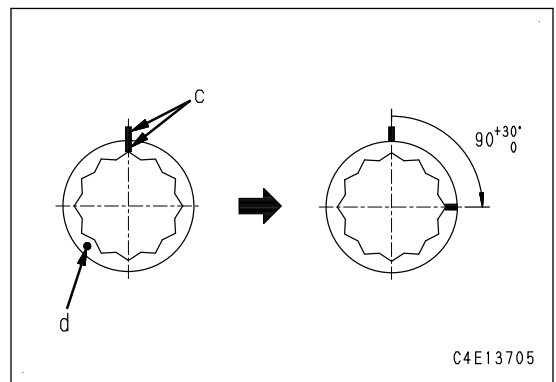
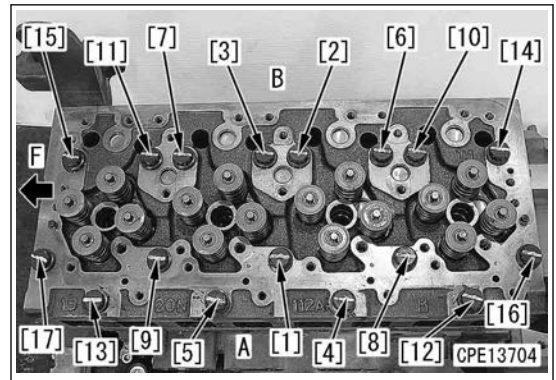
 2nd time: $107.8 \pm 4.9 \text{ Nm} \{11 \pm 0.5 \text{ kgfm}\}$

 3rd time: Retighten by $90 (+30/0)^\circ$

88. Put a punch mark (d) on the head of the mounting bolt.

REMARK

- Put a punch mark on the head of the bolt each time after you tighten it.
- Do not use the bolt if it has 5 punch marks (d). Replace it with a new one.
- Do not put a punch mark on a new bolt.



Injector assembly

NOTICE

When you replace the injector assembly, install the engine to the machine, and save the injector compensation value to the engine controller. For details, see TESTING AND ADJUSTING, “WRITE INJECTOR COMPENSATION VALUE TO ENGINE CONTROLLER” of the shop manual for the installed model.

89. Make sure that there is no dirt inside the injector hole.

NOTICE

- Fully wash and remove mud attached around the wiring harness connector to prevent its entry into the connector.
- Apply clean engine oil to the O-ring and lubrication part.


90. Install the gasket (2) to the injector (1).

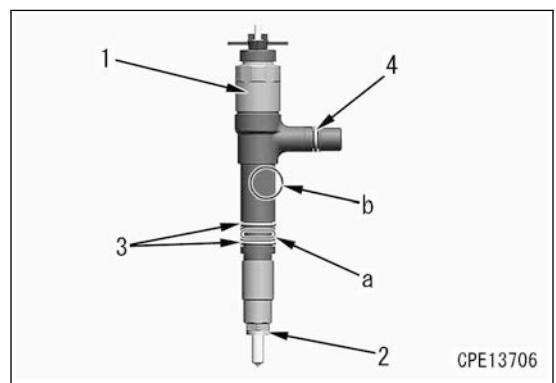
91. Install the O-rings (3) and (4) to the injector (1).

NOTICE


Be careful not to install the O-ring to the groove (a) part by mistake.

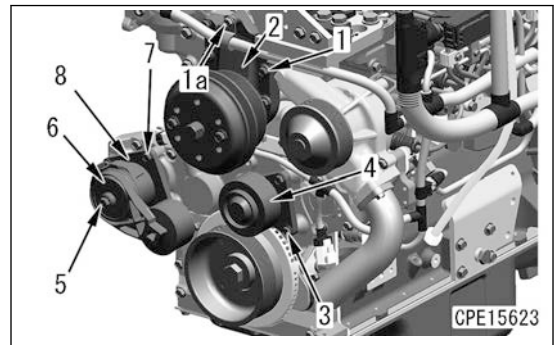
92. Apply engine oil on the O-ring (3) of the injector (1) and the insertion hole on the head side.

 O-ring, insertion hole at head side: Engine oil



Fan pulley, idler pulley, tensioner assembly

- 136. Install the plate (8) with the bolt (7).
- 137. Install the tensioner (6) with the bolt (5).
 Bolt (5): $50 \pm 5 \text{ Nm} \{ 5.1 \pm 0.5 \text{ kgfm} \}$
- 138. Install the idler pulley (4) with the bolt (3).
- 139. Install the fan pulley (2) with the bolt (1).




Engine oil cooler, adapter assembly

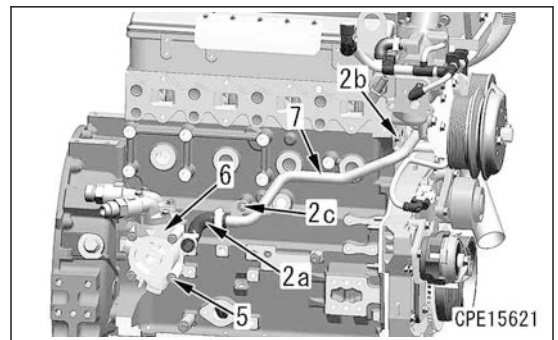
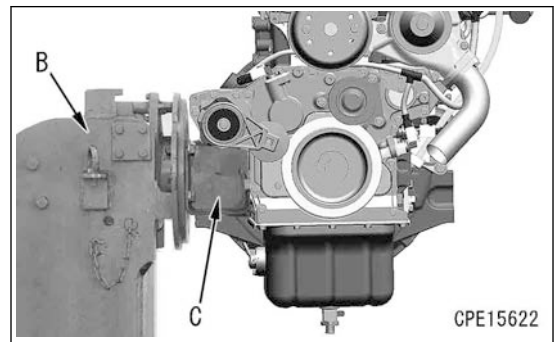
- 140. Lift the engine assembly and hold it. Remove the mounting bolts of the bracket (C).
- 141. Lift the engine assembly and the bracket (C) together, and remove them from the repair stand (B).

REMARK


- Remove the bracket (C) after you lower the cylinder assembly on the block.
- The weight is different by the machine model.

 Engine assembly: 430kg

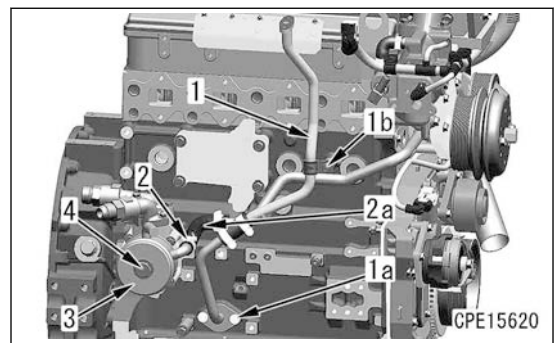
- 142. Install the tube (7) with the bolts (2b) and (2c).
- 143. Install the adapter assembly (6) with the bolts (5).



- 144. Install the engine oil cooler (3) with the bolt (4).
- 145. Install the hose (2a) between the tubes, and fasten the clamp (2).

 Hose clamp (2): $4.4 \pm 0.49 \text{ Nm} \{ 0.45 \pm 0.05 \text{ kgfm} \}$

- 146. Install the tube (1) with the bolts (1a).



REMOVE AND INSTALL SUPPLY PUMP ASSEMBLY

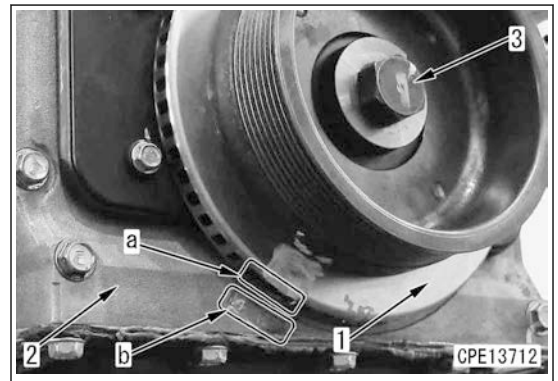
Tools to be used when removing and installing the supply pump assembly

Symbol	Part No.	Part name	Necessity	Qty	New/Redesign	Sketch	Details of work
G	790-101-3000	Push puller	■	1			Removal of supply pump gear

METHOD FOR REMOVING SUPPLY PUMP ASSEMBLY

Advance preparation

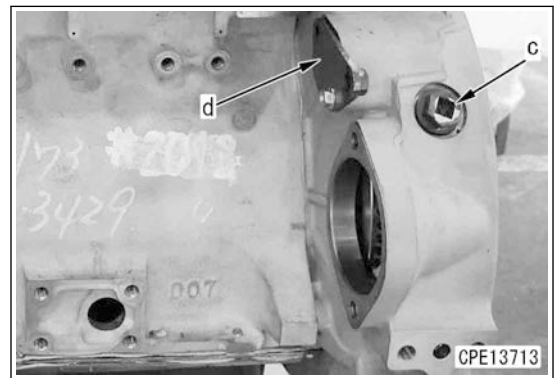
1. Rotate the crankshaft in the normal direction (clockwise viewed from the engine front) to align the notch part (a) of the plate (1) at the rear of the crankshaft pulley with the embossed mark (b) "1.4TOP" of the front cover (2) before removing.



REMARK

- Perform cranking while holding the crankshaft pulley bolt (3).
- Be sure to rotate the crankshaft pulley bolt only in the normal rotation direction to prevent it from being loosened.
- Cranking can be performed depending on the machine model.

- 1) When the plug (c) of the flywheel housing is removed, the mark (painted in white) of the No.1 cylinder top dead center on the flywheel side can be checked.
- 2) When the cover (d) of the flywheel housing is removed, the barring tool for cranking can be installed.
For details, see the shop manual of each model.



- 3) At the No.1 cylinder compression top dead center, the intake and exhaust rocker arm of the No.1 cylinder can be moved by the valve clearance with hands. If the rocker arm cannot be moved by hands, the No. 1 cylinder is not at its compression top dead center. In this case, rotate the crankshaft one more turn.

Fan belt

METHOD FOR INSTALLING ENGINE REAR OIL SEAL


1. By using the plate (P) and hammer, press fit the rear oil seal (1) into the rear wheel housing (2) according to the dimension (a).

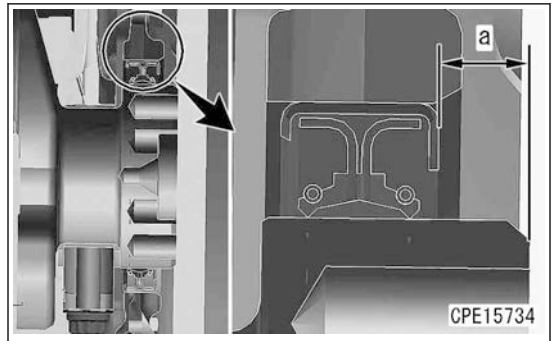
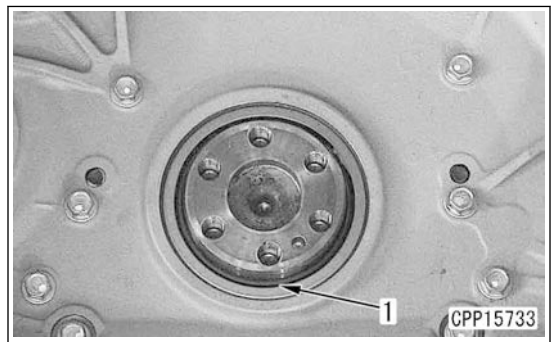
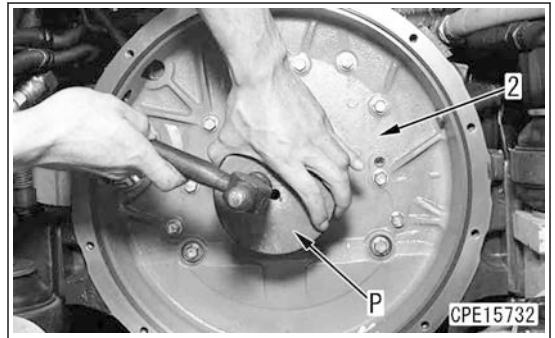
(a): 10 mm

NOTICE

Check that the end surface, corner and the lip sliding surface of the crankshaft are free from a flaw, burr, fin, rust, and etc. before installing the rear oil seal.

2. After press fitting the rear oil seal (1), fill the space between the oil seal lips with approximately 3 cc of grease.

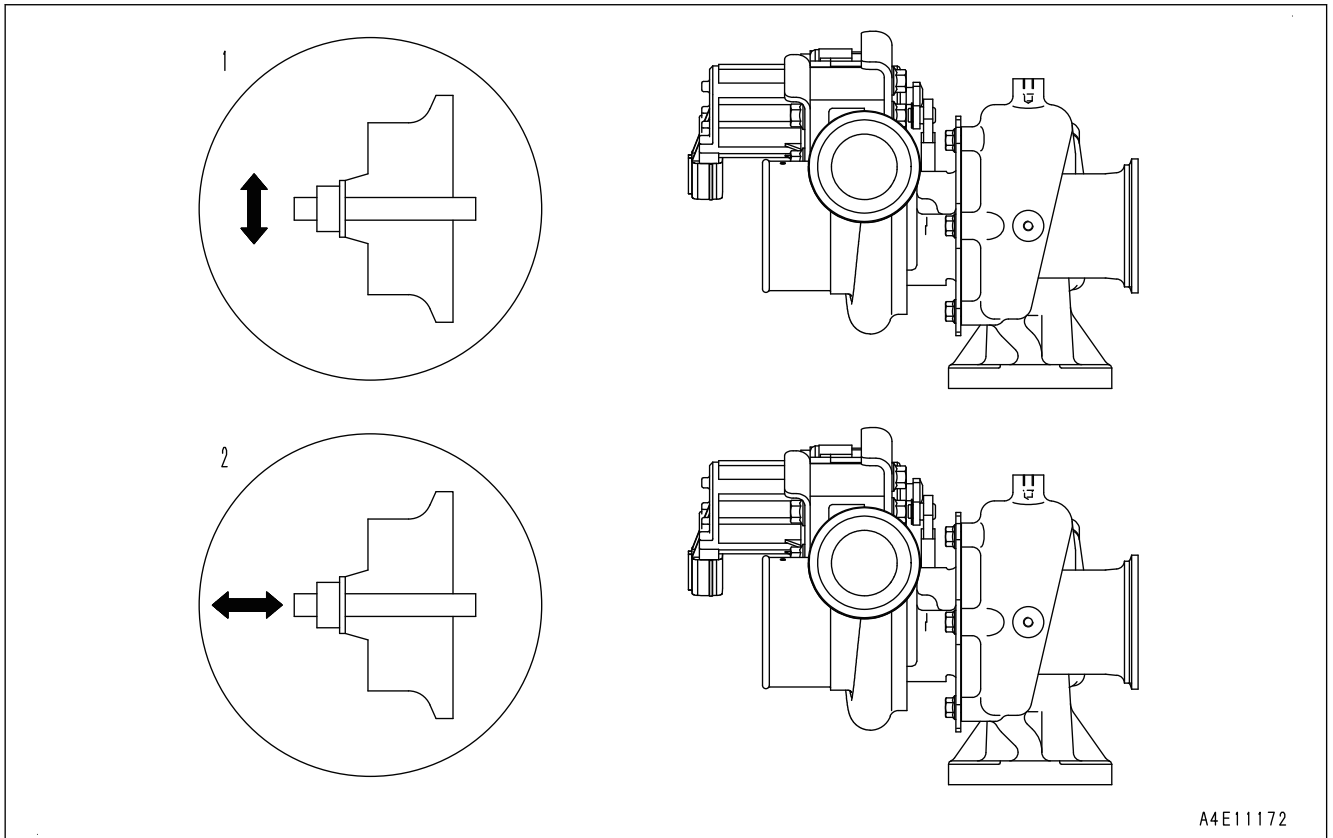
 Rear oil seal (1):
Grease (G2-LI)



ENGINE SYSTEM

INTAKE AND EXHAUST SYSTEM PARTS

MAINTENANCE STANDARD OF VARIABLE FLOW TURBOCHARGER

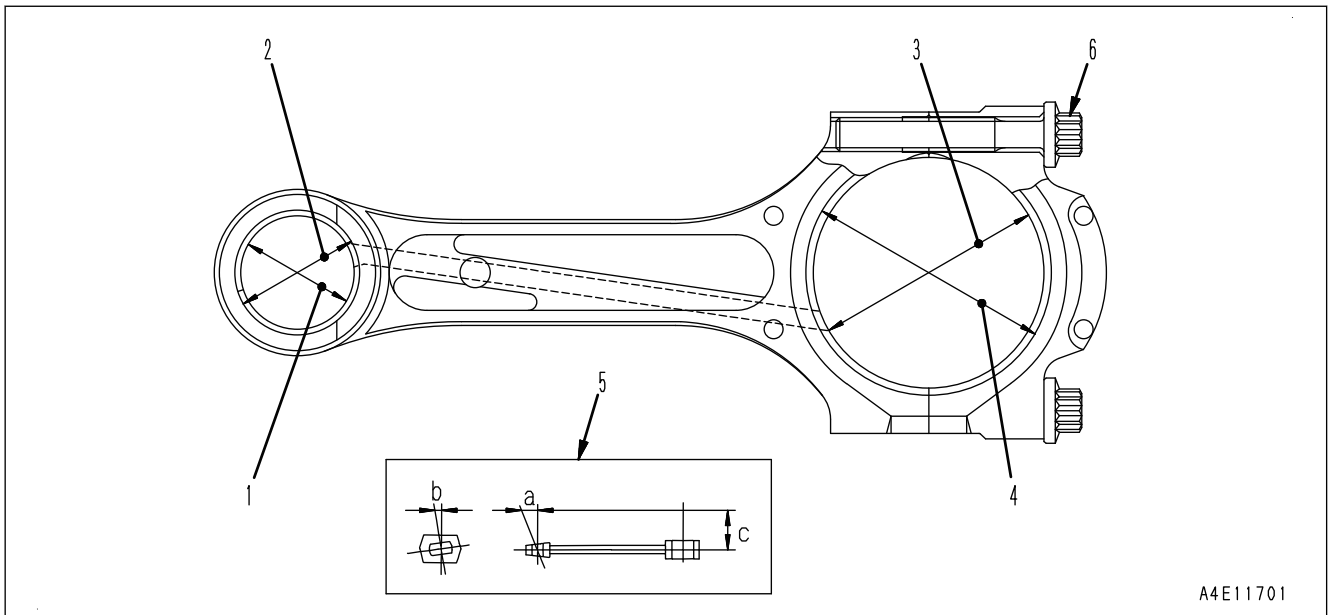


A4E11172

Unit: mm

No.	Item	Judgment criteria		Remedy
1	Radial play (Play in a radial direction)	When compressor wheel and turbine wheel are pushed lightly with the fingers toward the housing, both of them must not touch the housing.		Replace the turbocharger assembly
2	End play (Play in an axial direction)	Standard	Repair limit	
		0.02 to 0.07 (Reference value)	0.103	

MAINTENANCE STANDARD OF CONROD

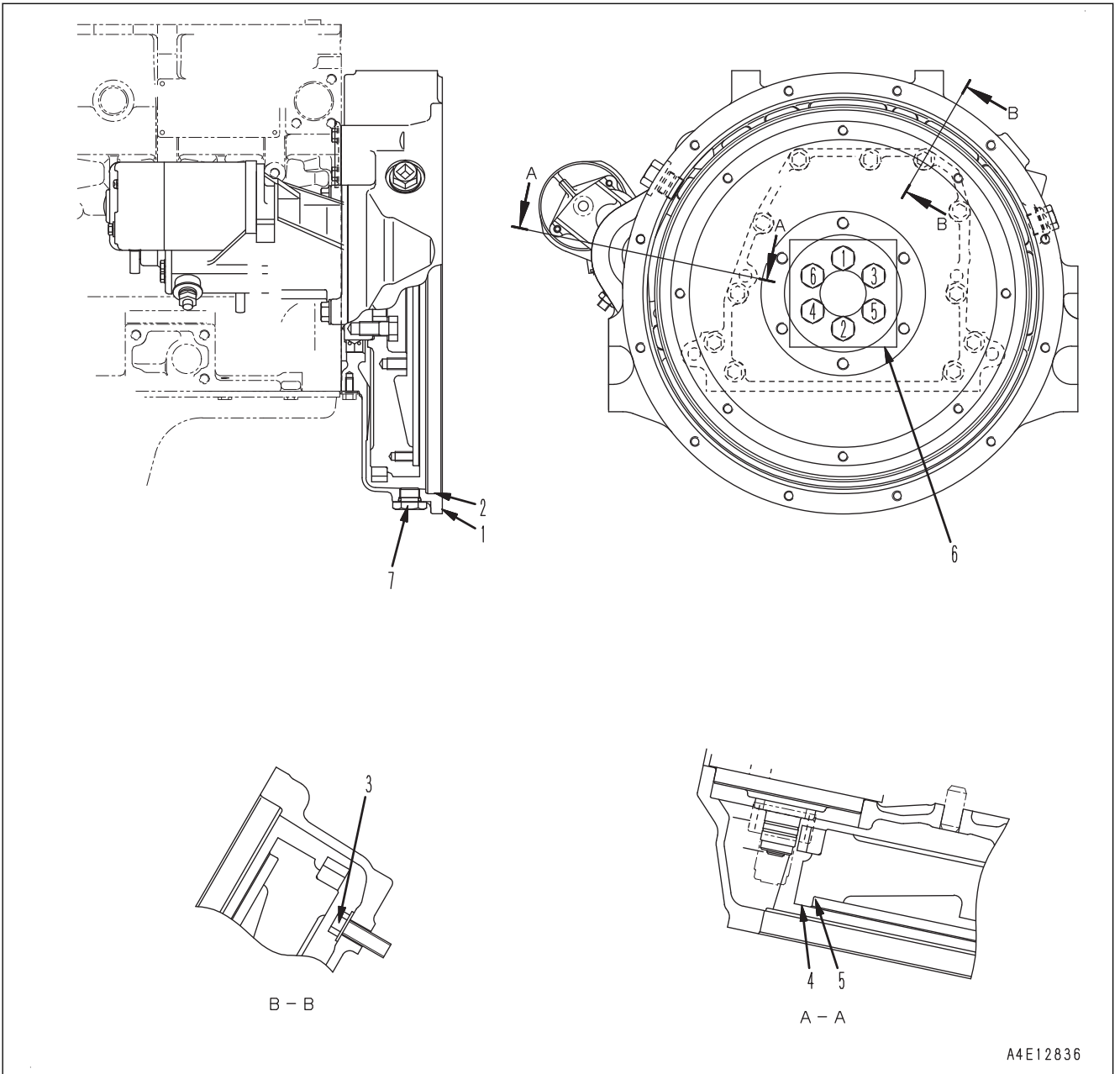


A4E11701

Unit: mm

No.	Item	Judgment criteria				Remedy	
		Standard dimensions	Tolerance		Standard clearance		Allowable clearance
	Shaft		Hole				
1	Clearance between the connecting rod bushing and the piston pin (reaming a hole after press fitting)	30	0 -0.006	+0.033 +0.020	0.020 to 0.039	0.10	Replace the bushing (Spare part is half finished.)
2	Inside diameter of the connecting rod bushing mounting hole	Standard dimensions		Tolerance			
		33.00		+0.025 0			
3	Inside diameter of the connecting rod metal	-	Standard dimensions	Tolerance	Repair limit	Replace the connecting rod metal	
		Standard	57.00	+0.095 +0.045	57.20		
		0.25 (*1)	56.75		56.95		
		0.50 (*1)	56.50		56.70		
		0.75 (*1)	56.25		56.45		
		1.00 (*1)	56.00		56.20		
4	Inside diameter of the connecting rod metal mounting hole	Standard dimensions		Tolerance		Replace the connecting rod	
		61.00		+0.024 0			
5	Bend and distortion of the connecting rod	Item	Tolerance		Repair limit	Replace the connecting rod	
		Parallelism (a)	Max. 0.10		0.15		
		Distortion (b)	Max. 0.30		0.35		
		Dimension (c)	167		-		

MAINTENANCE STANDARD OF FLYWHEEL



Unit: mm

No.	Item	Judgment criteria		Remedy
1	Facial runout of the flywheel housing	Repair limit: 0.30		Reassemble and repair
2	Radial runout of the flywheel housing	Repair limit: 0.30		
3	Tightening torque of the flywheel housing mounting bolt	Target	Range	Re-tighten
		66.2 Nm {6.75 kgfm}	58.8 to 73.5 Nm {6.0 to 7.5 kgfm}	
4	Facial runout of the flywheel	Repair limit: 0.35		Reassemble and repair
5	Radial runout of the flywheel	Repair limit: 0.30		

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL