WSM

WORKSHOP MANUAL
DIESEL ENGINE

07-E3B SERIES

Kubota

KiSC issued 04, 2014 A

TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of 07-E3B series. It is divided into three parts, “General”, “Mechanism” and “Servicing”.

■ **General**

Information on the engine identification, the general precautions, maintenance check list, check and maintenance and special tools are described.

■ **Mechanism**

Information on the construction and function are included. This part should be understood before proceeding with troubleshooting, disassembling and servicing.

Refer to Diesel Engine Mechanism Workshop Manual (Code No. 9Y021-01877) for the one which has not been described to this workshop manual.

■ **Servicing**

Information on the troubleshooting, servicing specification lists, tightening torque, checking and adjusting, disassembling and assembling, and servicing which cover procedures, precautions, factory specifications and allowable limits.

All information illustrations and specifications contained in this manual are based on the latest product information available at the time of publication.

The right is reserved to make changes in all information at any time without notice.

Due to covering many models of this manual, information or picture being used, have not been specified as one model.

November 2007

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Record of Revisions

For pdf, use search function {Search word} to find all the revised locations.

Last digit of the Code No.	Issue month	Main Revised Point and Corrective Measures {Search word}	Reference Page
6	2013.11	Correction of Workshop Manual	
		Model Name and Engine Serial Number	G-1, G-2
		Battery Specific Gravity	G-21, S-31
		Fuel System	M-11 to M-16

⚠ 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 attempt to repair or use this unit.

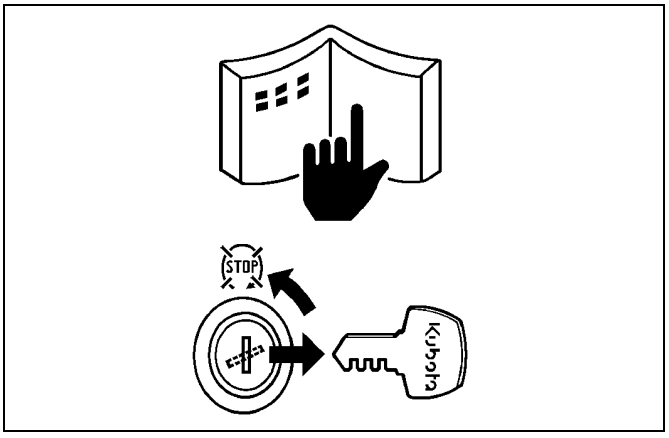
⚠ DANGER : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ 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, may result in minor or moderate injury.

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

■ NOTE : Gives helpful information.

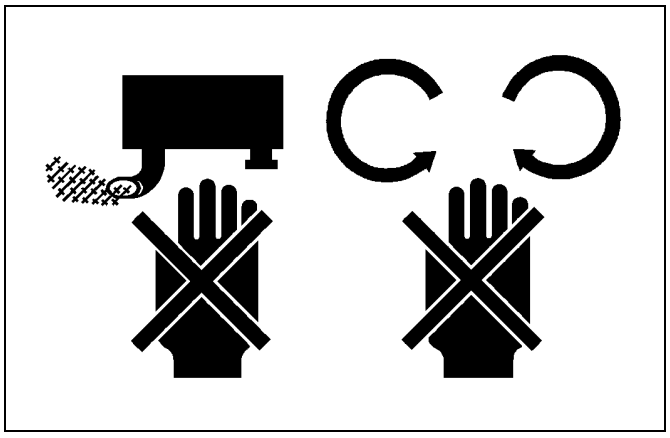


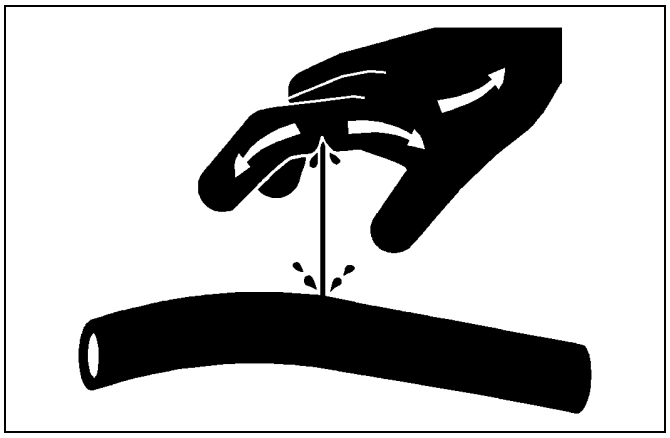
BEFORE SERVICING AND REPAIRING

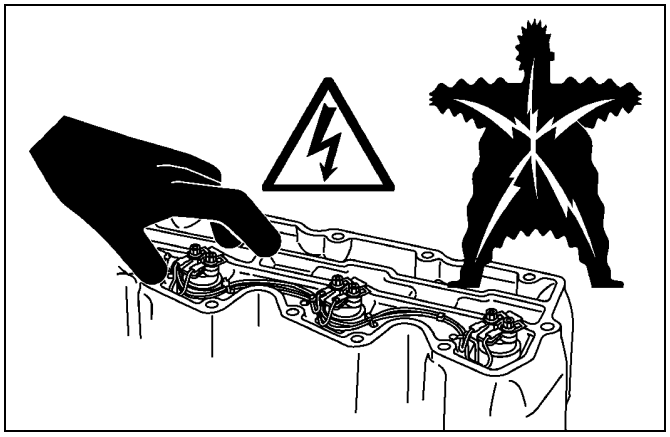
- Read all instructions and safety instructions in this manual and on your engine safety decals.
- Clean the work area and engine.
- Park the machine on a firm and level ground.
- Allow the engine to cool before proceeding.
- Stop the engine, and remove the key.
- Disconnect the battery negative cable.
- Hang a "**DO NOT OPERATE**" tag in operator station.

SAFETY STARTING

- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Unauthorized modifications to the engine may impair the function and / or safety and affect engine life.

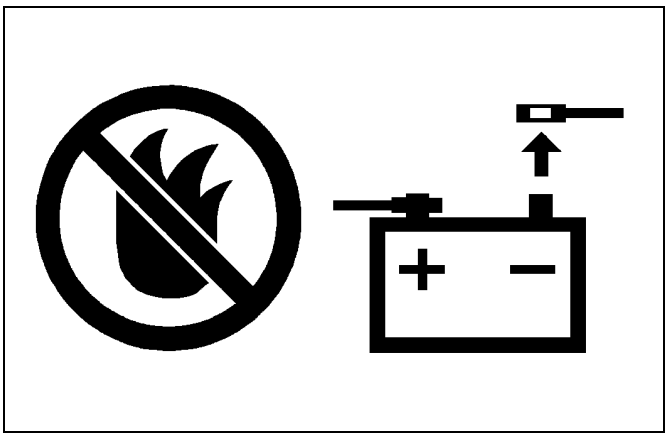






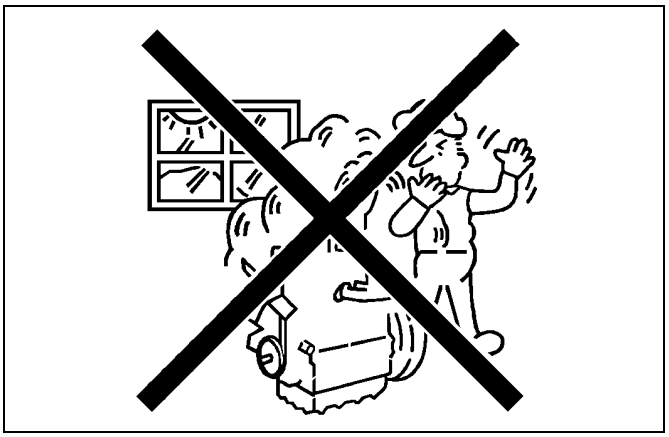
SAFETY WORKING

- Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
- Wear close fitting clothing and safety equipment appropriate to the job.
- Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
- When servicing is performed together by two or more persons, take care to perform all work safely.
- Do not touch the rotating or hot parts while the engine is operating.
- Never remove the radiator cap while the engine is operating, or immediately after stopping. Otherwise, hot water will spout out from radiator. Only remove radiator cap when cool enough to touch with bare hands. Slowly loosen the cap to first stop to relieve pressure before removing completely.
- Escaping fluid (fuel or hydraulic oil) under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or fuel lines. Tighten all connections before applying pressure.
- Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.
- Do not open high-pressure fuel system.
  High-pressure fluid remaining in fuel lines can cause serious injury. Do not disconnect or attempt to repair fuel lines, sensors, or any other components between the high-pressure fuel pump and injectors on engines with high pressure common rail fuel system.
- High voltage exceeding 100 V is generated in the ECU, and is applied to the injector.
  Pay sufficient caution to electric shock when performing work activities.



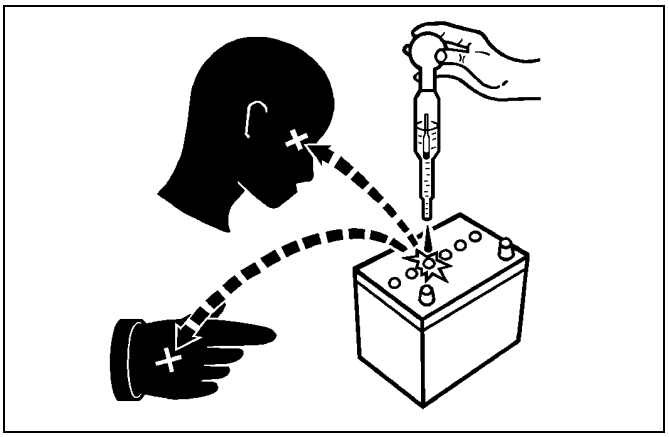
AVOID FIRES

- Fuel is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.
- To avoid sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- Battery gas can explode. Keep sparks and open flame away from the top of battery, especially when charging the battery.
- Make sure that no fuel has been spilled on the engine.



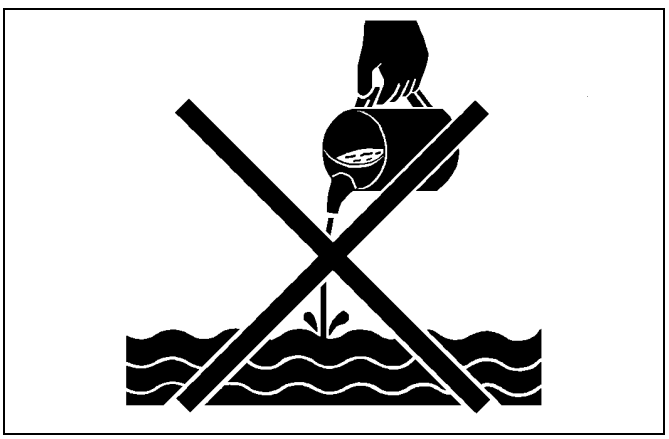
VENTILATE WORK AREA

- If the engine must be operating to do some work, make sure the area is well ventilated. Never operate the engine in a closed area. The exhaust gas contains poisonous carbon monoxide.



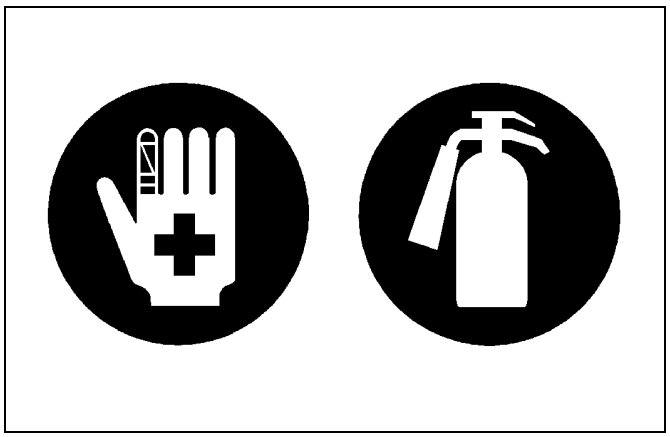
PREVENT ACID BURNS

- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, clothing and cause blindness if splashed into eyes. Keep electrolyte away from eyes, hands and clothing. If you spill electrolyte on yourself, flush with water, and get medical attention immediately.



DISPOSE OF FLUIDS PROPERLY

- Do not pour fluids into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, electrolyte and other harmful waste.



PREPARE FOR EMERGENCIES

- Keep a first aid kit and fire extinguisher handy at all times.
- Keep emergency numbers for doctors, ambulance service, hospital and fire department near your telephone.

SPECIFICATIONS

Model	V2607-DI-E3B	V2607-DI-T-E3B
Number of Cylinder	4	
Type	Vertical, water-cooled, 4-cycle DI diesel engine	
Bore × Stroke	87.0 × 110 mm (3.43 × 4.33 in.)	
Total Displacement	2615 cm^3 (159.6 cu.in.)	
ISO Net Continuous	30.4 kW / 2700 min^{-1} (rpm) (40.8 HP / 2700 min^{-1} (rpm))	41.3 kW / 2700 min^{-1} (rpm) (55.4 HP / 2700 min^{-1} (rpm))
ISO / SAE Net Intermittent	35.0 kW / 2700 min^{-1} (rpm) (46.9 HP / 2700 min^{-1} (rpm))	47.5 kW / 2700 min^{-1} (rpm) (63.7 HP / 2700 min^{-1} (rpm))
SAE Gross Intermittent	36.5 kW / 2700 min^{-1} (rpm) (48.9 HP / 2700 min^{-1} (rpm))	49.2 kW / 2700 min^{-1} (rpm) (66.0 HP / 2700 min^{-1} (rpm))
Maximum Bare Speed	2920 min^{-1} (rpm)	
Minimum Bare Idling Speed	825 to 875 min^{-1} (rpm)	
Combustion Chamber	Reentrant Type, Center Direct Injection Type (E-CDIS)	
Fuel Injection Pump	Bosch PFR4KZ Type Mini Pump	
Governor	All speed mechanical governor	
Direction of Rotation	Counter-clockwise (Viewed from flywheel side)	
Injection Nozzle	Bosch P Type	
Injection Timing	0.0393 rad (2.25 °) before T.D.C.	[Serial No. : 8G0001 to 8V9999] 0.0044 rad (0.25 °) after T.D.C. [Serial No. : 8W0001 and above] 0.0044 rad (0.25 °) before T.D.C.
Firing Order	1-3-4-2	
Injection Pressure	1st stage 18.63 MPa (190.0 kgf/cm^2, 2702 psi), 2nd stage 21.57 MPa (220.0 kgf/cm^2, 3129 psi),	
Compression Ratio	20.0	19.0
Lubricating System	Forced lubrication by trochoid pump	
Oil Pressure Indicating	Electrical Type Switch	
Lubricating Filter	Full Flow Paper Filter (Cartridge Type)	
Cooling System	Pressurized radiator, forced circulation with water pump	
Starting System	Electric Starting with Starter	
Starting Motor	12 V, 2.5 kW	
Starting Support Device	By Glow Plug in Combustion Chamber	
EGR	None	External EGR (EGR Cooler + Mechanical water-cooled EGR Valve + Reed Valve)
Battery	12 V, 92 AH equivalent	
Charging Alternator	12 V, 540 W	
Fuel	Recommended fuels vary depending on the contents of the emission control regulations, the ambient temperature, and the fuel specifications. Therefore, please refer to the detailed description on page G-6.	
Lubricating Oil	Class CF lubricating oil as per API classification is recommended. For details on recommended lubricating oils, see page G-6 and page G-9.	
Lubricating Oil Capacity	10.2 L (2.69 U.S.gals)	
Weight (Dry)	225 kg (496 lbs)	235 kg (518 lbs)

* The specification described above is of the standard engine of each model.
* Conversion Formula : HP = 0.746 kW, PS = 0.7355 kW

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Model	V3007-DI-T-E3B	V3307-DI-T-E3B
Number of Cylinder	4	
Type	Vertical, water-cooled, 4-cycle DI diesel engine	
Bore × Stroke	94.0 × 110 mm (3.70 × 4.33 in.)	94.0 × 120 mm (3.70 × 4.72 in.)
Total Displacement	3053 cm^3 (186.3 cu.in.)	3331 cm^3 (203.3 cu.in.)
ISO Net Continuous	39.8 kW / 2600 min^{-1} (rpm) (53.4 HP / 2600 min^{-1} (rpm))	45.6 kW / 2600 min^{-1} (rpm) (61.2 HP / 2600 min^{-1} (rpm))
ISO / SAE Net Intermittent	46.9 kW / 2600 min^{-1} (rpm) (62.9 HP / 2600 min^{-1} (rpm))	53.7 kW / 2600 min^{-1} (rpm) (72.0 HP / 2600 min^{-1} (rpm))
SAE Gross Intermittent	48.5 kW / 2600 min^{-1} (rpm) (65.0 HP / 2600 min^{-1} (rpm))	55.4 kW / 2600 min^{-1} (rpm) (74.3 HP / 2600 min^{-1} (rpm))
Maximum Bare Speed	2820 min^{-1} (rpm)	
Minimum Bare Idling Speed	775 to 825 min^{-1} (rpm)	
Combustion Chamber	Reentrant Type, Center Direct Injection Type (E-CDIS)	
Fuel Injection Pump	Bosch PFR4KZ Type Mini Pump	
Governor	All speed mechanical governor	
Direction of Rotation	Counter-clockwise (Viewed from flywheel side)	
Injection Nozzle	Bosch P Type	
Injection Timing	0.010 rad (0.60 °) after T.D.C.	0.023 rad (1.3 °) after T.D.C.
Firing Order	1-3-4-2	
Injection Pressure	1st stage 18.63 MPa (190.0 kgf/cm^2, 2702 psi), 2nd stage 22.56 MPa (230.0 kgf/cm^2, 3271 psi),	
Compression Ratio	20.0	
Lubricating System	Forced lubrication by trochoid pump	
Oil Pressure Indicating	Electrical Type Switch	
Lubricating Filter	Full Flow Paper Filter (Cartridge Type)	
Cooling System	Pressurized radiator, forced circulation with water pump	
Starting System	Electric Starting with Starter	
Starting Motor	12 V, 3.0 kW	
Starting Support Device	By Glow Plug in Combustion Chamber	
EGR	External EGR (EGR Cooler + Mechanical water-cooled EGR Valve + Reed Valve)	
Battery	12 V, 120 AH equivalent	
Charging Alternator	12 V, 540 W	
Fuel	Recommended fuels vary depending on the contents of the emission control regulations, the ambient temperature, and the fuel specifications. Therefore, please refer to the detailed description on page G-6.	
Lubricating Oil	Class CF lubricating oil as per API classification is recommended. For details on recommended lubricating oils, see page G-6 and page G-9.	
Lubricating Oil Capacity	11.2 L (2.96 U.S.gals)	
Weight (Dry)	263 kg (580 lbs)	275 kg (606 lbs)

* The specification described above is of the standard engine of each model.
* Conversion Formula : HP = 0.746 kW, PS = 0.7355 kW

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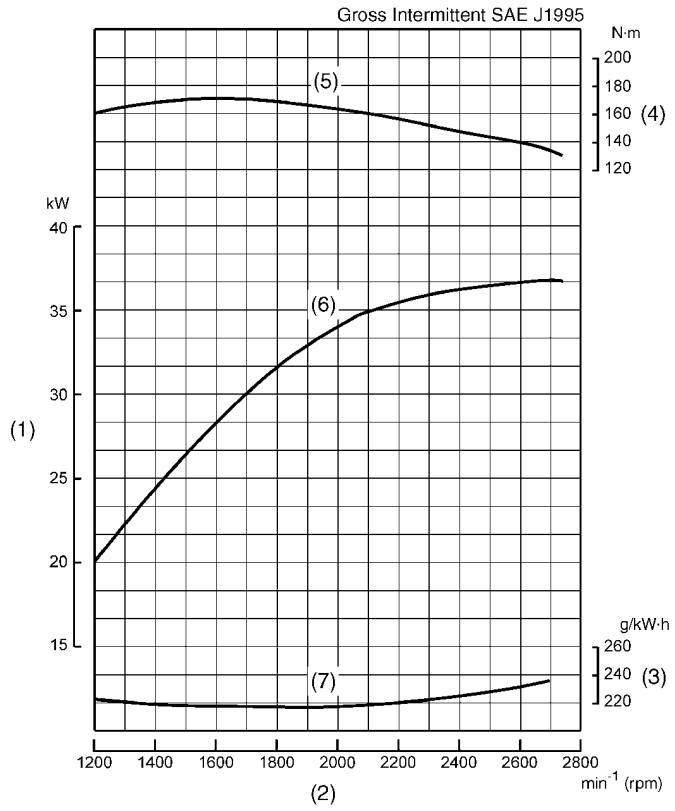
PERFORMANCE CURVES

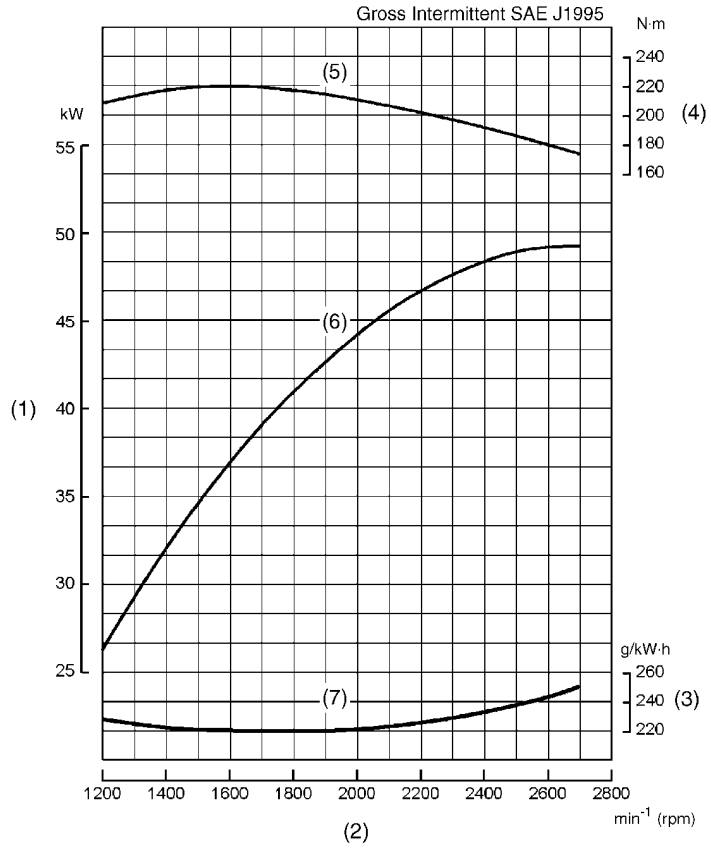
■ V2607-DI-E3B



9Y1210263IEI001A

(1) Brake Horsepower
(2) Engine Speed
(3) B.S.F.C.
(4) Torque
(5) Gross Intermittent Torque
(6) Gross Intermittent B.H.P.
(7) Gross Intermittent B.S.F.C.

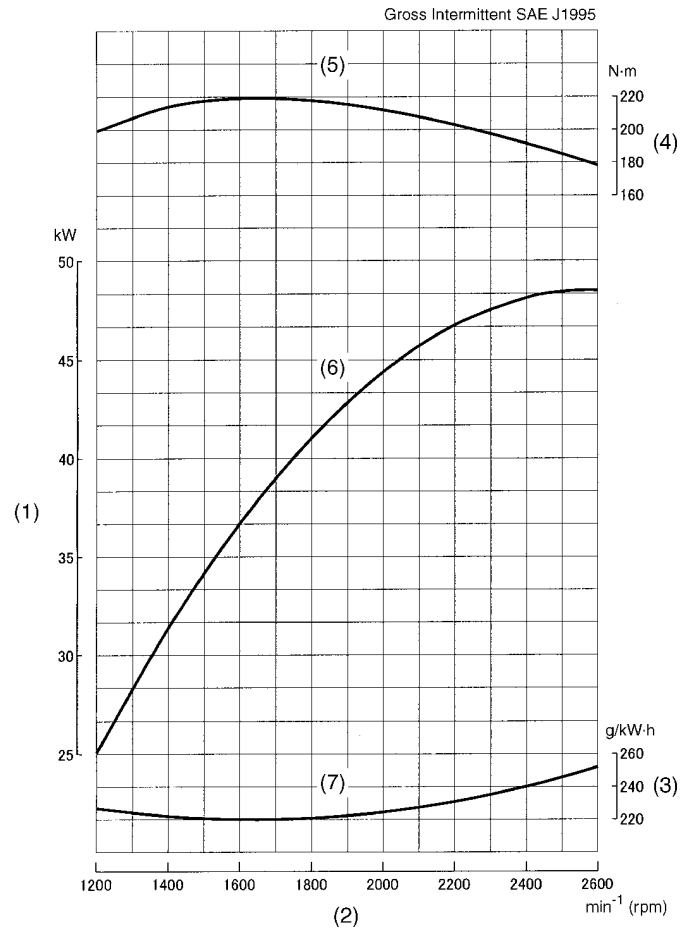
■ V2607-DI-T-E3B



3EEAGACEP001A

(1) Brake Horsepower
(2) Engine Speed
(3) B.S.F.C.
(4) Torque
(5) Gross Intermittent Torque
(6) Gross Intermittent B.H.P.
(7) Gross Intermittent B.S.F.C.

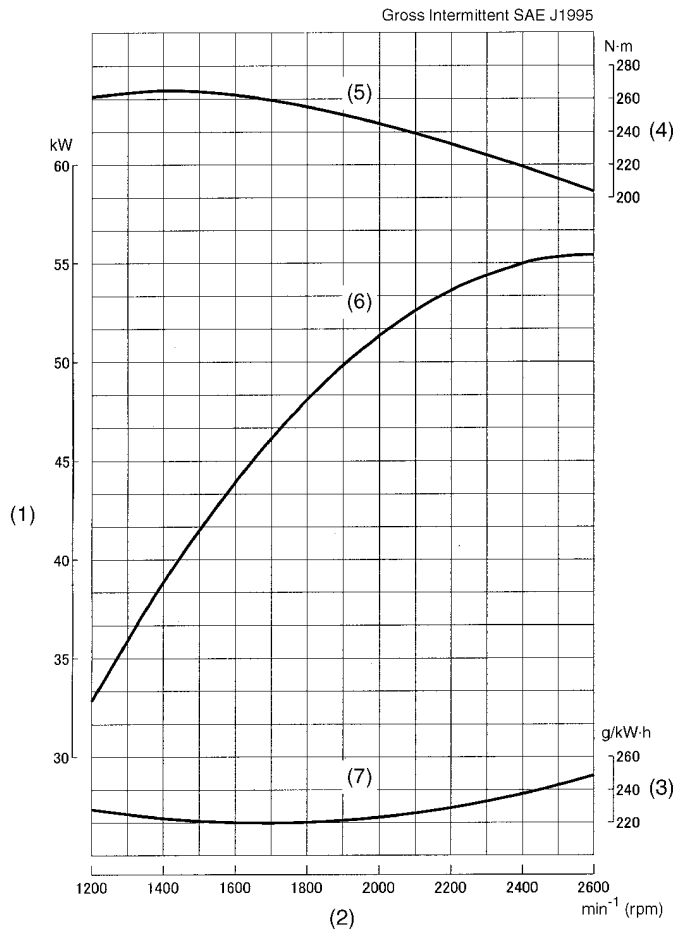
■ V3007-DI-T-E3B



3EEAGABEP001A

(1) Brake Horsepower
(2) Engine Speed
(3) B.S.F.C.
(4) Torque
(5) Gross Intermittent Torque
(6) Gross Intermittent B.H.P.
(7) Gross Intermittent B.S.F.C.

■ V3307-DI-T-E3B



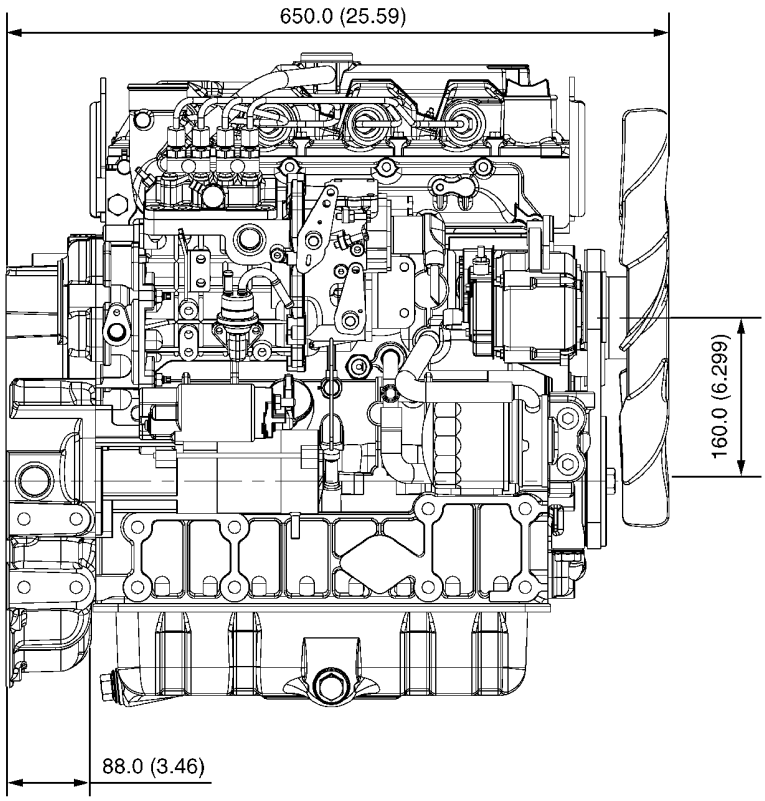
3EEAGABEP002A

(1) Brake Horsepower
(2) Engine Speed
(3) B.S.F.C.
(4) Torque
(5) Gross Intermittent Torque
(6) Gross Intermittent B.H.P.
(7) Gross Intermittent B.S.F.C.

DIMENSIONS

■ V2607-DI-E3B

Unit : mm (in.)



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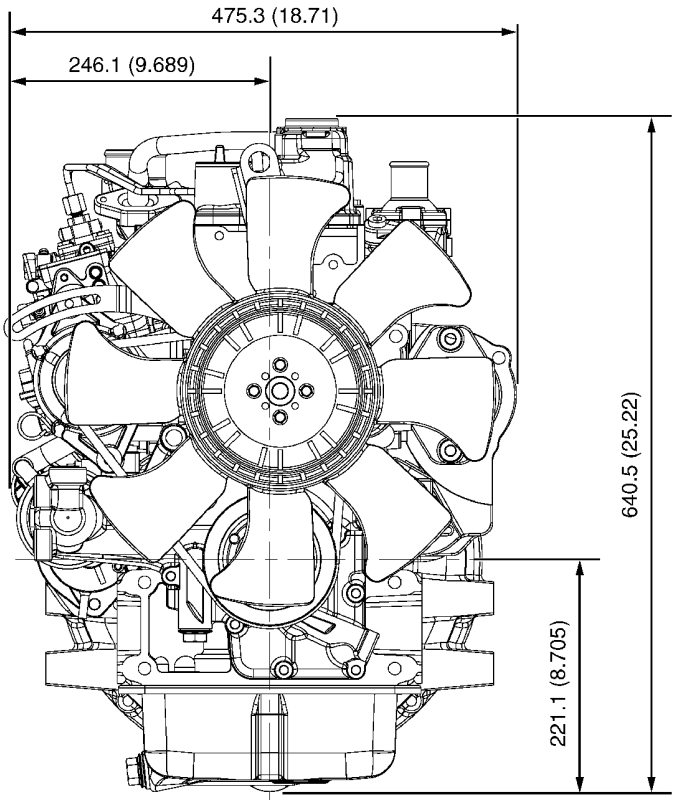
Unit : mm (in.)



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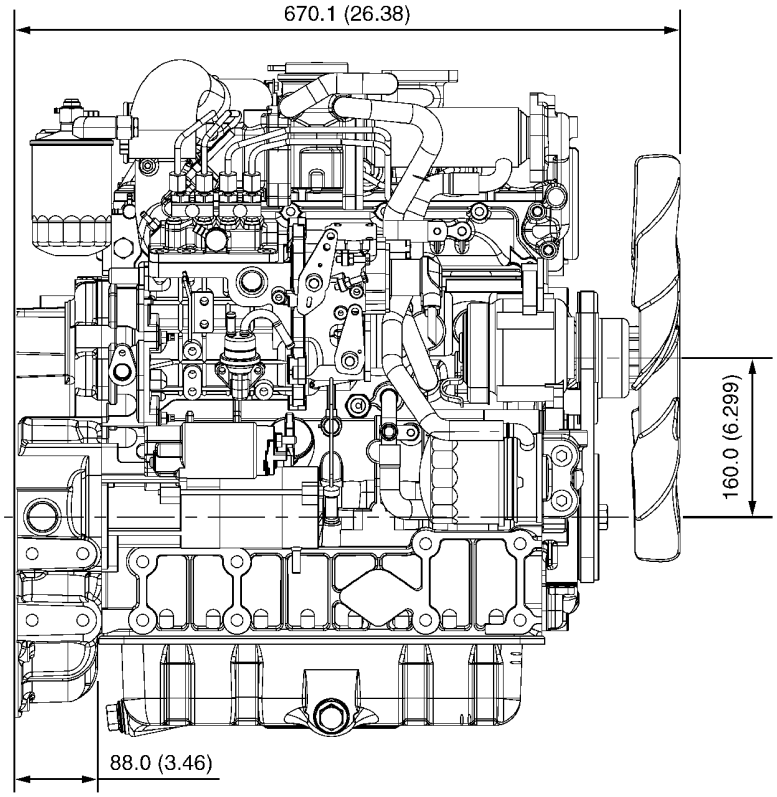
■V2607-DI-T-E3B

Unit : mm (in.)



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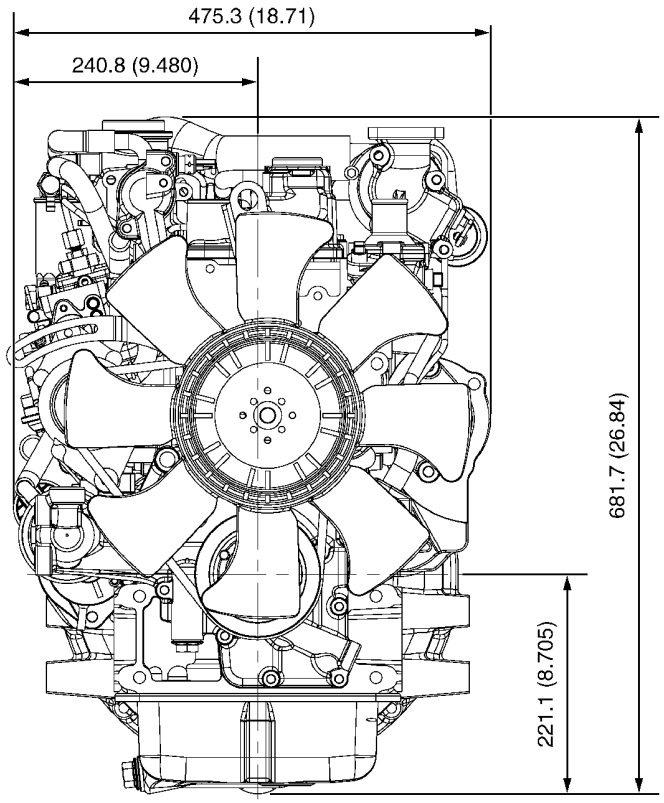
Unit : mm (in.)



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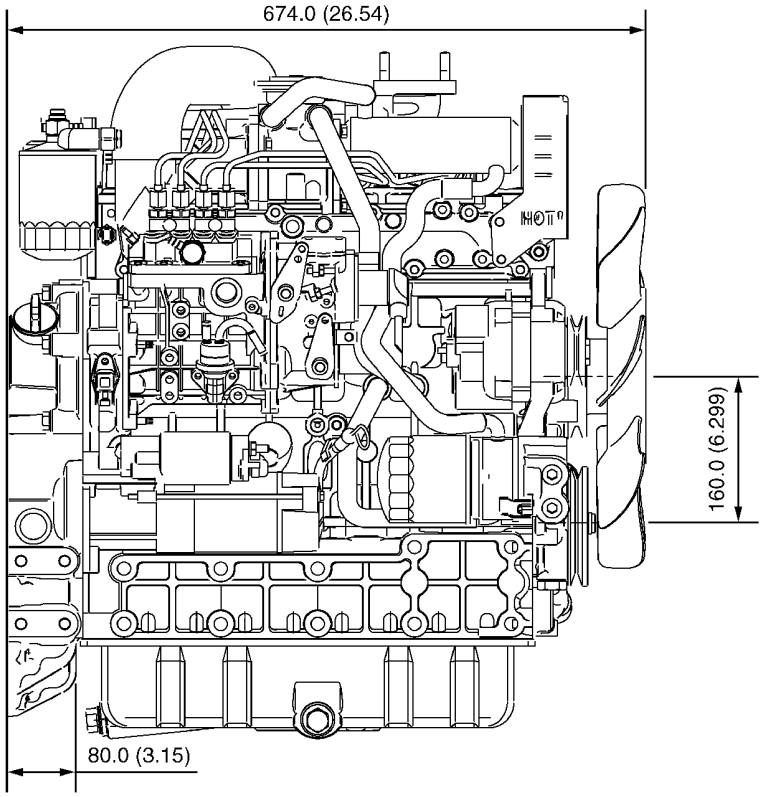
■ V3007-DI-T-E3B / V3307-DI-T-E3B

Unit : mm (in.)



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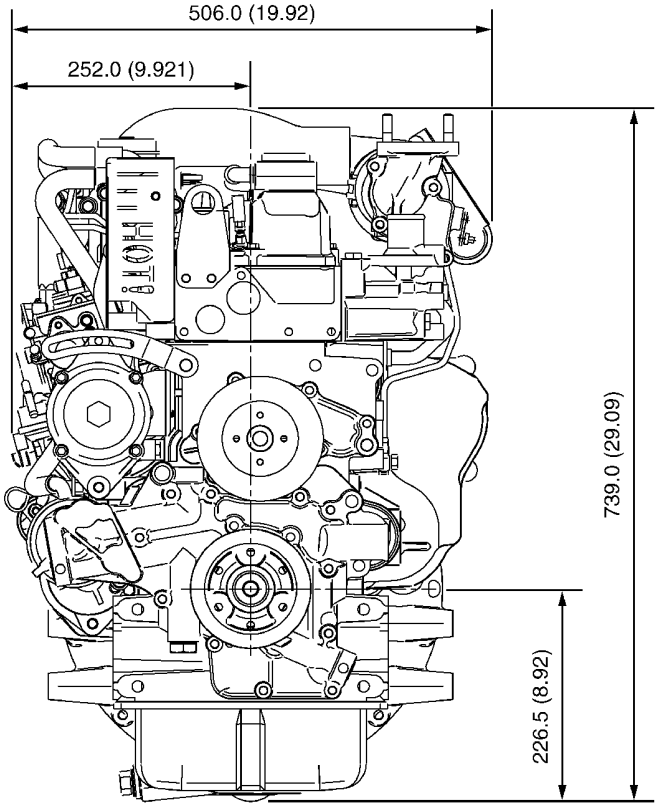
Unit : mm (in.)



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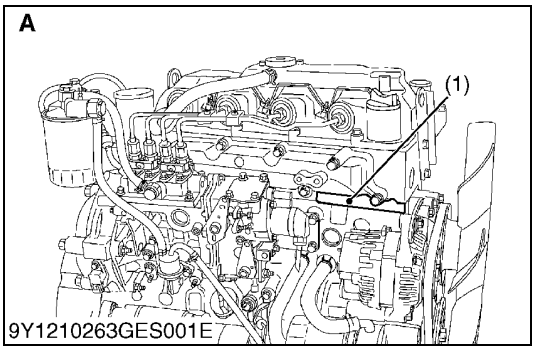
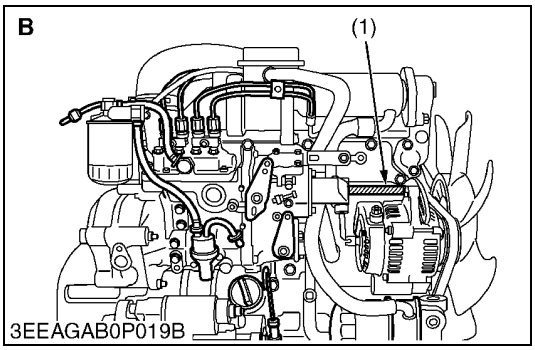
GENERAL

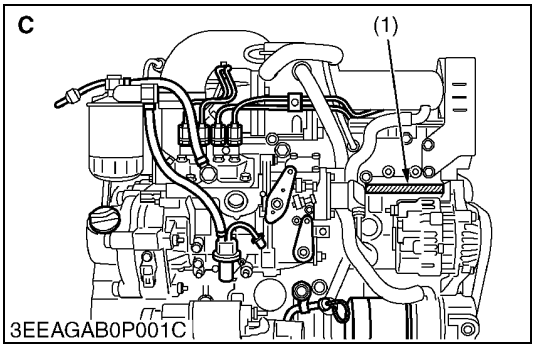
CONTENTS

1. ENGINE IDENTIFICATION

[1] MODEL NAME AND ENGINE SERIAL NUMBER







You must identify the engine model name and serial number before you start a job. When you get in touch with the manufacturer, always tell your engine model name and serial number.

■ **Engine Serial Number**

The engine serial number is an identified number for the engine. It appears after the engine model name.

It shows the month and year of manufacture as below.

- **Year of manufacture**

Alphabet or Number	Year	Alphabet or Number	Year
1	2001	F	2015
2	2002	G	2016
3	2003	H	2017
4	2004	J	2018
5	2005	K	2019
6	2006	L	2020
7	2007	M	2021
8	2008	N	2022
9	2009	P	2023
A	2010	R	2024
B	2011	S	2025
C	2012	T	2026
D	2013	V	2027
E	2014		

(1) Engine Model Name and Serial Number

A : V2607-DI-E3B
B : V2607-DI-T-E3B
C : V3007-DI-T-E3B / V3307-DI-T-E3B

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(To be continued)

(Continued)

- **Month of manufacture**

Month	Engine Lot Number	
January	A0001 ~ A9999	B0001 ~ BZ999
February	C0001 ~ C9999	D0001 ~ DZ999
March	E0001 ~ E9999	F0001 ~ FZ999
April	G0001 ~ G9999	H0001 ~ HZ999
May	J0001 ~ J9999	K0001 ~ KZ999
June	L0001 ~ L9999	M0001 ~ MZ999
July	N0001 ~ N9999	P0001 ~ PZ999
August	Q0001 ~ Q9999	R0001 ~ RZ999
September	S0001 ~ S9999	T0001 ~ TZ999
October	U0001 ~ U9999	V0001 ~ VZ999
November	W0001 ~ W9999	X0001 ~ XZ999
December	Y0001 ~ Y9999	Z0001 ~ ZZ999

* Alphabetical letters "**I**" and "**O**" are not used.

e.g. V3307-T - B B A001
(a) (b)(c) (d)

(a) Engine Model Name : **V3307-DI-T**
(b) Year : **B** indicates **2011**
(c) Month : **A** or **B** indicates **January**
(d) Lot number : (**0001 ~ 9999** or **A001 ~ Z999**)

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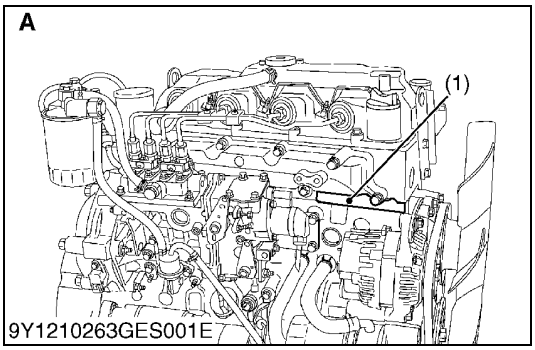
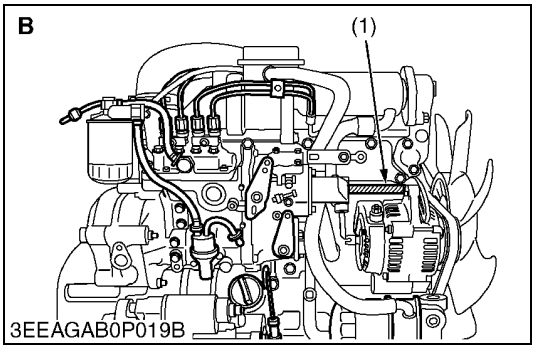
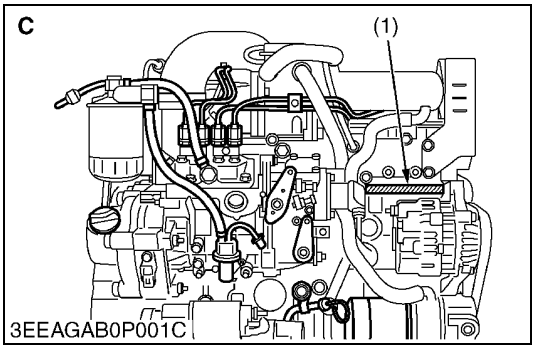
[2] MODEL NAME AND NEW ENGINE SERIAL NUMBER







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■ **Engine Serial Number**

The engine serial number is an identified number for the engine. It appears after the engine model name.

It shows the month and year of manufacture as below.

- **Engine Series**

Alphabet or Number	Year	Alphabet or Number	Year
1	05 (include: WG)	7	03
2	V3	8	07
3	08	A	EA, RK
4	SM(include: WG)	B	03 (KET Production)
5	Air Cooled Gasoline	C	V3, 07 (KEW Production)
6	GZ, OC, AC, EA, E		

- **Production Year**

Alphabet or Number	Year	Alphabet or Number	Year
1	2001	F	2015
2	2002	G	2016
3	2003	H	2017
4	2004	J	2018
5	2005	K	2019
6	2006	L	2020
7	2007	M	2021
8	2008	N	2022
9	2009	P	2023
A	2010	R	2024
B	2011	S	2025
C	2012	T	2026
D	2013	V	2027
E	2014		

(1) Engine Model Name and Serial Number

A : V2607-DI-E3B
B : V2607-DI-T-E3B
C : V3007-DI-T-E3B / V3307-DI-T-E3B

W1011076

(To be continued)

(Continued)

- **Production Month and Lot Number**

Month	Engine Lot Number	
January	A0001 ~ A9999	B0001 ~
February	C0001 ~ C9999	D0001 ~
March	E0001 ~ E9999	F0001 ~
April	G0001 ~ G9999	H0001 ~
May	J0001 ~ J9999	K0001 ~
June	L0001 ~ L9999	M0001 ~
July	N0001 ~ N9999	P0001 ~
August	Q0001 ~ Q9999	R0001 ~
September	S0001 ~ S9999	T0001 ~
October	U0001 ~ U9999	V0001 ~
November	W0001 ~ W9999	X0001 ~
December	Y0001 ~ Y9999	Z0001 ~

* Alphabetical letters "**I**" and "**O**" are not used.

e.g. V3307-T - 8 C M A001
(a) (b)(c)(d) (e)

(a) **V3307-T** : Engine Model Name
(b) **8** : Engine Series (07 series)
(c) **C** : Production Year (2012)
(d) **M** : Production Month (June)
(e) **A001** : Lot number (**0001 ~ 9999** or **A001 ~ Z999**)

W1079838

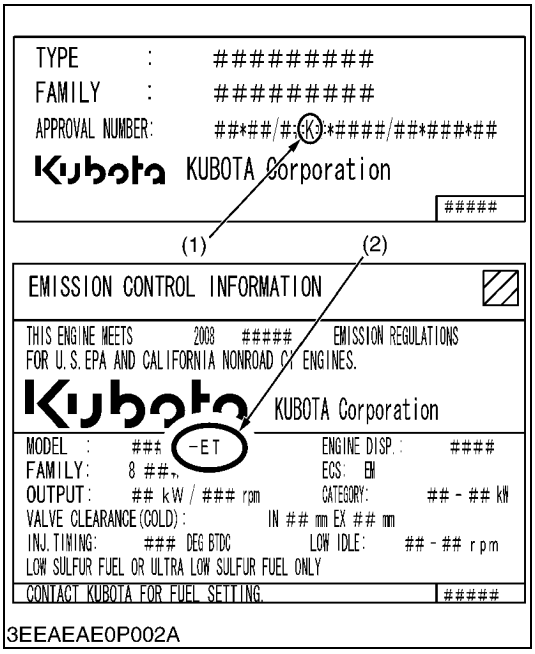
[3] E3B ENGINE

[Example : Engine Model Name V3307-DI-T-**E3B**-XXXX]

The emission controls previously implemented in various countries to prevent air pollution will be stepped up as Non-Road Emission Standards continue to change. The timing or applicable date of the specific Non-Road Emission regulations depends on the engine output classification.

Over the past several years, Kubota has been supplying diesel engines that comply with regulations in the respective countries affected by Non-Road Emission regulations. For Kubota Engines, E3B will be the designation that identifies engine models affected by the next emission phase (See the table below).

When servicing or repairing ###-E3B series engines, use only replacement parts for that specific E3B engine, designated by the appropriate E3B Kubota Parts List and perform all maintenance services listed in the appropriate Kubota Operator's Manual or in the appropriate E3B Kubota Workshop Manual. Use of incorrect replacement parts or replacement parts from other emission level engines (for example: E2B engines), may result in emission levels out of compliance with the original E3B design and EPA or other applicable regulations. Please refer to the emission label located on the engine head cover to identify Output classification and Emission Control Information. E3B engines are identified with "ET" at the end of the Model designation, on the US EPA label. Please note : E3B is not marked on the engine.



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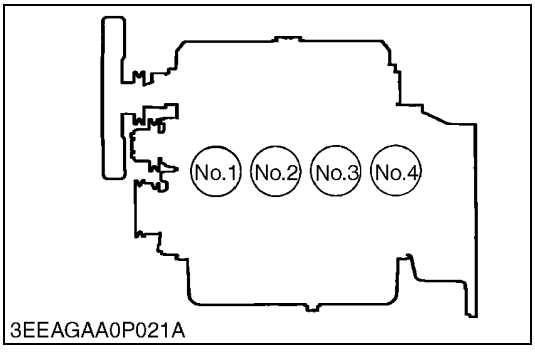
Category (1)	Engine output classification	EU regulation
K	From 19 to less than 37 kW	STAGE IIIA
J	From 37 to less than 75 kW	STAGE IIIA
I	From 75 to less than 130 kW	STAGE IIIA

Category (2)	Engine output classification	EPA regulation
ET	Less than 19kW	Tier 4
	From 19 to less than 56 kW	Interim Tier 4
	From 56 to less than 75 kW	Tier 3
	From 75 to less than 130 kW	Tier 3

(1) EU regulation engine output classification category
(2) "E3B" engines are identified with "ET" at the end of the Model designation, on the US EPA label.
"E3B" designates Tier 3 and some Interim Tier 4 / Tier 4 models, depending on engine output classification.

W1031971

[4] CYLINDER NUMBER



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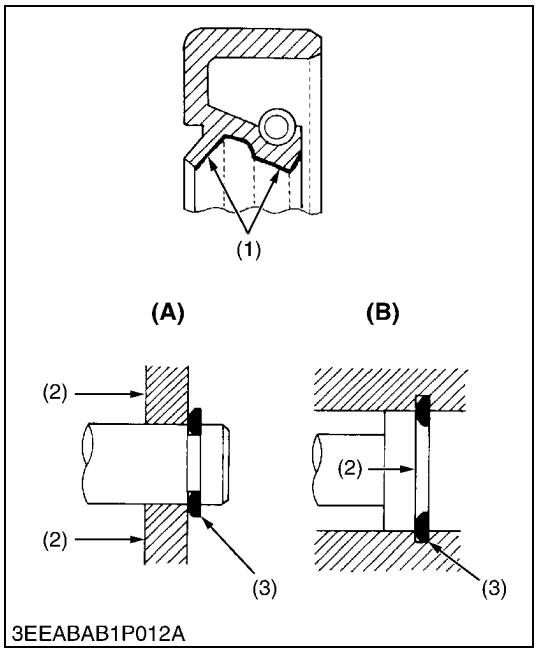
The cylinder numbers of kubota diesel engine are designated as shown in the figure.

The sequence of cylinder numbers is given as No. 1, No. 2, No. 3 and No. 4 starting from the front cover side.

W1011077

2. GENERAL PRECAUTIONS



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- During disassembly, carefully arrange removed parts in a clean area to prevent confusion later. Screws, bolts and nuts should be replaced in their original position to prevent reassembly errors.
- When special tools are required, use KUBOTA genuine special tools. Special tools which are not frequently used should be made according to the drawings provided.
- Before disassembling or servicing live wires, make sure to always disconnect the grounding cable from the battery first.
- Remove oil and dirt from parts before measuring.
- Use only KUBOTA genuine parts for parts replacement to maintain engine performance and to ensure safety.
- Gaskets and O-rings must be replaced during reassembly. Apply grease to new O-rings or oil seals before assembling.
- When reassembling external or internal snap rings, position them so that the sharp edge faces against the direction from which force is applied.
- Be sure to perform run-in the serviced or reassembled engine. Do not attempt to give heavy load at once, or serious damage may result to the engine.

(1) Grease
(2) Force
(3) Place the Sharp Edge against the Direction of Force

(A) External Snap Ring
(B) Internal Snap Ring

W1011734

3. MAINTENANCE CHECK LIST

To maintain long-lasting and safe engine performance, make it a rule to carry out regular inspections by following the table below.

Item	Service Interval									
	Initial 50 hrs	Every 50 hrs	Every 250 hrs	Every 500 hrs	Every 1000 hrs	Every 1 or 2 months	Every 1500 hrs	Every 3000 hrs	Every 1 year	Every 2 years
Changing engine oil	☆			☆					☆	
Replacing oil filter cartridge	☆			☆						
*Checking fuel hoses and clamp bands		☆								
*Cleaning air cleaner element (Replace the element after 6 times cleanings)			☆							
Cleaning fuel filter (Element type)			☆							
Checking battery electrolyte level			☆							
Checking radiator hoses and clamp bands			☆							
*Checking intake air line			☆							
Checking fan belt tension and damage	☆		☆							
*Replacing fuel filter cartridge				☆						
Replacing fan belt				☆						
Cleaning radiator interior				☆						
Checking valve clearance					☆					
Recharging battery						☆				
*Checking injection nozzle condition (spraying, pressure and valve seat tightness)							☆			
*Checking turbocharger								☆		
*Checking fuel injection pump								☆		
*Checking injection timing (spill timing)								☆		
*Replacing air cleaner element									☆	
Changing radiator coolant (L.L.C.)										☆
Replacing radiator hoses and clamp bands										☆
*Replacing fuel hoses and clamp bands										☆
*Replacing intake air line										☆
Replacing battery										☆

- When the battery is used for less than 100 hours in a year, check its electrolyte yearly. (for refillable battery's only)
- The items listed above (* marked) are registered as emission related critical parts by KUBOTA in the U.S.EPA nonroad emission regulation.
  As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.

W1029462

CAUTION

- **When changing or inspecting, be sure to level and stop the engine.**

■ **NOTE**

Changing interval of engine oil :

Models	Interval
V2607-DI-E3B V2607-DI-T-E3B V3007-DI-T-E3B V3307-DI-T-E3B	500 Hrs or 1 year whichever comes first
Initial	50 Hrs

API service classification : above CF grade
Ambient temperature : below 35 °C (95 °F)

■ **NOTE**

Engine Oil :

- **Refer to the following table for the suitable American Petroleum Institute (API) classification of engine oil according to the engine type (with internal EGR, external EGR or non-EGR) and the Fuel Type Used : (Low Sulfur, Ultra Low Sulfur or High Sulfur Fuels).**

Fuel Type	Engine oil classification (API classification)	
	Engines with non-EGR Engines with internal EGR	Engines with external EGR
High Sulfur Fuel [0.05 % (500 ppm) ≤ Sulfur Content < 0.50 % (5000 ppm)]	**CF** (If the "CF-4, CG-4, CH-4, or CI-4" engine oil is used with a high-sulfur fuel, change the engine oil at shorter intervals. (approximately half))	–
Low Sulfur Fuel [Sulfur Content < 0.05 % (500 ppm)] or Ultra Low Sulfur Fuel [Sulfur Content < 0.0015 % (15 ppm)]	**CF, CF-4, CG-4, CH-4** or **CI-4**	**CF** or **CI-4** (Class CF-4, CG-4 and CH-4 engine oils cannot be used on EGR type engines.)

EGR : Exhaust Gas Re-circulation

W1024941

- **CJ-4 classification oil is intended for use in engines equipped with DPF (Diesel Particulate Filter) and is Not Recommended for use in Kubota E3 specification engines.**
- **Oil used in the engine should have API classification and Proper SAE Engine Oil Viscosity according to the ambient temperatures where the engine is operated.**
- **With strict emission control regulations now in effect, the CF-4 and CG-4 engine oils have been developed for use with low sulfur fuels, for On-Highway vehicle engines. When a Non-Road engine operates on high sulfur fuel, it is advisable to use a "CF or better" classification engine oil with a high Total Base Number (a minimum TBN of 10 is recommended).**

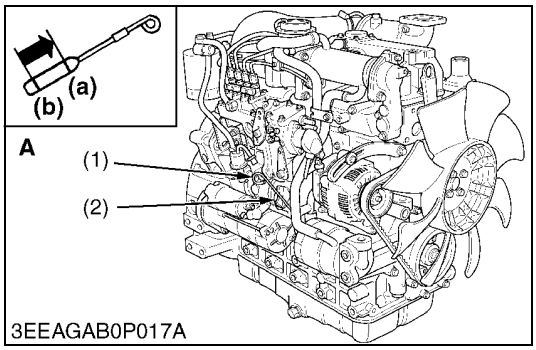
Fuel :

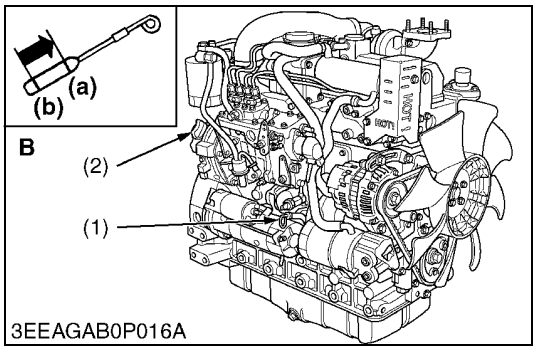
- **Cetane Rating : The minimum recommended Fuel Cetane Rating is 45. A cetane rating greater than 50 is preferred, especially for ambient temperatures below −20 °C (−4 °F) or elevations above 1500 m (5000 ft).**
- **Diesel Fuel Specification Type and Sulfur Content % (ppm) used, must be compliant with all applicable emission regulations for the area in which the engine is operated.**
- **Use of diesel fuel with sulfur content less than 0.10 % (1000 ppm) is strongly recommended.**
- **If high-sulfur fuel (sulfur content 0.50 % (5000 ppm) to 1.0 % (10000 ppm)) is used as a diesel fuel, change the engine oil and oil filter at shorter intervals. (approximately half)**
- **DO NOT USE Fuels that have sulfur content greater than 1.0 % (10000 ppm).**
- **Diesel fuels specified to EN 590 or ASTM D975 are recommended.**
- **No.2-D is a distillate fuel of lower volatility for engines in industrial and heavy mobile service. (SAE J313 JUN87)**
- **Since KUBOTA diesel engines of less than 56 kW (75 hp) utilize EPA Tier 4 and Interim Tier 4 standards, the use of low sulfur fuel or ultra low sulfur fuel is mandatory for these engines, when operated in US EPA regulated areas. Therefore, please use No.2-D S500 or S15 diesel fuel as an alternative to No.2-D, and use No.1-D S500 or S15 diesel fuel as an alternative to No.1-D for ambient temperatures below −10 °C (14 °F).**

1) SAE : Society of Automotive Engineers
2) EN : European Norm
3) ASTM : American Society of Testing and Materials
4) US EPA : United States Environmental Protection Agency
5) No.1-D or No.2-D, S500 : Low Sulfur Diesel (LSD) less than 500 ppm or 0.05 wt.%
   No.1-D or No.2-D, S15 : Ultra Low Sulfur Diesel (ULSD) 15 ppm or 0.0015 wt.%

4. CHECK AND MAINTENANCE

[1] DAILY CHECK POINTS





Checking Engine Oil Level

1. Level the engine.
2. To check the oil level, draw out the dipstick (1), wipe it clean, reinsert it, and draw it out again.
   Check to see that the oil level lies between the two notches.
3. If the level is too low, add new oil to the specified level.

■ **IMPORTANT**

- **When using an oil of different maker or viscosity from the previous one, drain old oil. Never mix two different types of oil.**

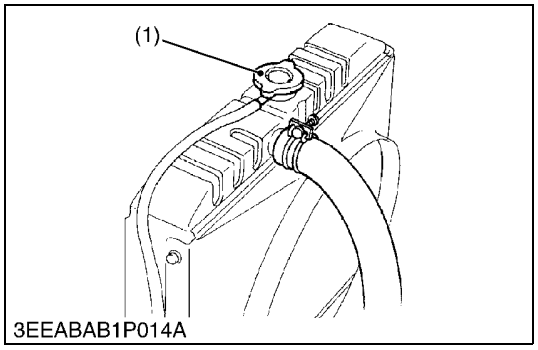
■ **NOTE**

- **Be sure to inspect the engine, locating it on a horizontal place. If placed on gradients, accurately, oil quantity may not be measured.**
- **Be sure to keep the oil level between upper and lower lines of the dipstick (1). Too much oil may cause a drop in output or excessive blow-by gas. On the closed breather type engine in which mist is sucked through port, too much oil may caused oil hammer. While too little oil, may seize the engine's rotating and sliding parts.**

(1) Dipstick
(2) Oil Filler Plug

(a) Upper Line
(b) Lower Line
A : V2607-DI-E3B / V2607-DI-T-E3B
B : V3007-DI-T-E3B / V3307-DI-T-E3B

W1035676



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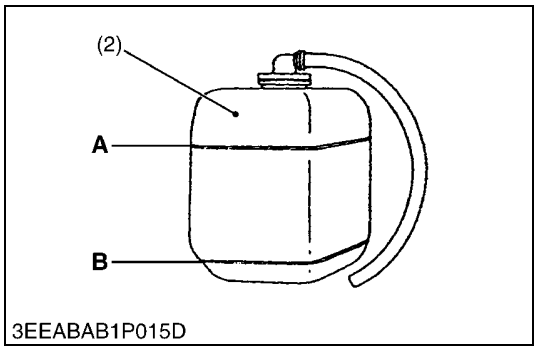

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Checking and Replenish Coolant

1. Without recovery tank (2) :
   Remove the radiator cap (1) and check to see that the coolant level is just below the port.
   With recovery tank (2) :
   Check to see that the coolant level lies between **FULL** (**A**) and **LOW** (**B**).
2. If coolant level is too low, check the reason for decreasing coolant.
   (Case 1)
   If coolant is decreasing by evaporation, replenish only fresh, soft water.
   (Case 2)
   If coolant is decreasing by leak, replenish coolant of the same manufacture and type in the specified mixture ratio (fresh, soft water and L.L.C.). If the coolant brand cannot be identified, drain out all of the remaining coolant and refill with a totally new brand of coolant mix.

CAUTION

- **Do not remove the radiator cap (1) until coolant temperature is below its boiling point. Then loosen the cap slightly to relieve any excess pressure before removing the cap completely.**

IMPORTANT

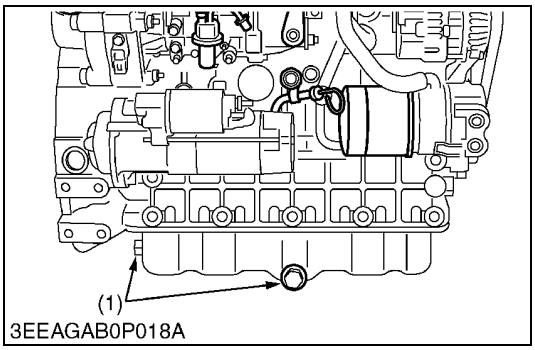
- **During filling the coolant, air must be vented from the engine coolant passages. The air vents by jiggling the radiator upper and lower hoses.**
- **Be sure to close the radiator cap (1) securely. If the cap is loose or improperly closed, coolant may leak out and the engine could overheat.**
- **Do not use an antifreeze and scale inhibitor at the same time.**
- **Never mix the different type or brand of L.L.C..**

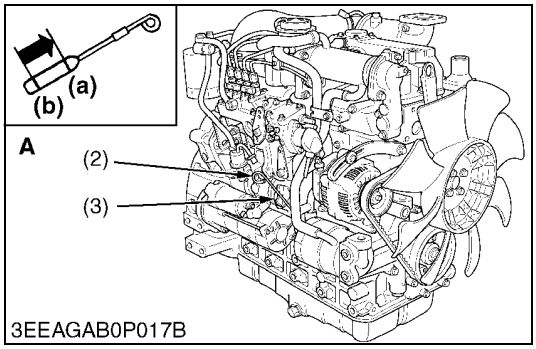
(1) Radiator Cap
(2) Recovery Tank

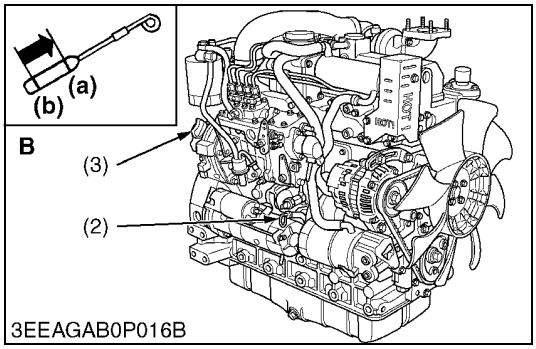
A : FULL
B : LOW

W1035779

[2] CHECK POINTS OF INITIAL 50 HOURS







Changing Engine Oil

CAUTION

- **Be sure to stop engine before changing engine oil.**

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. To drain the used oil, remove the drain plug (1) at the bottom of the engine and drain the oil completely.
4. Screw the drain plug (1).
5. Fill new oil up to upper line on the dipstick (2).

IMPORTANT

- **When using an oil of different maker or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different types of oil.**
- **Engine oil should have properties of API classification CF (See page G-6).**
- **Use the proper SAE Engine Oil according to ambient temperature.**

Above 25 °C (77 °F)	SAE 30 or SAE 10W-30 SAE 15W-40
0 °C to 25 °C (32 °F to 77 °F)	SAE 20 or SAE 10W-30 SAE 15W-40
Below 0 °C (32 °F)	SAE 10W or SAE 10W-30 SAE 15W-40

Engine oil capacity	V2607-DI-E3B V2607-DI-T-E3B	10.2 L 2.69 U.S.gals
	V3007-DI-T-E3B V3307-DI-T-E3B	11.2 L 2.96 U.S.gals

Tightening torque	Drain plug	45 to 53 N·m 4.5 to 5.5 kgf·m 33 to 39 lbf·ft

(1) Drain Plug
(2) Dipstick
(3) Oil Filler Plug

(a) Upper Line
(b) Lower Line
A : V2607-DI-E3B / V2607-DI-T-E3B
B : V3007-DI-T-E3B / V3307-DI-T-E3B

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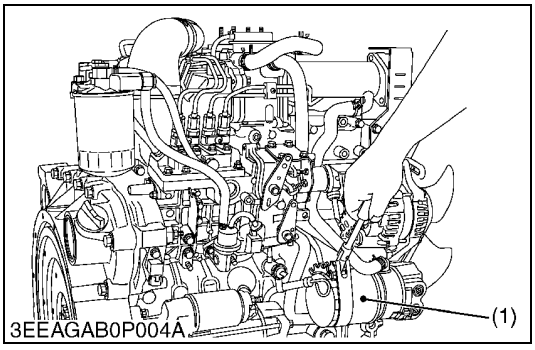


Replacing Oil Filter Cartridge

CAUTION

- **Be sure to stop the engine before changing filter cartridge.**

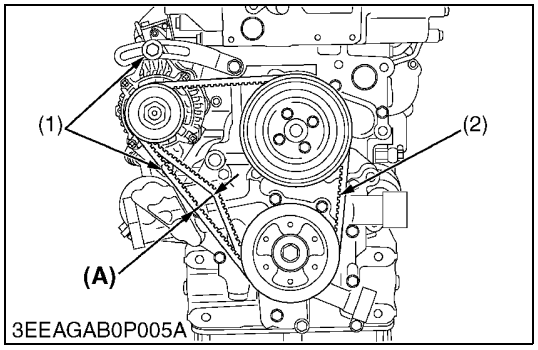
1. Remove the oil filter cartridge (1) with the filter wrench.
2. Apply a slight coat of oil onto the new cartridge gasket.
3. To install the new cartridge, screw it in by hand. Over tightening may cause deformation of rubber gasket.
4. After the new cartridge has been replaced, the engine oil normally decrease a little. Thus see that the engine oil does not leak through the seal and be sure to read the oil level on the dipstick. Then, replenish the engine oil up to the specified level.

IMPORTANT

- **To prevent serious damage to the engine, replacement element must be highly efficient. Use only a KUBOTA genuine filter or its equivalent.**

(1) Engine Oil Filter Cartridge

W1017137



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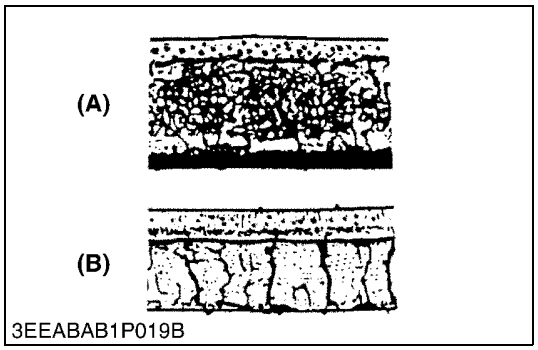
Checking Fan Belt Tension

1. Measure the deflection **(A)**, depressing the fan belt (2) halfway between the fan drive pulley and alternator pulley at specified force 98 N (10 kgf, 22 lbf).
2. If the measurement is not within the factory specifications, loosen the alternator mounting screws (1) and relocate the alternator to adjust.

Deflection **(A)**	Factory spec.	10.0 to 12.0 mm 0.394 to 0.472 in.

(1) Alternator Mounting Screw
(2) Fan Belt
(A) Deflection

W1208957



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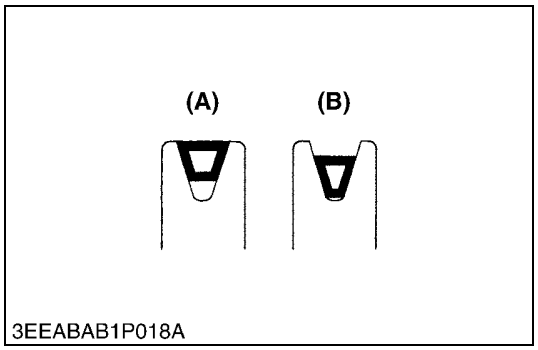
Checking Fan Belt Damage and Wear

1. Check the fan belt for damage.
2. If the fan belt is damaged, replace it.
3. Check if the fan belt is worn and sunk in the pulley groove.
4. If the fan belt is nearly worn out and deeply sunk in the pulley groove, replace it.

(A) Good **(B) Bad**

W1033474



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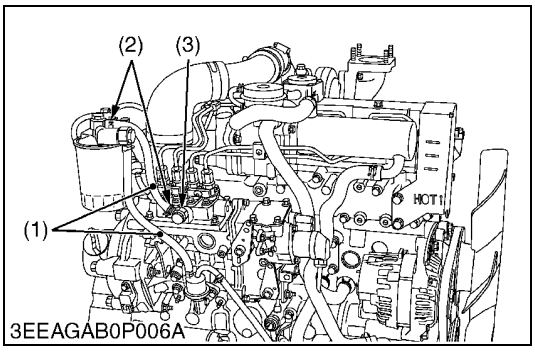
[3] CHECK POINT OF EVERY 50 HOURS



Checking Fuel Hoses and Clamp Bands

1. If the clamp band (2) is loose, apply oil to the threads and securely retighten it.
2. The fuel hose (1) is made of rubber and ages regardless of the period service.
   Change the fuel pipe together with the clamp band (2) every two years.
3. However, if the fuel hose (1) and clamp bands (2) are found to be damaged or deteriorate earlier than two years, then change or remedy.
4. After the fuel hose (1) and the clamp bands (2) have been changed, bleed the fuel system.

CAUTION

- **Stop the engine when attempting the check and change prescribed above.**

(When bleeding fuel system)

1. Fill the tank with fuel and open the cock.
2. Loosen the air vent coupling bolt of fuel filter a few turns.
3. When there is no more air bubbles in the fuel coming out of this coupling bolt, tighten the coupling bolt.
4. Open the air vent cock (3) on the top of fuel injection pump.
5. If equipped electrical fuel feed pump, turn the key on **AC** position and pump the fuel up for 10 to 15 seconds.
   If equipped mechanical fuel feed pump, set the stop lever on stop position and crank the engine for 10 to 15 seconds.
6. Close securely the air vent cock (3) after air bleeding.

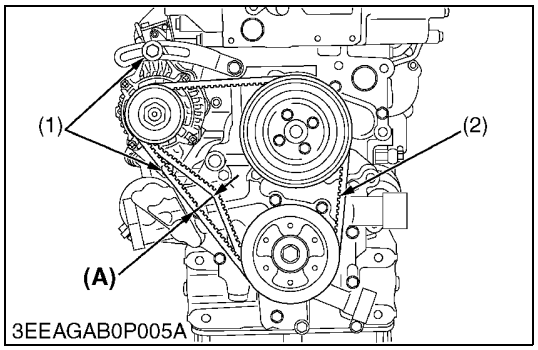
■ IMPORTANT

- **Except when venting the air, be sure to keep closed the air vent coupling bolt of the fuel injection pump. Otherwise, the engine may stall.**

(1) Fuel Hose
(2) Clamp Band
(3) Air Vent Cock

W1035921

[4] CHECK POINTS OF EVERY 250 HOURS



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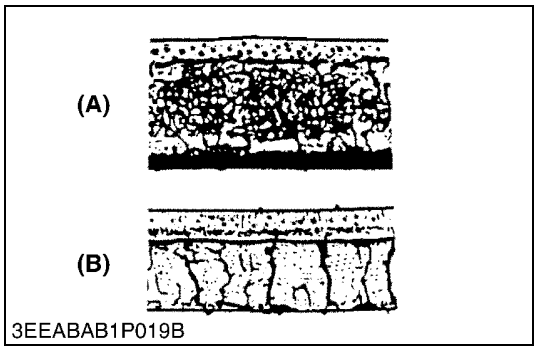
Checking Fan Belt Tension

1. Measure the deflection **(A)**, depressing the fan belt (2) halfway between the fan drive pulley and alternator pulley at specified force 98 N (10 kgf, 22 lbf).
2. If the measurement is not within the factory specifications, loosen the alternator mounting screws (1) and relocate the alternator to adjust.

Deflection **(A)**	Factory spec.	10.0 to 12.0 mm 0.394 to 0.472 in.

(1) Alternator Mounting Screw
(2) Fan Belt
(A) Deflection

W1014131



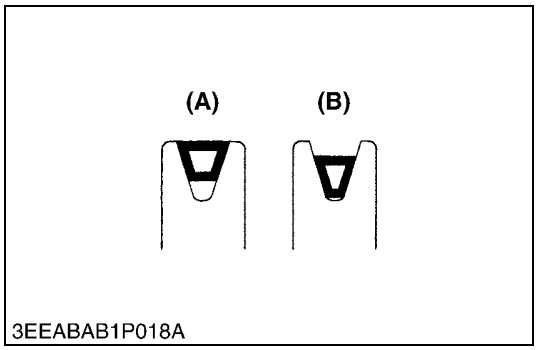
3EEABAB1P019B

Checking Fan Belt Damage and Wear

1. Check the fan belt for damage.
2. If the fan belt is damaged, replace it.
3. Check if the fan belt is worn and sunk in the pulley groove.
4. If the fan belt is nearly worn out and deeply sunk in the pulley groove, replace it.

(A) Good **(B) Bad**

W1209480



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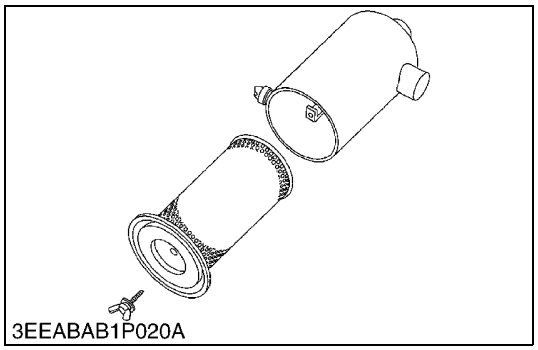
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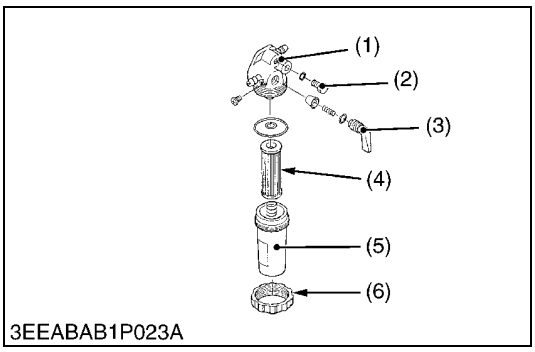
Cleaning Air Cleaner Element

1. Remove the air cleaner element.
2. Use clean dry compressed air on the inside of the element.
   Pressure of compressed air must be under 205 kPa (2.1 kgf/cm^2, 30 psi).
   Maintain reasonable distance between the nozzle and the filter.

■ **NOTE**
- **The air cleaner uses a dry element. Never apply oil to it.**
- **Do not operate the engine with filter element removed.**
- **Change the element once a year or every 6th cleaning.**

W1045746



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Cleaning Fuel Filter (Element Type only)

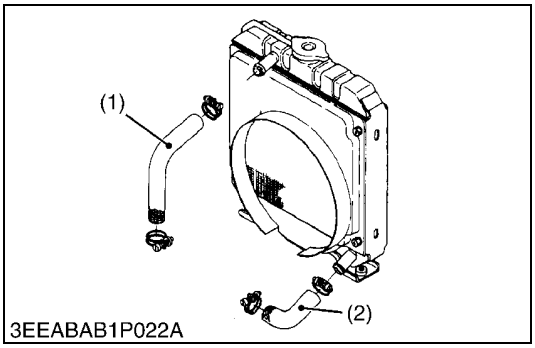
1. Close the fuel cock (3).
2. Unscrew the retaining ring (6) and remove the filter cup (5), and rinse the inside with kerosene.
3. Take out the element (4) and dip it in the kerosene to rinse.
4. After cleaning, reassemble the fuel filter, keeping out dust and dirt.
5. Bleed the fuel system.

■ **IMPORTANT**

- **If dust and dirt enter the fuel, the fuel injection pump and injection nozzle will wear quickly. To prevent this, be sure to clean the filter cup (5) periodically.**

(1) Cock Body
(2) Air Vent Plug
(3) Fuel Cock
(4) Filter Element
(5) Filter Cup
(6) Retaining Ring

W1046058



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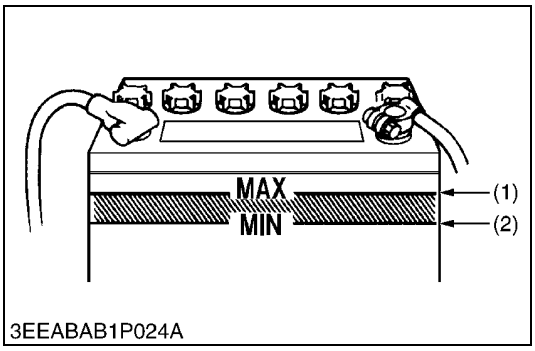
Checking Radiator Hoses and Clamp Bands

1. Check to see if the radiator hoses are properly fixed every 250 hours of operation or every six months, whichever comes first.
2. If the clamp band is loose, apply oil to the threads and retighten it securely.
3. The water hose is made of rubber and tends to age. It must be replaced every two years. Also replace the clamp band and tighten it securely.

(1) Upper Hose
(2) Lower Hose

W1029518



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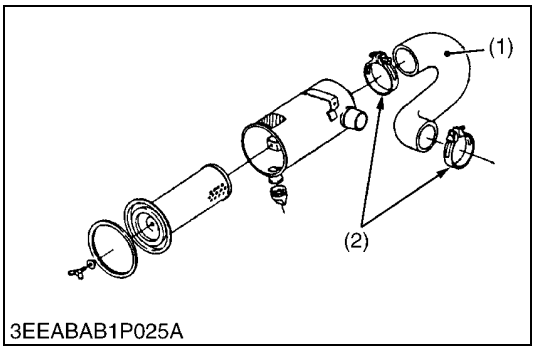
Checking Battery Electrolyte Level (for Refillable Battery's only)

1. Check the battery electrolyte level.
2. If the level is below the lower level line (2), fill each cell with distilled water until the upper level line.

(1) Upper Level Line
(2) Lower Level Line

W1047154



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Checking Intake Air Line

1. Check to see if the intake air hose (1) is properly fixed every 250 hours of operation.
2. If the clamp bands (2) are loose, apply oil to the threads and retighten them securely.
3. The intake air hose (1) is made of rubber and tends to age. It must be change every two years. Also change the clamp bands (2) and tighten them securely.

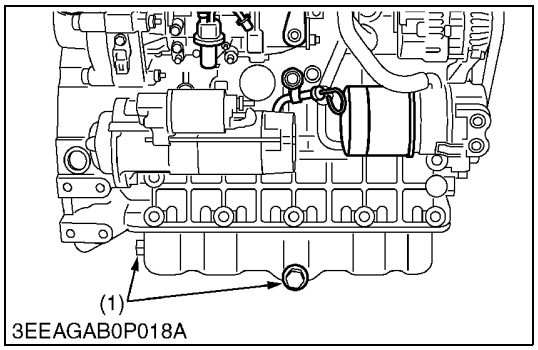
■ **IMPORTANT**

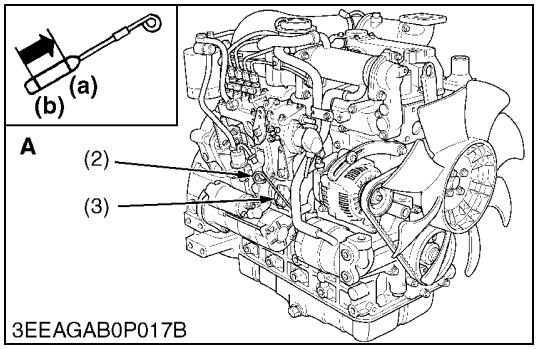
- **To prevent serious damage to the engine, keep out any dust inside the intake air line.**

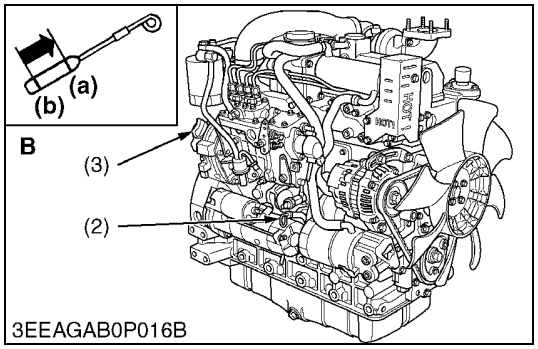
(1) Intake Air Hose
(2) Clamp Band

W1029631

[5] CHECK POINTS OF EVERY 500 HOURS







Changing Engine Oil

CAUTION

- **Be sure to stop engine before changing engine oil.**

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. To drain the used oil, remove the drain plug (1) at the bottom of the engine and drain the oil completely.
4. Screw the drain plug (1).
5. Fill new oil up to upper line on the dipstick (2).

IMPORTANT

- **When using an oil of different maker or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different types of oil.**
- **Engine oil should have properties of API classification CF (See page G-6).**
- **Use the proper SAE Engine Oil according to ambient temperature.**

Above 25 °C (77 °F)	SAE 30 or SAE 10W-30 SAE 15W-40
0 °C to 25 °C (32 °F to 77 °F)	SAE 20 or SAE 10W-30 SAE 15W-40
Below 0 °C (32 °F)	SAE 10W or SAE 10W-30 SAE 15W-40

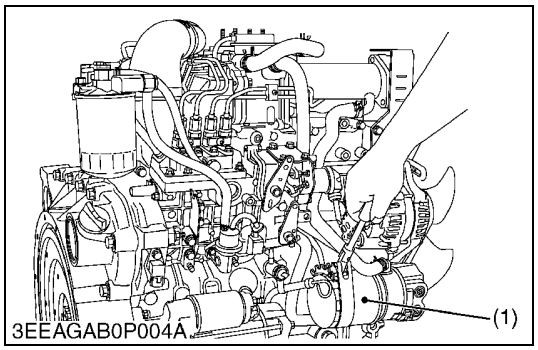
Engine oil capacity	V2607-DI-E3B V2607-DI-T-E3B	10.2 L 2.69 U.S.gals
	V3007-DI-T-E3B V3307-DI-T-E3B	11.2 L 2.96 U.S.gals

Tightening torque	Drain plug	45 to 53 N·m 4.5 to 5.5 kgf·m 33 to 39 lbf·ft

(1) Drain Plug
(2) Dipstick
(3) Oil Filler Plug

(a) Upper Line
(b) Lower Line
A : V2607-DI-E3B / V2607-DI-T-E3B
B : V3007-DI-T-E3B / V3307-DI-T-E3B

W1014590



Replacing Oil Filter Cartridge

CAUTION

- **Be sure to stop the engine before changing filter cartridge.**

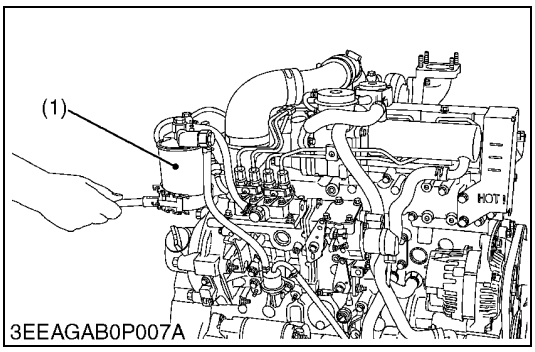
1. Remove the oil filter cartridge (1) with the filter wrench.
2. Apply a slight coat of oil onto the new cartridge gasket.
3. To install the new cartridge, screw it in by hand. Over tightening may cause deformation of rubber gasket.
4. After the new cartridge has been replaced, the engine oil normally decrease a little. Thus see that the engine oil does not leak through the seal and be sure to read the oil level on the dipstick. Then, replenish the engine oil up to the specified level.

IMPORTANT

- **To prevent serious damage to the engine, replacement element must be highly efficient. Use only a KUBOTA genuine filter or its equivalent.**

(1) Engine Oil Filter Cartridge

W1015117



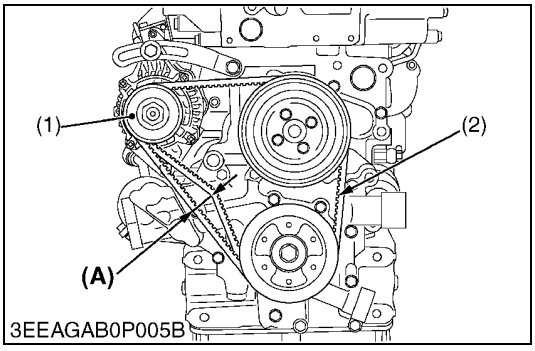
Replacing Fuel Filter Cartridge (Cartridge Type)

Water and dust in fuel are collected in the filter cartridge. So, change the filter cartridge every 500 hours service.

1. Remove the used filter cartridge with filter wrench.
2. Apply a thin film of fuel to the surface of new filter cartridge gasket before screwing on.
3. Then tighten enough by hand.
4. Loosen the air vent plug to let the air out.
5. Start engine and check for fuel leakage.

(1) Fuel Filter Cartridge

W1037062



Replacing Fan Belt

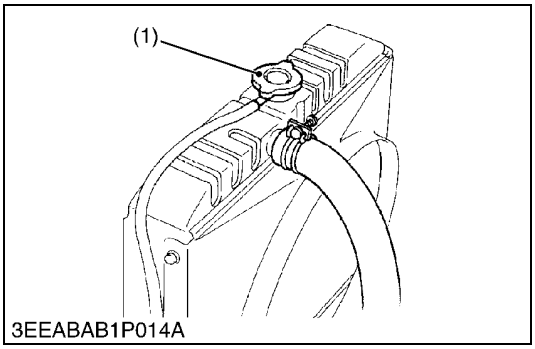
1. Remove the alternator (1).
2. Remove the fan belt (2).
3. Replace new fan belt.
4. Install the alternator.
5. Check the fan belt tension.

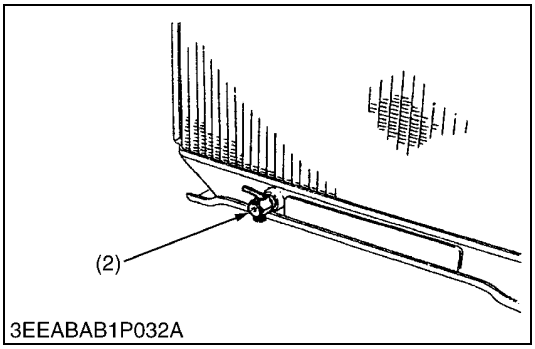
Deflection **(A)**	Factory spec.	10.0 to 12.0 mm / 98 N 0.394 to 0.472 in. / 98 N (10 kgf, 22 lbf)

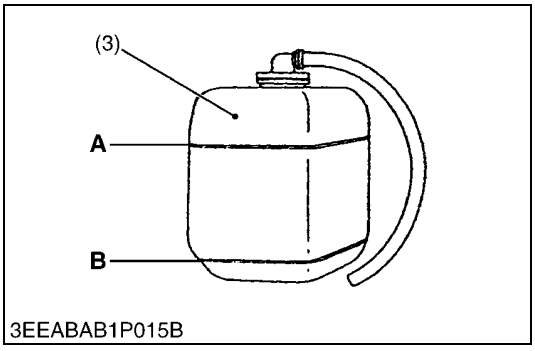
(1) Alternator
(2) Fan Belt

(A) Deflection

W1052220







Cleaning Water Jacket and Radiator Interior

CAUTION

- **Do not remove the radiator cap (1) when the engine is hot. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.**

1. Stop the engine and let cool down.
2. To drain the coolant, open the radiator drain plug (2) and remove the radiator cap (1). Then radiator cap (1) must be removed to completely drain the coolant. And open the drain cock of engine body.
3. After all coolant is drained, close the drain plug (2).
4. Fill with clean water and cooling system cleaner.
5. Follow directions of the cleaner instruction.
6. After flushing, fill with clean water and anti-freeze until the coolant level is just below the port. Install the radiator cap (1) securely.
7. Fill with coolant up to “FULL” (**A**) mark on the recovery tank (3).
8. Start and operate the engine for few minutes.
9. Stop the engine and let cool. Check coolant level of radiator and recovery tank (3) and add coolant if necessary.

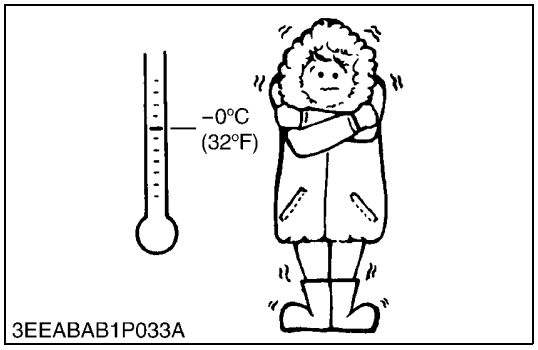
■ IMPORTANT

- **Do not start engine without coolant.**
- **Use clean, fresh, soft water and anti-freeze to fill the radiator and recovery tank (3).**
- **When the anti-freeze is mixed with fresh, soft water, the anti-freeze mixing ratio must be less than 50 %.**
- **Securely tighten radiator cap (1). If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**

(1) Radiator Cap
(2) Drain Plug
(3) Recovery Tank

A : Full
B : Low

W1038102



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Anti-Freeze

- There are two types of anti-freeze available: use the permanent type (PT) for this engine.
- Before adding anti-freeze for the first time, clean the radiator interior by pouring fresh, soft water and draining it a few times.
- The procedure for mixing water and anti-freeze differs according to the make of the anti-freeze and the ambient temperature. Basically, it should be referred to SAE J1034 standard, more specifically also to SAE J814c.
- Mix the anti-freeze with fresh, soft water, and then fill into the radiator.

■ **IMPORTANT**

- **When the anti-freeze is mixed with fresh, soft water, the anti-freeze mixing ratio must be less than 50 %.**

Vol % anti-freeze	Freezing point		Boiling point*	
	°C	°F	°C	°F
40	–24	–11	106	223
50	–37	–35	108	226

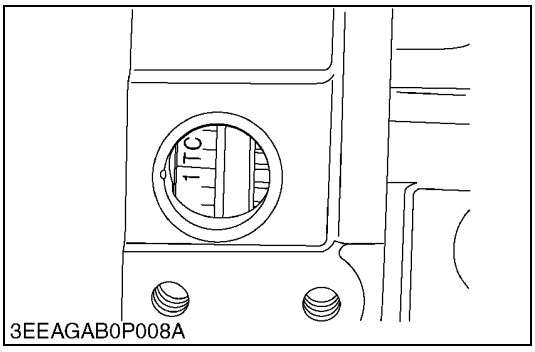
* At 1.013 × 100000 Pa (760 mmHg) pressure (atmospheric). A higher boiling point is obtained by using a radiator pressure cap which permits the development of pressure within the cooling system.

■ **NOTE**

- **The above data represents industrial standards that necessitate a minimum glycol content in the concentrated anti-freeze.**
- **When the coolant level drops due to evaporation, add fresh, soft water only to keep the anti-freeze mixing ratio less than 50 %. In case of leakage, add anti-freeze and fresh, soft water in the specified mixing ratio.**
- **Anti-freeze absorbs moisture. Keep unused anti-freeze in a tightly sealed container.**
- **Do not use radiator cleaning agents when anti-freeze has been added to the coolant.**
  (Anti-freeze contains an anti-corrosive agent, which will react with the radiator cleaning agent forming sludge which will affect the engine parts.)

W1039218

[6] CHECK POINT OF EVERY 1000 HOURS



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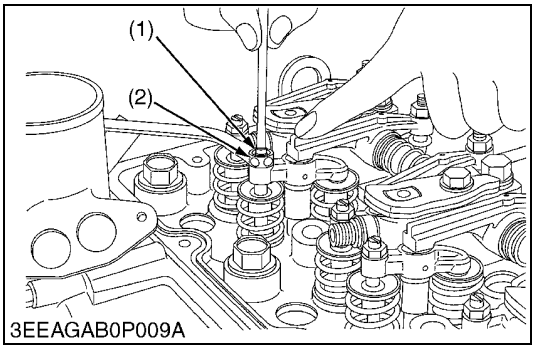

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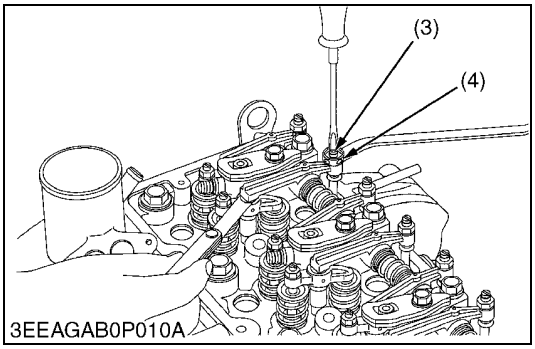

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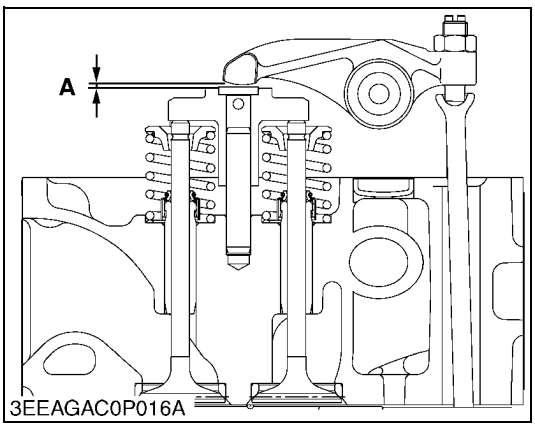

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Checking Valve Clearance

■ **IMPORTANT**

- **Valve clearance must be checked and adjusted when engine is cold.**

1. Remove the high pressure pipes, glow lead, glow plugs and the cylinder head cover.
2. Align the 1TC mark of flywheel and the convex of flywheel housing timing windows so that the first piston (front cover side) comes to the compression top dead center.

[Adjustable type of valve bridge arm]
(V3007-DI-T-E3B / V3307-DI-T-E3B)

3. Before adjusting the valve clearance, adjust the valve bridge arm evenly to the valve stem.
4. Loosen the lock nut (2) of adjusting screw (1) and adjust with screw.
5. Slightly push the rocker arm with your fingers and screw in the adjusting screw (1) slowly until you feel the screw touch the top of valve stem, then tighten the lock nut (2).
6. Loosen the lock nut (4) of adjusting screw (3) (push rod side) and insert the feeler gauge between the rocker arm and the head of valve bridge arm. Set the adjusting screw (3) to the specified value, then tighten the lock nut.

[Adjustment unnecessary type of valve bridge arm]
(V2607-DI-E3B / V2607-DI-T-E3B / V3007-DI-T-E3B / V3307-DI-T-E3B)

3. Loosen the lock nut (4) of adjusting screw (3) (push rod side) and insert the feeler gauge between the rocker arm and the head of valve bridge arm. Set the adjusting screw (3) to the specified value, then tighten the lock nut.

Valve clearance (**A**)	Factory spec.	0.13 to 0.17 mm 0.0052 to 0.0066 in.

■ **NOTE**

- **After adjusting, tighten the lock nut (4) securely.**

Valve arrangement Adjustment cylinder Location of piston		IN.	EX.
When No.1 piston is at compression top dead center	1st	☆	☆
	2nd	☆	
	3rd		☆
	4th		
When No.1 piston is at overlap position	1st		
	2nd		☆
	3rd	☆	
	4th	☆	☆

Tightening torque	Cylinder head cover screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft
	Injection pipe retaining nut	23 to 36 N·m 2.3 to 3.7 kgf·m 17 to 26 lbf·ft

(1) Adjusting Screw
(2) Lock Nut
(3) Adjusting Screw
(4) Lock Nut

A : Valve Clearance

W1047000

[7] CHECK POINTS OF EVERY 1 OR 2 MONTHS

Recharging

CAUTION

- **When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.**
- **When charging battery, remove battery vent plugs.**
- **When disconnecting the cable from the battery, start with the negative terminal first. When connecting the cable to the battery, start with the positive terminal first.**
- **Never check battery charge by placing a metal object across the posts.**
  Use a voltmeter or hydrometer.

1) Slow Charging

1. Add distilled water if the electrolyte level is low. When charging, the amount of electrolyte should be slightly lower than the specified level to prevent overflow.
2. Connect the battery to the charging unit, following the manufacture's instructions.
3. As the electrolyte generates gas while charging, remove all port caps.
4. The electrolyte temperature must not exceed 40 °C (104 °F) during charging.
   If it exceed 40 °C (104 °F), decrease the charging amperage or stop charging for a while.
5. When charging several batteries in series, charge at the rate of the smallest battery in the line.

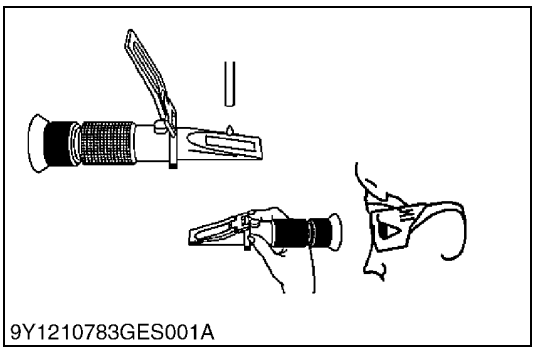
2) Quick Charging

1. Determine the proper charging current and charging time with the tester attached to the quick charger.
2. Determine the proper charging current as 1/1 of the battery capacity. If the battery capacity exceeds 50 Ah, consider 50 A as the maximum.

■ **Precaution for Operating a Quick Charger**

- Operate with a quick charger differs according to the type.
  Consult the instruction manual and use accordingly.

W1052658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Battery Specific Gravity

- If battery acid (dilute sulfuric acid) gets on you it could cause blindness or burns, or could cause corrosion of machinery and tools so please be careful when handling.
- Wear safety glasses and rubber gloves when performing battery maintenance and inspection (measuring specific gravity, replenishing water, or charging).
- If the gas that is generated is ignited by an ignition source, it may explode so be very careful with sparks and fire.
- Keep your body and face as far away from the battery as you can when performing maintenance and inspection.
- Do not allow people who do not know how to handle a battery or who do not sufficiently understand the danger perform inspection or maintenance.

(Measurement items)

■ Zero adjustment

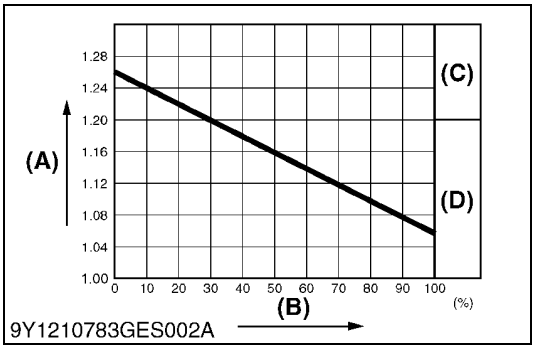
1. Open the cover and drip water on the prism surface using the included rod.
2. Close the cover.
3. Aim in a direction that is bright, look into the lens, and adjust the focus until the gradations can be seen clearly.
4. If the boundary line is not on the gradation baseline (0 position), turn the adjustment screw until it matches.
5. When zero adjustment is complete, wipe the prism and cover surface with a soft cloth or tissue paper.

■ Measurement of test fluid

1. Open the cover and drip test fluid on the prism surface using the included rod.
2. Close the cover.
3. Aim in a direction that is bright, look into the lens and read the gradation of the blue boundary line.
4. When the measurement is complete, wipe the prism and cover surface with a soft cloth or tissue paper.

(Reference)

Electrolyte specific gravity and amount of discharge.
Use the following table as a reference.



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(A) Electrolyte Specific Gravity
(B) Discharge
(C) Good
(D) Charging is necessary.

■ NOTE

Temperature conversion of electrolyte specific gravity

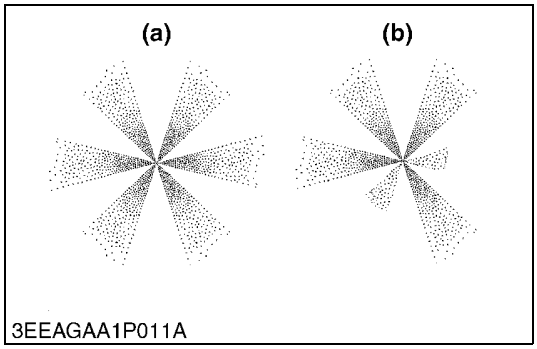
- **Battery electrolyte specific gravity changes based on temperature.**
- **Insert the value identified on a specific gravity meter into the following conversion equation for temperature correction to learn an accurate specific gravity value.**
  (Standard temperature assumed to be 20 °C (68 °F))
  D_{20} = Dt + 0.0007 (t - 20)
  D_{20} = specific gravity value converted to standard temperature of 20 °C (68 °F)
  D_t = measured specific gravity value at the electrolyte temperature t °C

W1012763

[8] CHECK POINTS OF EVERY 1500 HOURS

CAUTION

- **Check the nozzle injection pressure and condition after confirming that there is nobody standing in the direction the spray goes.**
- **If the spray from the nozzle directly contacts the human body, cells may be destroyed and blood poisoning may be caused.**



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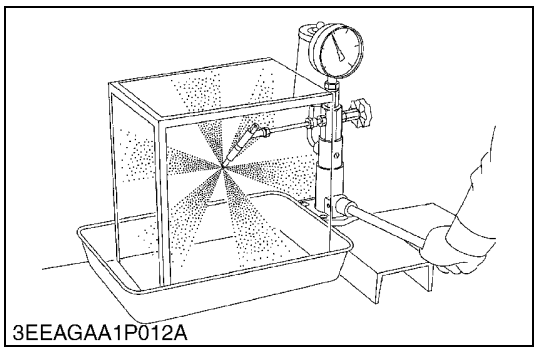
Checking Nozzle Spraying Condition

1. Attach the injection nozzle to the nozzle tester, and check the nozzle spraying condition.
2. If the spraying condition is defective, replace the injection nozzle assembly or repair at Kubota-authorized nozzle service shop.

(a) Good **(b) Bad**

W10371670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Checking Nozzle Injection Pressure

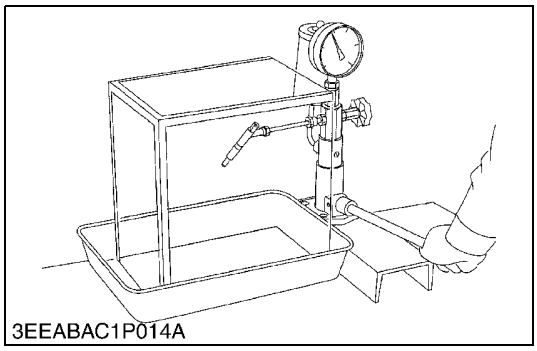
1. Attach the injection nozzle to the nozzle tester.
2. Slowly move the tester handle to measure the pressure at which fuel begins jetting out from the nozzle.
3. If the measurement is not within the factory specifications, replace the injection nozzle assembly or repair at Kubota-authorized nozzle service shop.

■ **NOTE**

- **Injection nozzle gasket must be replaced when the injection nozzle is removed for checking.**

Injection pressure (1st stage)	Factory spec.	V2607-DI-E3B V2607-DI-T-E3B	18.64 to 20.10 MPa 190.0 to 205.0 kgf/cm^2 2703 to 2915 psi
		V3007-DI-T-E3B V3307-DI-T-E3B	18.64 to 19.61 MPa 190.0 to 200.0 kgf/cm^2 2703 to 2844 psi

W1037280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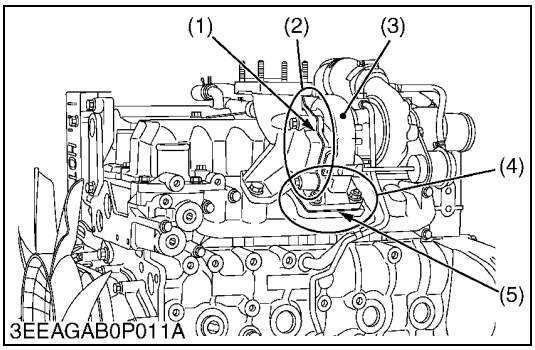
Checking Valve Seat Tightness

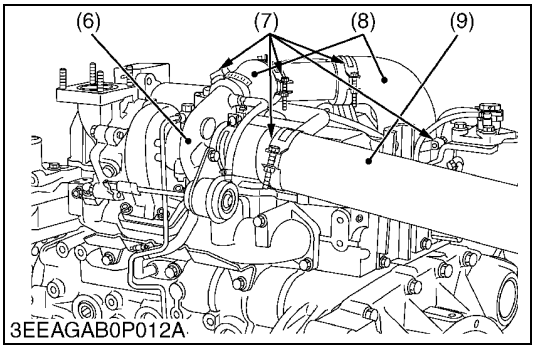
1. Attach the injection nozzle to the nozzle tester.
2. Raise the fuel pressure, and keep at 16.67 MPa (170.0 kgf/cm^2, 2418 psi) for 10 seconds.
3. If any fuel leak is found, replace the injection nozzle assembly or repair at Kubota-authorized nozzle service shop.

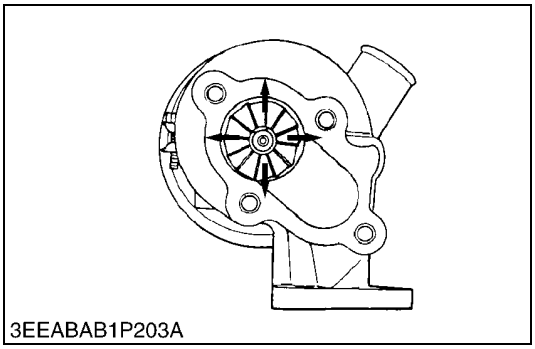
Valve seat tightness	Factory spec.	No fuel leak at 16.67 MPa 170.0 kgf/cm^2 2418 psi

W10374150

[9] CHECK POINTS OF EVERY 3000 HOURS







Checking Turbocharger (for V2607-DI-T-E3B / V3007-DI-T-E3B / V3307-DI-T-E3B)

(Turbine Side)

1. Check the exhaust port (2) and inlet port (4) side of turbine housing (3) to see if there is no exhaust gas leak.
2. If any gas leak is found, retighten the bolts and nuts or replace the gasket ((1) or (5)) with new one.

(Compressor Side)

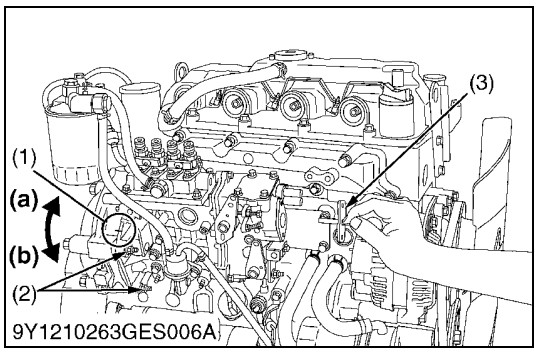
1. Check the inlet hose (9) of the compressor cover (6) to see if there is no air leak.
2. If any air leak is found, change the clamp band (7) and / or inlet hoses (9).
3. Check the intake hose (8) and the clamp band (7) to see if there is not loose or crack.
4. If any loose or crack is found, tighten the clamp band (7) or change the hose ((8) or (9)) to prevent dust from entry.

(Radial Clearance)

1. If the wheel contact to the housing, replace the turbocharger assembly with new one.

(1) Gasket
(2) Exhaust Port
(3) Turbine Housing
(4) Inlet Port
(5) Gasket
(6) Compressor Cover
(7) Clamp Band
(8) Intake Hose
(9) Inlet Hose

W1022082



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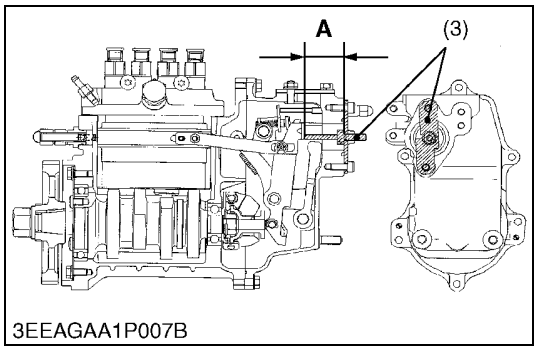

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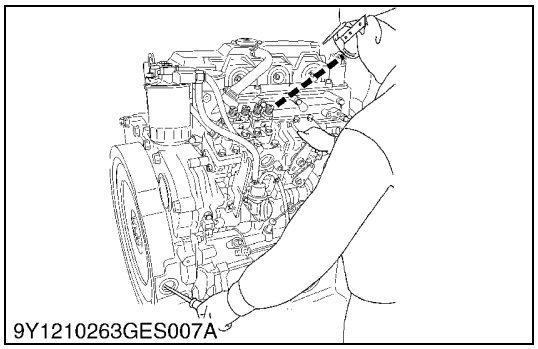
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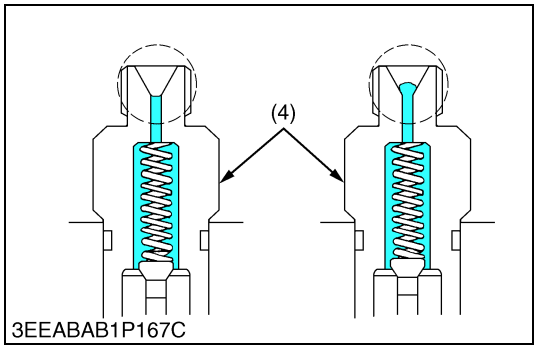

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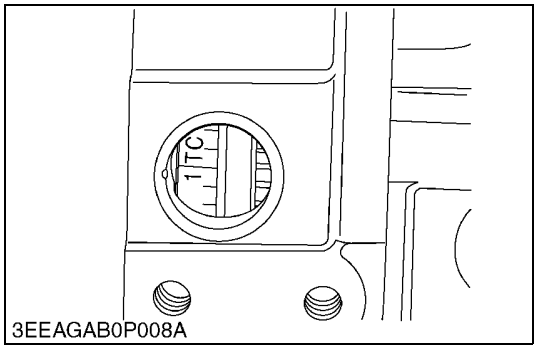

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Checking Injection Timing (for V2607-DI-E3B)

1. Make sure of matching the injection timing align mark (1) of the injection pump unit and the flywheel housing, as shown in the illustration.
2. Remove the injection pipes.
3. Remove the stop solenoid.
4. Set the fuel control rack fixing tool (3) to fix injection pump control rack as shown in the illustration. (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.)
5. Turn the flywheel counterclockwise (viewed from flywheel side) until the fuel fills up to the hole of the delivery valve holder (4) for No.1 cylinder.
6. After the fuel fills up to the hole of the delivery valve holder (4) for No.1 cylinder, turn back (clockwise) the flywheel around 1.6 rad (90 °).
7. Turn the flywheel counterclockwise to set at around 0.17 rad (10 °) before T.D.C..
8. Slowly turn the flywheel counterclockwise and stop turning when the fuel begins to come up, to get the present injection timing.
9. Check to see the degree on flywheel.
   The flywheel has mark “1TC” for the crank angle before the top dead center of No.1 piston.
10. If the injection timing is not within the specification, rotate the injection pump unit to adjust the injection timing.

■ **IMPORTANT**

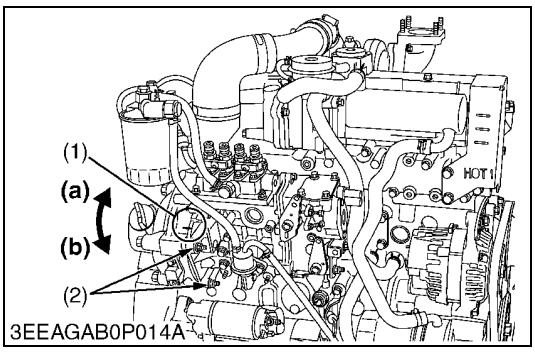
- **When installing the injection pump unit to the engine body, follow the correct procedure.**
  See the “Injection Pump Unit”.

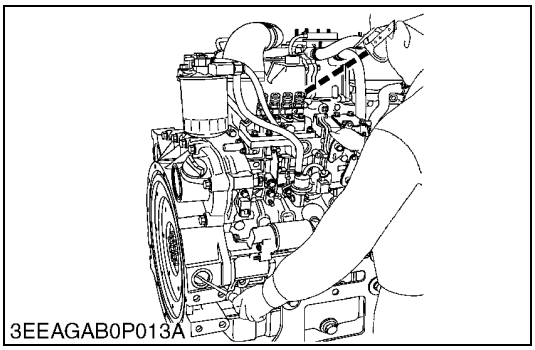
Injection Timing	Factory spec.	0.027 to 0.052 rad before T.D.C. (1.5 to 3.0 ° before T.D.C.)

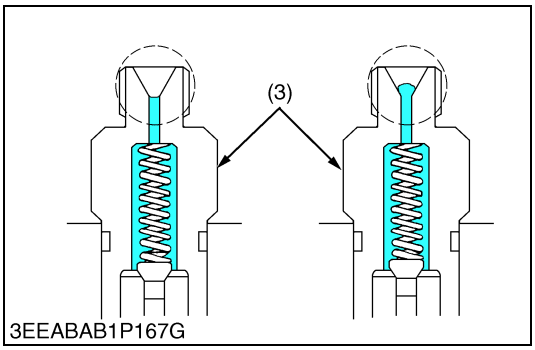
Tightening torque	Injection pipe retaining nut	23 to 36 N·m 2.3 to 3.7 kgf·m 17 to 26 lbf·ft
	Injection pump unit mounting nut	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

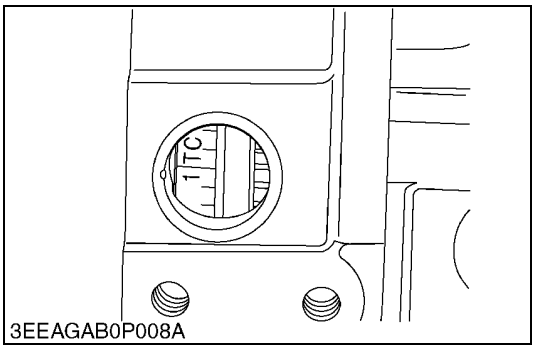
(1) Injection Timing Align Mark
(2) Injection Pump Unit Mounting Nut
(3) Fuel Control Rack Fixing Tool
(4) Delivery Valve Holder

(a) Injection Timing Advanced
(b) Injection Timing Retarded
A : 34.9 to 35.1 mm (1.374 to 1.381 in.)









Checking Injection Timing (for V2607-DI-T-E3B / V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Make sure of matching the injection timing align mark (1) of the injection pump unit and the flywheel housing, as shown in the illustration.
2. Remove the injection pipes.
3. Remove the stop solenoid.
4. Turn the flywheel counterclockwise (viewed from flywheel side) until the fuel fills up to the hole of the delivery valve holder (3) for No.1 cylinder.
5. After the fuel fills up to the hole of the delivery valve holder (3) for No.1 cylinder, turn back (clockwise) the flywheel around 1.6 rad (90 °).
6. Turn the flywheel counterclockwise to set at around 0.17 rad (10 °) before T.D.C..
7. Slowly turn the flywheel counterclockwise and stop turning when the fuel begins to come up, to get the present injection timing.
8. Check to see the degree on flywheel.
   The flywheel has mark “1TC” for the crank angle before the top dead center of No.1 piston.
9. If the injection timing is not within the specification, rotate the injection pump unit to adjust the injection timing.

■ **IMPORTANT**

- **When installing the injection pump unit to the engine body, follow the correct procedure.**
  See the “Injection Pump Unit”.

(Injection timing)

Model	Factory spec.
V2607-DI-T-E3B (Serial No. : 8G0001 to 8V9999)	0.0087 rad before T.D.C. to 0.017 rad after T.D.C. (0.50 ° before T.D.C. to 1.0 ° after T.D.C.)
V2607-DI-T-E3B (Serial No. : 8W0001 and above)	0.017 rad before T.D.C. to 0.0087 rad after T.D.C. (1.0 ° before T.D.C. to 0.50 ° after T.D.C.)
V3007-DI-T-E3B	0.00261 rad before T.D.C. to 0.0235 rad after T.D.C. (0.150 ° before T.D.C. to 1.35 ° after T.D.C.)
V3307-DI-T-E3B	0.00960 to 0.0357 rad after T.D.C. (0.550 to 2.05 ° after T.D.C.)

Tightening torque	Injection pipe retaining nut	23 to 36 N·m 2.3 to 3.7 kgf·m 17 to 26 lbf·ft
	Injection pump unit mounting nut	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

(1) Injection Timing Align Mark
(2) Injection Pump Unit Mounting Nut
(3) Delivery Valve Holder
(a) Injection Timing Advanced
(b) Injection Timing Retarded

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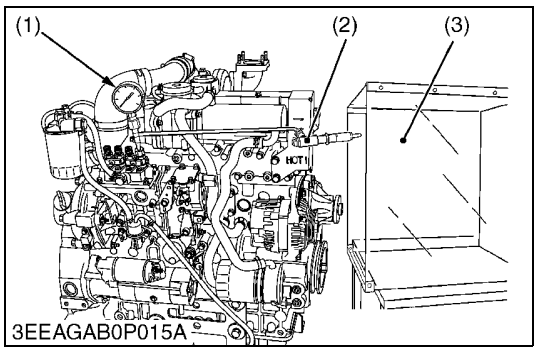


Checking Injection Pump

(Fuel Tightness of Pump Element)

1. Remove the engine stop solenoid.
2. Remove the injection pipes.
3. Install the injection pump pressure tester (1) to the injection pump.
4. Install the injection nozzle (2) jetted with the proper injection pressure to the injection pump pressure tester (1). (Refer to the figure.)
5. Set the speed control lever to the maximum speed position.
6. Operate the starter to increase the pressure.
7. If the pressure can not reach the allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

(Fuel Tightness of Delivery Valve)

1. Remove the engine stop solenoid.
2. Remove the injection pipes.
3. Install a pressure tester to the fuel injection pump.
4. Install the injection nozzle (2) jetted with the proper injection pressure to the injection pump pressure tester (1).
5. Operate the starter to increase the pressure.
6. Stop the starter when the fuel jets from the injection nozzle (2). After that, turn the flywheel by the hand and raise the pressure to approx. 18.63 MPa (190.0 kgf/cm^2, 2702 psi).
7. Now turn the flywheel back about half a turn (to keep the plunger free). Maintain the flywheel at this position and clock the time taken for the pressure to drop from 18.63 to 17.66 MPa (from 190.0 to 180.0 kgf/cm^2, from 2702 to 2561 psi).
8. Measure the time needed to decrease the pressure from 18.63 to 17.66 MPa (from 190.0 to 180.0 kgf/cm^2, from 2702 to 2561 psi).
9. If the measurement is less than allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

Fuel tightness of pump element	Allowable limit	18.63 MPa 190.0 kgf/cm^2 2702 psi
Fuel tightness of delivery valve	Factory spec.	10 seconds 18.63 → 17.66 MPa 190.0 → 180.0 kgf/cm^2 2702 → 2561 psi
	Allowable limit	5 seconds 18.63 → 17.66 MPa 190.0 → 180.0 kgf/cm^2 2702 → 2561 psi

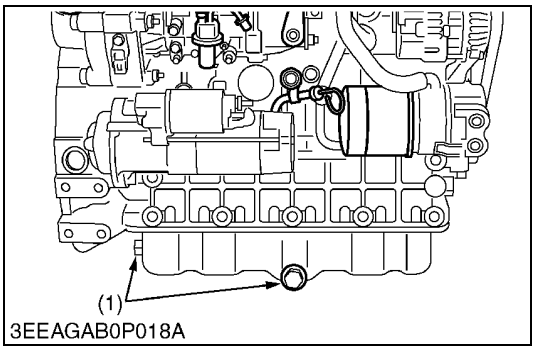
■ **NOTE**

- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**

(1) Injection Pump Pressure Tester
(2) Injection Nozzle
(3) Protection Cover for Jetted Fuel

W1022357

[10] CHECK POINTS OF EVERY 1 YEAR



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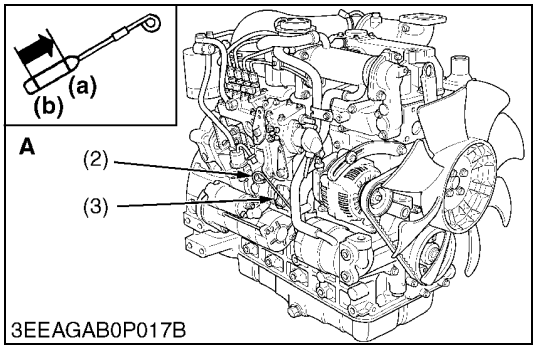

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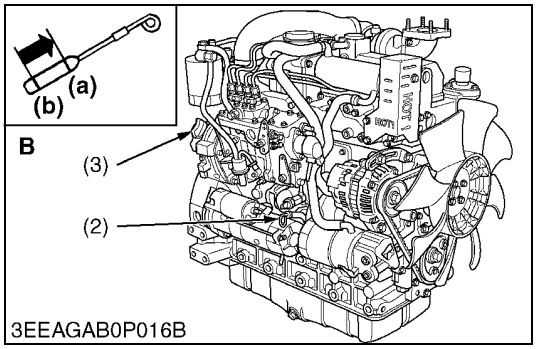

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Changing Engine Oil

CAUTION

- **Be sure to stop engine before changing engine oil.**

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. To drain the used oil, remove the drain plug (1) at the bottom of the engine and drain the oil completely.
4. Screw the drain plug (1).
5. Fill new oil up to upper line on the dipstick (2).

■ **IMPORTANT**

- **When using an oil of different maker or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different types of oil.**
- **Engine oil should have properties of API classification CF (See page G-6).**
- **Use the proper SAE Engine Oil according to ambient temperature.**

Above 25 °C (77 °F)	SAE 30 or SAE 10W-30 SAE 15W-40
0 °C to 25 °C (32 °F to 77 °F)	SAE 20 or SAE 10W-30 SAE 15W-40
Below 0 °C (32 °F)	SAE 10W or SAE 10W-30 SAE 15W-40

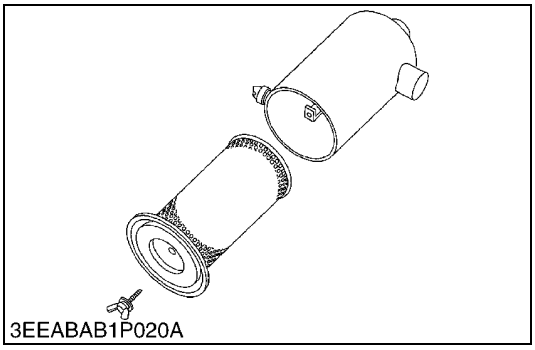
Engine oil capacity	V2607-DI-E3B V2607-DI-T-E3B	10.2 L 2.69 U.S.gals
	V3007-DI-T-E3B V3307-DI-T-E3B	11.2 L 2.96 U.S.gals

Tightening torque	Drain plug	45 to 53 N·m 4.5 to 5.5 kgf·m 33 to 39 lbf·ft

(1) Drain Plug
(2) Dipstick
(3) Oil Filler Plug

(a) Upper Line
(b) Lower Line
A : V2607-DI-E3B / V2607-DI-T-E3B
B : V3007-DI-T-E3B / V3307-DI-T-E3B

W1036031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Replacing Air Cleaner Element

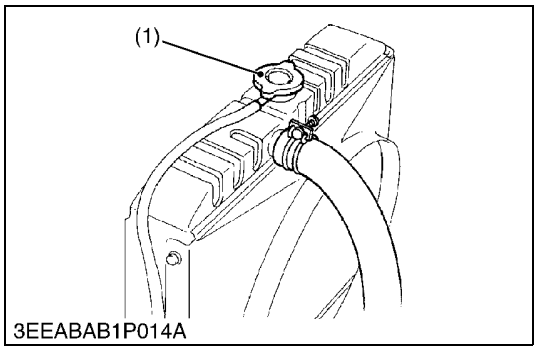
1. Remove used air cleaner element.
2. Replace new air cleaner element.

■ **NOTE**

- **The air cleaner uses a dry element. Never apply oil to it.**
- **Do not operate the engine with filter element removed.**

W1020554

[11] CHECK POINTS OF EVERY 2 YEARS



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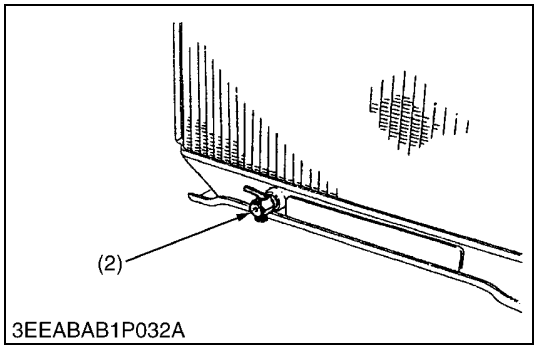

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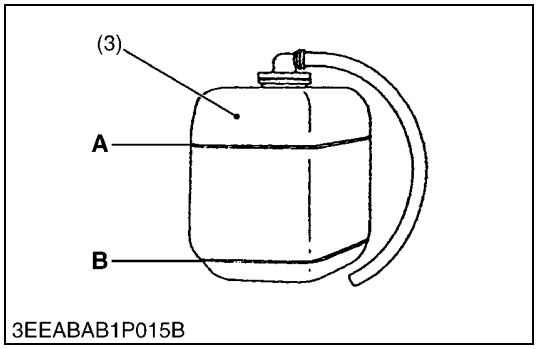

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Changing Radiator Coolant (L.L.C.)

CAUTION

- **Do not remove the radiator cap (1) when the engine is hot. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.**

1. Stop the engine and let cool down.
2. To drain the coolant, open the radiator drain plug (2) and remove the radiator cap (1). Then radiator cap (1) must be removed to completely drain the coolant. And open the drain cock of engine body.
3. After all coolant is drained, close the drain plug (2).
4. Fill with clean water and cooling system cleaner.
5. Follow directions of the cleaner instruction.
6. After flushing, fill with clean water and anti-freeze until the coolant level is just below the port. Install the radiator cap (1) securely.
7. Fill with coolant up to “FULL” (**A**) mark on the recovery tank (3).
8. Start and operate the engine for few minutes.
9. Stop the engine and let cool. Check coolant level of radiator and recovery tank (3) and add coolant if necessary.

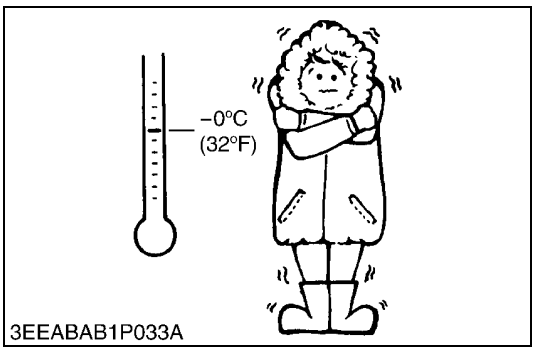
■ **IMPORTANT**

- **Do not start engine without coolant.**
- **Use clean, fresh, soft water and anti-freeze to fill the radiator and recovery tank (3).**
- **When the anti-freeze is mixed with fresh, soft water, the anti-freeze mixing ratio must be less than 50 %.**
- **Securely tighten radiator cap (1). If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**

(1) Radiator Cap
(2) Drain Plug
(3) Recovery Tank

A : Full
B : Low

(To be continued)
W1024599



(Continued)
(Anti-freeze)

- There are two types of anti-freeze available: use the permanent type (PT) for this engine.
- Before adding anti-freeze for the first time, clean the radiator interior by pouring fresh, soft water and draining it a few times.
- The procedure for mixing water and anti-freeze differs according to the make of the anti-freeze and the ambient temperature. Basically, it should be referred to SAE J1034 standard, more specifically also to SAE J814c.
- Mix the anti-freeze with fresh, soft water, and then fill into the radiator.

■ **IMPORTANT**

- **When the anti-freeze is mixed with fresh, soft water, the anti-freeze mixing ratio must be less than 50 %.**

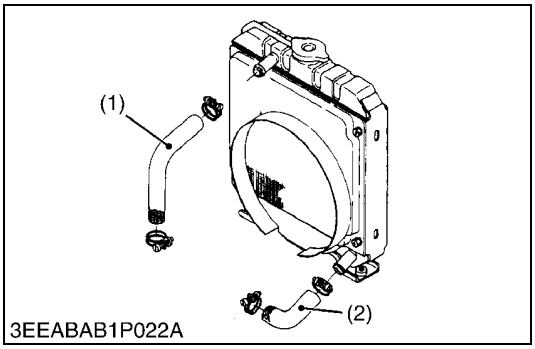
Vol % anti-freeze	Freezing point		Boiling point*	
	°C	°F	°C	°F
40	–24	–11	106	223
50	–37	–35	108	226

* At 1.013 × 100000 Pa (760 mmHg) pressure (atmospheric). A higher boiling point is obtained by using a radiator pressure cap which permits the development of pressure within the cooling system.

■ **NOTE**

- **The above data represents industrial standards that necessitate a minimum glycol content in the concentrated anti-freeze.**
- **When the coolant level drops due to evaporation, add fresh, soft water only to keep the anti-freeze mixing ratio less than 50 %. In case of leakage, add anti-freeze and fresh, soft water in the specified mixing ratio.**
- **Anti-freeze absorbs moisture. Keep unused anti-freeze in a tightly sealed container.**
- **Do not use radiator cleaning agents when anti-freeze has been added to the coolant.**
  (Anti-freeze contains an anti-corrosive agent, which will react with the radiator cleaning agent forming sludge which will affect the engine parts.)

W1024852



Replacing Radiator Hoses and Clamp Bands

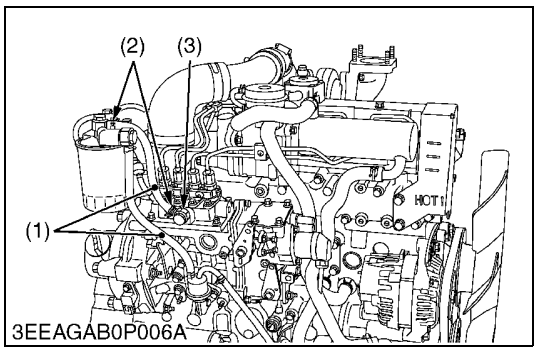
CAUTION

- **Do not remove the radiator cap when the engine is hot. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.**

1. Drain the coolant.
2. Loosen the clamp bands.
3. Remove the upper hose (1) and lower hose (2).
4. Replace new upper / lower hose (1), (2) and clamp bands.
5. Tighten the clamp bands.
6. Fill with clean water and anti-freeze until the coolant level is just below the port. Install the radiator cap securely.

(1) Upper Hose (2) Lower Hose

W1024178



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Replacing Fuel Hoses and Clamp Bands

1. Loosen the clamp band (2) and remove the fuel hose (1).
2. Replace new fuel hose (1) and new clamp band (2).
3. Tighten the clamp band (2).

CAUTION

- **Stop the engine when attempting the check and change prescribed above.**

(When bleeding fuel system)

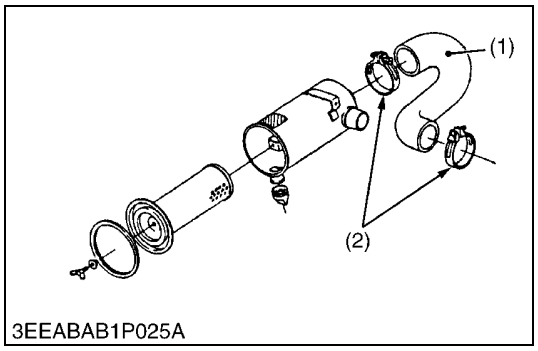
1. Fill the tank with fuel and open the cock.
2. Loosen the air vent coupling bolt of fuel filter a few turns.
3. When there is no more air bubbles in the fuel coming out of this coupling bolt, tighten the coupling bolt.
4. Open the air vent cock (3) on the top of fuel injection pump.
5. If equipped electrical fuel feed pump, turn the key on **AC** position and pump the fuel up for 10 to 15 seconds.
   If equipped mechanical fuel feed pump, set the stop lever on stop position and crank the engine for 10 to 15 seconds.
6. Close securely the air vent cock (3) after air bleeding.

■ **IMPORTANT**

- **Except when venting the air, be sure to keep closed the air vent coupling bolt of the fuel injection pump. Otherwise, the engine may stall.**

(1) Fuel Hose
(2) Clamp Band
(3) Air Vent Cock

W1020090



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Replacing Intake Air Line

1. Loosen the clamp bands (2).
2. Remove the intake air hose (1) and clamp bands (2).
3. Replace new intake air hose (1) and new clamp bands (2).
4. Tighten the clamp bands (2).

■ **NOTE**

- **To prevent serious damage to the engine, keep out any dust inside the intake air line.**

(1) Intake Air Hose
(2) Clamp Band

W1023867

Replacing Battery

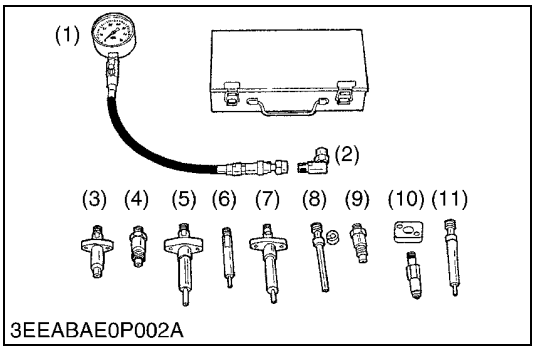
CAUTION

- **When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.**
- **When charging battery, remove battery vent plugs.**
- **When disconnecting the cable from the battery, start with the negative terminal first. When connecting the cable to the battery, start with the positive terminal first.**
- **Never check battery charge by placing a metal object across the posts.**

1. Disconnect the negative terminal and positive terminal.
2. Remove the battery holder.
3. Remove the used battery.
4. Replace the new battery.
5. Tighten the battery holder.
6. Connect the positive terminal.
7. Connect the negative terminal.

W1023996

5. SPECIAL TOOLS



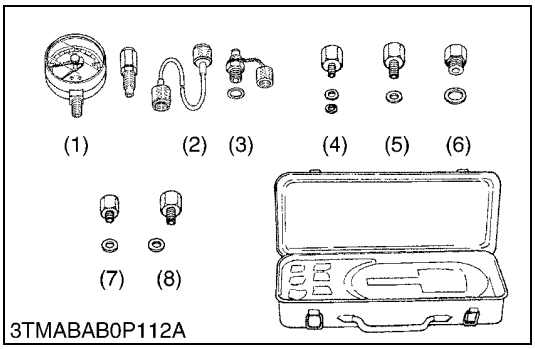
Diesel Engine Compression Tester

Code No: 07909-30208 (Assembly)

Application: Use to measure diesel engine compression and diagnostics of need for major overhaul.

(1) Gauge
(2) **L** Joint
(3) Adaptor **A**
(4) Adaptor **B**
(5) Adaptor **C**
(6) Adaptor **E**
(7) Adaptor **F**
(8) Adaptor **G**
(9) Adaptor **H**
(10) Adaptor **I**
(11) Adaptor **J**

W1024200



Oil Pressure Tester

Code No: 07916-32032

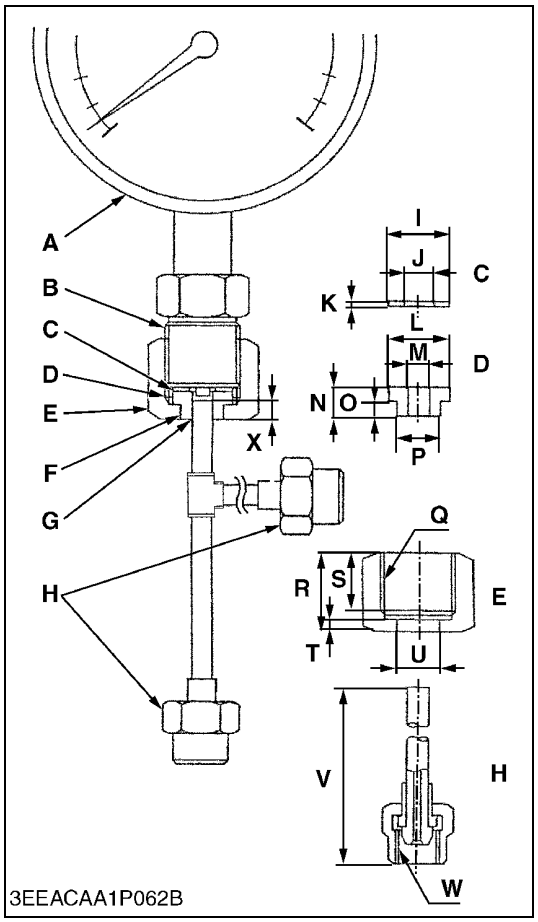
Application: Use to measure lubricating oil pressure.

(1) Gauge
(2) Cable
(3) Threaded Joint
(4) Adaptor **1**
(5) Adaptor **2**
(6) Adaptor **3**
(7) Adaptor **4**
(8) Adaptor **5**

W1024318

■ **NOTE**

- **The following special tools are not provided, make them referring to the figure.**



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Injection Pump Pressure Tester

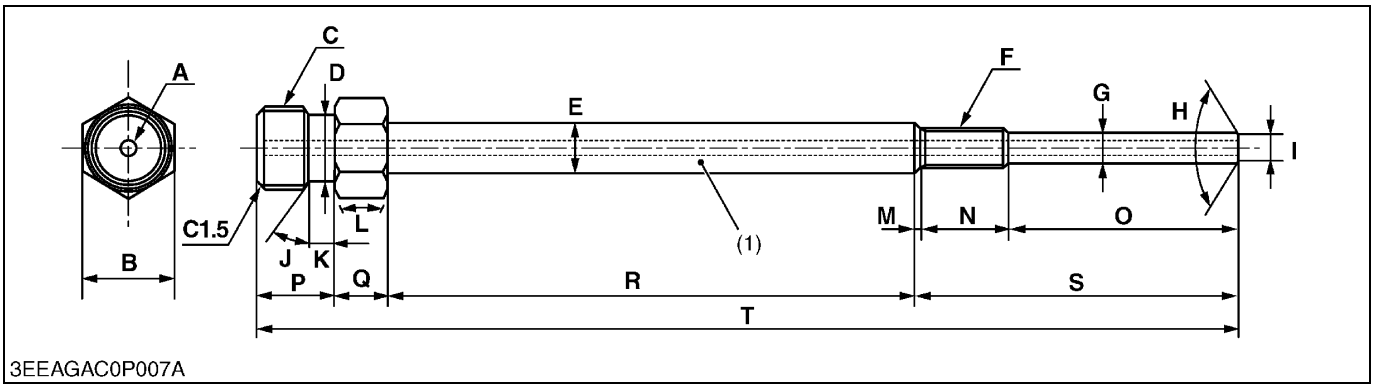
Application: Use to check fuel tightness of injection pumps.

A	Pressure gauge full scale : More than 29.4 MPa (300 kgf/cm^2, 4270 psi)
B	PF 1/2
C	Copper gasket
D	Flange (Material Steel)
E	Hex. nut 27 mm (1.1 in.) across the plat
F	Adhesive application
G	Fillet welding on the enter circumference
H	Retaining nut
I	17 mm dia. (0.67 in. dia.)
J	8.0 mm dia. (0.31 in. dia.)
K	1.0 mm (0.039 in.)
L	17 mm dia. (0.67 in. dia.)
M	6.10 to 6.20 mm dia. (0.241 to 0.244 in. dia.)
N	8.0 mm (0.31 in.)
O	4.0 mm (0.16 in.)
P	11.97 to 11.99 mm dia. (0.4713 to 0.4720 in. dia.)
Q	PF 1/2
R	23 mm (0.91 in.)
S	17 mm (0.67 in.)
T	4.0 mm (0.16 in.)
U	12.00 to 12.02 mm dia. (0.4725 to 0.4732 in. dia.)
V	100 mm (3.94 in.)
W	M12 × P1.5
X	5.0 mm (0.20 in.)

W10252400

Glow Plug Adapter (for V2607-DI-E3B / V2607-DI-T-E3B)

Application: Use to check compression pressure through glow plug hole.



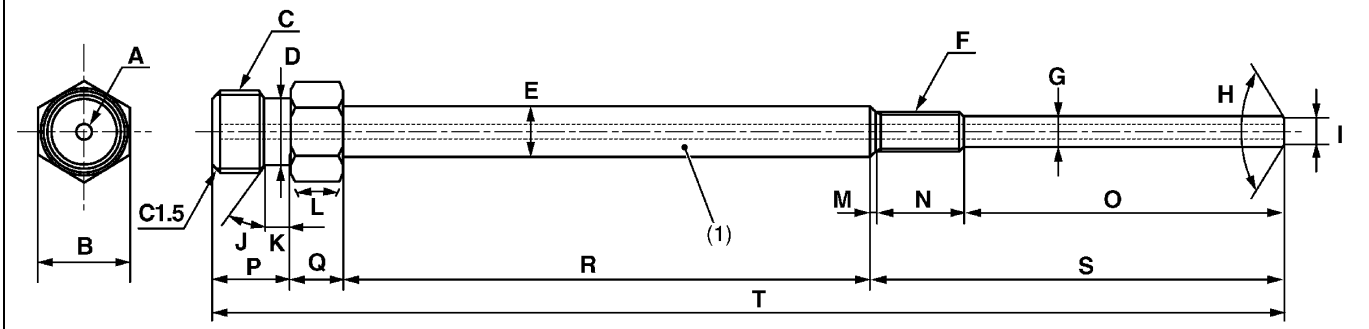
3EEAGAC0P007A

A	3.0 mm dia. (0.12 in. dia.) through hole	**L**	1.0 rad (60 °)
B	17.0 mm (0.669 in.)	**M**	1.0 mm (0.039 in.)
C	16.0 mm dia. (0.630 in. dia.) P0.5	**N**	17.0 mm (0.669 in.)
D	13.0 mm dia. (0.512 in. dia.)	**O**	47.0 mm (1.85 in.)
E	9.5 mm dia. (0.37 in. dia.)	**P**	15.0 mm (0.591 in.)
F	M8 x 1.0	**Q**	10.0 mm (0.394 in.)
G	6.50 to 6.70 mm dia. (0.256 to 0.263 in. dia.)	**R**	100 mm (3.94 in.)
H	2.12 to 2.18 rad (121 to 125 °)	**S**	65.0 mm (2.56 in.)
I	4.90 to 5.50 mm dia. (0.193 to 0.216 in. dia.)	**T**	190 mm (7.48 in.)
J	0.52 rad (30 °)	**C1.5**	Chamfer 1.5 mm (0.059 in.)
K	5.0 mm (0.20 in.)		

(1) Material : SS400

Glow Plug Adapter (for V3007-DI-T-E3B / V3307-DI-T-E3B)

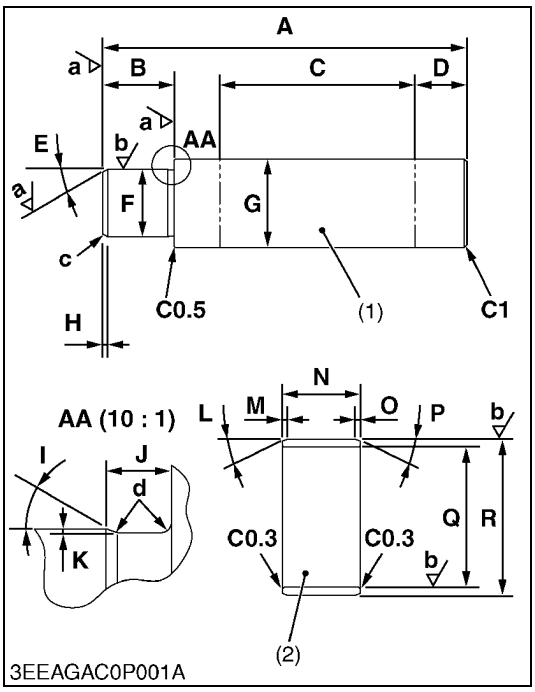
Application: Use to check compression pressure through glow plug hole.



3EEAGAA0P009B

A	3.0 mm dia. (0.12 in. dia.) through hole	**L**	1.0 rad (60 °)
B	17.0 mm (0.669 in.)	**M**	1.0 mm (0.039 in.)
C	16.0 mm dia. (0.630 in. dia.) P0.5	**N**	17.0 mm (0.669 in.)
D	13.0 mm dia. (0.512 in. dia.)	**O**	61.5 mm (2.42 in.)
E	9.5 mm dia. (0.37 in. dia.)	**P**	15.0 mm (0.591 in.)
F	M8 x 1.0	**Q**	10.0 mm (0.394 in.)
G	6.50 to 6.70 mm dia. (0.256 to 0.263 in. dia.)	**R**	100 mm (3.94 in.)
H	2.145 to 2.148 rad (122.9 to 123.1 °)	**S**	79.5 mm (3.13 in.)
I	4.90 to 5.50 mm dia. (0.193 to 0.216 in. dia.)	**T**	204.5 mm (8.051 in.)
J	0.52 rad (30 °)	**C1.5**	Chamfer 1.5 mm (0.059 in.)
K	5.0 mm (0.20 in.)		

(1) Material : SS400



Small End Bushing Replacing Tool (for V2607-DI-E3B / V2607-DI-T-E3B)

Application: Use to press fit the small end bushing.

A	140 mm (5.51 in.)
B	27.2 to 27.5 mm (1.07 to 1.08 in.)
C	75.0 mm (2.95 in.) : Roulette
D	20.0 mm (0.787 in.)
E	0.52 rad (30 °)
F	25.967 to 25.980 mm dia. (1.0224 to 1.0228 in. dia.)
G	34.0 mm dia. (1.34 in. dia.)
H	2.0 mm (0.079 in.)
I	0.35 rad (20 °)
J	2.5 mm (0.098 in.)
K	0.15 to 0.25 mm (0.0059 to 0.0098 in.)
L	0.35 rad (20 °)
M	1.0 mm (0.039 in.)
N	14.5 mm (0.571 in.)
O	1.0 mm (0.039 in.)
P	0.35 rad (20 °)
Q	26.000 to 26.021 mm (1.0237 to 1.0244 in.)
R	28.900 to 28.950 mm (1.1378 to 1.1397 in.)
a	Ra = 3.2a
b	Ra = 1.6a
c	1.0 mm radius (0.039 in radius)
d	0.40 mm radius (0.016 in. radius)
C0.3	Chamfer 0.30 mm (0.012 in.)
C0.5	Chamfer 0.50 mm (0.020 in.)
C1	Chamfer 1.0 mm (0.039 in.)

(1) Shaft Material : SS400
(2) Guide Material : STKM12A

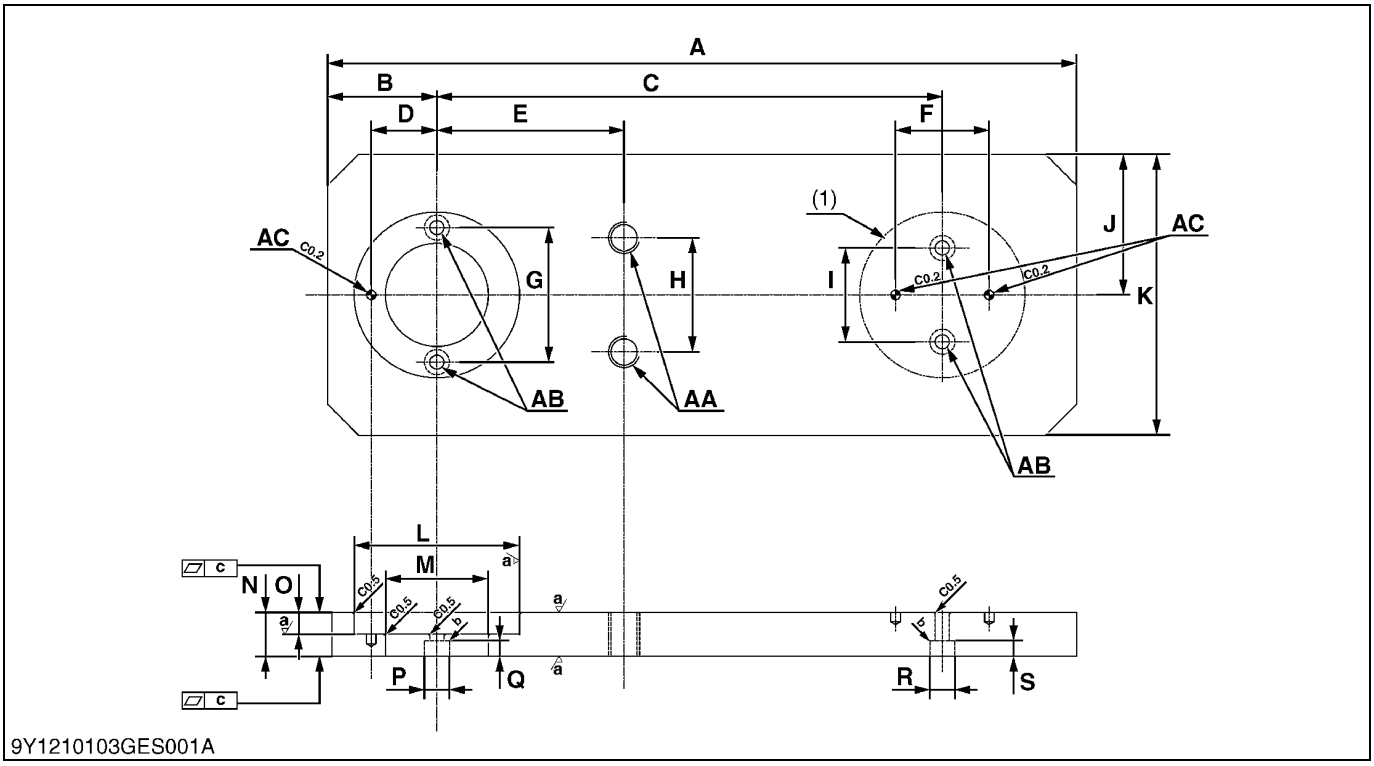
W1038743

Small End Bushing Replacing Tool (for V3007-DI-T-E3B / V3307-DI-T-E3B)

Application: Use to press out and to press fit the small end bushing.

[Serial No. : to 9DZ999]

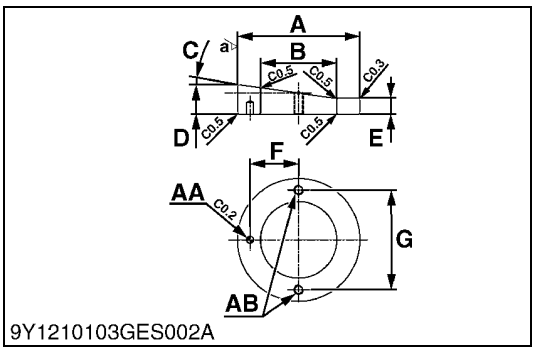
1) Base



9Y1210103GES001A

A	240 mm (9.45 in.)	**O**	6.90 to 7.10 mm (0.272 to 0.279 in.)
B	35.0 mm (1.38 in.)	**P**	8.0 mm dia. (0.31 in. dia.)
C	161.95 to 162.05 mm (6.3760 to 6.3799 in.)	**Q**	5.0 mm (0.20 in.)
D	20.95 to 21.05 mm (0.8248 to 0.8287 in.)	**R**	8.0 mm dia. (0.31in. dia.)
E	60.0 mm (2.36in.)	**S**	5.0 mm (0.20 in.)
F	29.95 to 30.05 mm (1.180 to 1.183 in.)	**AA**	M10 × P1.25 through hole
G	42.90 to 43.10 mm (1,689 to 1.696 in.)	**AB**	4.5 mm dia. (0.18 in. dia.) through hole
H	36.45 to 36.55 mm (1.435 to 1.438 in.)	**AC**	3.000 to 3.018 mm dia. (0.1182 to 0.1188 in. dia.), 5.0 mm (0.20 in.) depth
I	29.90 to 30.10 mm (1.178 to 1.185 in.)	**a**	Ra = 1.6 a
J	45.0 mm (1.77 in.)	**b**	0.40 mm radius (0.016 in. radius)
K	90.0 mm (3.54 in.)	**c**	0.05 mm (0.002 in.)
L	53.000 to 53.030 mm dia. (2.0867 to 2.0877 in. dia.)	**C0.2**	Chamfer 0.20 mm (0.0079 in.)
M	33.0 mm dia. (1.30 in. dia.)	**C0.5**	Chamfer 0.50 mm (0.020 in.)
N	14.0 mm (0.551 in.)		

(1) Guide2

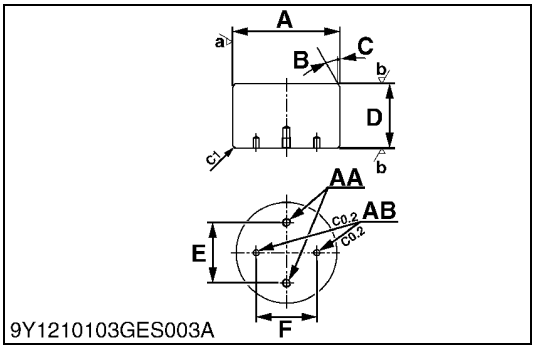


9Y1210103GES002A

2) Guide 1

A	52.951 to 52.970 mm dia. (2.0847 to 2.0854 in. dia.)
B	33.0 mm dia. (1.30 in. dia.)
C	0.13 to 0.15 rad (7.0 to 9.0 °)
D	9.00 to 9.20 mm (0.355 to 0.362 in.)
E	6.90 to 7.10 mm (0.272 to 0.279 in.)
F	20.95 to 21.05 mm (0.8248 to 0.8287 in.)
G	42.90 to 43.10 mm (1,689 to 1.696 in.)
AA	3.010 to 3.022 mm dia. (0.1185 to 0.1189 in. dia.), 5.0 mm (0.20 in.) depth
AB	M4 through hole
a	Ra = 1.6 a
C0.2	Chamfer 0.20 mm (0.0079 in.)
C0.3	Chamfer 0.30 mm (0.012 in.)
C0.5	Chamfer 0.50 mm (0.020 in.)

W1060624

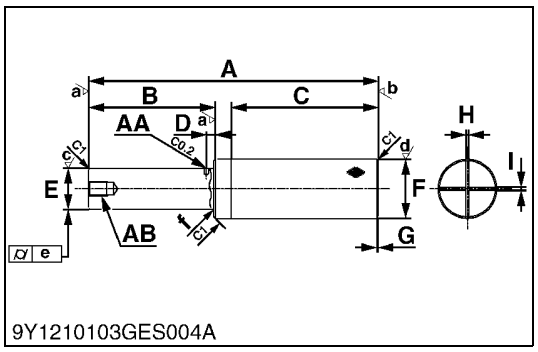


9Y1210103GES003A

3) Guide 2

A	52.924 to 52.970 mm dia. (2.0837 to 2.0854 in. dia)
B	0.52 rad (30 °)
C	1.0 mm (0.039 in.)
D	32.0 mm (1.26 in.)
E	29.90 to 30.10 mm (1.178 to 1.185 in.)
F	29.95 to 30.05 mm (1.180 to 1.183 in.)
AA	M4 × 5.0 mm (0.20 in.) / 3.3 mm dia. (0.13 in. dia.) × 10 mm (0.39 in.)
AB	3.010 to 3.022 mm dia. (0.1185 to 0.1189 in. dia.), 5.0 mm (0.20 in.) depth
a	Ra = 1.6 a
b	Ra = 3.2 a
C0.2	Chamfer 0.20 mm (0.0079 in.)

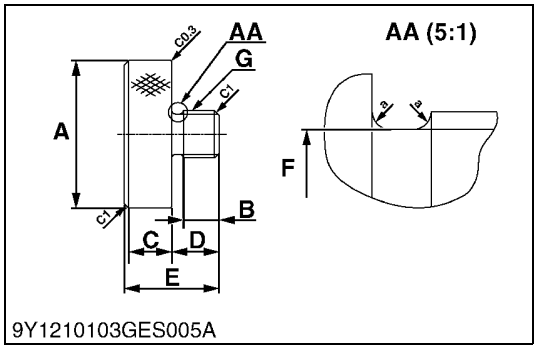
W1061379



4) Shaft

A	197 mm (7.76 in.)
B	85.00 to 85.10 mm (3.347 to 3.350 in.)
C	100 mm (3.94 in.) : Roulette
D	4.5 to 5.0 mm (0.18 to 0.19 in.)
E	27.959 to 27.980 mm dia. (1.1008 to 1.1015 in. dia.)
F	40.0 mm dia. (1.57 in. dia.)
G	1.0 mm (0.039 in.)
H	2.0 mm (0.079 in.)
I	2.0 mm (0.079 in.)
AA	3.000 to 3.018 mm dia. (0.1182 to 0.1188 in. dia.), 4.0 mm (0.16 in.) depth
AB	M10 × 1.25 mm (0.0492 in.) × 12 mm (0.47 in.) / 8.5 mm dia. (0.33 in. dia.) × 17 mm (0.67 in.)
a	Ra = 3.2 a
b	Ra = 12.5 a
c	Ra = 1.6 a
d	Ra = 6.3 a
e	0.02 mm (0.0008 in.)
f	0.30 to 0.40 mm radius (0.012 to 0.015 in. radius)
C0.2	Chamfer 0.20 mm (0.0079 in.)
C1	Chamfer 1.0 mm (0.039 in.)

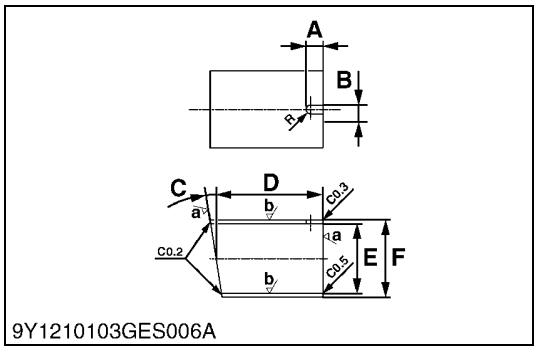
W1061682



5) Bolt

A	30.90 to 30.95 mm dia. (1.217 to 1.218 in. dia.)
B	7.5 mm (0.30 in.)
C	9.0 mm (0.35 in.) : Roulette
D	10.0 mm (0.394 in.)
E	20.0 mm (0.787 in.)
F	8.5 mm dia. (0.33 in. dia.)
G	M10 × P1.25
a	0.80 mm radius (0.031 in. radius)
C0.3	Chamfer 0.30 mm (0.012 in.)
C1	Chamfer 1.0 mm (0.039 in.)

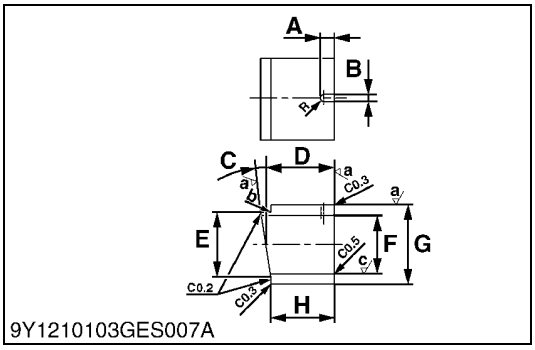
W1062530



6) Guide 3

A	6.75 mm (0.266 in.)
B	3.5 mm (0.14 in.)
C	0.14 to 0.17 rad (8.0 to 10 °)
D	42.8 to 43.2 mm (1.69 to 1.70 in.)
E	28.000 to 28.021 mm dia. (1.1024 to 1.1031 in. dia)
F	30.90 to 30.95 mm dia. (1.217 to 1.218 in. dia.)
a	Ra = 3.2 a
b	Ra = 1.6 a
C0.2	Chamfer 0.20 mm (0.0079 in.)
C0.3	Chamfer 0.30 mm (0.012 in.)
C0.5	Chamfer 0.50 mm (0.020 in.)

W1063428

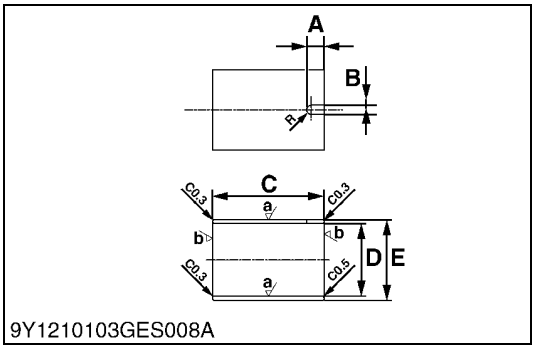


9Y1210103GES007A

7) Guide 4

A	6.75 mm (0.266 in.)
B	3.5 mm (0.14 in.)
C	0.14 to 0.17 rad (8.0 to 10 °)
D	32.80 to 33.20 mm (1.292 to 1.307 in.)
E	30.90 to 30.95 mm dia. (1.217 to 1.218 in. dia.)
F	27.90 to 27.95 mm dia. (1.099 to 1.100 in. dia.)
G	38.0 mm dia. (1.50 in. dia)
H	30.55 mm (1.203 in.)
a	Ra = 3.2 a
b	0.40 mm radius (0.016 in. radius)
c	Ra = 1.6 a
C0.2	Chamfer 0.20 mm (0.0079 in.)
C0.3	Chamfer 0.30 mm (0.012 in.)
C0.5	Chamfer 0.50 mm (0.020 in.)

W1063864

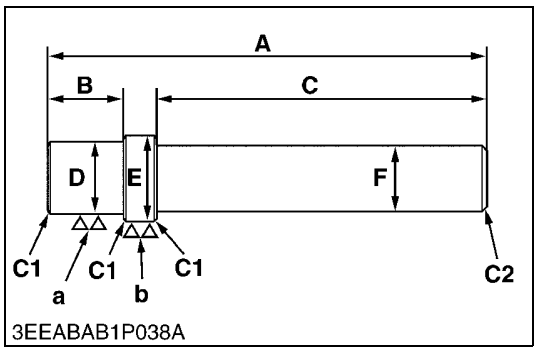


9Y1210103GES008A

8) Guide 5

A	6.75 mm (0.266 in.)
B	3.5 mm (0.14 in.)
C	42.8 to 43.2 mm (1.69 to 1.70 in.)
D	28.000 to 28.021 mm dia. (1.1024 to 1.1031 in. dia)
E	30.90 to 30.95 mm dia. (1.217 to 1.218 in. dia.)
a	Ra = 1.6 a
b	Ra = 3.2 a
C0.3	Chamfer 0.30 mm (0.012 in.)
C0.5	Chamfer 0.50 mm (0.020 in.)

W1064363



3EEABAB1P038A

Small End Bushing Replacing Tool (for V3007-DI-T-E3B / V3307-DI-T-E3B)

Application : Use to press out and to press fit the small end bushing.
[Serial No. : 9E0001 and above]

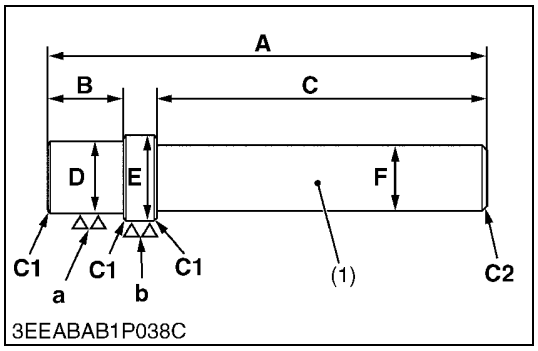
[Press out]

A	157 mm (6.181 in.)
B	14.0 mm (0.5512 in.)
C	120 mm (4.7244 in.)
D	27.4 mm dia. (1.0787 in. dia.)
E	30.95 mm dia. (1.2185 in. dia.)
F	20 mm dia. (0.7874 in. dia.)
a	6.3 μm (250 μin.)
b	6.3 μm (250 μin.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)

[Press fit]

A	157 mm (6.181 in.)
B	14.0 mm (0.5512 in.)
C	120 mm (4.7244 in.)
D	27.4 mm dia. (1.0787 in. dia.)
E	42.000 mm dia. (1.6535 in. dia.)
F	20 mm dia. (0.7874 in. dia.)
a	6.3 μm (250 μin.)
b	6.3 μm (250 μin.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)

W1040702



3EEABAB1P038C

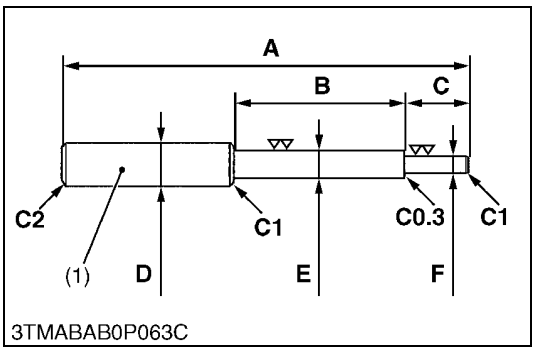
Idle Gear Bushing Replacing Tool (for V2607 / V3007 / V3307)

Application: Use to press out and to press fit the bushing.

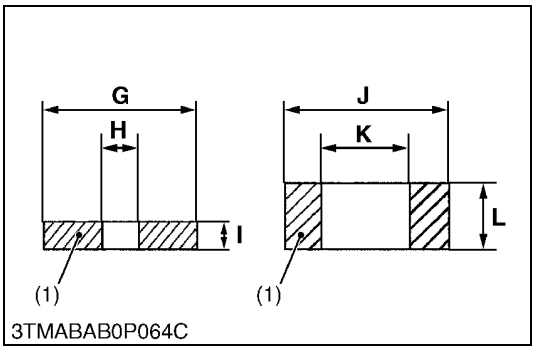
A	196 mm (7.72 in.)
B	25.0 mm (0.984 in.)
C	150 mm (5.91 in.)
D	34.5 mm dia. (1.36 in. dia.)
E	38.075 to 38.100 mm dia. (1.4991 to 1.5000 in. dia.)
F	20 mm dia. (0.79 in. dia.)
a	6.3 μm (250 μin.)
b	6.3 μm (250 μin.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)

(1) Material : SS400

W1039429



3TMABAB0P063C



3TMABAB0P064C

Valve Guide Replacing Tool

Application: Use to press out and press fit the valve guide.

[for V2607-DI-E3B / V2607-DI-T-E3B]

A	220 mm (8.66 in.)
B	80 mm (3.1 in.)
C	40 mm (1.6 in.)
D	20 mm dia. (0.79 in. dia.)
E	9.960 to 9.980 mm dia. (0.3922 to 0.3929 in. dia.)
F	5.50 to 5.70 mm dia. (0.217 to 0.224 in. dia.)
G	25 mm dia. (0.98 in. dia.)
H	6.00 to 6.10 mm dia. (0.237 to 0.240 in. dia.)
I	5.0 mm (0.20 in.)
J	18 mm dia. (0.71 in. dia.)
K	10.6 to 10.7 mm dia. (0.418 to 0.421 in. dia.)
L	6.90 to 7.10 mm (0.272 to 0.279 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.30 mm (0.012 in.)

[for V3007-DI-T-E3B / V3307-DI-T-E3B]

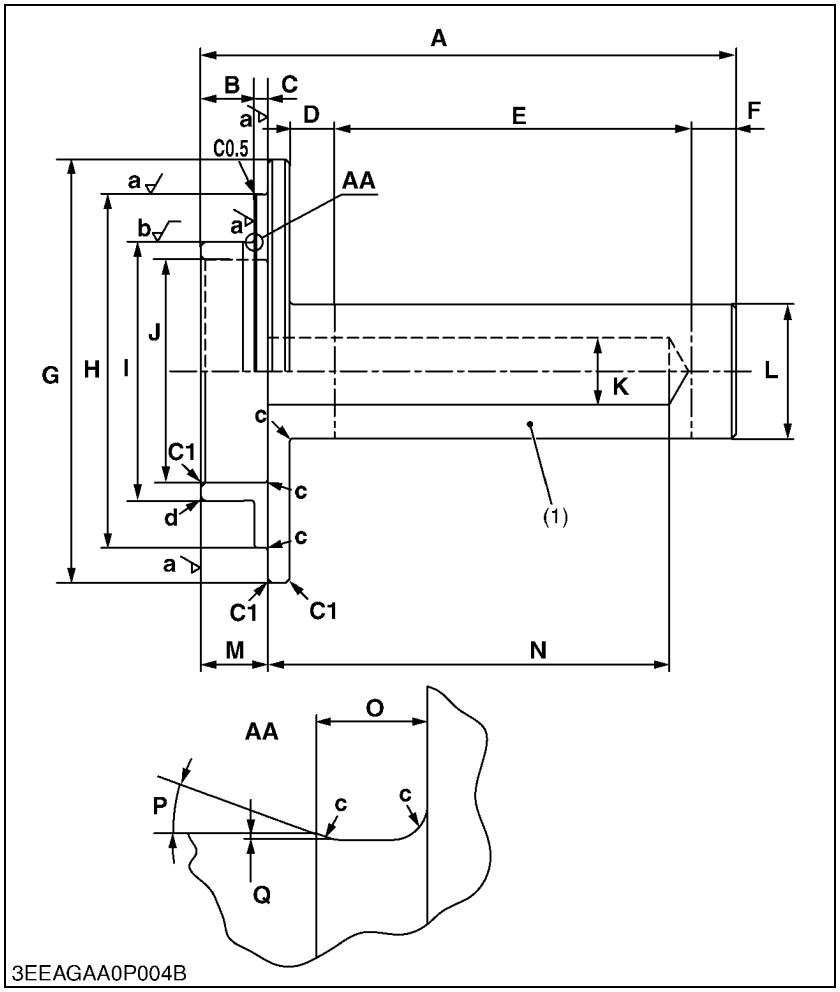
A	225 mm (8.86 in.)
B	70 mm (2.8 in.)
C	45 mm (1.8 in.)
D	20 mm dia. (0.79 in dia.)
E	11.7 to 11.9 mm dia. (0.461 to 0.468 in. dia.)
F	6.50 to 6.60 mm dia. (0.256 to 0.259 in. dia.)
G	25 mm dia. (0.98 in. dia.)
H	6.70 to 7.00 mm dia. (0.264 to 0.275 in. dia.)
I	5.0 mm (0.20 in.)
J	20 mm dia. (0.79 in. dia.)
K	12.5 to 12.8 mm dia. (0.493 to 0.503 in. dia.)
L	8.50 to 8.90 mm (0.335 to 0.350 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.30 mm (0.012 in.)

(1) Material : SS400

W10250170

Front Cover Oil Seal Replacing Tool (for V2607 / V3007 / V3307)

Application: Use to press fit the front cover oil seal.



3EEAGAA0P004B

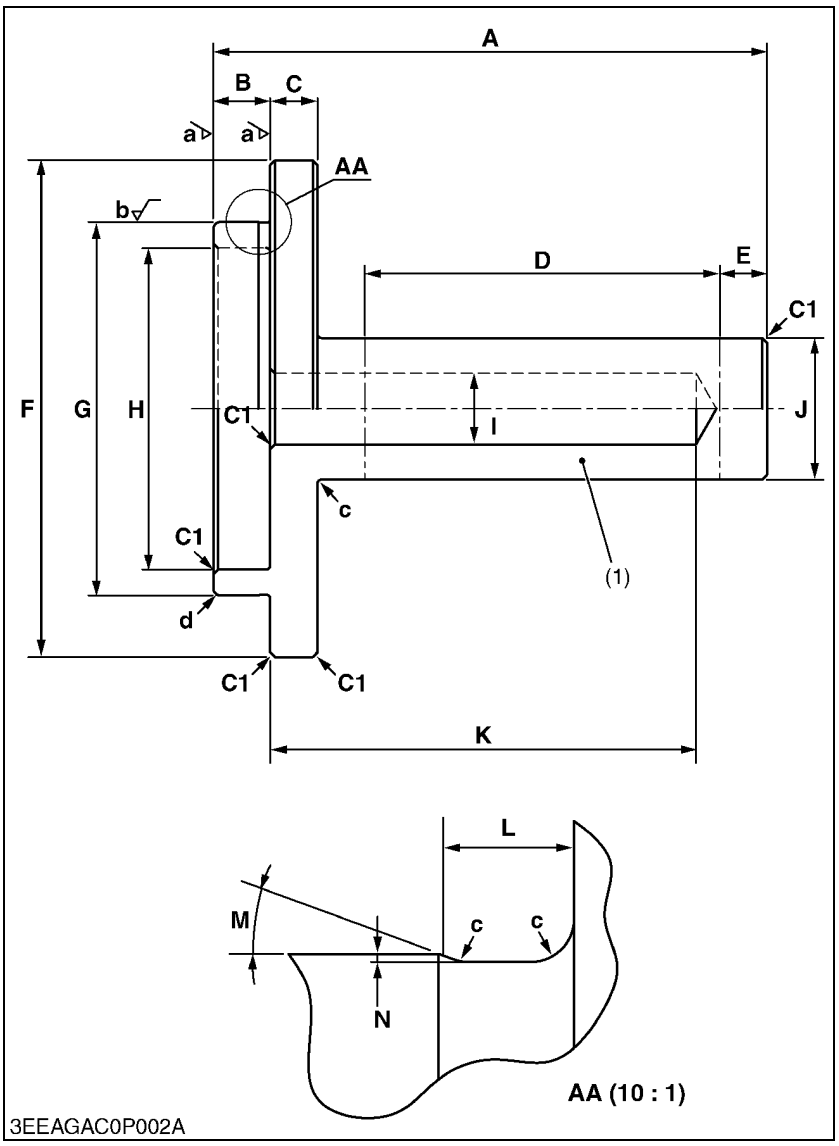
A	120 mm (4.72 in.)
B	12.0 mm (0.472 in.)
C	2.90 to 3.00 mm (0.115 to 0.118 in.)
D	10.0 mm (0.394 in.)
E	80.0 mm (3.15 in.)
F	10.0 mm (0.394 in.)
G	95.0 mm dia. (3.74 in. dia.)
H	78.900 to 79.100 mm dia. (3.1063 to 3.1141 in. dia.)
I	57.971 to 57.990 mm dia. (2.2824 to 2.2830 in. dia.)
J	50.0 mm dia. (1.97 in. dia.)
K	15.0 mm dia. (0.591 in. dia.)
L	30.0 mm dia. (1.18 in. dia.)
M	15.0 mm (0.591 in.)
N	90.0 mm (3.54 in.)
O	2.50 mm (0.0984 in.)
P	0.35 rad (20 °)
Q	0.15 to 0.25 mm (0.0059 to 0.0098 in.)
a	Ra = 3.2 a
b	Ra = 1.6 a
c	0.80 mm radius (0.031 in. radius)
d	1.5 mm radius (0.059 in. radius)
C0.5	Chamfer 0.50 mm (0.020 in.)
C1	Chamfer 1.0 mm (0.039 in.)

(1) Material : S43C-D

W1014589

Flywheel Housing Oil Seal Replacing Tool (for V2607-DI-E3B / V2607-DI-T-E3B)

Application : Use to press fit the flywheel housing oil seal.



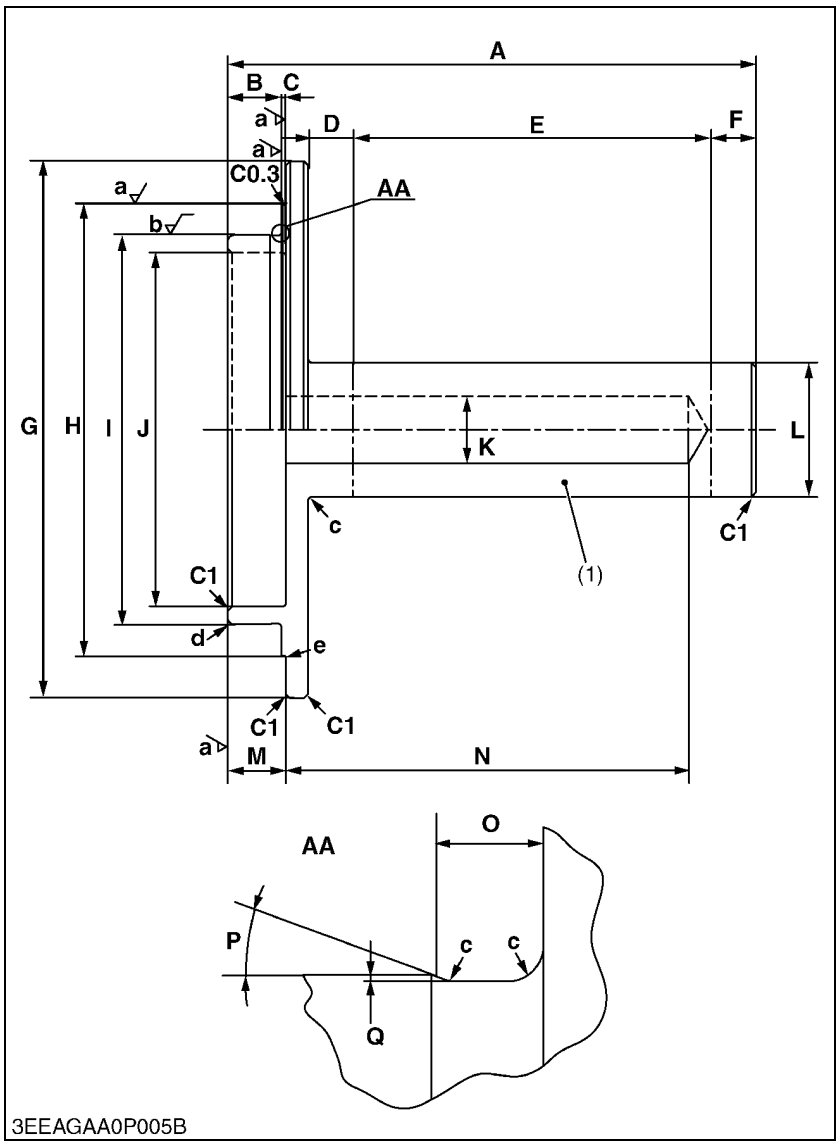
A	117 mm (4.61 in.)
B	12.0 mm (0.472 in.)
C	10.0 mm (0.394 in.)
D	75.0 mm (2.95 in.) : Roulette
E	10.0 mm (0.394 in.)
F	105 mm dia. (4.13 in. dia.)
G	78.9971 to 78.9990 mm dia. (3.11013 to 3.11019 in. dia.)
H	68.0 mm dia. (2.68 in. dia.)
I	15.0 mm dia. (0.591 in. dia.)
J	30.0 mm dia. (1.18 in. dia.)
K	90.0 mm (3.54 in.)
L	2.5 mm (0.098 in.)
M	0.35 rad (20 °)
N	0.15 to 0.25 mm (0.0059 to 0.0098 in.)
a	Ra = 3.2 a
b	Ra = 1.6 a
c	0.80 mm radius (0.031 in. radius)
d	1.5 mm radius (0.059 in. radius)
C1	Chamfer 1.0 mm (0.039 in.)

(1) Material : SS400

W1041793

Flywheel Housing Oil Seal Replacing Tool (for V3007-DI-T-E3B / V3307-DI-T-E3B)

Application: Use to press fit the flywheel housing oil seal.



3EEAGAA0P005B

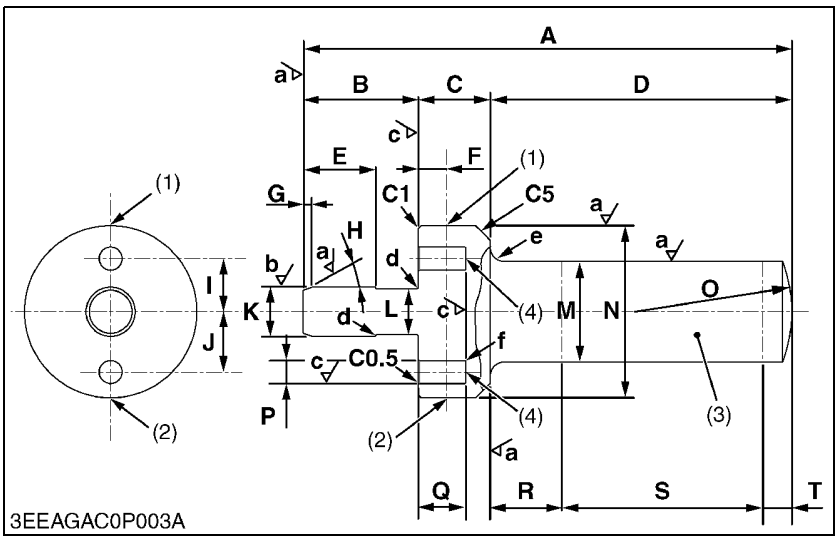
A	118 mm (4.65 in.)
B	12.0 mm (0.472 in.)
C	0.90 to 1.0 mm (0.036 to 0.039 in.)
D	10.0 mm (0.394 in.)
E	80.0 mm (3.15 in.)
F	10.0 mm (0.394 in.)
G	120 mm dia. (4.72 in. dia.)
H	100.90 to 101.10 mm dia. (3.9725 to 3.9803 in. dia.)
I	86.966 to 86.988 mm dia. (3.4239 to 3.4247 in. dia.)
J	79.0 mm dia. (3.11 in. dia.)
K	15.0 mm dia. (0.591 in. dia.)
L	30.0 mm dia. (1.18 in. dia.)
M	13.0 mm (0.512 in.)
N	90.0 mm (3.54 in.)
O	2.50 mm (0.0984 in.)
P	0.35 rad (20 °)
Q	0.15 to 0.25 mm (0.0059 to 0.0098 in.)
a	Ra = 3.2 a
b	Ra = 1.6 a
c	0.80 mm radius (0.031 in. radius)
d	1.5 mm radius (0.059 in. radius)
e	0.20 mm radius (0.0079 in. radius)
C0.3	Chamfer 0.30 mm (0.012 in.)
C1	Chamfer 1.0 mm (0.039 in.)

(1) Material : S43C-D

W1015151

Valve Bridge Shaft Replacing Tool (for V2607-DI-E3B / V2607-DI-T-E3B)

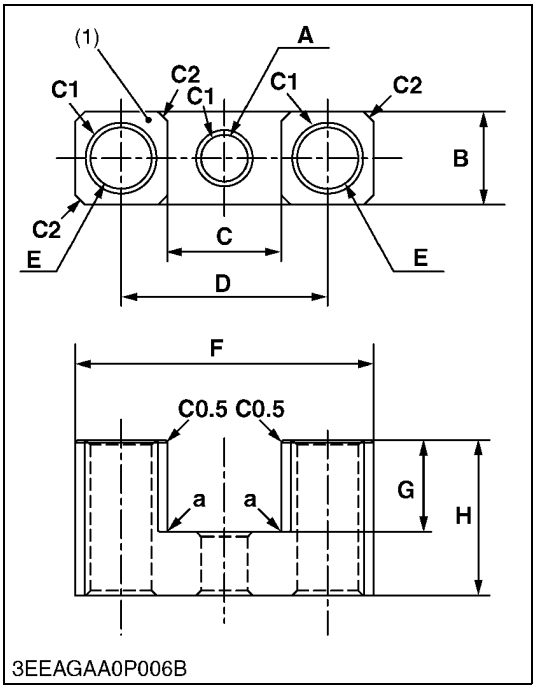
Application : Use to press fit the valve bridge shaft.



A	170 mm (6.69 in.)
B	40.0 mm (1.57 in.)
C	25.0 mm (0.984 in.)
D	105 mm (4.13 in.)
E	25.0 mm (0.984 in.)
F	10.0 mm (0.394 in.)
G	3.0 mm (0.12 in.)
H	0.35 rad (20 °)
I	18.45 to 18.55 mm (0.7264 to 0.7303 in.)
J	20.95 to 21.05 mm (0.8248 to 0.8287 in.)
K	17.057 to 17.084 mm dia. (0.67154 to 0.67259 in. dia.)
L	16.0 mm dia. (0.630 in. dia.)
M	35.0 mm dia. (1.38 in. dia.)
N	60.0 mm dia. (2.36 in. dia.)
O	SR 50.0 mm (1.97 in.)
P	8.10 to 8.15 mm dia. (0.319 to 0.320 in. dia.)
Q	16.4 to 16.6 mm (0.646 to 0.653 in.)
R	25.0 mm (0.984 in.)
S	70.0 mm (2.76 in.) : Roulette
T	10.0 mm (0.394 in.)
a	Ra = 6.3 a
b	Ra = 1.6 a
c	Ra = 3.2 a
d	0.50 mm radius (0.020 in. radius)
e	5.0 mm radius (0.20 in. radius)
f	under 0.30 mm radius (0.012 in. radius)
C0.5	Chamfer 0.50 mm (0.020 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C5	Chamfer 5.0 mm (0.20 in.)

(1) “IN” side
(2) “EX” side
(3) Material : S43C-D
(4) Bottom flat

W1042739



3EEAGAA0P006B

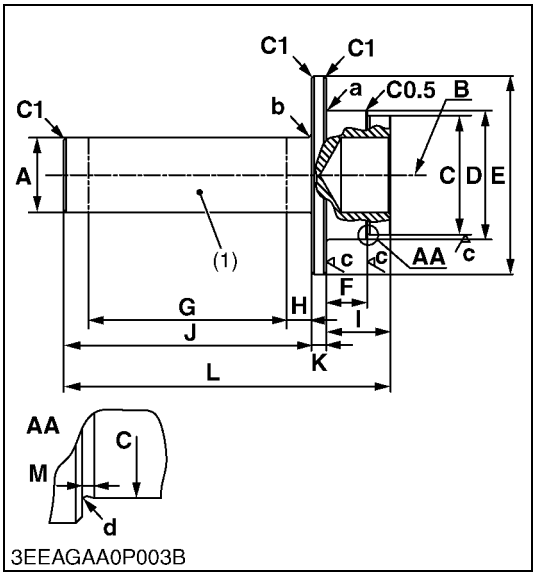
Valve Bridge Shaft Replacing Tool (for V3007-DI-T-E3B / V3307-DI-T-E3B)

Application: Use to press fit the valve bridge shaft.

A	9.50 mm dia. (0.374 in. dia.) through hole
B	19.0 mm (0.748 in.)
C	23.2 mm (0.913 in.)
D	42.00 to 42.40 mm (1.654 to 1.669 in.)
E	12.5 mm dia. (0.492 in. dia.) through hole
F	61.0 mm (2.40 in.)
G	18.7 mm (0.736 in.)
H	30.90 to 31.70 mm (1.217 to 1.248 in.)
a	0.30 mm radius (0.012 in. radius)
C0.5	Chamfer 0.50 mm (0.020 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)

(1) Material : SS400

W1015898



3EEAGAA0P003B

Camshaft Cover Replacing Tool (for V3007-DI-T-E3B / V3307-DI-T-E3B)

Application: Use to press fit the camshaft cover.

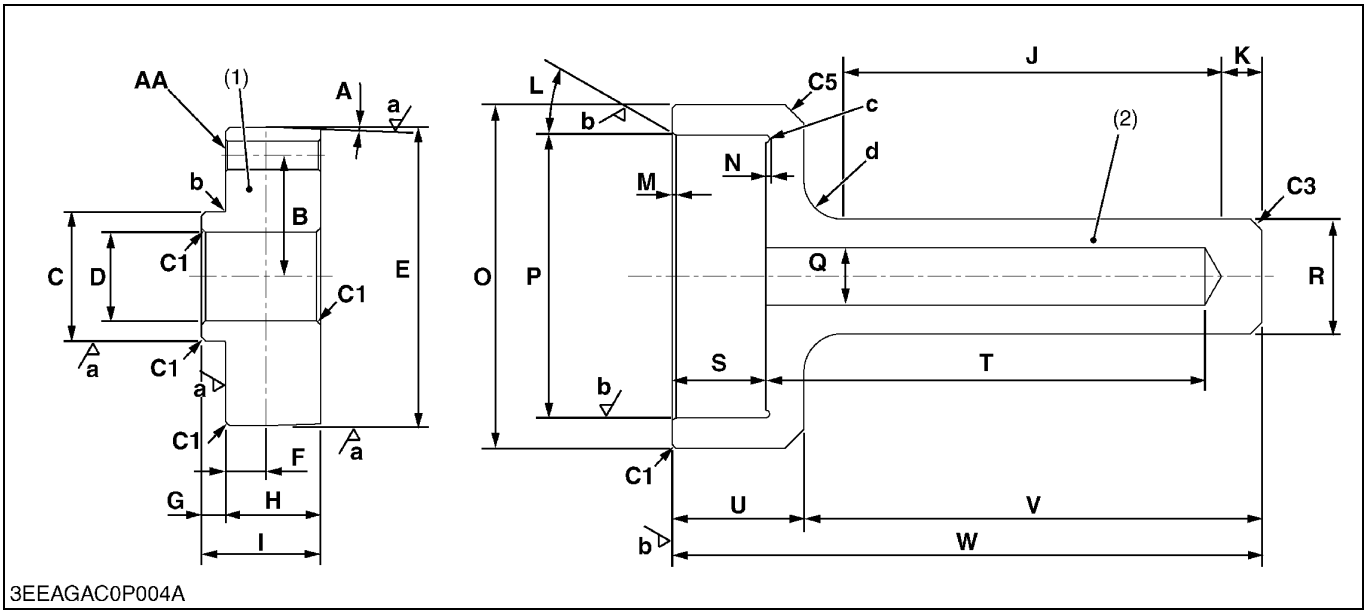
A	30.0 mm (1.18 in.)
B	30.0 mm dia., 20.0 mm depth (1.18 in. dia., 0.79 in. depth)
C	47.975 to 48.000 mm (1.8888 to 1.8897 in.)
D	52.0 mm (2.05 in.)
E	80.0 mm (3.15 in.)
F	16.5 to 16.6 mm (0.650 to 0.653 in.)
G	80.0 mm (3.15 in.)
H	10.0 mm (0.394 in.)
I	26.0 mm (1.02 in.)
J	100 mm (3.94 in.)
K	6.0 mm (0.24 in.)
L	132 mm (5.20 in.)
M	1.0 mm (0.039 in.)
a	1.0 mm radius (0.039 in. radius)
b	2.0 mm radius (0.079 in. radius)
c	Ra = 3.2a
d	0.40 mm radius (0.016 in. radius)
C0.5	Chamfer 0.50 mm (0.020 in.)
C1	Chamfer 1.0 mm (0.039 in.)

(1) Material : S43C

W1014056

Crankshaft Sleeve Replacing Tool (for V2607-DI-E3B / V2607-DI-T-E3B)

Application : Use to fix the crankshaft sleeve of the diesel engine.



3EEAGAC0P004A

A	0.035 rad (2.0 °)	**Q**	15.0 mm dia. (0.591 in. dia.)
B	30.0 mm (1.18 in.)	**R**	30.0 mm dia. (1.18 in. dia.)
C	31.925 to 31.950 mm dia. (1.2569 to 1.2578 in. dia.)	**S**	24.45 to 24.55 mm (0.9626 to 0.9665 in.)
D	22.0 mm dia. (0.866 in. dia.)	**T**	115 mm depth (4.53 in. depth)
E	73.60 to 73.70 mm dia. (2.898 to 2.901 in. dia.)	**U**	34.5 mm (1.36 in.)
F	10.0 mm (0.394 in.)	**V**	120 mm (4.72 in.)
G	6.0 mm (0.24 in.)	**W**	154.5 mm (6.083 in.)
H	23.45 to 23.55 mm (0.9233 to 0.9272 in.)	**AA**	7.0 mm dia. (0.28 in. dia.), Chamfer 0.50 mm (0.020 in.) both side
I	29.5 mm (1.16 in.)	**a**	Ra = 1.6 a
J	95.0 mm (3.74 in.) : Roulette	**b**	Ra = 3.2 a
K	10.0 mm (0.394 in.)	**c**	1.0 mm radius (0.039 in. radius)
L	0.52 rad (30 °)	**d**	10.0 mm radius (0.394 in. radius)
M	0.70 to 1.0 mm dia. (0.028 to 0.039 in. dia.)	**C1**	Chamfer 1.0 mm (0.039 in.)
N	1.0 mm (0.039 in.)	**C3**	Chamfer 3.0 mm (0.12 in.)
O	90.0 mm dia. (3.54 in. dia.)	**C5**	Chamfer 5.0 mm (0.20 in.)
P	74.10 to 74.20 mm dia. (2.918 to 2.921 in. dia.)		

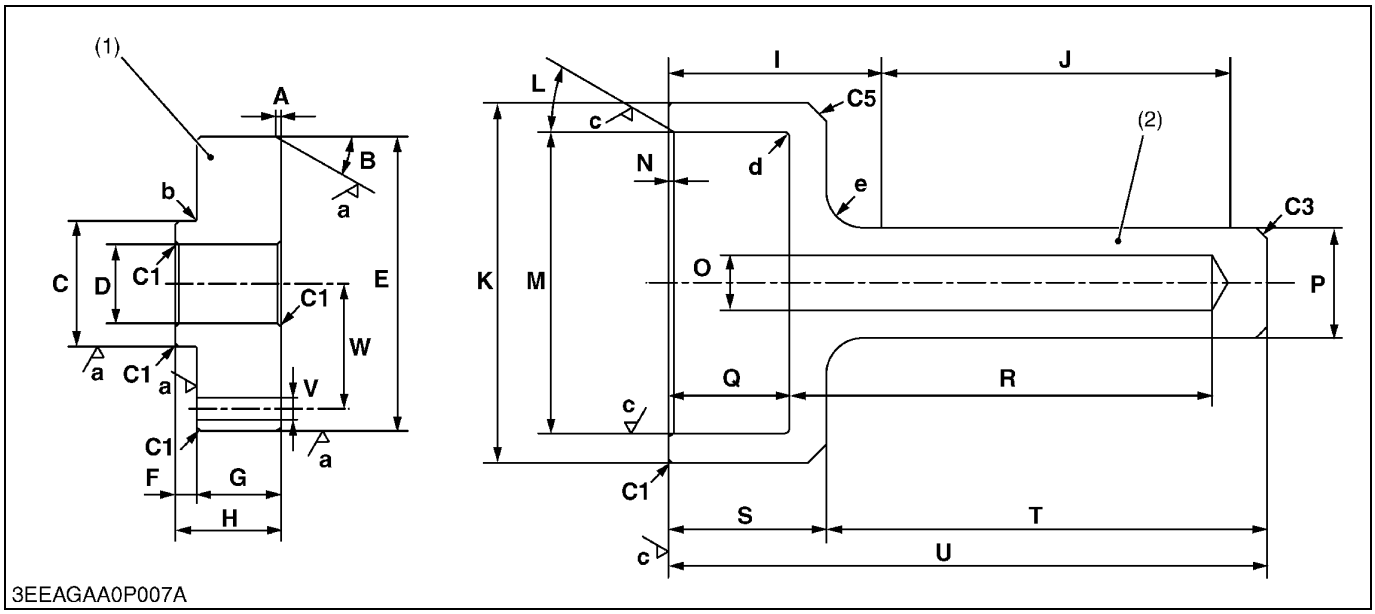
(1) Sleeve Guide Material : SGD400-D

(2) Shaft Material : SGD400-D

W1036487

Crankshaft Sleeve Replacing Tool (for V3007-DI-T-E3B / V3307-DI-T-E3B)

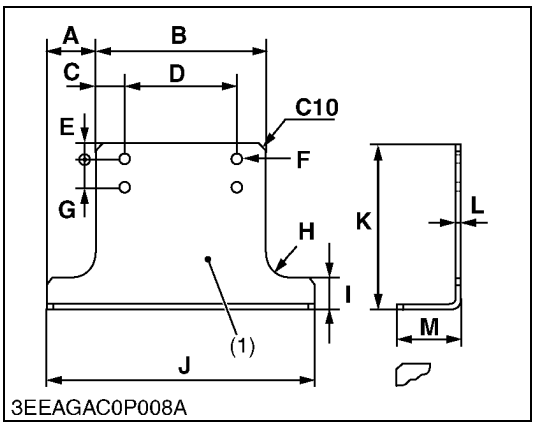
Application: Use to fix the crankshaft sleeve of the diesel engine.



3EEAGAA0P007A

A	1.50 mm (0.0591 in.)	**Q**	33.0 mm (1.30 in.)
B	0.52 rad (30 °)	**R**	115 mm depth (4.53 in. depth)
C	34.925 to 34.950 mm dia. (1.3750 to 1.3759 in. dia.)	**S**	43.0 mm (1.69 in.)
D	22 mm dia. (0.8661 in. dia.)	**T**	120 mm (4.72 in.)
E	81.980 to 81.985 mm dia. (3.2276 to 3.2277 in. dia.)	**U**	163 mm (6.42 in.)
F	6.0 mm (0.24 in.)	**V**	8.0 mm dia. (0.31 in. dia.)
G	23.5 mm (0.925 in.)	**W**	33.475 to 33.525 mm (1.3180 to 1.3198 in.)
H	29.5 mm (1.16 in.)	**a**	Ra = 1.6 a
I	58.0 mm (2.28 in.)	**b**	0.50 mm radius (0.020 in. radius)
J	95.0 mm (3.74 in.)	**c**	Ra = 3.2 a
K	98.0 mm dia. (3.86 in. dia.)	**d**	1.50 mm radius (0.0591 in. radius)
L	0.52 rad (30 °)	**e**	10.0 mm radius (0.394 in. radius)
M	82.100 to 82.200 mm dia. (3.2323 to 3.2362 in. dia.)	**C1**	Chamfer 1.0 mm (0.039 in.)
N	1.50 mm (0.0591 in.)	**C3**	Chamfer 3.0 mm (0.12 in.)
O	15.0 mm dia. (0.591 in. dia.)	**C5**	Chamfer 5.0 mm (0.20 in.)
P	30.0 mm dia. (1.18 in. dia.)		

(1) Sleeve Guide Material : S43C (2) Shaft Material : S43C



3EEAGAC0P008A

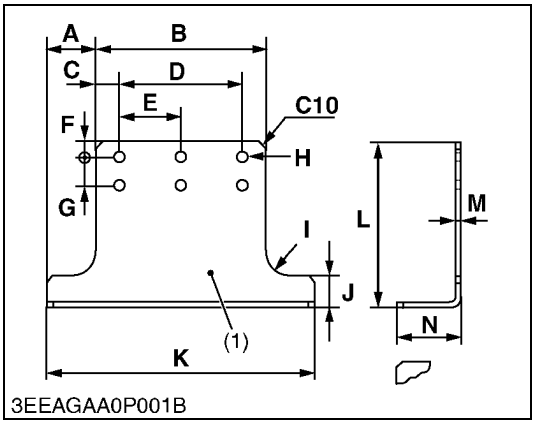
Engine Stand (for V2607-DI-E3B / V2607-DI-T-E3B)

Application: Use to support engine.

A	107 mm (4.21 in.)
B	246 mm (9.68 in.)
C	28 mm (1.1 in.)
D	190 mm (7.48 in.)
E	15 mm (0.59 in.)
F	14 mm dia. (0.55 in. dia.)
G	59 mm (2.3 in.)
H	80 mm radius (3.1 in. radius)
I	70 mm (2.8 in.)
J	460 mm (18.1 in.)
K	270 mm (10.6 in.)
L	6.0 mm (0.24 in.)
M	70 mm (2.8 in.)
C10	Chamfer 10 mm (0.39 in.)

(1) Material : S43C

W1033072



3EEAGAA0P001B

Engine Stand (for V3007-DI-T-E3B / V3307-DI-T-E3B)

Application: Use to support engine.

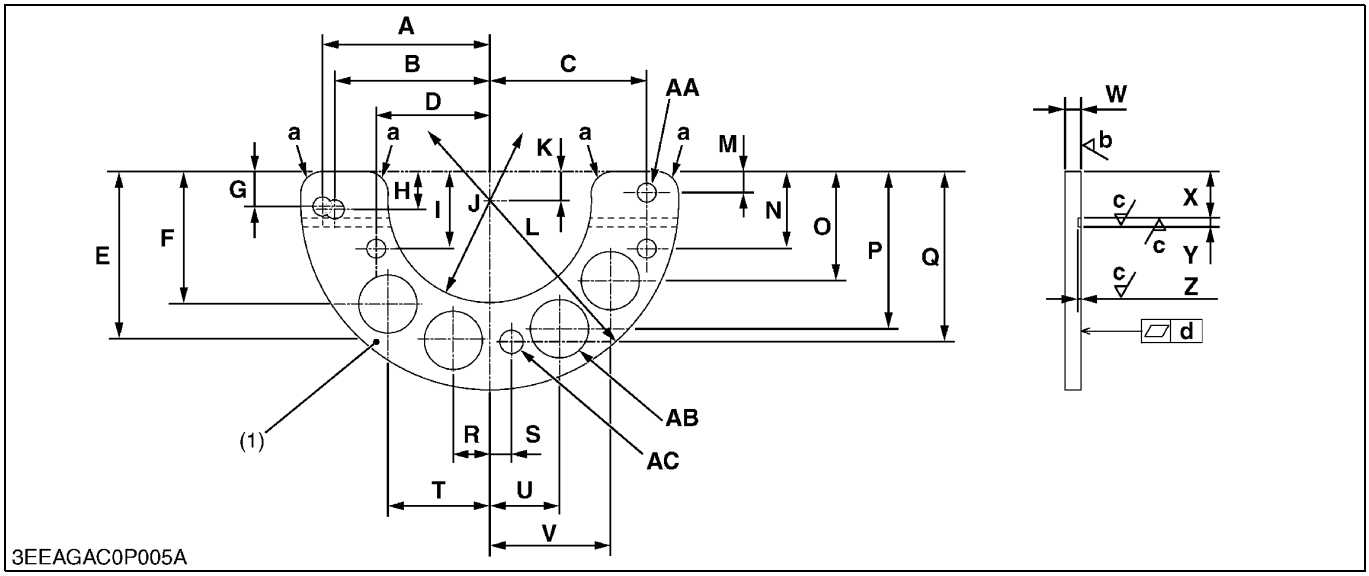
A	107 mm (4.21 in.)
B	246 mm (9.68 in.)
C	21 mm (0.83 in.)
D	204 mm (8.03 in.)
E	102 mm (4.02 in.)
F	15 mm (0.59 in.)
G	59 mm (2.3 in.)
H	14 mm dia. (0.55 in. dia.)
I	80 mm radius (3.1 in. radius)
J	70 mm (2.8 in.)
K	460 mm (18.1 in.)
L	270 mm (10.6 in.)
M	6.0 mm (0.24 in.)
N	70 mm (2.8 in.)
C10	Chamfer 10 mm (0.39 in.)

(1) Material : S43C

W1033645

Crankcase Aligning Plate (for V2607-DI-E3B / V2607-DI-T-E3B)

Application :Use for aligning the crankcase 1 and 2.

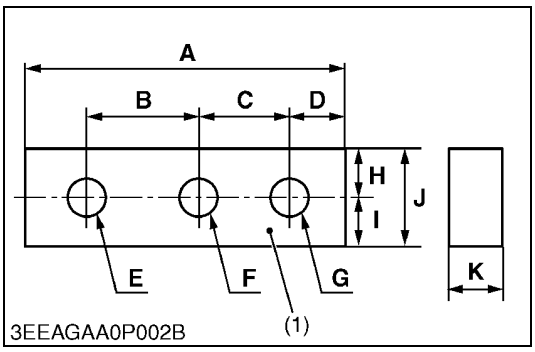


3EEAGAC0P005A

A	115 mm (4.53 in.)	**R**	25.0 mm (0.984 in.)
B	106.5 mm (4.193 in.)	**S**	15.0 mm (0.591 in.)
C	108 mm (4.25 in.)	**T**	70.0 mm (2.76 in.)
D	78.0 mm (3.07 in.)	**U**	48.0 mm (1.89 in.)
E	115 mm (4.53 in.)	**V**	83.0 mm (3.27 in.)
F	91.0 mm (3.58 in.)	**W**	11.0 mm (0.433 in.)
G	24.0 mm (0.945 in.)	**X**	32.0 mm (1.26 in.)
H	26.0 mm (1.02 in.)	**Y**	6.0 mm (0.24 in.)
I	53.0 mm (2.09 in.)	**Z**	2.0 mm (0.079 in.)
J	140 mm dia. (5.51 in. dia.)	**AA**	5 X 13.0 mm dia. (0.512 in. dia.), Chamfer 0.50 mm (0.020 in.)
K	20.0 mm (0.787 in.)	**AB**	4 X 40.0 mm dia. (1.57 in. dia.), Chamfer 0.50 mm (0.020 in.)
L	260 mm dia. (10.2 in. dia.)	**AC**	16.0 mm dia. (0.630 in. dia.), Chamfer 0.50 mm (0.020 in.)
M	14.5 mm (0.571 in.)	**a**	15.0 mm radius (0.591 in. radius)
N	53.0 mm (2.09 in.)	**b**	Ra = 3.2 a
O	75.0 mm (2.95 in.)	**c**	Ra = 6.3 a
P	108 mm (4.25 in.)	**d**	0.05 mm (0.002 in.)
Q	117 mm (4.61 in.)		

(1) Material : SS400

W1045196



Crankcase Aligning Plate (for V3007-DI-T-E3B / V3307-DI-T-E3B)

Application: Use for aligning the crankcase 1 and 2.

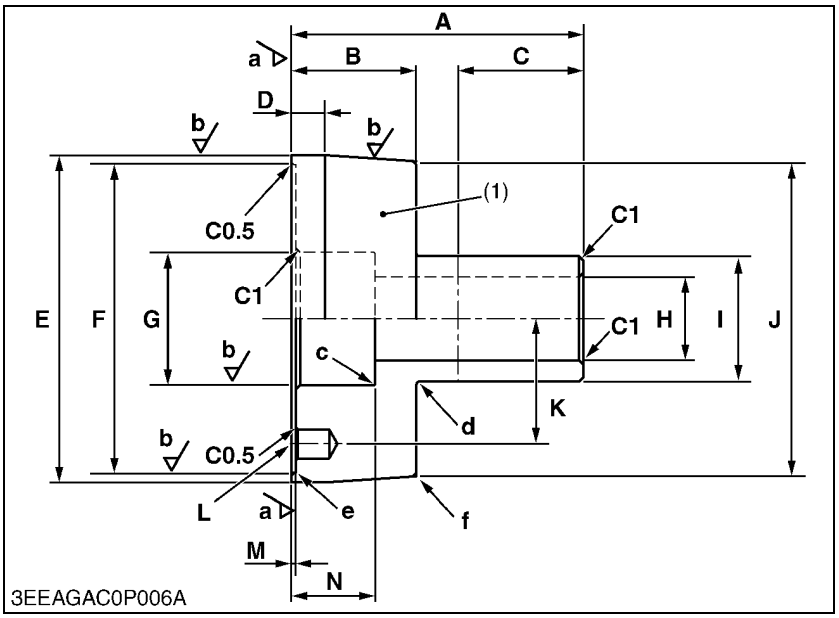
A	126.6 mm (4.984 in.)
B	49.1 mm (1.93 in.)
C	37.5 mm (1.48 in.)
D	20 mm (0.79 in.)
E	14 mm dia. (0.55 in. dia.)
F	14 mm dia. (0.55 in. dia.)
G	14 mm dia. (0.55 in. dia.)
H	17.5 mm (0.689 in.)
I	17.5 mm (0.689 in.)
J	35 mm (1.4 in.)
K	19 mm (0.75 in.)

(1) Material : S43C

W1047882

Flywheel Housing Guide (for V2607-DI-E3B / V2607-DI-T-E3B)

Application: Use to install the flywheel housing to the crankcase.



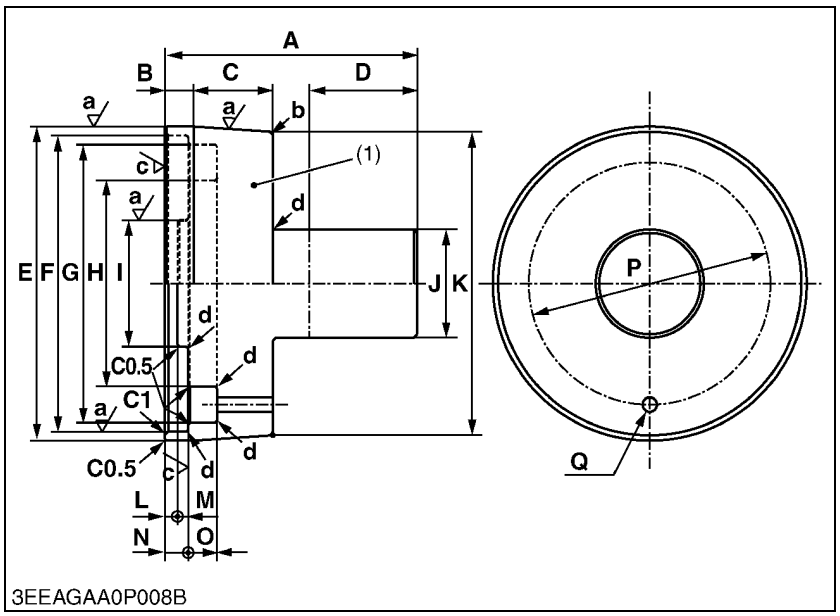
A	70.0 mm (2.76 in.)
B	30.0 mm (1.18 in.)
C	30.0 mm (1.18 in.) : Roulette
D	8.0 mm (0.31 in.)
E	78.60 to 78.70 mm dia. (3.095 to 3.098 in. dia.)
F	73.8 to 74.2 mm dia. (2.91 to 2.92 in. dia.)
G	32.009 to 32.034 mm dia. (1.2602 to 1.2611 in. dia.)
H	20.0 mm dia. (0.787 in. dia.)
I	30.0 mm dia. (1.18 in. dia.)
J	75.5 mm dia. (2.97 in. dia.)
K	30.0 mm (1.18 in.)
L	7.0 mm dia., 8.0 mm depth (0.28 in. dia., 0.31 in. depth)
M	1.1 to 1.3 mm (0.044 to 0.051 in.)
N	20.0 mm (0.787 in.)
a	Ra = 3.2 a
b	Ra = 1.6 a
c	0.40 mm radius (0.016 in. radius)
d	0.80 mm radius (0.031 in. radius)
e	0.20 mm radius (0.0079 in. radius)
f	1.5 mm radius (0.059 in. radius)
C0.5	Chamfer 0.50 mm (0.020 in.)
C1	Chamfer 1.0 mm (0.039 in.)

(1) Material : SS400

W1046882

Flywheel Housing Guide (for V3007-DI-T-E3B / V3307-DI-T-E3B)

Application: Use to install the flywheel housing to the crankcase.

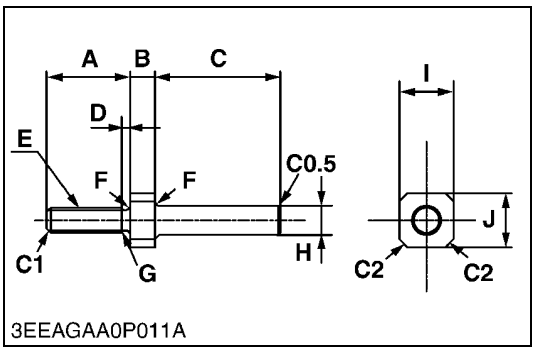


3EEAGAA0P008B

A	70.0 mm (2.76 in.)
B	8.0 mm (0.31 in.)
C	22.0 mm (0.866 in.)
D	30.0 mm (1.18 in.)
E	87.0 mm dia. (3.43 in. dia.)
F	82.036 to 82.071 mm dia. (3.2298 to 3.2311 in. dia.)
G	77.0 mm dia. (3.03 in. dia.)
H	57.0 mm dia. (2.24 in. dia.)
I	35.0 mm dia. (1.38 in. dia.)
J	30.0 mm dia. (1.18 in. dia.)
K	84.0 mm dia. (3.31 in. dia.)
L	3.5 mm (0.14 in.)
M	3.0 mm (0.12 in.)
N	6.60 to 6.80 mm (0.260 to 0.267 in.)
O	8.0 mm (0.31 in.)
P	67.0 mm dia. (2.64 in. dia.)
Q	4.0 mm dia. (0.16 in. dia.) through hole
a	Ra = 1.6 a
b	1.5 mm radius (0.059 in. radius)
c	Ra = 3.2 a
d	0.80 mm radius (0.031 in. radius)
C0.5	Chamfer 0.50 mm (0.020 in.)
C1	Chamfer 1.0 mm (0.039 in.)

(1) Material : SS400

W1017819



3EEAGAA0P011A

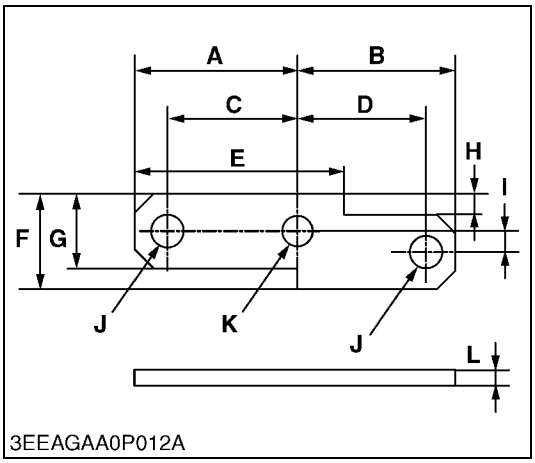
Fuel Control Rack Fixing Tool (for V2607-DI-E3B)

Application: Use to fix the fuel control rack of the injection pump.

1) Shaft

A	20.0 mm (0.787 in.)
B	6.0 mm (0.24 in.)
C	28.90 to 29.10 mm (1.138 to 1.145 in.)
D	2.0 to 3.0 mm (0.079 to 0.11 in.)
E	M6 X P1.0
F	1.0 mm radius (0.039 in. radius)
G	0.50 mm radius (0.020 in. radius)
H	7.0 mm dia. (0.28 in. dia.)
I	13.0 mm (0.512 in.)
J	13.0 mm (0.512 in.)
C0.5	Chamfer 0.50 mm (0.020 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)

W10398940



3EEAGAA0P012A

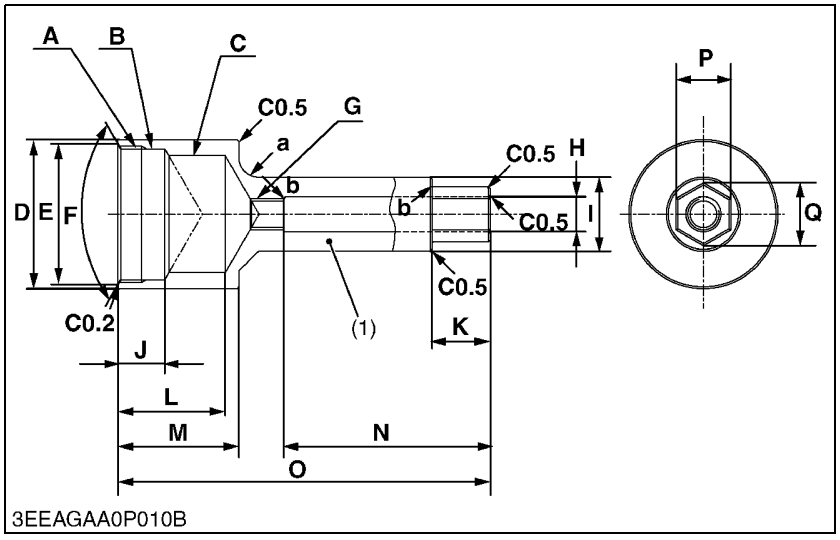
2) Flange

A	35.0 mm (1.38 in.)
B	34.0 mm (1.34 in.)
C	28.0 mm (1.10 in.)
D	27.64 mm (1.088 in.)
E	45.0 mm (1.77 in.)
F	20.5 mm (1.807 in.)
G	16.0 mm (0.630 in.)
H	4.5 mm (0.18 in.)
I	4.5 mm (0.18 in.)
J	7.0 mm dia. (0.28 in. dia.) through hole
K	6.5 mm dia. (0.26 in. dia.) through hole
L	3.2 mm (0.13 in.)

W10404690

Injection Pump Gear Puller (for V2607 / V3007 / V3307)

Application: Use for remove the injection pump gear from governor shaft.

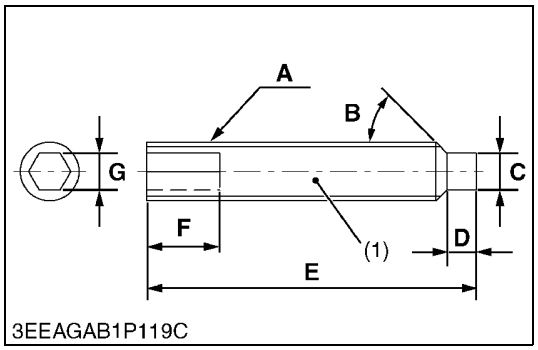


3EEAGAA0P010B

A	M35 x P1.5, 6.0 mm depth (0.24 in. depth)
B	35.0 mm dia., 12.0 mm depth (1.38 in. dia., 0.472 in. depth)
C	30.0 mm dia., 27.5 mm depth (1.18 in. dia., 1.08 in. depth)
D	40.00 to 40.20 mm dia. (1.575 to 1.582 in. dia.)
E	35.90 to 36.10 mm dia. (1.414 to 1.421 in. dia.)
F	2.09 rad (120 °)
G	M8 x P1.25
H	9.0 mm dia. (0.35 in. dia.)
I	19.0 mm dia. (0.748 in. dia.)
J	12.0 mm (0.472 in.)
K	15.0 mm (0.591 in.)
L	27.5 mm (1.08 in.)
M	31.0 mm (1.22 in.)
N	57.5 mm (2.26 in.)
O	100 mm (3.94 in.)
P	13.75 to 14.00 mm (0.5414 to 0.5511 in.)
Q	16.17 mm (0.6366 in.)
a	5.0 mm radius (0.20 in. radius)
b	0.40 mm radius (0.016 in. radius)
C0.2	Chamfer 0.20 mm (0.0079 in.)
C0.5	Chamfer 0.50 mm (0.020 in.)

(1) Material : SS400

W1018612



3EEAGAB1P119C

Fuel Camshaft Lock Screw (Socket Set Screw Dog Point Type)

Application: Use to fix the fuel camshaft.

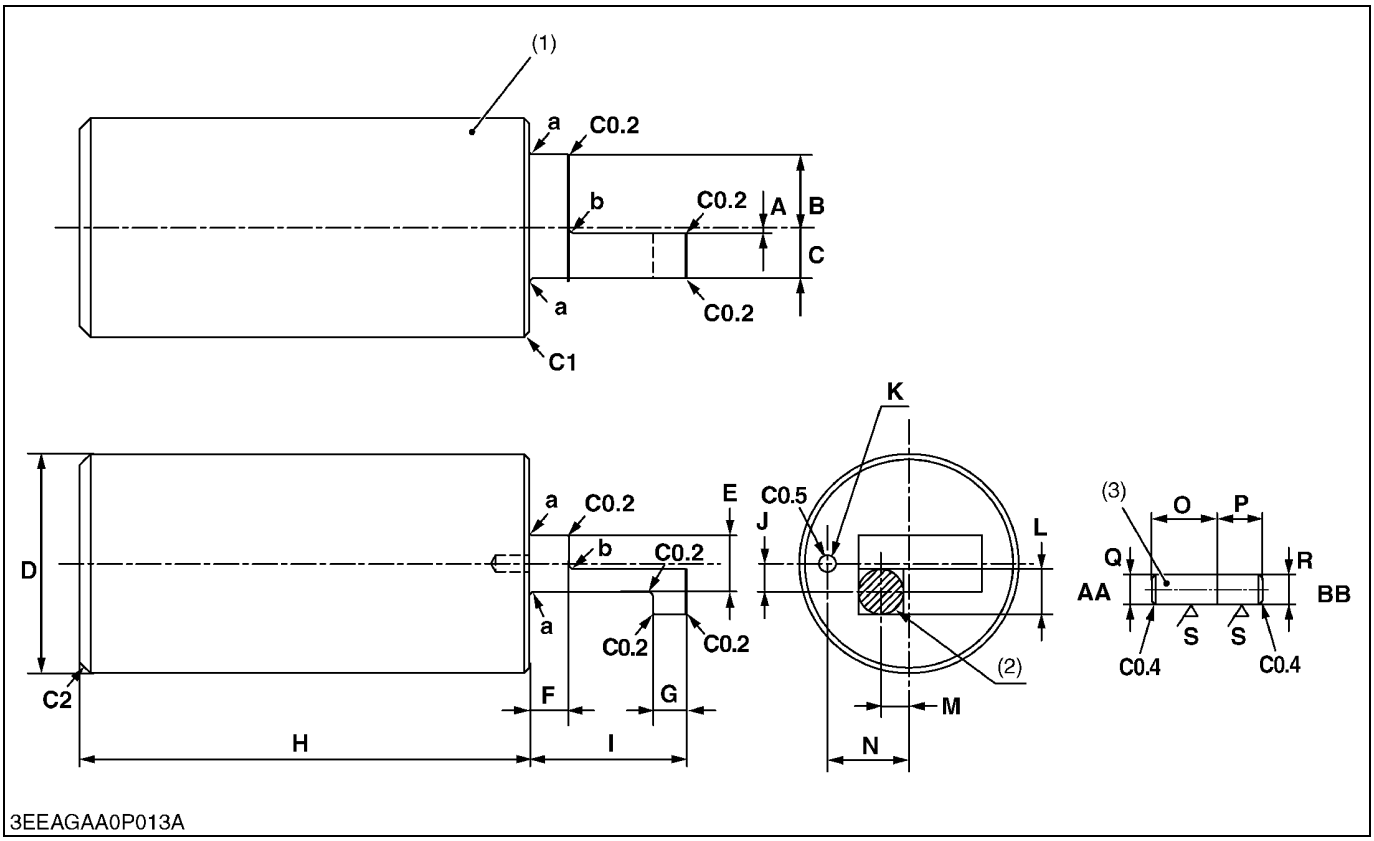
A	M8 × Pitch 1.25
B	0.79 rad (45 °)
C	5.0 mm dia. (0.20 in. dia.)
D	4.0 mm (0.16 in.)
E	45 mm (1.8 in.)
F	10 mm (0.39 in.) : Conspicuously Painted
G	5.0 mm (0.20 in.)

(1) Material : SS400

W10461560

Jig for Governor Connecting Rod (for V2607 / V3007 / V3307)

Application: Use for connecting the governor connecting rod to the rack pin of the fuel injection pump assembly.



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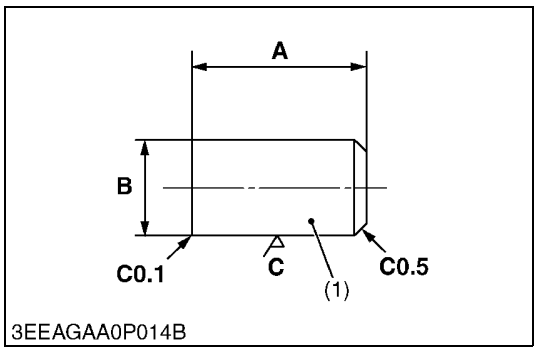
A	0.50 mm (0.020 in.)	**O**	5.0 mm (0.20 in.)
B	12.7 to 13.0 mm (0.500 to 0.511 in.)	**P**	4.0 mm (0.16 in.)
C	8.70 to 9.00 mm (0.343 to 0.354 in.)	**Q**	2.955 to 2.965 mm dia. (0.1164 to 0.1167 in. dia.)
D	39.0 mm (1.54 in.)	**R**	3.020 to 3.030 mm dia. (0.1189 to 0.1192 in. dia.)
E	10.0 mm (0.394 in.)	**S**	Ra = 1.6 a
F	7.0 mm (0.28 in.)	**AA**	Governor housing side
G	6.0 mm (0.24 in.)	**BB**	Press in side
H	80.0 mm (3.15 in.)	**a**	0.60 mm radius (0.024 in. radius)
I	27.95 to 28.05 mm (1.101 to 1.104 in.)	**b**	1.0 mm radius (0.039 in. radius)
J	5.0 mm (0.20 in.)	**C0.2**	Chamfer 0.20 mm (0.0079 in.)
K	3.000 to 3.010 mm dia., 6.0 mm depth (0.1182 to 0.1185 in. dia., 0.24 in. depth)	**C0.4**	Chamfer 0.40 mm (0.016 in.)
L	9.0 mm (0.35 in.)	**C0.5**	Chamfer 0.50 mm (0.020 in.)
M	5.0 mm (0.20 in.)	**C1**	Chamfer 1.0 mm (0.039 in.)
N	14.45 to 14.55 mm (0.5689 to 0.5728 in.)	**C2**	Chamfer 2.0 mm (0.079 in.)

(1) Material : S43C-D

(2) Permanent Magnet :
8.0 mm dia. (0.31 in. dia.)
Thickness : 3.0 mm (0.12 in.)

(3) Pin Material : SUM22



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Pin for Balancer Shaft Bearing Replacing Tool (for V3007 / V3307 Balancer Model)

Application: Use to press fit the bearing.

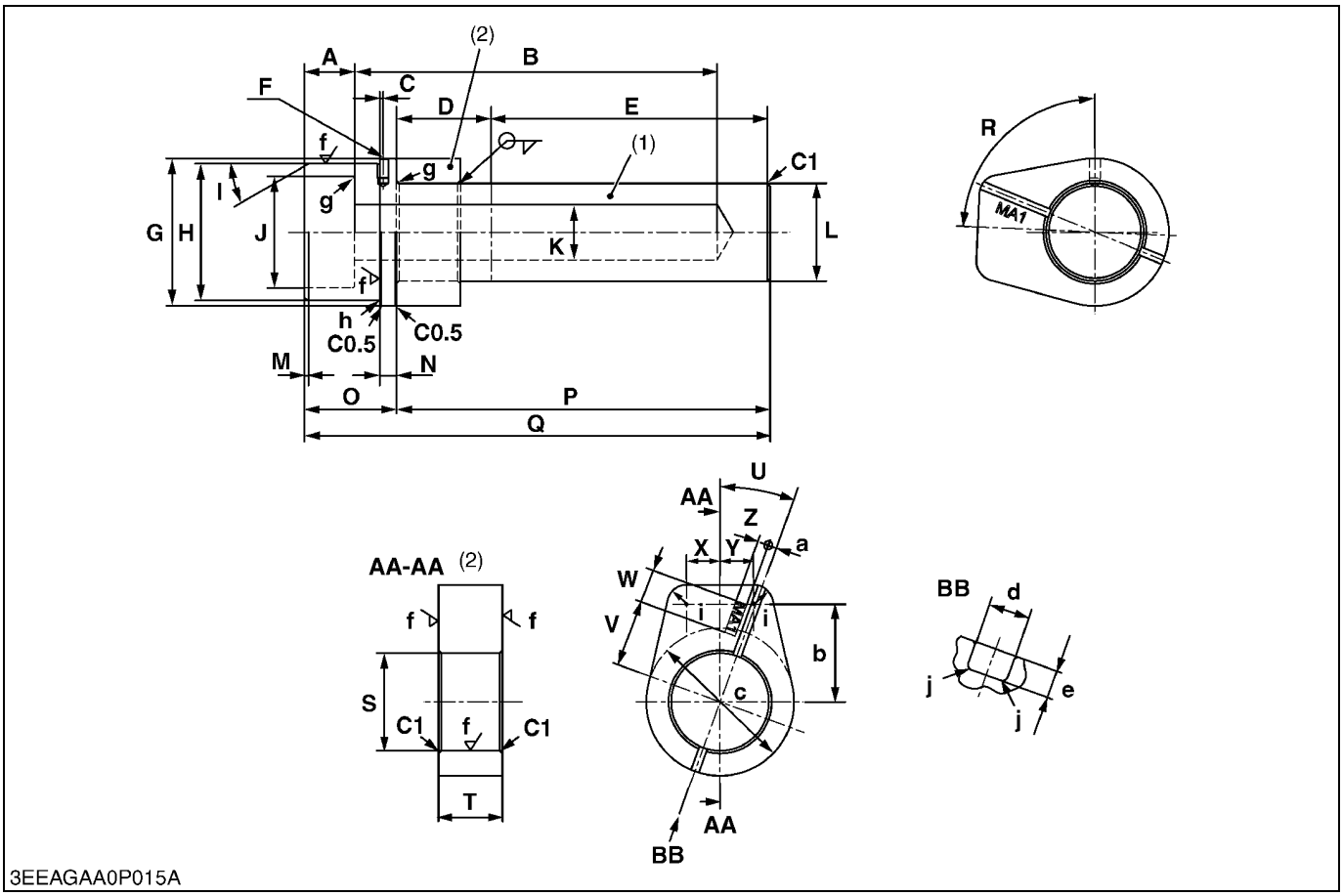
A	7.20 to 7.40 mm (0.284 to 0.291 in.)
B	4.0 mm dia. (0.16 in. dia.)
C	Ra = 0.8 a
C0.1	Chamfer 0.10 mm (0.0039 in.)
C0.5	Chamfer 0.50 mm (0.020 in.)

(1) Material : SUM22

W1020662

Balancer Shaft 1 Bearing A Replacing Tool (for V3007 / V3307 Balancer Model)

Application: Use to press fit the bearing.

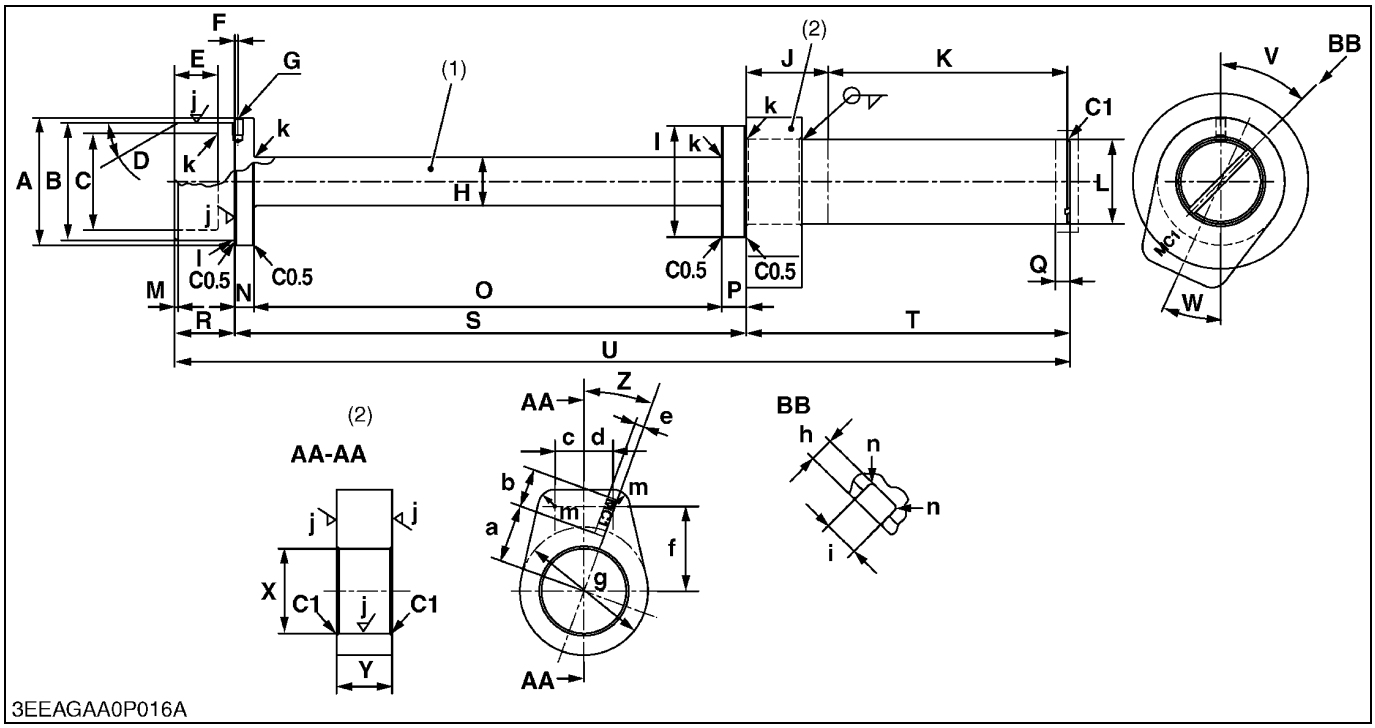


A	18.0 mm (0.709 in.)	**T**	23.0 mm (0.906 in.)
B	130 mm (5.12 in.)	**U**	0.35 rad (20 °)
C	1.2 mm (0.047 in.)	**V**	24.0 mm (0.945 in.)
D	34.0 mm (1.34 in.)	**W**	12.0 mm (0.472 in.)
E	99.0 mm (3.90 in.)	**X**	12.0 mm (0.472 in.)
F	4.000 to 4.018 mm dia., 7.0 mm depth (0.1575 to 0.1581 in. dia., 0.28 in. depth)	**Y**	12.0 mm (0.472 in.)
G	53.0 mm dia. (2.09 in. dia.)	**Z**	4.0 mm (0.16 in.)
H	48.80 to 48.90 mm dia. (1.922 to 1.925 in. dia.)	**a**	3.0 mm (0.12 in.)
I	0.52 rad (30 °)	**b**	35.0 mm (1.38 in.)
J	40.0 mm dia. (1.57 in. dia.)	**c**	53.0 mm (2.09 in.)
K	20.0 mm dia. (0.787 in. dia.)	**d**	3.0 mm (0.12 in.)
L	34.90 to 35.00 mm dia. (1.374 to 1.377 in. dia.)	**e**	2.0 mm (0.079 in.)
M	1.5 mm (0.059 in.)	**f**	Ra = 3.2 a
N	5.5 to 6.5 mm (0.22 to 0.25 in.)	**g**	0.80 mm radius (0.031 in. radius)
O	33.0 mm (1.30 in.)	**h**	0.30 mm radius (0.012 in. radius)
P	134 mm (5.28 in.)	**i**	7.0 mm radius (0.28 in. radius)
Q	167 mm (6.57 in.)	**j**	0.40 mm radius (0.016 in. radius)
R	1.53 rad (87.5 °)	**C0.5**	Chamfer 0.50 mm (0.020 in.)
S	35.0 mm dia. (1.38 in. dia.)	**C1**	Chamfer 1.0 mm (0.039 in.)

(1) Shaft Material : S43C-D (2) Stopper Material : SS400

Balancer Shaft 1 Bearing C Replacing Tool (for V3007 / V3307 Balancer Model)

Application: Use to press fit the bearing.



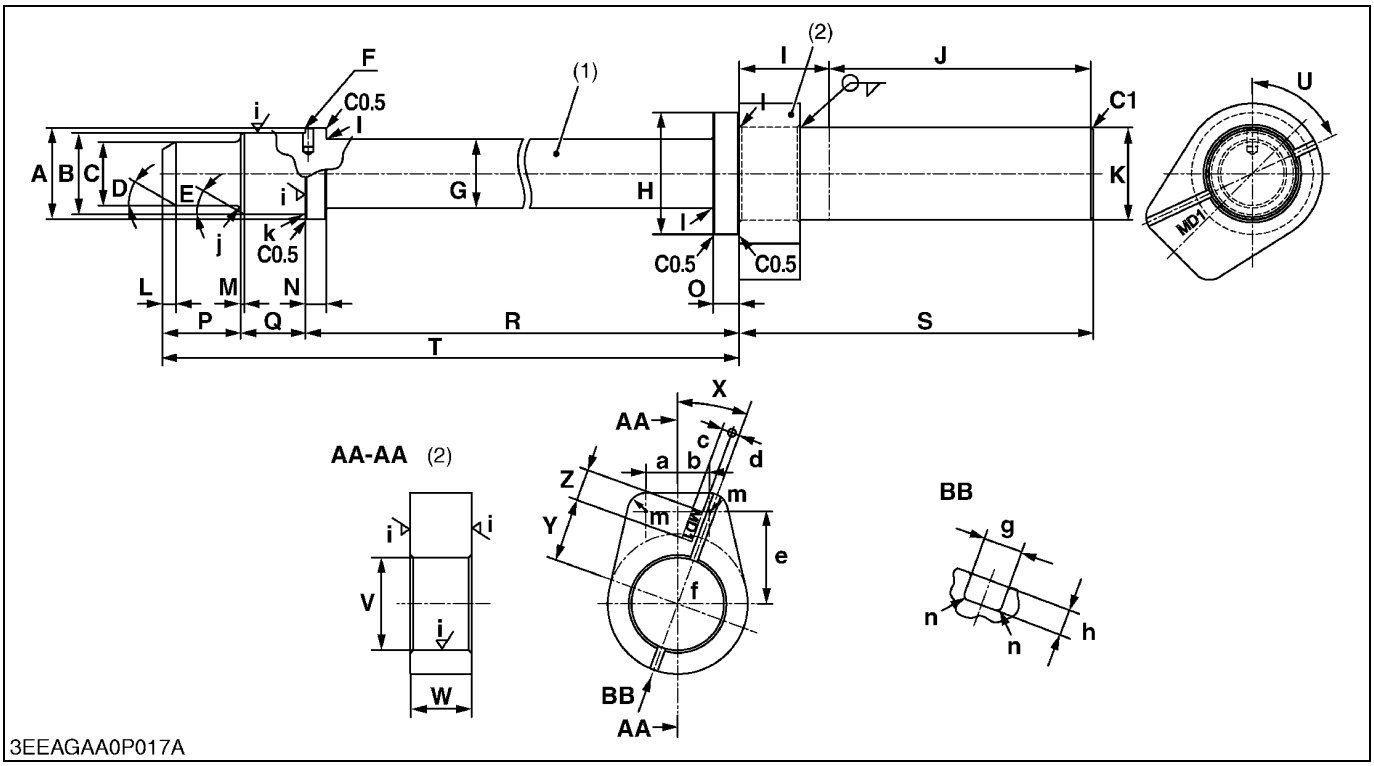
3EEAGAA0P016A

A	52.5 mm dia. (2.07 in. dia.)	**V**	0.86 rad (49 °)
B	48.40 to 48.50 mm dia. (1.906 to 1.909 in. dia.)	**W**	0.428 rad (24.5 °)
C	40.0 mm dia. (1.57 in. dia.)	**X**	35.0 mm dia. (1.38 in. dia.)
D	0.52 rad (30 °)	**Y**	23.0 mm (0.906 in.)
E	18.0 mm (0.709 in.)	**Z**	0.35 rad (20 °)
F	1.2 mm (0.047 in.)	**a**	24.0 mm (0.945 in.)
G	4.000 to 4.018 mm dia., 7.0 mm depth (0.1575 to 0.1581 in. dia., 0.28 in. depth)	**b**	16.0 mm (0.630 in.)
H	20.0 mm dia. (0.787 in. dia.)	**c**	12.0 mm (0.472 in.)
I	46.0 mm dia. (1.81 in. dia.)	**d**	12.0 mm (0.472 in.)
J	34.0 mm (1.34 in.)	**e**	4.0 mm (0.16 in.)
K	99.0 mm (3.90 in.)	**f**	35.0 mm (1.38 in.)
L	34.90 to 35.00 mm dia. (1.374 to 1.378 in. dia.)	**g**	53.0 mm (2.09 in.)
M	1.5 mm (0.059 in.)	**h**	2.0 mm (0.079 in.)
N	8.0 mm (0.31 in.)	**i**	3.0 mm (0.12 in.)
O	193.5 mm (7.618 in.)	**j**	Ra = 3.2 a
P	10.0 mm (0.394 in.)	**k**	0.80 mm radius (0.031 in. radius)
Q	6.0 mm (0.24 in.)	**l**	0.30 mm radius (0.012 in. radius)
R	25.0 mm (0.984 in.)	**m**	7.0 mm radius (0.28 in. radius)
S	211 to 212 mm (8.31 to 8.34 in.)	**n**	0.40 mm radius (0.016 in. radius)
T	134 mm (5.28 in.)	**C0.5**	Chamfer 0.50 mm (0.020 in.)
U	370.5 mm (14.59 in.)	**C1**	Chamfer 1.0 mm (0.039 in.)

(1) Shaft Material : S43C-D (2) Stopper Material : SS400

Balancer Shaft 1 Bearing D Replacing Tool (for V3007 / V3307 Balancer Model)

Application: Use to press fit the bearing.



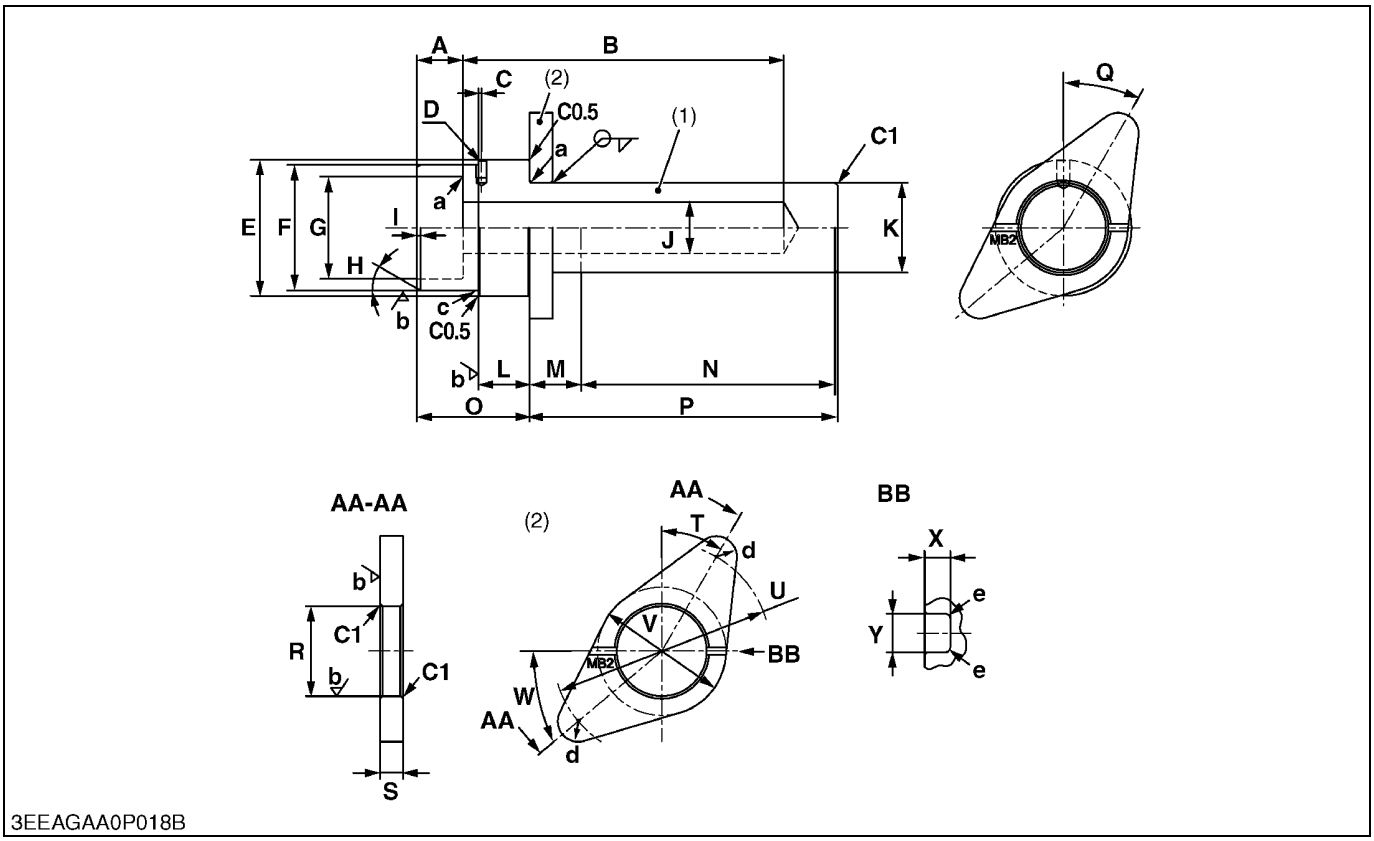
3EEAGAA0P017A

A	34.5 mm dia. (1.36 in. dia.)	**V**	35.0 mm dia. (1.38 in. dia.)
B	30.80 to 30.90 mm dia. (1.213 to 1.216 in. dia.)	**W**	23.0 mm (0.906 in.)
C	24.0 mm dia. (0.945 in. dia.)	**X**	0.35 rad (20 °)
D	0.52 rad (30 °)	**Y**	24.0 mm (0.945 in.)
E	0.52 rad (30 °)	**Z**	12.0 mm (0.472 in.)
F	4.000 to 4.018 mm dia., 7.0 mm depth (0.1575 to 0.1581 in. dia., 0.28 in. depth)	**a**	12.0 mm (0.472 in.)
G	26.0 mm dia. (1.02 in. dia.)	**b**	12.0 mm (0.472 in.)
H	46.0 mm dia. (1.81 in. dia.)	**c**	4.0 mm (0.16 in.)
I	34.0 mm (1.34 in.)	**d**	3.0 mm (0.12 in.)
J	99.0 mm (3.90 in.)	**e**	35.0 mm (1.38 in.)
K	34.90 to 35.00 mm dia. (1.374 to 1.377 in. dia.)	**f**	53.0 mm (2.09 in.)
L	5.0 mm (0.20 in.)	**g**	3.0 mm (0.12 in.)
M	1.5 mm (0.059 in.)	**h**	2.0 mm (0.079 in.)
N	8.0 mm (0.31 in.)	**i**	Ra = 3.2 a
O	10.0 mm (0.394 in.)	**j**	2.0 mm radius (0.079 in. radius)
P	29.5 mm (1.16 in.)	**l**	0.30 mm radius (0.012 in. radius)
Q	24.5 mm (0.965 in.)	**k**	0.80 mm radius (0.031 in. radius)
R	413.5 to 414.5 mm (16.28 to 16.31 in.)	**m**	7.0 mm radius (0.28 in. radius)
S	134 mm (5.28 in.)	**n**	0.40 mm radius (0.016 in. radius)
T	468 mm (18.4 in.)	**C0.5**	Chamfer 0.50 mm (0.020 in.)
U	1.1 rad (65 °)	**C1**	Chamfer 1.0 mm (0.039 in.)

(1) Shaft Material : S43C-D (2) Stopper Material : SS400

Balancer Shaft 2 Bearing B Replacing Tool (for V3007 / V3307 Balancer Model)

Application: Use to press fit the bearing.



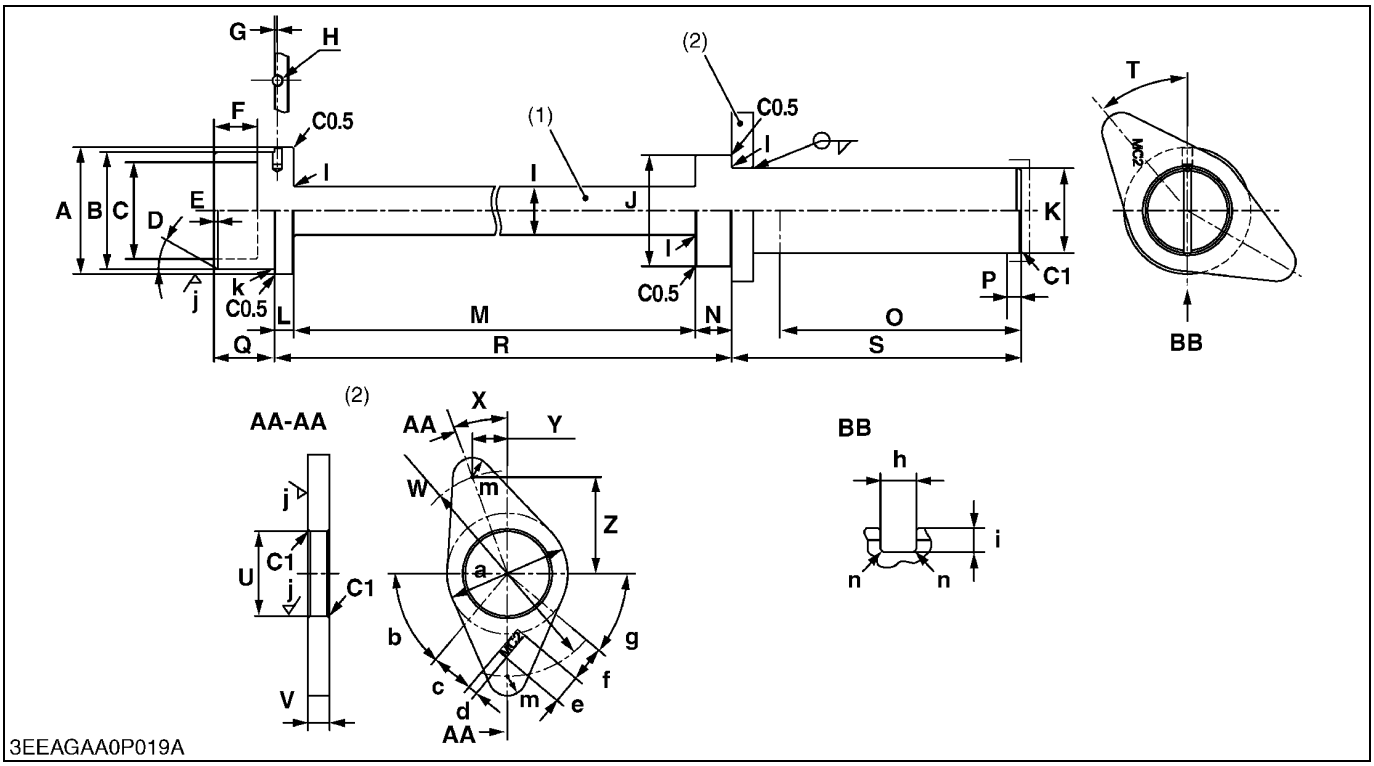
3EEAGAA0P018B

A	18.0 mm (0.709 in.)	**Q**	0.52 rad (30 °)
B	125 mm (4.92 in.)	**R**	35.0 mm dia. (1.38 in. dia.)
C	1.2 mm (0.047 in.)	**S**	9.0 mm (0.35 in.)
D	4.000 to 4.018 mm dia., 7.0 mm depth (0.1575 to 0.1581 in. dia., 0.28 in. depth)	**T**	0.52 rad (30 °)
E	53.0 mm dia. (2.09 in. dia.)	**U**	84.5 to 85.5 mm (3.33 to 3.36 in.)
F	48.80 to 48.90 mm dia. (1.922 to 1.925 in. dia.)	**V**	50.0 mm (1.97 in.)
G	40.0 mm dia. (1.57 in. dia.)	**W**	0.70 rad (40 °)
H	0.52 rad (30 °)	**X**	2.0 mm (0.079 in.)
I	1.5 mm (0.059 in.)	**Y**	3.0 mm (0.12 in.)
J	20.0 mm dia. (0.787 in. dia.)	**a**	0.80 mm radius (0.031 in. radius)
K	34.90 to 35.00 mm dia. (1.374 to 1.377 in. dia.)	**b**	Ra = 3.2 a
L	19.5 to 20.5 mm dia. (0.768 to 0.807 in. dia.)	**c**	0.20 mm radius (0.0079 in. radius)
M	20.0 mm (0.787 in.)	**d**	8.0 mm radius (0.31 in. radius)
N	99.0 mm (3.90 in.)	**e**	0.40 mm radius (0.016 in. radius)
O	44.0 mm (1.73 in.)	**C0.5**	Chamfer 0.50 mm (0.020 in.)
P	120 mm (4.72 in.)	**C1**	Chamfer 1.0 mm (0.039 in.)

(1) Shaft Material : S43C-D (2) Stopper Material : SS400

Balancer Shaft 2 Bearing C Replacing Tool (for V3007 / V3307 Balancer Model)

Application: Use to press fit the bearing.



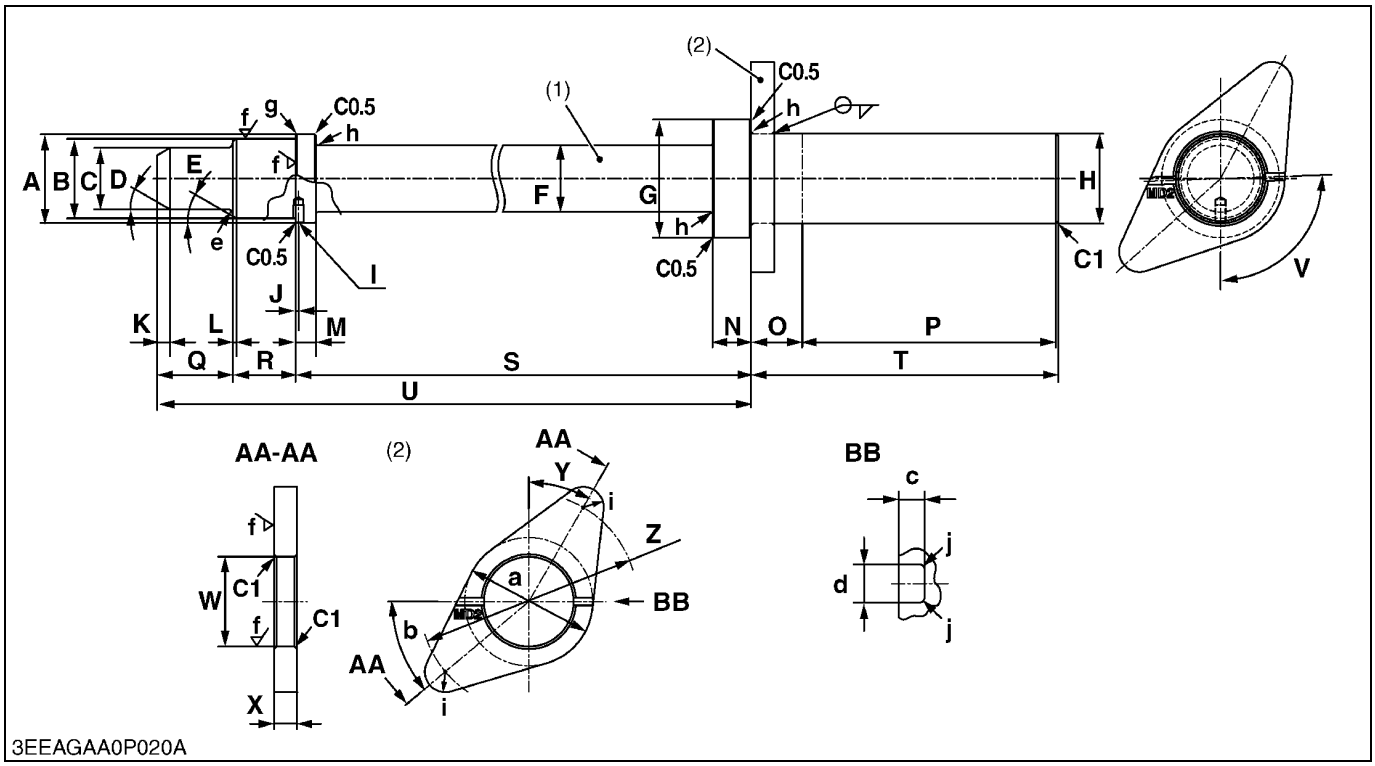
3EEAGAA0P019A

A	52.5 mm dia. (2.07 in. dia.)	**V**	9.0 mm (0.35 in.)
B	48.30 to 48.40 mm dia. (1.902 to 1.905 in. dia.)	**W**	84.5 to 85.5 mm (3.33 to 3.36 in.)
C	40.0 mm dia. (1.57 in. dia.)	**X**	0.35 rad (20 °)
D	0.52 rad (30 °)	**Y**	14.54 mm (0.5724 in.)
E	1.5 mm (0.059 in.)	**Z**	39.94 mm (1.572 in.)
F	18.0 mm (0.709 in.)	**a**	50.0 mm (1.97 in.)
G	1.2 mm (0.047 in.)	**b**	0.87 rad (50 °)
H	4.000 to 4.018 mm dia., 7.0 mm depth (0.1575 to 0.1581 in. dia., 0.28 in. depth)	**c**	18.0 mm (0.709 in.)
I	20.0 mm dia. (0.787 in. dia.)	**d**	4.0 mm (0.16 in.)
J	46.0 mm dia. (1.81 in. dia.)	**e**	12.0 mm (0.472 in.)
K	34.90 to 35.00 mm dia. (1.374 to 1.378 in. dia.)	**f**	15.0 mm (0.591 in.)
L	8.0 mm (0.31 in.)	**g**	0.70 rad (40 °)
M	199.5 mm (7.854 in.)	**h**	3.0 mm (0.12 in.)
N	15.0 mm (0.591 in.)	**i**	2.0 mm (0.079 in.)
O	100 mm (3.94 in.)	**j**	Ra = 3.2 a
P	6.0 mm (0.24 in.)	**l**	0.20 mm radius (0.0079 in. radius)
Q	25.0 mm (0.984 in.)	**k**	0.80 mm radius (0.031 in. radius)
R	222 to 223 mm (8.74 to 8.77 in.)	**m**	8.0 mm radius (0.31 in. radius)
S	120 mm (4.72 in.)	**n**	0.40 mm radius (0.016 in. radius)
T	0.70 rad (40 °)	**C0.5**	Chamfer 0.50 mm (0.020 in.)
U	35.0 mm dia. (1.38 in. dia.)	**C1**	Chamfer 1.0 mm (0.039 in.)

(1) Shaft Material : S43C-D (2) Stopper Material : SS400

Balancer Shaft 2 Bearing D Replacing Tool (for V3007 / V3307 Balancer Model)

Application: Use to press fit the bearing.



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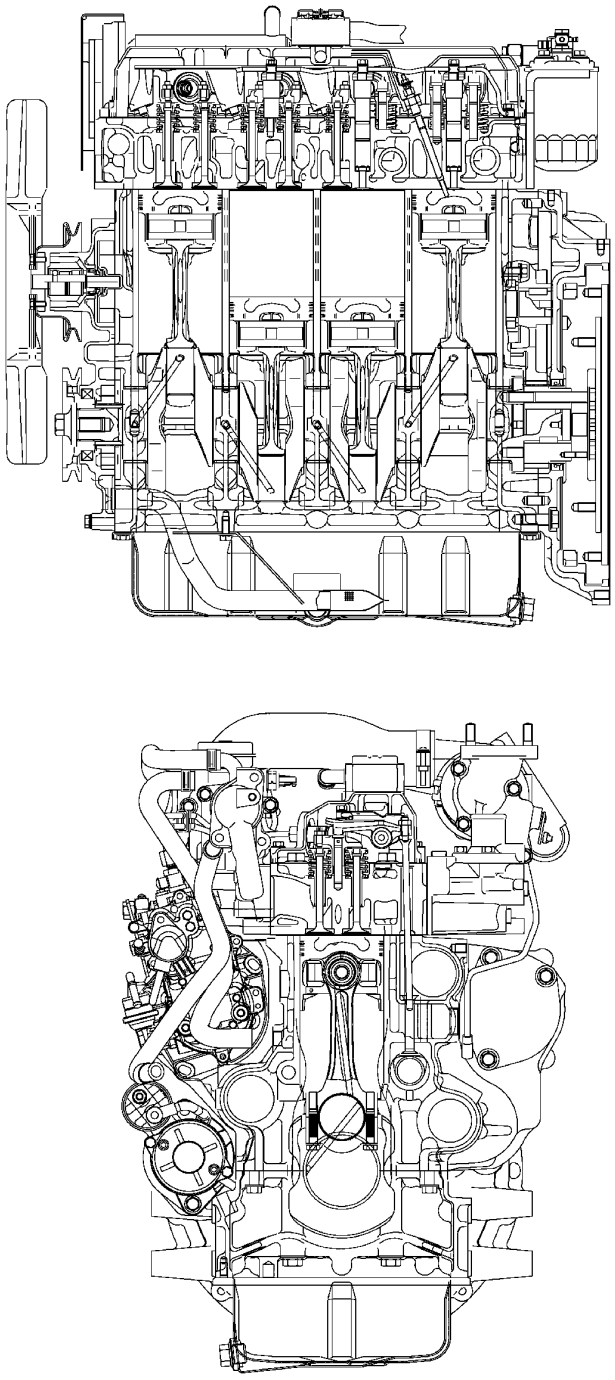
A	34.5 mm dia. (1.36 in. dia.)	**T**	120 mm (4.72 in.)
B	30.80 to 30.90 mm dia. (1.213 to 1.216 in. dia.)	**U**	479 mm (18.9 in.)
C	24.0 mm dia. (0.945 in. dia.)	**V**	1.6 rad (92 °)
D	0.52 rad (30 °)	**W**	35.0 mm dia. (1.38 in. dia.)
E	0.52 rad (30 °)	**X**	9.0 mm (0.35 in.)
F	26.0 mm dia. (1.02 in. dia.)	**Y**	0.52 rad (30 °)
G	46.0 mm dia. (1.81 in. dia.)	**Z**	84.5 to 85.5 mm (3.33 to 3.36 in.)
H	34.90 to 35.00 mm dia. (1.374 to 1.377 in. dia.)	**a**	50.0 mm (1.97 in.)
I	4.000 to 4.018 mm dia., 7.0 mm depth (0.1575 to 0.1581 in. dia., 0.28 in. depth)	**b**	0.70 rad (40 °)
J	1.2 mm (0.047 in.)	**c**	2.0 mm (0.079 in.)
K	5.0 mm (0.20 in.)	**d**	3.0 mm (0.12 in.)
L	1.5 mm (0.059 in.)	**e**	2.0 mm radius (0.079 in. radius)
M	8.0 mm (0.31 in.)	**f**	Ra = 3.2 a
N	15.0 mm (0.591 in.)	**g**	0.30 mm radius (0.012 in. radius)
O	20.0 mm (0.787 in.)	**h**	0.80 mm radius (0.031 in. radius)
P	99.0 mm (3.90 in.)	**i**	8.0 mm radius (0.31 in. radius)
Q	29.5 mm (1.16 in.)	**j**	0.40 mm radius (0.016 in. radius)
R	24.5 mm (0.965 in.)	**C0.5**	Chamfer 0.50 mm (0.020 in.)
S	424.5 to 425.5 mm (16.72 to 16.75 in.)	**C1**	Chamfer 1.0 mm (0.039 in.)

(1) Shaft Material : S43C-D (2) Stopper Material : SS400

MECHANISM

CONTENTS

1. FEATURE



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The 07 series DI engine are the vertical type 4-cycle diesel engine featuring the advanced performances shown below.

■ **New Concept**

- The Kubota 07 Series is a totally new concept in engine design developed with various requirements necessary for a wide range of industrial applications.
- Kubota's unique cylinder block design was developed using Kubota's original casting technology allowing for a larger displacement within the current 2.4 L compact engine package.
- The improved cooling system with a main water gallery and water passages between cylinder bores as a countermeasure against heat load provides high power density, superior endurance and a reliable Kubota 07 Series.
- The Kubota 07 Series completes Kubota's seamless range up to 100 hp.

■ **Emissions**

- The NEW Kubota 07 Series engines have been designed to comply with EPA Interim Tier 4 (Option 1) emissions regulations, which are the most stringent in this size range. The Kubota 07 Series engines also comply with EU Stage IIIA requirements. The Kubota 07 Series engines offer the benefit of one year longer validity than Tier 3. Therefore, these engines are good through the end of 2012 in both the North American and European markets, which would save engineering resources for the future Tier levels.
- Meeting emission regulations with minimal additional required devices : NOx is reduced only by mechanical means such as a compactly designed cooled exhaust gas recirculation (EGR) system.

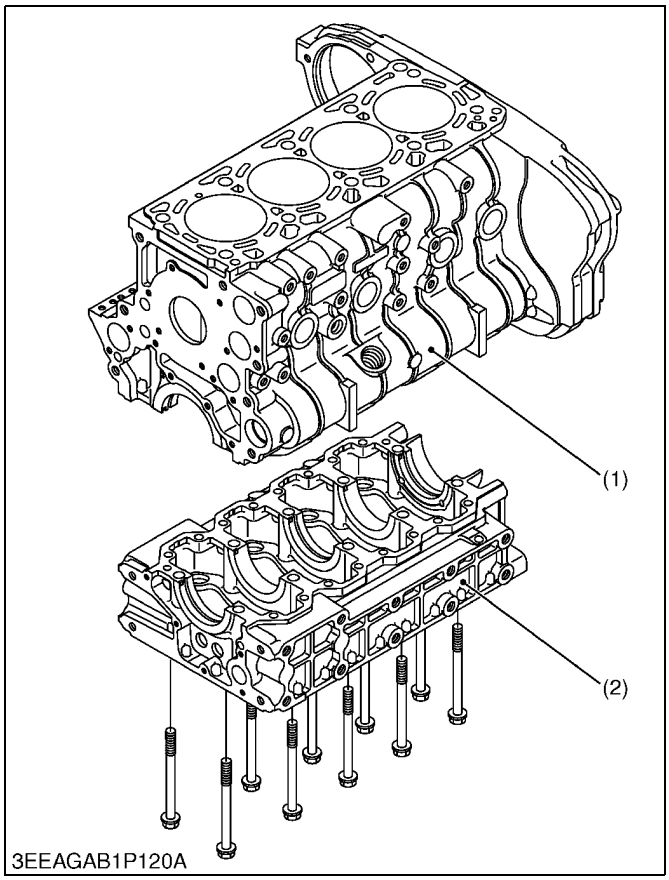
■ **Clean and Quiet Power**

- Kubota's original E-CDIS (Center Direct Injection System) combustion system, renowned for clean combustion in the Kubota V3 (DI) Series, has been renovated. The fuel injection pressure was increased and the combustion chamber was redesigned to achieve a 25 % lower particulate matter (PM) level, resulting in a better condition when compared to engines that only meet EPA Tier 3 regulations in this class.
- These new engines have been designed to reduce transmitted vibrations and radiated sound, resulting in lower noise levels. Operator and environmentally friendly, the Kubota 07 Series begins a new era of Kubota's engine design.

W1012645

2. ENGINE BODY

[1] CYLINDER BLOCK



The 07 series DI engine employs ladder frame structure type crankcases - the crankcase 1 (1) with combustion part and the crankcase 2 (2) which supports the crankcase 1 (1).

The following benefits are in the ladder frame structure.

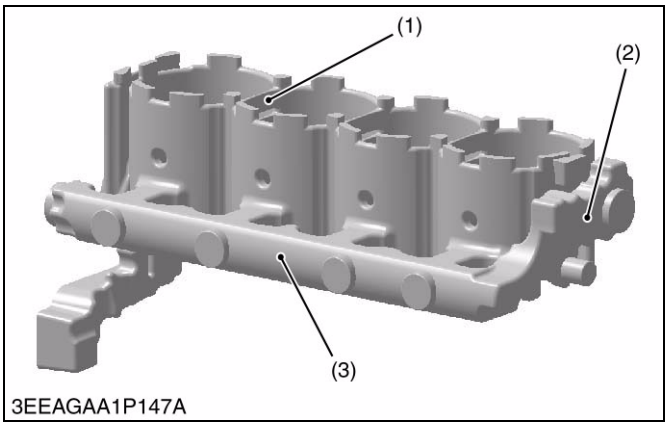
1. Minimizing parts.
2. Noise reduction.
3. Reduction of loss and dispersion on friction thanks to accuracy of axial concentricity.

The cylinder is a linerless type which enables good cooling operation, less strain and good abrasion resistance.

(1) Crankcase 1 (2) Crankcase 2

W1012790

[2] COOLING JACKET



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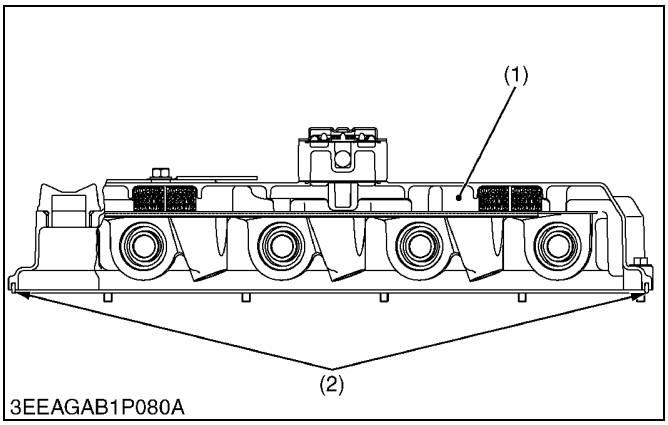
The 07 series DI engine employs coolant evenness distribution type cooling jacket inside crankcase 1. The coolant is evenly supplied to each cylinder through the main gallery (3) in the jacket mold core (2).

(1) Coolant Passage between Cylinder
(2) Jacket Mold Core
(3) Main Gallery

W1013000

[3] HALF-FLOATING HEAD COVER



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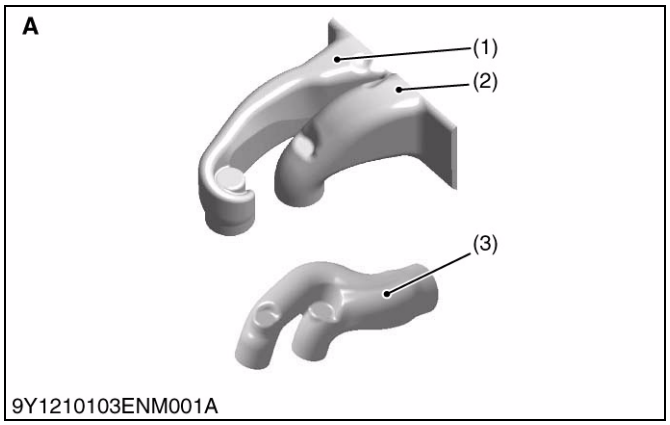
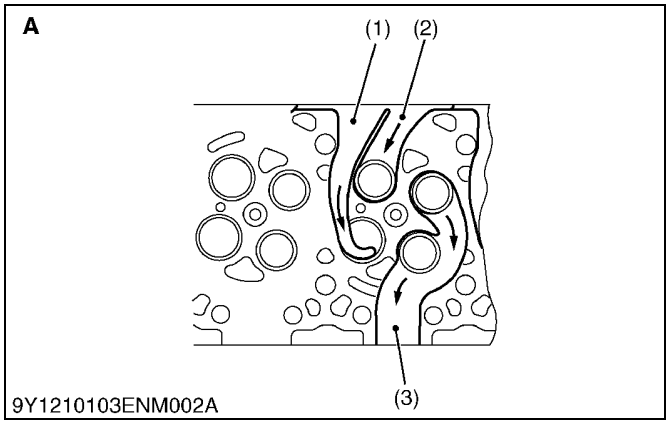
The rubber packing (2) is fitted in to maintain the head cover 0.5 mm (0.02 in.) or so off the cylinder head. This arrangement helps reduce noise coming from the cylinder head.

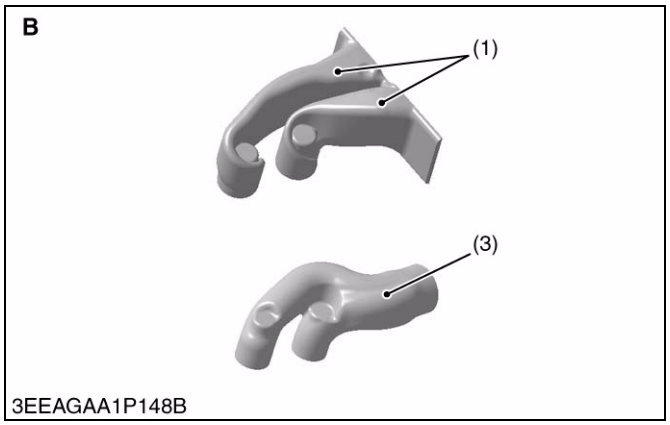
(1) Cylinder Head Cover
(2) Rubber Packing

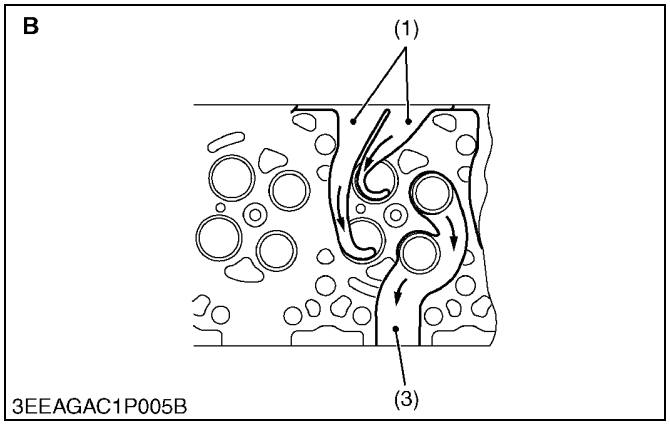
W1013327

[4] CYLINDER HEAD









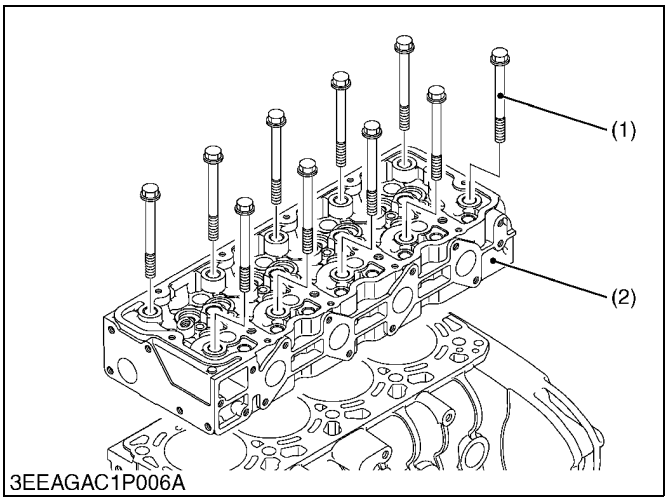
This engine employs four valve system, the cylinder head is provided with double intake passage in order to ensure appropriate air suction and give an optimum swirl.

(1) Intake Port (Helical)
(2) Intake Port (Direct)
(3) Exhaust Port

A : V2607-DI-E3B / V2607-DI-T-E3B
B : V3007-DI-T-E3B / V3307-DI-T-E3B

W1013336

[5] 4 SCREWS PER EACH CYLINDER ASSEMBLING STRUCTURE



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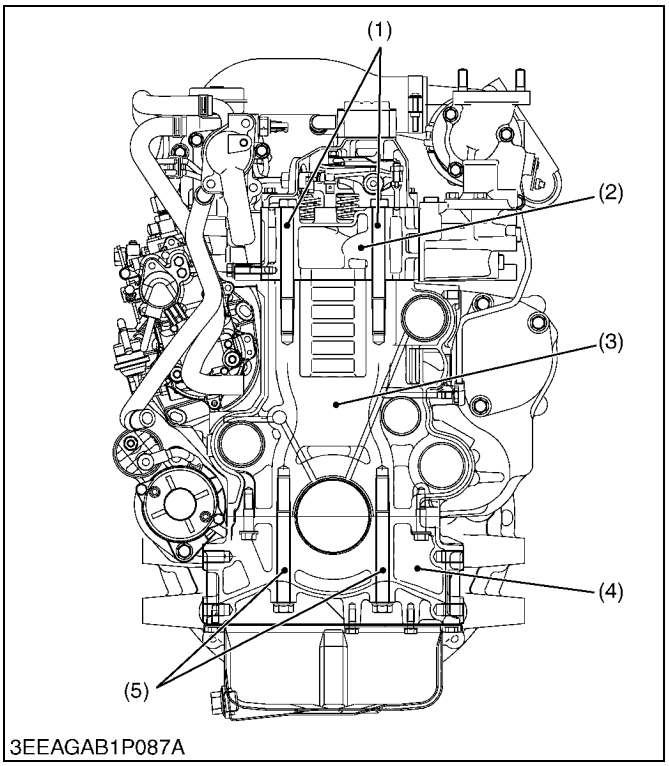


3EEAGAB1P087A

The 07 series DI engine employs 4 screws per each cylinder assembling structure.

The cylinder head (2) and the crankcase 2 (4) are assembled from the top and bottom to the crankcase 1 (3) with each of 10 screws.

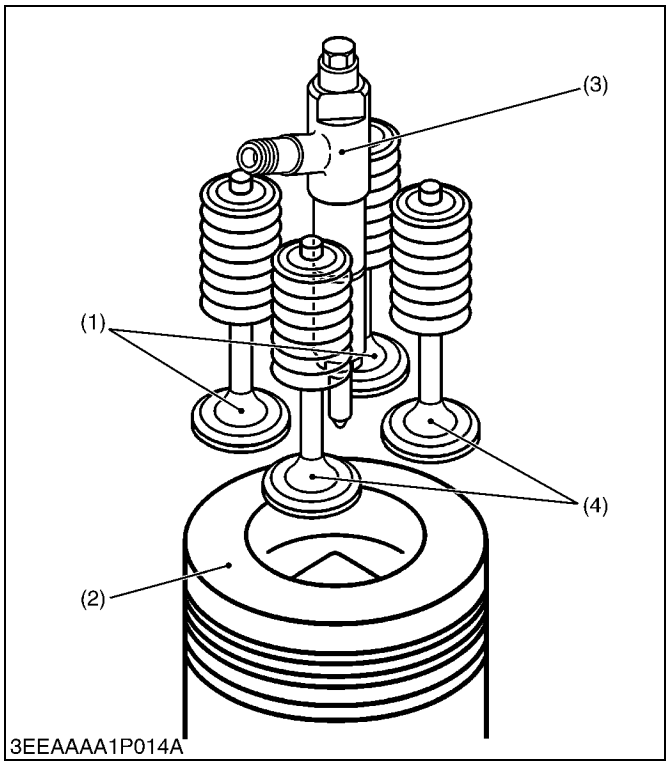
The following objectives are in the 4 screws per each cylinder assembling structure.

1. Reduce the load share rate of combustion pressure on outer block surface wall.
2. Flexibility of cylinder head design.

(1) Cylinder Head Mounting Screw
(2) Cylinder Head
(3) Crankcase 1
(4) Crankcase 2
(5) Crankcase 2 Mounting Screw

W1013265

[6] CENTER DIRECT INJECTION SYSTEM (E-CDIS)



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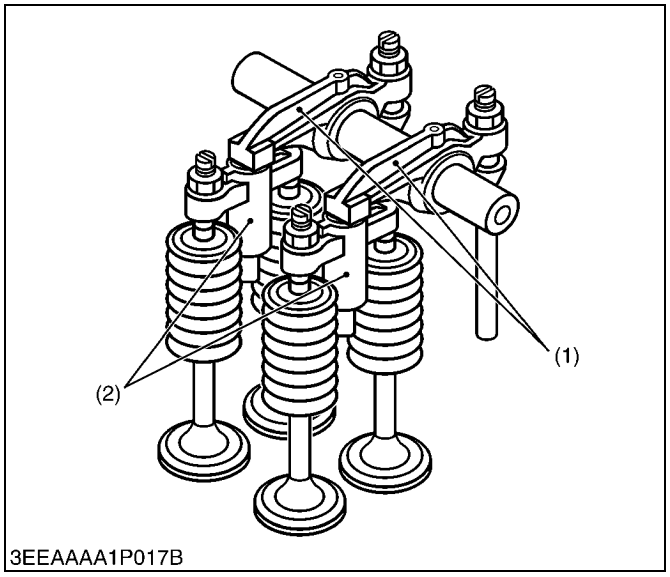
The 07 series DI engine adopts the Center Direct Injection System (E-CDIS), in which the injection nozzle (3) is positioned upright at the center of the cylinder.

This system serves to inject fuel directly at the center of the cylinder. By so doing, injected fuel and suction air can be mixed more uniformly, leading to more stable, higher combustion performance. In other words, cleaner emission, higher power output, lower fuel consumption, lower operating noise and higher start-up performance have been achieved.

(1) Exhaust Valves
(2) Piston
(3) Injection Nozzle
(4) Intake Valves

W11094950



3EEAAAA1P017B

The 07 series DI engine has two intake valves and two exhaust valves per each cylinder.

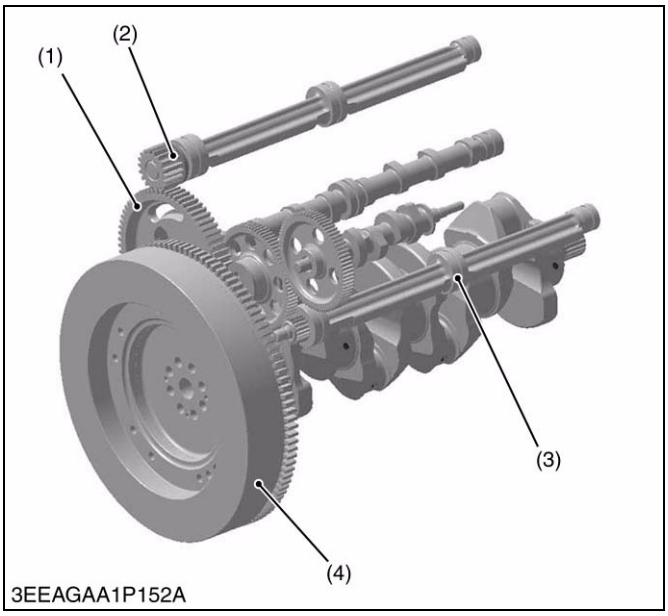
The rocker arm (1) contacts a valve bridge arm (2) instead of the valves stem tip.

The valve bridge arm (2) then contacts both intake valves or both exhaust valves and causes two valves to open simultaneously.

(1) Rocker Arm
(2) Valve Bridge Arm

W1014724

[7] GEAR TRAIN CONFIGURATION



3EEAGAA1P152A

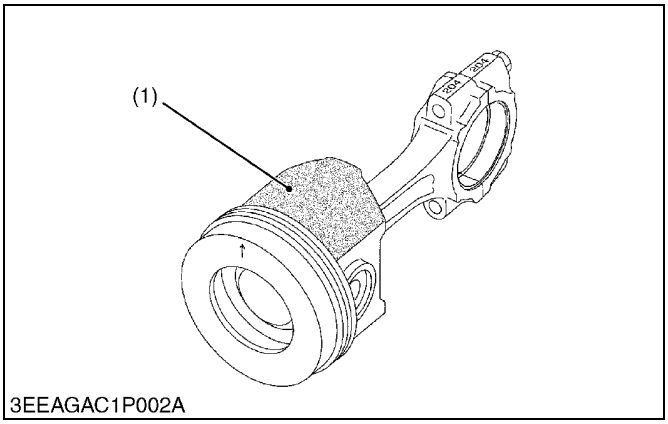
The 07 series DI engine employs gear train located at flywheel side. The following benefits are in the rear gear train configuration.

1. Flexibility of auxiliary parts arrangement.
2. Reduction of gear chattering noise from crankshaft of torsional and bending vibration.

(1) Rear Gear Train
(2) Balancer Shaft 1 (Option)
(3) Balancer Shaft 2 (Option)
(4) Flywheel

W1013611

[8] PISTON



3EEAGAC1P002A

Piston's skirt is coated with **molybdenum disulfide★**, which reduces the piston slap noise and thus the entire operating noise.

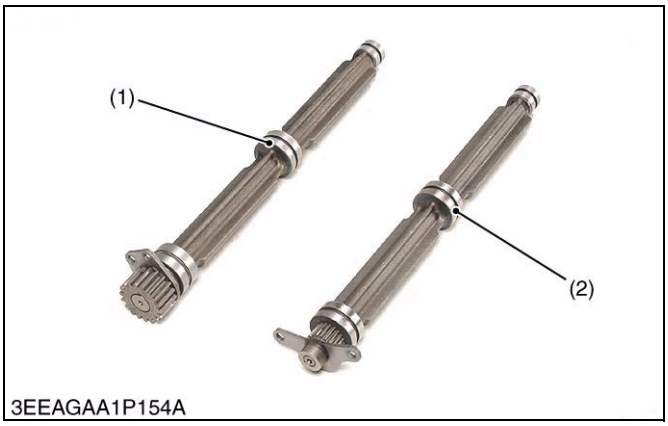
★Molybdenum disulfide (MoS_2)

The molybdenum disulfide (1) serves as a solid lubricant, like a Graphite or Teflon. This material helps resist metal wears even with little lube oil.

(1) Molybdenum Disulfide

W1015665

[9] BUILT-IN DYNAMIC BALANCER (BALANCER MODEL ONLY)



3EEAGAA1P154A

Engines are sure to vibrate by piston's reciprocation. Theoretically, three-cylinder engines are much less prone to cause vibration than four-cylinder ones (second inertia, etc.). However, any engine has many moving parts in addition to its pistons and cannot be completely free from vibration.

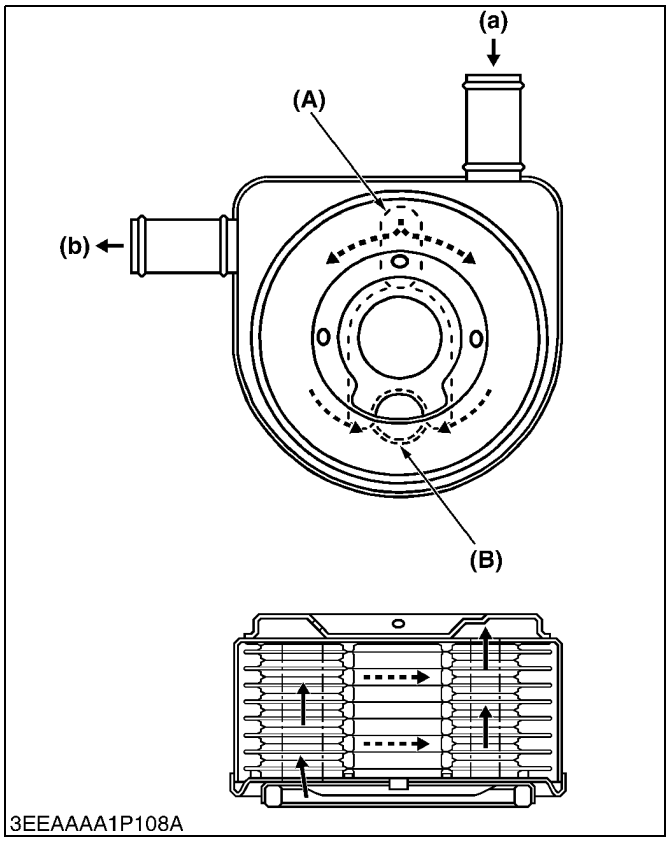
The four cylinder engine is fitted with balance weight on crankcase to absorb the second inertia mentioned above and reduce vibration.

(1) Balancer Shaft 1
(2) Balancer Shaft 2

W1013617

3. LUBRICATING SYSTEM

[1] OIL COOLER



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The 07 series engine has a coolant-cooled oil cooler that not only cools hot oil, but also warms the cool engine oil shortly after start up.

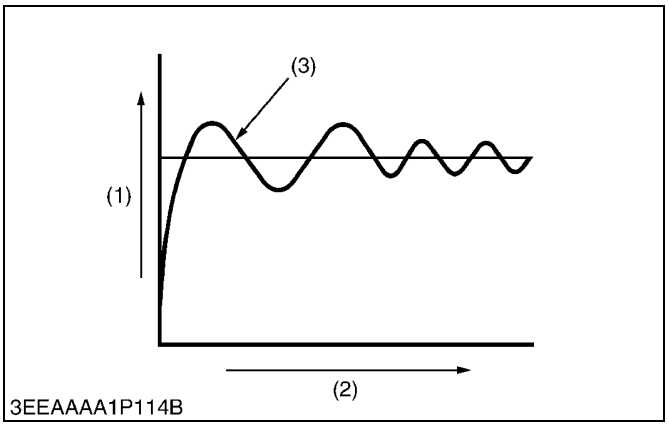
As shown in the figure, the oil flows inside the connected cooler plate, whereas coolant is kept circulating outside the cooler plate, thereby cooling down or warming the oil.

(A) Oil Inlet Port
(B) Oil Outlet Port
(a) Coolant Inlet Port
(b) Coolant Outlet Port

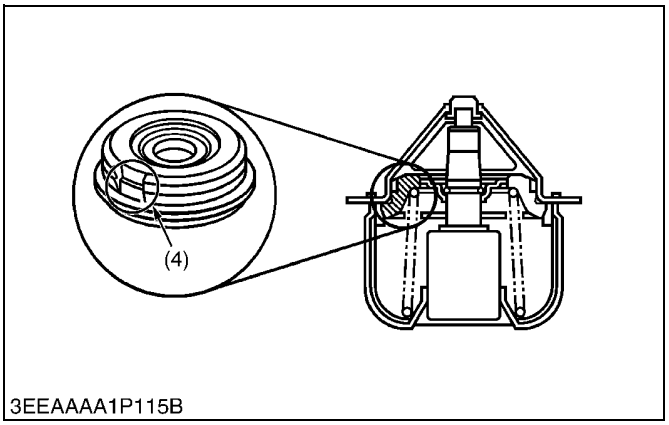
W10344770

4. COOLING SYSTEM

[1] THERMOSTAT



3EEAAAA1P114B



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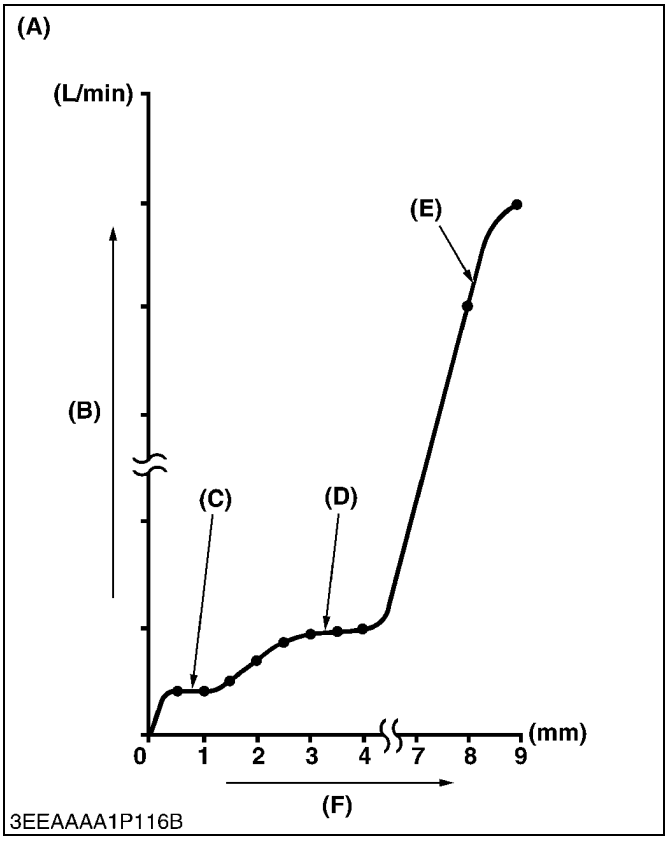


3EEAAAA1P116B

Conventional thermostatically-controlled valves (outlet water temperature control type) open against the flow of coolant. In this design, the pressure (steam pressure + water pump's discharge pressure) affects the open/close performance of such valve. In other words, the valve may be delayed in opening at a preset opening temperature opening suddenly, above the preset temperature. This is called the overshoot phenomenon.

The overshoot problem invites the undershoot phenomenon too. Too much water cooled by the radiator flows through the water passage, which suddenly closes the valve below the thermostat's preset valve closing temperature.

A repeated cycle of such overshoot (3) and undershoot phenomena is called the water temperature hunting. This hunting problem may adversely affect the cooling system parts, and also the engine and its related components.

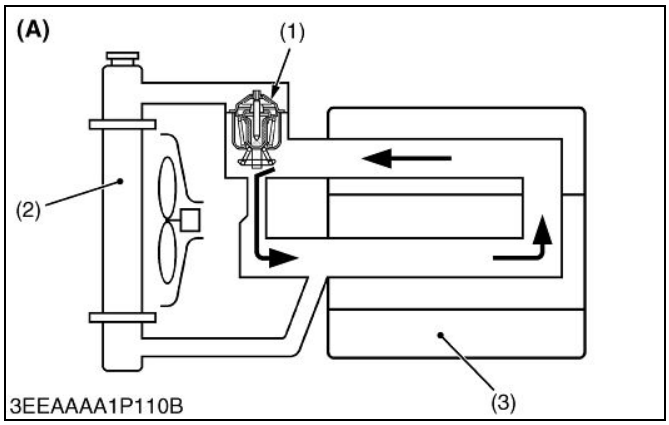
To cope with this trouble, the 07 series engine is equipped with the flow control thermostat. The valve has a notch (4) to control the coolant flow-rate smoothly in small steps.

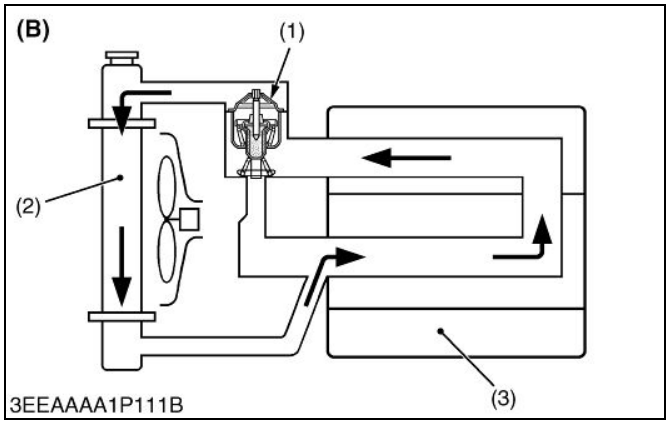
(1) Coolant Temperature
(2) Time
(3) Overshoot
(4) Notch

(A) Valve Lift Versus Flow-rate
(B) Flow-rate
(C) At Short Valve Lift
(D) At Medium Valve Lift
(E) At High Valve Lift
(F) Valve Lift

W1013684

[2] BOTTOM BYPASS SYSTEM





Bottom bypass system is introduced in the 07 series for improving the cooling performance of the radiator.

While the temperature of coolant in the engine is low, the thermostat (1) is held closed and the coolant is allowed to flow through the bypass pipe and to circulate in the engine.

When the temperature exceeds the thermostat (1) valve opening level, the thermostat (1) fully opens itself to prevent the hot coolant from flowing through the bypass into the engine.

In this way, the radiator can increase its cooling performance.

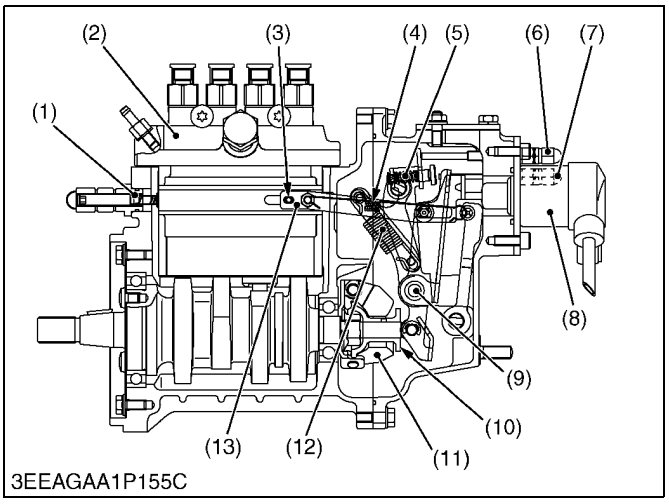
(1) Thermostat
(2) Radiator
(3) Engine

(A) Bypass Opened
(B) Bypass Closed

W1013406

5. FUEL SYSTEM

[1] GOVERNOR



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The engine employs the separated fuel injection pump in combination with Kubota's own small multi-function mechanical governor, which enables more dependability.

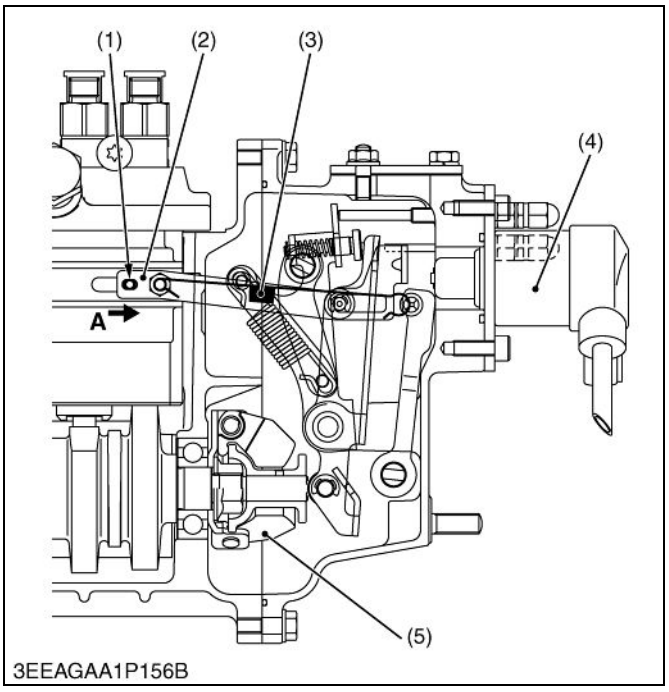
It also employs the torque limiting mechanism to control the maximum peak torque so that it complies with the regulations of exhaust gas.

This mechanism maintains engine speed at a constant level even under fluctuating loads, provides stable idling and regulates maximum engine speed by controlling the fuel injection rate.

This engine uses a mechanical governor that controls the fuel injection rate at all speed ranges (from idling to maximum speed) by utilizing the balance between the flyweight's centrifugal force and spring tension.

(1) Idle Limit Spring
(2) Injection Pump
(3) Control Rack
(4) Start Spring
(5) Torque Spring
(6) Output Limiting Bolt
(7) Torque Limiting Bolt
(8) Stop Solenoid
(9) Fork Lever 1, 2
(10) Governor Sleeve
(11) Flyweight
(12) Governor Spring
(13) Governor Connecting Rod

W1013830



3EEAGAA1P156B

■ At Start

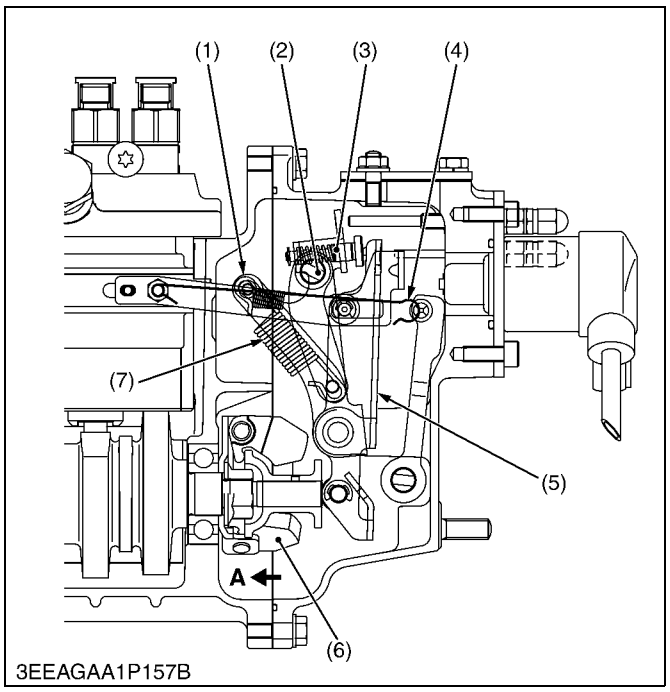
The stop solenoid (4) (energized-to-run type) is powered to release the governor connecting rod (2).

As no centrifugal force is applied to flyweight (5), low tension of start spring (3) permits control rack (1) to move the starting position **A** as showing the arrow, supplying the amount of fuel required to start the engine.

(1) Control Rack
(2) Governor Connecting Rod
(3) Start Spring
(4) Stop Solenoid
(5) Flyweight

A : To Start Position

W1013967



3EEAGAA1P157B

■ At Idling

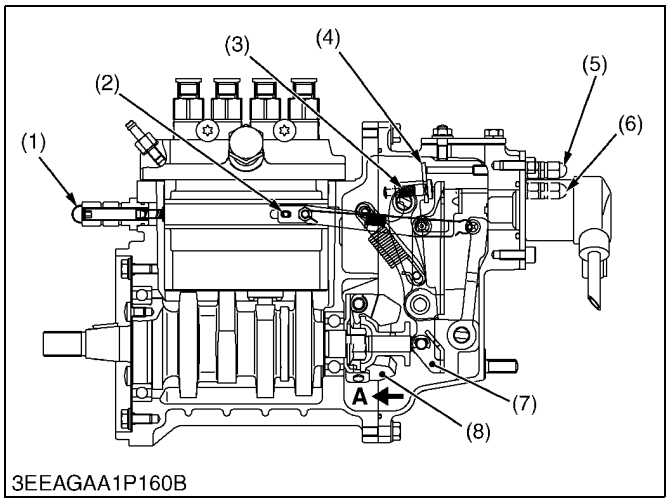
When the speed control lever is turned clockwise, the engine rotates at idling speed. It tensions the governor spring (7) to pull the fork lever 2 (1).

When the fork lever 2 (1) is pulled, it moves the torque spring pin (3) and the fork lever 1 (5) in the direction of the arrow **A** to restrain the weight. In combination with the start spring tension, it is balanced with the centrifugal force of flyweight (6) to keep idling.

(1) Fork Lever 2
(2) Speed Control Lever
(3) Spring Pin
(4) Start Spring
(5) Fork Lever 1
(6) Flyweight
(7) Governor Spring

A : Direction of movement

W1014034



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■ At rated speed with full load and overload

As the speed control lever is changed from the middle speed to high speed, the governor spring tension increases to compress the torque spring (3) and move the fork lever 1 (7) in the direction of the arrow **A**.

The fork lever 2 (4) moves until it reaches the output limiting bolt to keep rated rotation and rated output.

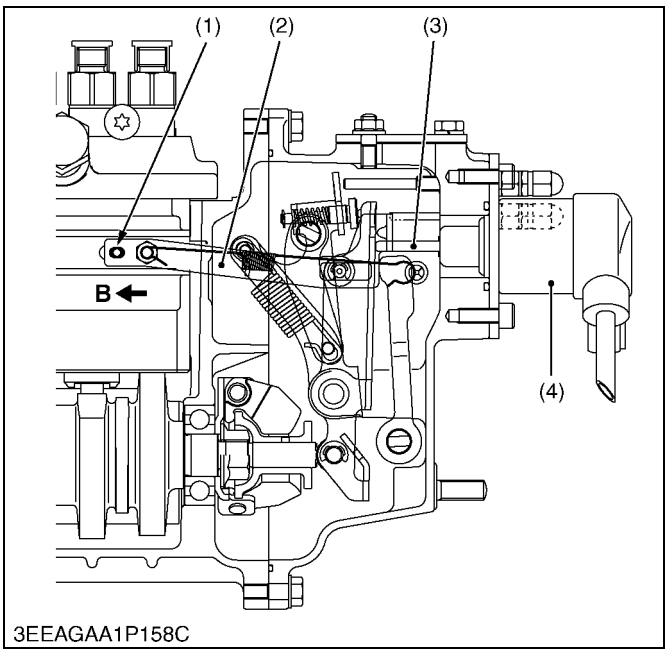
When the engine is overloaded, the engine rotating speed decreases and the centrifugal force of flyweight (8) decreases. Then the torque spring (3) moves the fork lever 1 (7) in the direction of arrow **A**.

The control rack (2) moves in the direction that increases fuel supply to increase the output. It is balanced with the centrifugal force of the flyweight (8) to produce low-speed output (torque output).

(1) Idle Limiting Spring
(2) Control Rack
(3) Torque Spring
(4) Fork Lever 2
(5) Output Limiting Bolt
(6) Torque Limiting Bolt
(7) Fork Lever 1
(8) Flyweight

A : Direction of movement

W1014276



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■ **To stop engine**

When the stop solenoid (4) is turned off electrically, the spring tension of the solenoid is released, the plunger (3) extrudes and the stop lever moves the control rack (1) in the direction of the arrow **B** which stops the engine.

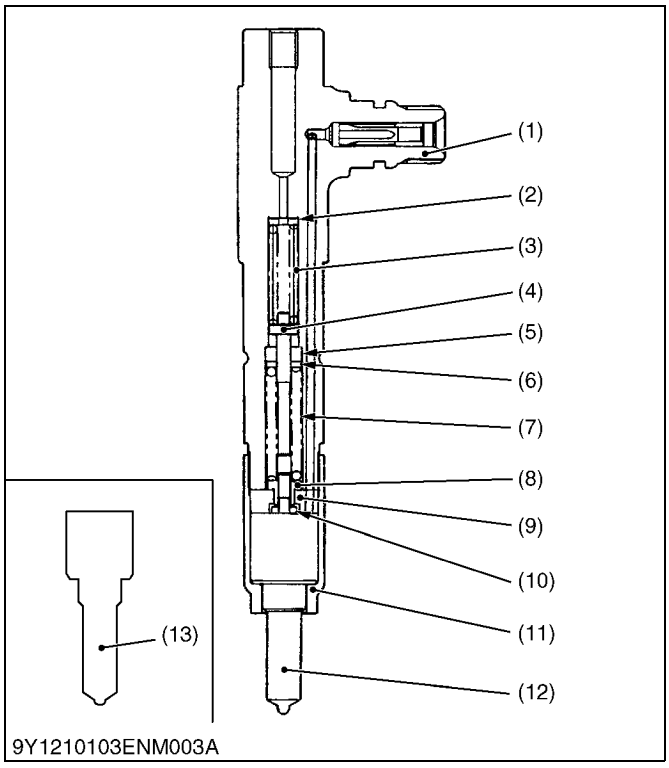
To stop the engine manually, move the external stop lever to the left.

(1) Control Rack
(2) Governor Connecting Rod
(3) Plunger
(4) Stop Solenoid

B : Direction of Movement

W1014393

[2] 2 STAGE DI NOZZLE



Exhaust and noise regulations are becoming increasingly strict, particularly in regard to the reduction of NOx (nitrogen oxides) and particulates.

The two-spring nozzle holder has been developed to reduce NOx (nitrogen oxides) and particulates from direct injection diesel engine exhaust.

■ **Features**

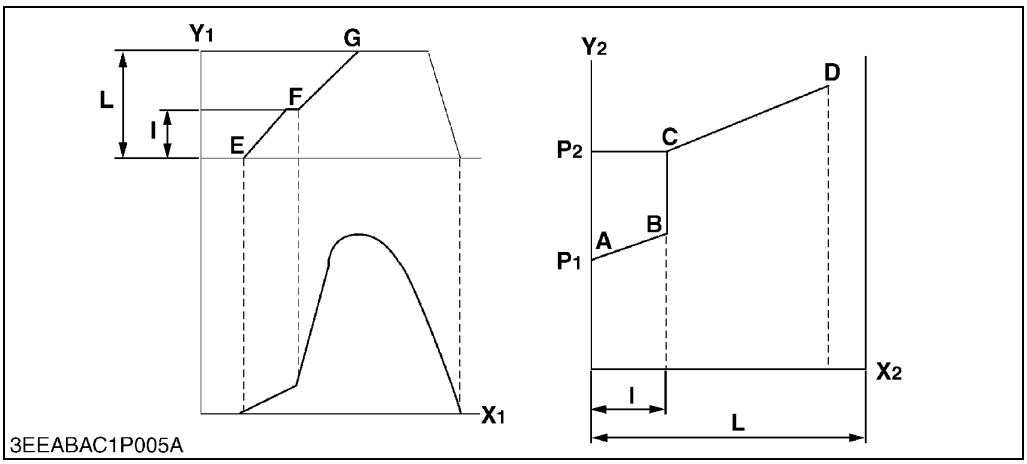
The two-spring nozzle holder limits needle valve (13) lift at initial valve opening to throttle the injection quantity. Main injection occurs when the in-line pressure has increased sufficiently to move the needle valve (13) through its full lift.

This gives the following features.

- Improved engine stability at low and intermediate speeds.
- Decreased engine hunting and surge.
- Decreased noise at idling.
- Decreased idling speed because of improved engine stability.
- Stabilized fuel injection characteristics from the injection pump and nozzle system, and easier matching of governor characteristics to engine demand.

(1) Nozzle Holder Body
(2) 1st Stage Injection Pressure Adjusting Shim
(3) First Spring
(4) Pressure Pin
(5) Spring Seat
(6) 2nd Stage Injection Pressure Adjusting Shim
(7) Second Spring
(8) Pre-lift Adjusting Spring Seat
(9) Chip-packing
(10) Max-lift Adjusting Washer
(11) Retaining Nut
(12) Nozzle
(13) Needle Valve

W1014568



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A-B : Set Force of First Spring
B-C-D : Combined Force of First and Second Springs
E-F : First Opening Pressure
F-G : Second Opening Pressure
P1 : First Opening Pressure
P2 : Second Opening Pressure

L : Full Needle Valve Lift
I : Needle Valve Pre-lift

X1 : Cam Angle (°)
Y1 : Injection Rate (mm3/°)
X2 : Needle Valve Lift (mm)
Y2 : In-line Pressure

W1014795

■ **First opening pressure**

The force of the high pressure fuel delivered by the injection pump acts to push the needle valve up. When this force exceeds the set force of the first spring, the nozzle's needle valve pushes the first pushrod (pressure pin) up and the valve opens. (First opening pressure is represented by point **E-F** in the above left hand figure, and set force of first spring is represented by **A-B** in the above right hand figure.)

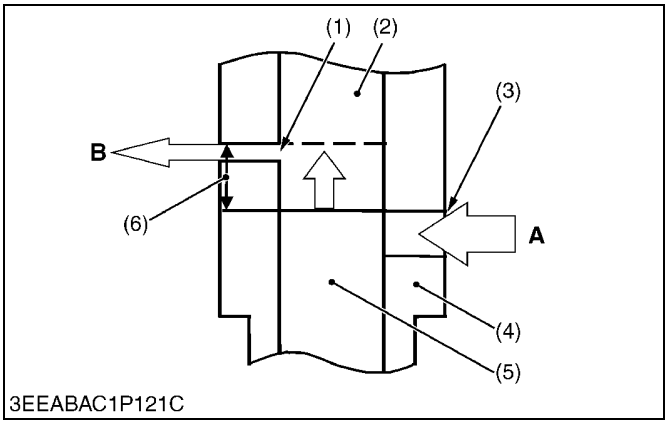
■ **Second opening pressure**

When the first pushrod (pressure pin) has been lifted through the pre-lift, it contacts the second pushrod (spring seat). As the set force of the second spring is acting on the second pushrod, the combined forces of both the first spring and the second spring then act on the needle valve, which will not lift unless these forces are overcome.

When the high pressure fuel (i.e., in-line pressure) overcomes the combined forces of the first and second springs, the needle valve is again lifted and main injection can begin. (Second opening pressure is represented by point **F-G** in the above left hand figure and combined force of first and second springs **B-C-D** in the above right hand figure.)

[3] INJECTION PUMP

(1) Fine Spill Port (F.S.P)



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The fuel injection pump with F.S.P. (Fine Spill Port) mechanism is equipped with two functions: speed timer function and injection rate control function.

Speed Timer Function :

As the engine speed is low, the injection timing gets delayed. This helps cut down on NOx and operating noise.

Injection Rate Control Function :

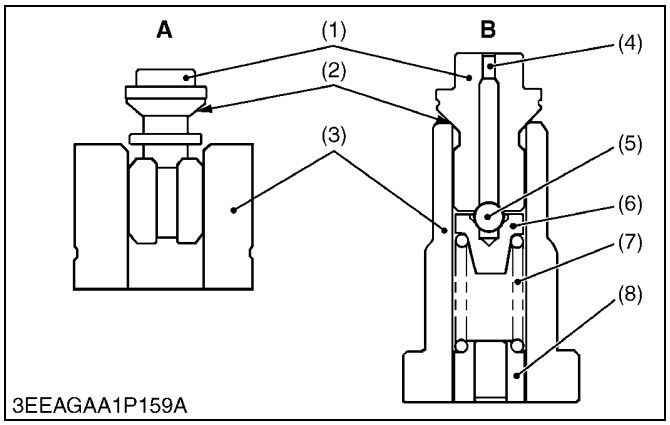
This serves to keep down the initial injection rate and keep up the later injection rate, which cuts down on NOx and PM as well.

(1) Fine Spill Port (F.S.P.)
(2) Plunger Chamber
(3) Main Port
(4) Cylinder
(5) Plunger
(6) F.S.P. Stroke

A : Main Fuel
B : Overflow Fuel (Initial Fuel Pressure-Feed Stage)

W1014969

(2) CPV Equipped Delivery Valve



The Constant Pressure Valve (CPV) is a mechanism that maintains uniform residual pressure in the high pressure pipe. It stabilizes overall delivery quantity characteristics and especially delivery quantity characteristics at low speeds.

■ **At high fuel pressure**

The delivery valve (1), the steel ball (5) and the snapper valve (6) are moved up together. The delivery valve seat surface (2) opens when the fuel pressure becomes more than the delivery valve set pressure.

■ **At after injection**

The delivery valve (1), the steel ball (5) and the snapper valve (6) are moved down and the delivery valve seat surface (2) closes. The steel ball still opens on the way and the fuel returns to the injection pump side. The steel ball (5) closes the delivery valve hole when the fuel pressure becomes less than the snapper valve set pressure.

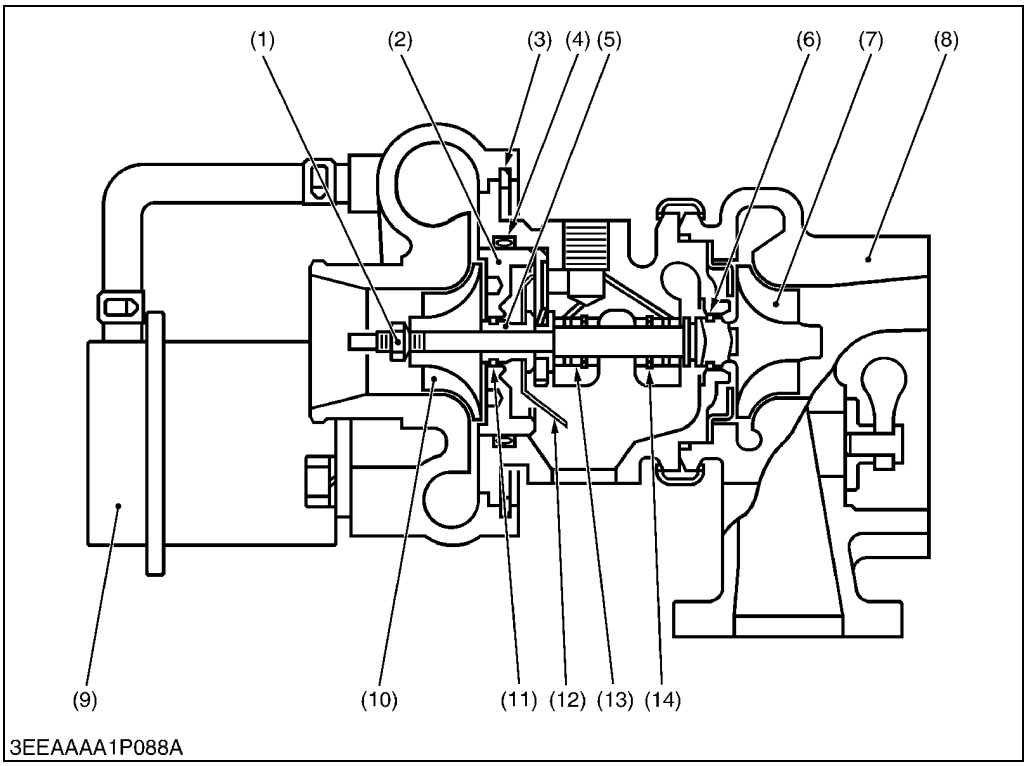
(1) Delivery Valve
(2) Seat Surface
(3) Valve Seat
(4) Orifice
(5) Steel Ball
(6) Snapper Valve
(7) Snapper Valve Spring
(8) Snapper Valve Seat

A : Current Delivery Valve
B : CPV Equipped Delivery Valve

W1015816

6. INTAKE AND EXHAUST SYSTEM

[1] TURBOCHARGER



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(1) Lock Nut
(2) Thrust Bearing
(3) Snap Ring
(4) O-ring
(5) Thrust Sleeve
(6) Piston Ring
(7) Turbine Wheel
(8) Turbine Housing
(9) Actuator
(10) Compressor Wheel
(11) Piston Ring
(12) Oil Deflector
(13) Bearing
(14) Snap Ring

W10353780

A turbocharger consists basically of a centrifugal compressor mounted on a common shaft with a turbine driven by exhaust gas. The compressor is usually located between the air cleaner and the intake manifold (or intercooler; if equipped), while the turbine is located between the exhaust manifold and the muffler.

The prime job of the turbocharger is, by compressing the air, to force more air into the engine cylinders. This allows the engine to efficiently burn more fuel, thereby producing more horsepower.

In applications where the boost pressure is relatively low, the turbocharger is capable of reducing the smoke concentration, the concentration in the cylinder, fuel consumption, and deterioration in performance at elevated terrain by increasing the amount of air into the engine cylinders.

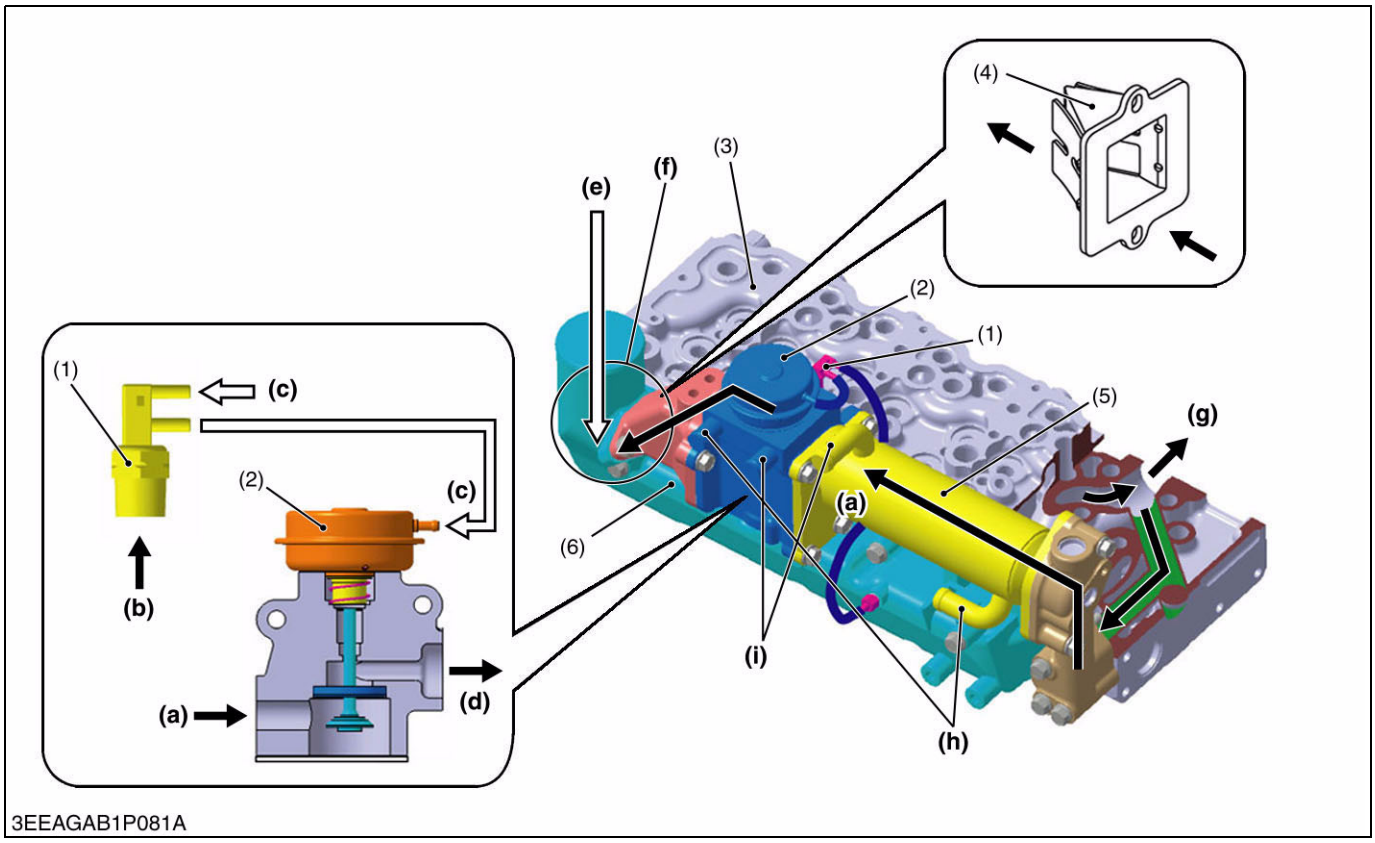
In applications where the boost pressure is high, the turbocharger is capable of providing a large increase in engine output by increasing the amount of air into the engine cylinders.

7. EXHAUST GAS RECIRCULATION (EGR) SYSTEM

[1] GENERAL

In order to meet with the strict emission regulations, Kubota has adopted the EGR on the V2607-DI-T-E3B, V3007-DI-T-E3B and V3307-DI-T-E3B. The nitrogen oxide (NOx) which is a hazardous component in exhaust gas is generated by oxidation of nitrogen in the air, due to rise of the combustion temperature in cylinders. The EGR is a system in which the exhaust gas with lean oxygen is cooled and returned to cylinders again in order to lower the combustion temperature. As a result, NOx can be decreased.

[2] EXTERNAL MECHANICAL EGR



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(1) Thermo Valve
(2) Mechanical EGR Valve
(3) Cylinder Head
(4) Reed Valve
(5) EGR Cooler
(6) Intake Manifold

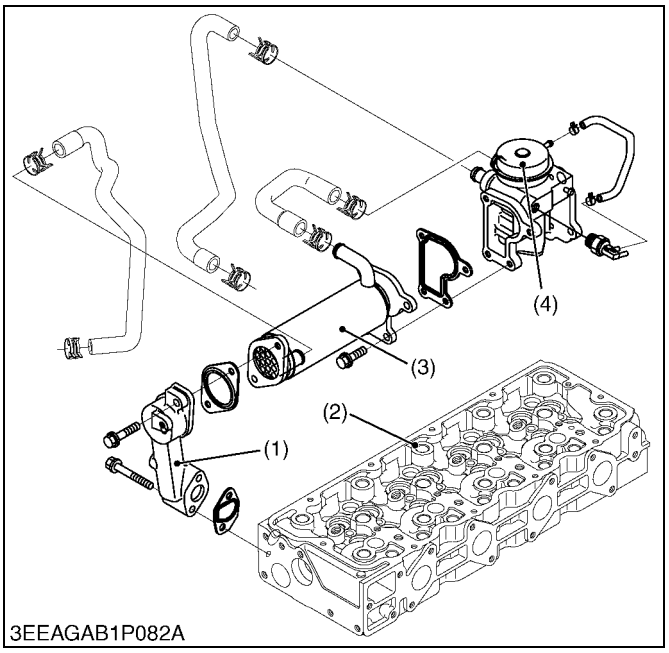
(a) Cooled EGR Gas
(b) Coolant Temperature
(c) Boost Pressure
(d) To The Intake Manifold
(e) Fresh Air
(f) Cooled EGR Gas Merges with Fresh Air
(g) Exhaust Gas
(h) Coolant Inlet
(i) Coolant Outlet

External mechanical EGR consists of water cooled EGR cooler (5), mechanical EGR valve (2), reed valve (4) and thermo valve (1).

When the coolant temperature **(b)** is getting higher, thermo valve (1) is open and the boost pressure of intake manifold (6) gets to reach the diaphragm of mechanical EGR valve (2).

If the coolant temperature **(b)** is high, but the boost pressure is low, the EGR valve (2) does not open. If coolant temperature **(b)** is high, boost pressure is also high, EGR valve (2) is open and cooled EGR gas **(a)** through the water cooled EGR cooler (5) flows into the intake manifold (6). And the reed valve (4) between EGR valve (2) and intake manifold (6) prevents the fresh air flowing into EGR system.

(1) EGR Cooler



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The EGR (Exhaust Gas Recirculation) cooler (3) is used to lower combustion temperature and efficiently cool EGR gas, with the aim of reducing the NOx that is in the exhaust gas of diesel engine.

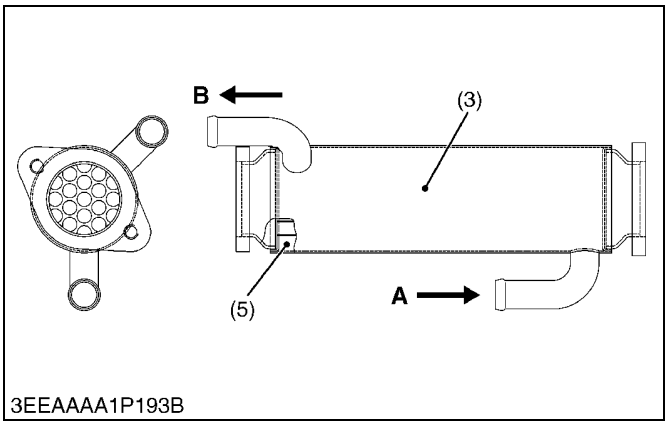
The EGR cooler (3) is placed between the cylinder head (2) and the mechanical EGR valve (4) and returns the cooled exhaust gases to the engine suction side.

The EGR cooler (3) has resistant to clogging up, compact and efficient tubes (5) internally.

(1) Flange
(2) Cylinder Head
(3) EGR Cooler
(4) Mechanical EGR Valve
(5) Tube

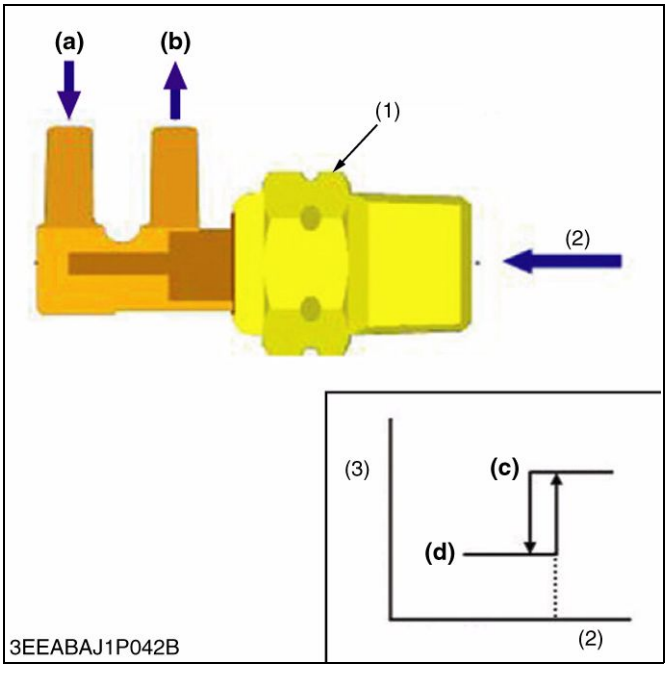
A : Coolant Inlet Port
B : Coolant Outlet Port

W1175338



3EEAAAA1P193B

(2) Thermo Valve



3EEABAJ1P042B

Thermo valve (1) controls boost pressure “ON / OFF” for the EGR valve.

If the coolant temperature (2) is low, thermo valve (1) is closed, so that boost pressure does not reach to the EGR valve.

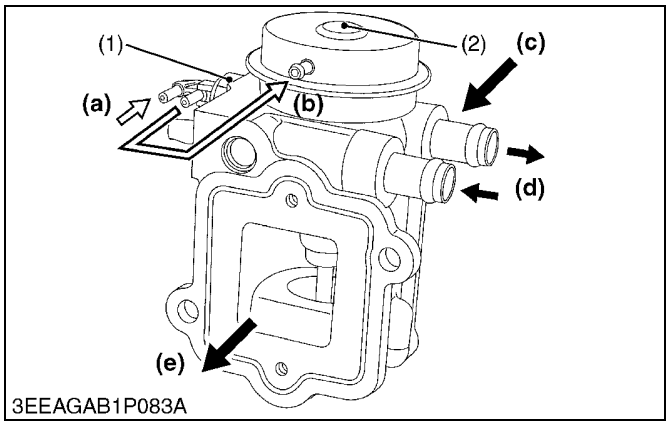
If the coolant temperature (2) is high, thermo valve (1) is open, so that boost pressure reaches to the EGR valve.

(1) Thermo Valve
(2) Coolant Temperature
(3) Boost Pressure Flow

(a) Boost Pressure From Intake Manifold
(b) Boost Pressure To EGR Valve
(c) Open
(d) Close

W1175753

(3) Mechanical EGR Valve



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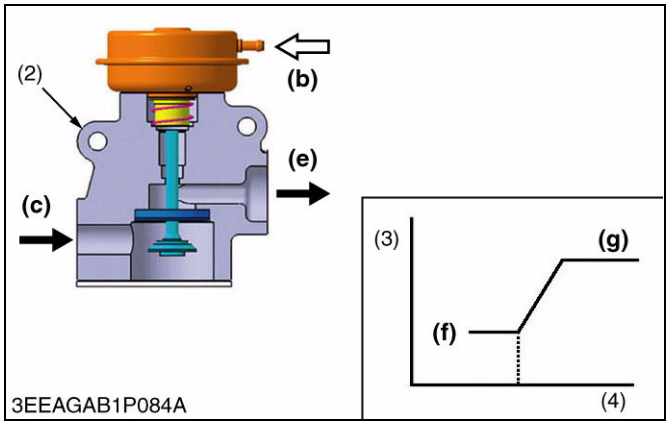


3EEAGAB1P084A

Mechanical EGR valve (2) controls the flow of cooled EGR gas **(c)** to the intake manifold.

If the boost pressure **(b)** is low, EGR valve (2) is closed, so cooled EGR gas **(c)** does not flow to the intake manifold **(e)**.

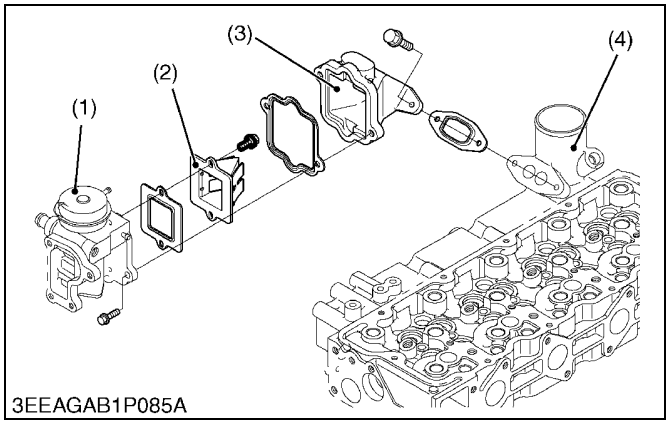
If the boost pressure **(b)** is getting higher, EGR valve (2) is opening and cooled EGR gas **(c)** is flowing to the intake manifold **(e)**.

(1) Thermo Valve
(2) Mechanical EGR Valve
(3) EGR Valve Lift
(4) Boost Pressure

(a) Boost Pressure from Inlet Manifold
(b) Boost Pressure from Thermo Valve
(c) Cooled EGR Gas
(d) Coolant
(e) Cooled EGR Gas To The Intake Manifold
(f) Close
(g) Open

W1176088

(4) Reed Valve



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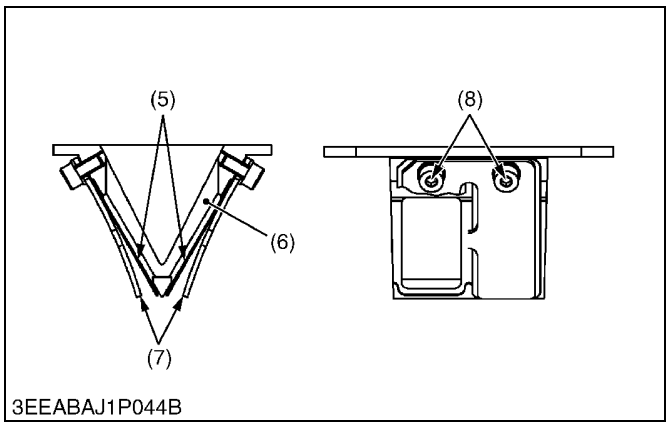

3EEABAJ1P044B

The reed valve (2) is provided at the confluence of exhaust gas after passing the EGR valve (1), and intake air. It operates by the pressure difference between inside of the crankcase and the atmosphere, and prevents back-flow of the mixture of exhaust gas and intake air generated by the piston and valves. It is used as the secondary air introduction device for the countermeasure against exhaust gas of four-cycle engines.

(1) Mechanical EGR Valve
(2) Reed Valve
(3) Reed Valve Housing
(4) Intake Manifold
(5) Valve
(6) Case
(7) Stopper
(8) Screw

W1176594

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Replenish fuel	G-11
	Air in the fuel system	Vent air	G-11
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel hose clogged	Clean or replace	G-11, 28
	Fuel filter clogged	Replace	G-13, 15
	Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-6, 9
	Fuel with low cetane number	Use specified fuel	G-6
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	S-44
	Incorrect injection timing	Adjust	S-26
	Fuel camshaft worn	Replace	S-59
	Injection nozzle clogged	Repair or replace	S-29, 45
	Injection pump malfunctioning	Repair or replace	S-28, 61
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	–
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	S-44 to 50
	Improper valve timing	Correct or replace timing gear	S-69, 70
	Piston ring and cylinder worn	Replace	S-73, 74, 75, 99, 107
	Excessive valve clearance	Adjust	S-22
	Stop solenoid malfunctioning	Replace	S-33
Starter Does Not Operate	Battery discharged	Charge	G-18, 19
	Starter malfunctioning	Repair or replace	S-32, 78, 109
	Key switch malfunctioning	Replace	–
	Wiring disconnected	Connect	–

W1034445

Symptom	Probable Cause	Solution	Reference Page
Engine Revolution Is Not Smooth	Fuel filter clogged or dirty	Replace	G-13, 15
	Air cleaner clogged	Clean or replace	G-12, 25
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	S-44
	Injection pump malfunctioning	Repair or replace	S-28, 61
	Incorrect nozzle opening pressure	Repair or replace	S-29, 45
	Injection nozzle stuck or clogged	Repair or replace	S-29, 45
	Governor malfunctioning	Repair	S-56, 57
	Turbocharger bearing worn out	Replace the turbocharger assembly	S-34, 40
	Turbocharger shaft bent	Replace the turbocharger assembly	S-34, 40
	Turbocharger fin or other part damaged due to foreign matters	Replace the turbocharger assembly	S-34, 40
Either White or Blue Exhaust Gas Is Observed	Excessive engine oil	Reduce to specified level	G-7, 9
	Piston ring and cylinder worn or stuck	Repair or replace	S-73, 74, 75, 99, 107
	Incorrect injection timing	Adjust	S-26
Oil Leak into Exhaust Pipe or Suction Pipe	Waste oil pipe clogged or deformed	Repair or replace	S-40
	Turbocharger's piston ring seal damaged	Replace the turbocharger assembly	S-40
Either Black or Dark Gray Exhaust Gas Is Observed	Overload	Reduce the load	–
	Low grade fuel used	Use specified fuel	G-6
	Fuel filter clogged	Replace	G-13, 15
	Air cleaner clogged	Clean or replace	G-12, 25
	Deficient nozzle injection	Repair or replace nozzle	S-29, 45

W1036076

Symptom	Probable Cause	Solution	Reference Page
Deficient Output	Incorrect injection timing	Adjust	S-26
	Engine's moving parts seem to be seizing	Repair or replace	–
	Injection pump malfunctioning	Repair or replace	S-28, 61
	Deficient nozzle injection	Repair or replace nozzle	S-29, 45
	Compression leak	Check the compression pressure and repair	S-21, 44 to 50
	Gas leak from exhaust system	Repair or replace	S-34, 40
	Air leak from compressor discharge side	Repair or replace	S-34, 40
	Air cleaner dirty or clogged	Clean or replace	G-12, 25
	Compressor wheel turning heavily	Replace the turbocharger assembly	S-34, 40
Excessive Lubricant Oil Consumption	Piston ring's gap facing the same direction	Shift ring gap direction	S-73, 74, 75
	Oil ring worn or stuck	Replace	S-73, 74, 75, 99
	Piston ring groove worn	Replace piston	S-73, 74, 75, 99
	Valve stem and valve guide worn	Replace	S-51, 83
	Crankshaft bearing and crank pin bearing worn	Replace	S-72, 74, 75, 101 to 104
	Oil leaking due to defective seals or packing	Replace	–
Fuel Mixed into Lubricant Oil	Injection pump's plunger worn	Repair or replace	S-28, 61
	Deficient nozzle injection	Repair or replace nozzle	S-29, 45
	Injection pump broken	Replace	S-28, 61
Water Mixed into Lubricant Oil	Head gasket defective	Replace	S-48, 49, 50
	Cylinder block or cylinder head flawed	Replace	S-82
Low Oil Pressure	Engine oil insufficient	Replenish	G-7, 9
	Oil strainer clogged	Clean	S-71
	Relief valve stuck with dirt	Clean	S-65, 108
	Relief valve spring weaken or broken	Replace	S-65, 108
	Excessive oil clearance of crankshaft bearing	Replace	S-76, 104
	Excessive oil clearance of crankpin bearing	Replace	S-72, 102, 103
	Excessive oil clearance of rocker arm	Replace	S-47, 85
	Oil passage clogged	Clean	–
	Different type of oil	Use specified type of oil	G-6, 9
	Oil pump defective	Replace	S-23, 108

W1037777

Symptom	Probable Cause	Solution	Reference Page
High Oil Pressure	Different type of oil	Use specified type of oil	G-6, 9
	Relief valve defective	Replace	S-65, 108
Engine Overheated	Engine oil insufficient	Replenish	G-7, 9
	Fan belt broken or elongated	Replace or adjust	G-12, 15
	Coolant insufficient	Replenish	G-8, 15
	Radiator net and radiator fin clogged with dust	Clean	–
	Inside of radiator corroded	Clean or replace	G-15
	Coolant flow route corroded	Clean or replace	G-15
	Radiator cap defective	Replace	S-24
	Overload operating	Reduce the load	–
	Head gasket defective	Replace	S-48, 49, 50
	Incorrect injection timing	Adjust	S-26
	Unsuitable fuel used	Use specified fuel	G-6
Battery Quickly Discharged	Battery electrolyte insufficient	Replenish distilled water and charge	G-18, 19
	Fan belt slips	Adjust belt tension or replace	G-12, 15
	Wiring disconnected	Connect	–
	Rectifier defective	Replace	S-33, 78
	Alternator defective	Replace	S-33, 78
	Battery defective	Replace	G-28, S-30, 31

W1168623

2. SERVICING SPECIFICATIONS

ENGINE BODY

Item		Factory Specification	Allowable Limit
Compression Pressure	**[V2607-DI-T-E3B]**	3.20 MPa / 250 min^{-1} (rpm) 32.6 kgf/cm^2 / 250 min^{-1} (rpm) 464 psi / 250 min^{-1} (rpm)	2.20 MPa / 250 min^{-1} (rpm) 22.4 kgf/cm^2 / 250 min^{-1} (rpm) 319 psi / 250 min^{-1} (rpm)
	[V2607-DI-E3B / V3007-DI-T-E3B / V3307-DI-T-E3B]	3.92 MPa / 250 min^{-1} (rpm) 40.0 kgf/cm^2 / 250 min^{-1} (rpm) 569 psi / 250 min^{-1} (rpm)	2.90 MPa / 250 min^{-1} (rpm) 29.6 kgf/cm^2 / 250 min^{-1} (rpm) 421 psi / 250 min^{-1} (rpm)
Variance Among Cylinders		–	10 % or less
Valve Clearance (Cold)		0.13 to 0.17 mm 0.0052 to 0.0068 in.	–
Top Clearance		0.60 to 0.80 mm 0.024 to 0.031 in.	–
Cylinder Head Surface	Flatness	–	0.05 mm 0.002 in.
Valve Recessing (Intake and Exhaust)		0.65 to 0.85 mm 0.026 to 0.033 in.	1.20 mm 0.0472 in.
[V2607-DI-E3B / V2607-DI-T-E3B] Valve Stem to Valve Guide (Intake)	Clearance	0.030 to 0.057 mm 0.0012 to 0.0022 in.	0.10 mm 0.0039 in.
Valve Stem	O.D.	5.968 to 5.980 mm 0.2350 to 0.2354 in.	–
Valve Guide	I.D.	6.010 to 6.025 mm 0.2367 to 0.2372 in.	–
Valve Stem to Valve Guide (Exhaust)	Clearance	0.045 to 0.072 mm 0.0018 to 0.0028 in.	0.10 mm 0.0039 in.
Valve Stem	O.D.	5.953 to 5.965 mm 0.2344 to 0.2348 in.	–
Valve Guide	I.D.	6.010 to 6.025 mm 0.2367 to 0.2372 in.	–
[V3007-DI-T-E3B / V3307-DI-T-E3B] Valve Stem to Valve Guide (Intake and Exhaust)	Clearance	0.055 to 0.085 mm 0.0022 to 0.0033 in.	0.10 mm 0.0039 in.
Valve Stem	O.D.	6.960 to 6.975 mm 0.2741 to 0.2746 in.	–
Valve Guide	I.D.	7.030 to 7.045 mm 0.2768 to 0.2773 in.	–

W1185533

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Valve Face (Intake and Exhaust)	Angle	0.79 rad (45 °)	–
Valve Seat (Intake and Exhaust)	Angle	0.79 rad (45 °)	–
	Width	3.3 to 3.6 mm 0.13 to 0.14 in.	–
Intake Valve Timing **[V2607-DI-T-E3B]**	Open	0.21 rad (12 °) before T.D.C.	–
	Close	0.77 rad (44 °) after B.D.C.	–
[V2607-DI-E3B / V3007-DI-T-E3B / V3307-DI-T-E3B]	Open	0.24 rad (14 °) before T.D.C.	–
	Close	0.70 rad (40 °) after B.D.C.	–
Exhaust Valve Timing **[V2607-DI-T-E3B]**	Open	0.86 rad (49 °) before B.D.C.	–
	Close	0.30 rad (17 °) after T.D.C.	–
[V2607-DI-E3B / V3007-DI-T-E3B / V3307-DI-T-E3B]	Open	0.87 rad (50 °) before B.D.C.	–
	Close	0.24 rad (14 °) after T.D.C.	–
Valve Spring (Intake and Exhaust) **[V2607-DI-E3B / V2607-DI-T-E3B]**	Tilt	–	1.0 mm 0.039 in.
	Free Length	35.4 to 35.9 mm 1.40 to 1.41 in.	34.9 mm 1.37 in.
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Tilt	–	1.0 mm 0.039 in.
	Free Length	35.1 to 35.6 mm 1.39 to 1.40 in.	34.6 mm 1.36 in.

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Valve Spring (Intake and Exhaust) **[V2607-DI-E3B / V2607-DI-T-E3B]**	Setting Load / Setting Length	60.8 N / 29.7 mm 6.20 kgf / 29.7 mm 13.7 lbf / 1.17 in.	45.9 N / 29.7 mm 4.68 kgf / 29.7 mm 10.3 lbf / 1.17 in.
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Setting Load / Setting Length	63.5 N / 31.5 mm 6.48 kgf / 31.5 mm 14.3 lbf / 1.24 in.	45.9 N / 31.5 mm 4.68 kgf / 31.5 mm 10.3 lbf / 1.24 in.
Rocker Arm Shaft to Rocker Arm **[V2607-DI-E3B / V2607-DI-T-E3B]**	Oil Clearance	0.016 to 0.045 mm 0.00063 to 0.0017 in.	0.15 mm 0.0059 in.
Rocker Arm Shaft	O.D.	13.973 to 13.984 mm 0.55012 to 0.55055 in.	–
Rocker Arm	I.D.	14.000 to 14.018 mm 0.55119 to 0.55188 in.	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Oil Clearance	0.016 to 0.045 mm 0.00063 to 0.0017 in.	0.15 mm 0.0059 in.
Rocker Arm Shaft	O.D.	14.973 to 14.984 mm 0.58949 to 0.58992 in.	–
Rocker Arm	I.D.	15.000 to 15.018 mm 0.59056 to 0.59125 in.	–
Valve Bridge Arm and Valve Bridge Shaft **[V2607-DI-E3B / V2607-DI-T-E3B]**	Oil Clearance	0.018 to 0.057 mm 0.00071 to 0.0022 in.	0.15 mm 0.0059 in.
Valve Bridge Shaft	O.D.	8.023 to 8.032 mm 0.3159 to 0.3162 in.	–
Valve Bridge Arm	I.D.	8.050 to 8.080 mm 0.3170 to 0.3181 in.	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Oil Clearance	0.018 to 0.042 mm 0.00071 to 0.0016 in.	0.15 mm 0.0059 in.
Valve Bridge Shaft	O.D.	9.023 to 9.032 mm 0.3553 to 0.3555 in.	–
Valve Bridge Arm	I.D.	9.050 to 9.065 mm 0.3563 to 0.3568 in.	–
Push Rod	Alignment	–	0.25 mm 0.0098 in.

W1041245

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Tappet to Tappet Bore	Oil Clearance	0.020 to 0.050 mm 0.00079 to 0.0019 in.	0.07 mm 0.003 in.
Tappet	O.D.	9.965 to 9.980 mm 0.3924 to 0.3929 in.	–
Tappet Bore	I.D.	10.000 to 10.015 mm 0.39370 to 0.39429 in.	–
Timing Gear **[V2607-DI-E3B / V2607-DI-T-E3B]**			
Crank Gear to Cam Gear	Backlash	0.0400 to 0.137 mm 0.00158 to 0.00539 in.	0.22 mm 0.0087 in.
Cam Gear to Idle Gear	Backlash	0.0460 to 0.136 mm 0.00182 to 0.00535 in.	0.22 mm 0.0087 in.
Idle Gear to Injection Pump Gear	Backlash	0.0460 to 0.136 mm 0.00182 to 0.00535 in.	0.22 mm 0.0087 in.
[V3007-DI-T-E3B / V3307-DI-T-E3B]			
Crank Gear to Cam Gear	Backlash	0.0410 to 0.139 mm 0.00162 to 0.00547 in.	0.22 mm 0.0087 in.
Cam Gear to Idle Gear	Backlash	0.0410 to 0.134 mm 0.00162 to 0.00527 in.	0.22 mm 0.0087 in.
Idle Gear to Injection Pump Gear	Backlash	0.0410 to 0.134 mm 0.00162 to 0.00527 in.	0.22 mm 0.0087 in.
Cam Gear to Balancer 1 Gear	Backlash	0.0410 to 0.134 mm 0.00162 to 0.00527 in.	0.22 mm 0.0087 in.
Idle Gear to Balancer 2 Gear	Backlash	0.0410 to 0.129 mm 0.00162 to 0.00507 in.	0.22 mm 0.0087 in.
Idle Gear **[V2607-DI-E3B / V2607-DI-T-E3B]**	Side Clearance	0.050 to 0.20 mm 0.0020 to 0.0078 in.	0.90 mm 0.035 in.
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Side Clearance	0.15 to 0.25 mm 0.0059 to 0.0098 in.	0.90 mm 0.035 in.

W1190039

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Idle Gear Shaft to Idle Gear Bushing **[V2607-DI-E3B / V2607-DI-T-E3B]**	Oil Clearance	0.025 to 0.096 mm 0.00099 to 0.0037 in.	0.10 mm 0.0039 in.
Idle Gear Shaft	O.D.	34.959 to 34.975 mm 1.3764 to 1.3769 in.	–
Idle Gear Bushing	I.D.	35.000 to 35.055 mm 1.3780 to 1.3801 in.	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Oil Clearance	0.050 to 0.091 mm 0.0020 to 0.0036 in.	0.10 mm 0.0039 in.
Idle Gear Shaft	O.D.	34.959 to 34.975 mm 1.3764 to 1.3769 in.	–
Idle Gear Bushing	I.D.	35.025 to 35.050 mm 1.3790 to 1.3799 in.	–
Camshaft	Side Clearance	–	0.10 mm 0.0039 in.
Camshaft	Alignment	–	0.01 mm 0.0004 in.
Cam Height **[V2607-DI-E3B]**	Intake	32.70 mm 1.287 in.	32.20 mm 1.268 in.
	Exhaust	33.20 mm 1.307 in.	32.70 mm 1.287 in.
[V2607-DI-T-E3B]	Intake	32.60 mm 1.283 in.	32.10 mm 1.264 in.
	Exhaust	33.00 mm 1.299 in.	32.50 mm 1.280 in.
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Intake	37.50 mm 1.476 in.	37.00 mm 1.457 in.
	Exhaust	37.90 mm 1.492 in.	37.40 mm 1.472 in.

W1042752

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Camshaft **[V2607-DI-E3B / V2607-DI-T-E3B]**	Oil Clearance	0.050 to 0.091 mm 0.0020 to 0.0035 in.	0.15 mm 0.0059 in.
Camshaft Journal 1	O.D.	34.934 to 34.950 mm 1.3754 to 1.3759 in.	–
Cylinder Block Bore 1	I.D.	35.000 to 35.025 mm 1.3780 to 1.3789 in.	–
Camshaft Journal 2	O.D.	41.934 to 41.950 mm 1.6510 to 1.6515 in.	–
Cylinder Block Bore 2	I.D.	42.000 to 42.025 mm 1.6536 to 1.6545 in.	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Oil Clearance	0.050 to 0.091 mm 0.0020 to 0.0035 in.	0.15 mm 0.0059 in.
Camshaft Journal 1	O.D.	34.934 to 34.950 mm 1.3754 to 1.3759 in.	–
Cylinder Block Bore 1	I.D.	35.000 to 35.025 mm 1.3780 to 1.3789 in.	–
Camshaft Journal 2	O.D.	43.934 to 43.950 mm 1.7297 to 1.7303 in.	–
Cylinder Block Bore 2	I.D.	44.000 to 44.025 mm 1.7323 to 1.7332 in.	–
Balancer Shaft **[V3007-DI-T-E3B / V3307-DI-T-E3B]**			
Balancer Shaft 1	Side Clearance	0.070 to 0.22 mm 0.0028 to 0.0086 in.	0.30 mm 0.012 in.
Balancer Shaft 2	Side Clearance	0.070 to 0.32 mm 0.0028 to 0.012 in.	0.34 mm 0.013 in.
Balancer Shaft 1, 2 **[V3007-DI-T-E3B / V3307-DI-T-E3B]**	Alignment	–	0.02 mm 0.0008 in.
Balancer Shaft 1 Journal **[V3007-DI-T-E3B / V3307-DI-T-E3B]**	Oil Clearance	0.0600 to 0.146 mm 0.00237 to 0.00574 in.	0.20 mm 0.0079 in.
Balancer Shaft 1 Journal	O.D.	48.934 to 48.950 mm 1.9266 to 1.9271 in.	–
Balancer Shaft 1 Bearing	I.D.	49.010 to 49.080 mm 1.9296 to 1.9322 in.	–

W1359031

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Balancer Shaft 2 Journal **[V3007-DI-T-E3B / V3307-DI-T-E3B]**	Oil Clearance	0.0500 to 0.136 mm 0.00197 to 0.00535 in.	0.20 mm 0.0079 in.
Balancer Shaft 2 Journal	O.D.	48.934 to 48.950 mm 1.9266 to 1.9271 in.	–
Balancer Shaft 2 Bearing	I.D.	49.000 to 49.070 mm 1.9292 to 1.9318 in.	–
Piston Pin Bore **[V2607-DI-E3B / V2607-DI-T-E3B]**	I.D.	26.000 to 26.013 mm 1.0237 to 1.0241 in.	26.05 mm 1.026 in.
[V3007-DI-T-E3B / V3307-DI-T-E3B]	I.D.	28.000 to 28.013 mm 1.1024 to 1.1028 in.	28.05 mm 1.104 in.
Piston Pin to Small End Bushing **[V2607-DI-E3B / V2607-DI-T-E3B]**	Oil Clearance	0.014 to 0.034 mm 0.00056 to 0.0013 in.	0.15 mm 0.0059 in.
Piston Pin	O.D.	26.006 to 26.011 mm 1.0239 to 1.0240 in.	–
Small End Bushing	I.D.	26.025 to 26.040 mm 1.0246 to 1.0252 in.	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Oil Clearance	0.020 to 0.040 mm 0.00079 to 0.0015 in.	0.15 mm 0.0059 in.
Piston Pin	O.D.	28.006 to 28.011 mm 1.1026 to 1.1027 in.	–
Small End Bushing	I.D.	28.031 to 28.046 mm 1.1036 to 1.1041 in.	–
Connecting Rod	Alignment	–	0.05 mm 0.002 in.
Piston Ring Gap **[V2607-DI-E3B / V2607-DI-T-E3B]**	Top Ring	0.20 to 0.35 mm 0.0079 to 0.013 in.	1.25 mm 0.0492 in.
	Second Ring	0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.
	Oil Ring	0.25 to 0.45 mm 0.0099 to 0.017 in.	1.25 mm 0.0492 in.
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Top Ring	0.25 to 0.40 mm 0.0099 to 0.015 in.	1.25 mm 0.0492 in.
	Second Ring	0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.
	Oil Ring	0.25 to 0.45 mm 0.0099 to 0.017 in.	1.25 mm 0.0492 in.

W1044411

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Piston Ring to Piston Ring Groove Top Ring	Clearance	0.050 to 0.090 mm 0.0020 to 0.0035 in.	0.15 mm 0.0059 in.
Second Ring	Clearance	0.090 to 0.12 mm 0.0035 to 0.0047 in.	0.20 mm 0.0079 in.
Oil Ring	Clearance	0.020 to 0.060 mm 0.00079 to 0.0023 in.	0.15 mm 0.0059 in.
Crankshaft	Side Clearance	0.15 to 0.35 mm 0.0059 to 0.013 in.	0.50 mm 0.020 in.
Crankshaft	Alignment	–	0.02 mm 0.0008 in.
Crankpin to Crankpin Bearing **[V2607-DI-E3B / V2607-DI-T-E3B]**	Oil Clearance	0.011 to 0.058 mm 0.00044 to 0.0022 in.	0.20 mm 0.0079 in.
Crankpin	O.D.	46.980 to 46.991 mm 1.8496 to 1.8500 in.	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Oil Clearance	0.017 to 0.048 mm 0.00067 to 0.0018 in.	0.20 mm 0.0079 in.
Crankpin	O.D.	49.980 to 49.991 mm 1.9678 to 1.9681 in.	–
Crankshaft Journal to Crankshaft Bearing **[V2607-DI-E3B / V2607-DI-T-E3B]**	Oil Clearance	0.030 to 0.051 mm 0.0012 to 0.0020 in.	0.20 mm 0.0079 in.
Crankshaft Journal	O.D.	72.977 to 72.990 mm 2.8732 to 2.8736 in.	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Oil Clearance	0.030 to 0.073 mm 0.0012 to 0.0028 in.	0.20 mm 0.0079 in.
Crankshaft Journal	O.D.	79.977 to 79.990 mm 3.1487 to 3.1492 in.	–
Cylinder Bore **[V2607-DI-E3B / V2607-DI-T-E3B]**	I.D.	87.000 to 87.022 mm 3.4252 to 3.4260 in.	87.15 mm 3.431 in.
[V3007-DI-T-E3B / V3307-DI-T-E3B]	I.D.	94.000 to 94.022 mm 3.7008 to 3.7016 in.	94.15 mm 3.707 in.
Cylinder Bore (Oversize) **[V2607-DI-E3B / V2607-DI-T-E3B]**	I.D.	87.250 to 87.272 mm 3.4350 to 3.4359 in.	87.40 mm 3.441 in.
[V3007-DI-T-E3B / V3307-DI-T-E3B]	I.D.	94.500 to 94.522 mm 3.7205 to 3.7213 in.	94.65 mm 3.726 in.

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LUBRICATING SYSTEM

Item		Factory Specification	Allowable Limit
Engine Oil Pressure	At Idle Speed	–	49 kPa 0.50 kgf/cm^2 7.1 psi
	At Rated Speed	197 to 392 kPa 2.00 to 4.00 kgf/cm^2 28.5 to 56.8 psi	147 kPa 1.50 kgf/cm^2 21.3 psi
Engine Oil Pressure Switch	Working Pressure	40 to 58 kPa 0.40 to 0.60 kgf/cm^2 5.7 to 8.5 psi	–
Inner Rotor to Outer Rotor	Clearance	0.030 to 0.090 mm 0.0012 to 0.0035 in.	0.30 mm 0.012 in.
Outer Rotor to Pump Body	Clearance	0.100 to 0.184 mm 0.00394 to 0.00724 in.	0.30 mm 0.012 in.
Rotor to Cover	Clearance	0.025 to 0.075 mm 0.00099 to 0.0029 in.	0.225 mm 0.00886 in.
Relief Valve **[V2607-DI-E3B / V2607-DI-T-E3B]**	Spring Free Length	60.0 to 60.5 mm 2.37 to 2.38 in.	55.0 mm 2.17 in.
	Working Pressure	392 kPa 4.00 kgf/cm^2 56.9 psi	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Spring Free Length	60.0 to 60.5 mm 2.37 to 2.38 in	55.0 mm 2.17 in.
	Working Pressure	294 kPa 3.00 kgf/cm^2 42.7 psi	–

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COOLING SYSTEM

Item		Factory Specification	Allowable Limit
Fan Belt	Tension	10.0 to 12.0 mm / 98 N 0.394 to 0.472 in. / 98 N (10 kgf, 22 lbf)	–
Radiator Cap	Pressure Falling Time	10 seconds or more 88 → 59 kPa 0.90 → 0.60 kgf/cm^2 13 → 8.5 psi	–
Radiator	Water Leakage Test Pressure	No leak at specified pressure	–
Thermostat **[V2607-DI-E3B / V2607-DI-T-E3B]**	Valve Opening Temperature	80 to 84 °C 176 to 183 °F	–
	Valve Opening Temperature (Opened Completely)	95 °C 203 °F	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Valve Opening Temperature	74.5 to 78.5 °C 166.1 to 173.3 °F	–
	Valve Opening Temperature (Opened Completely)	90 °C 194 °F	–

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FUEL SYSTEM

Item		Factory Specification	Allowable Limit
Injection Timing	V2607-DI-E3B	0.027 to 0.052 rad before T.D.C. (1.5 to 3.0 ° before T.D.C.)	–
	V2607-DI-T-E3B (Serial No. : 8G0001 to 8V9999)	0.0087 rad before T.D.C. to 0.017 rad after T.D.C. (0.50 ° before T.D.C. to 1.0 ° after T.D.C.)	–
	(Serial No. : 8W0001 and above)	0.017 rad before T.D.C. to 00087 rad after T.D.C. (1.0 ° before T.D.C. to 0.50 ° after T.D.C.)	–
	V3007-DI-T-E3B	0.00261 rad before T.D.C. to 0.0235 rad after T.D.C. (0.150 ° before T.D.C. to 1.35 ° after T.D.C.)	–
	V3307-DI-T-E3B	0.00960 to 0.0357 rad after T.D.C. (0.550 to 2.05 ° after T.D.C.)	–
Pump Element	Fuel Tightness	–	18.63 MPa 190.0 kgf/cm^2 2702 psi
Delivery Valve	Fuel Tightness	10 seconds 18.63 → 17.66 MPa 190.0 → 180.0 kgf/cm^2 2702 → 2561 psi	5 seconds 18.63 → 17.66 MPa 190.0 → 180.0 kgf/cm^2 2702 → 2561 psi

W10139730

FUEL SYSTEM (Continued)

Item		Factory Specification	Allowable Limit
Fuel Injection Nozzle **[V2607-DI-E3B / V2607-DI-T-E3B]**	Injection Pressure (1st stage)	18.64 to 20.10 MPa 190.0 to 205.0 kgf/cm^2 2703 to 2915 psi	–
	Injection Pressure (2nd stage)	21.58 to 23.04 MPa 220.0 to 235.0 kgf/cm^2 3130 to 3342 psi	–
	Valve Seat Tightness	When the pressure is 16.67 MPa (170.0 kgf/cm^2, 2418 psi), the valve seat must be fuel tightness.	–
[V3007-DI-T-E3B / V3307-DI-T-E3B]	Injection Pressure (1st stage)	18.64 to 19.61 MPa 190.0 to 200.0 kgf/cm^2 2703 to 2844 psi	–
	Injection Pressure (2nd stage)	22.56 to 23.53 MPa 230.0 to 240.0 kgf/cm^2 3272 to 3413 psi	–
	Valve Seat Tightness	When the pressure is 16.67 MPa (170.0 kgf/cm^2, 2418 psi), the valve seat must be fuel tightness.	–

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ELECTRICAL SYSTEM

Item		Factory Specification	Allowable Limit
Glow Plug	Resistance	Approx. 0.95 Ω	–
Starter			
Commutator	O.D.	32.0 mm 1.26 in.	31.4 mm 1.24 in.
Mica	Undercut	0.50 mm 0.020 in.	0.20 mm 0.0079 in.
Brush	Length	18.0 mm 0.709 in.	11.0 mm 0.433 in.
Brush Holder - Holder Support	Resistance	Infinity	–
Commutator - Armature Coil Core	Resistance	Infinity	–
Segment - Segment	Resistance	0 Ω	–
Lead - Brush	Resistance	0 Ω	–
Brush - Yoke	Resistance	Infinity	–
Alternator			
No-load Voltage	Output Voltage	13.8 to 14.8 V at 25 °C (77 °F), 4000 min^{-1} (rpm)	–
Stator	Resistance	Less than 1.0 Ω	–
Rotor	Resistance	2.8 to 3.3 Ω	–
Slip Ring	O.D.	22.7 mm 0.894 in.	22.1 mm 0.870 in.
Brush	Length	18.5 mm 0.728 in.	5.0 mm 0.20 in.

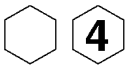
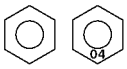
W1173869

3. TIGHTENING TORQUES

Use a torque wrench to tighten the screws, bolts and nuts to the specified torque. Tighten the screws, bolts and nuts used, such as on the cylinder head in the correct sequence and torque.

[1] TIGHTENING TORQUES OF SCREWS, BOLTS AND NUTS FOR GENERAL USE

If the tightening torque is not specified, refer to the table below for the none specified torques values.

Indication on top of bolt	 **No-grade or 4T**			 **7T**		
Indication on top of nut	 **No-grade or 4T**					
Unit	**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	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
M8	18 to 20	1.8 to 2.1	13 to 15	24 to 27	2.4 to 2.8	18 to 20
M10	40 to 45	4.0 to 4.6	29 to 33	49 to 55	5.0 to 5.7	37 to 41
M12	63 to72	6.4 to 7.4	47 to 53	78 to 90	7.9 to 9.2	58 to 66

W10345420

[2] TIGHTENING TORQUES OF THE SCREWS, BOLTS AND NUTS FOR SPECIAL USE

■ **NOTE**

- **For the screws, bolts and nuts with the mark "*", apply engine oil to their threads and seats before you tighten.**
- **The alphabet "M" in Dimension x Pitch shows that the screw, bolt or nut dimensions are in the metric system. The dimension is the nominal external diameter in mm of the threads. The pitch is the nominal distance in mm between 2 threads.**

Item	Dimension x Pitch	N·m	kgf·m	lbf·ft
Glow lead mounting nut	M4 x 0.7	0.98 to 1.7	0.10 to 0.18	0.73 to 1.3
Glow plug	M8 x 1.0	7.7 to 9.3	0.78 to 0.95	5.7 to 6.8
Cylinder head cover screw	M6 x 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
Injection pipe retaining nut	M12 x 1.5	23 to 36	2.3 to 3.7	17 to 26
Oil switch taper screw	R 1/8	15 to 19	1.5 to 2.0	11 to 14
Injection pump unit mounting nut	M8 x 1.25	18 to 20	1.8 to 2.1	13 to 15
Drain plug	M22 x 1.5	45 to 53	4.5 to 5.5	33 to 39
Oil pipe 1 mounting screw	M10 x 1.25	16 to 19	1.6 to 2.0	12 to 14
Thermo valve	R 3/8	30 to 39	3.0 to 4.0	22 to 28
Nozzle holder clamp screw	M8 x 1.25	24 to 27	2.4 to 2.8	18 to 20
Overflow pipe assembly retaining screw	M6 x 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
*Lubricating oil pipe mounting screw	M10 x 1.25	16 to 19	1.6 to 2.0	12 to 14
Governor housing mounting screw	M6 x 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
Lock nut	M5 x 0.8	2.9 to 4.0	0.29 to 0.41	2.1 to 2.9
Injection pump assembly mounting screw	M8 x 1.25	24 to 27	2.4 to 2.8	18 to 20
Injection pump assembly mounting nut	M8 x 1.25	18 to 20	1.8 to 2.1	13 to 15
Governor weight mounting nut	M12 x 1.25	63 to 72	6.4 to 7.4	47 to 53
Fuel camshaft stopper mounting screw	M6 x 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
Fuel camshaft bearing stopper mounting screw	M6 x 1.0	3.9 to 4.2	0.39 to 0.43	2.9 to 3.1
*Crankshaft screw	M16 x 1.5	255 to 274	26.0 to 28.0	188 to 202
Relief valve retaining screw	M22 x 1.5	69 to 78	7.0 to 8.0	51 to 57
*Flywheel screw	M12 x 1.25	98.1 to 107	10.0 to 11.0	72.4 to 79.5
Camshaft set screw	M8 x 1.25	24 to 27	2.4 to 2.8	18 to 20
Balancer shaft set screw	M8 x 1.25	24 to 27	2.4 to 2.8	18 to 20
Starter's terminal **B** mounting nut	M8 x 1.25	9.8 to 11	1.0 to 1.2	7.3 to 8.6
Alternator pulley nut	M24	58.4 to 78.9	5.95 to 8.05	43.1 to 58.2
Oil pump cover screw	M6	7.9 to 9.3	0.80 to 0.95	5.8 to 6.8

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[V2607-DI-E3B / V2607-DI-T-E3B]

Item	Dimension x Pitch	N·m	kgf·m	lbf·ft
Rocker arm bracket screw	M8 x 1.25	24 to 27	2.4 to 2.8	18 to 20
*Cylinder head mounting screw	M13 x 1.25	147 to 156	15.0 to 16.0	109 to 115
Injection pump gear mounting nut (left-handed screw)	M16 x 1.5 -LH	93.2 to 102	9.50 to 10.5	68.8 to 75.9
Oil cooler joint screw	M20 x 1.5	64 to 73	6.5 to 7.5	47 to 54
Front cover mounting screw	M8 x 1.25	24 to 27	2.4 to 2.8	18 to 20
Flywheel housing mounting screw	M12 x 1.25	78 to 90	7.9 to 9.2	58 to 66
Idle gear mounting screw	M10 x 1.25	49 to 55	5.0 to 5.7	37 to 41
*Connecting rod screw [Serial No. : 8G0001 to 9K9999]	M8 x 1.0	45 to 49	4.5 to 5.0	33 to 36
*Connecting rod screw [Serial No. : 9L0001 and above]	M8 x 1.0	41 to 45	4.1 to 4.6	30 to 33
*Crankcase 2 mounting screw	M13 x 1.25	128 to 137	13.0 to 14.0	94.1 to 101
Crankcase 2 flange screw	M10 x 1.25	49 to 55	5.0 to 5.7	37 to 41

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[V3007-DI-T-E3B / V3307-DI-T-E3B]

Item	Dimension x Pitch	N·m	kgf·m	lbf·ft
Rocker arm bracket screw	M10 x 1.25	49 to 55	5.0 to 5.7	37 to 41
*Cylinder head mounting screw	M14 x 1.5	187 to 196	19.0 to 20.0	138 to 144
Injection pump gear mounting nut (left-handed screw)	M16 x 1.5 -LH	138 to 158	14.0 to 16.0	102 to 115
Oil cooler joint screw	M20 x 1.5	40 to 44	4.0 to 4.5	29 to 32
Front cover mounting screw (7T)	M8 x 1.25	24 to 27	2.4 to 2.8	18 to 20
Front cover mounting screw (10T)	M8 x 1.25	30 to 34	3.0 to 3.5	22 to 25
Flywheel housing mounting screw (9T)	M12 x 1.25	103 to 117	10.5 to 12.0	76.0 to 86.7
Idle gear mounting screw (10T)	M8 x 1.25	30 to 34	3.0 to 3.5	22 to 25
*Connecting rod screw	M9 x 1.0	69 to 73	7.0 to 7.5	51 to 54
*Crankcase 2 mounting screw	M14 x 1.5	138 to 147	14.0 to 15.0	102 to 108
Crankcase 2 flange screw (9T)	M10 x 1.25	59 to 63	6.0 to 6.5	44 to 47

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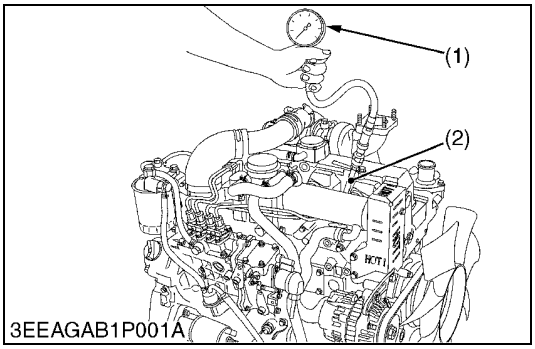
4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Engine Body



Compression Pressure

1. After warming up the engine, shut it down and remove the air cleaner, the muffler, breather tube, glow lead and all glow plugs.
2. Install a compression tester (1) (Code No: 07909-30208) and glow plug adaptor (2) (for V2607 / V3007 / V3307 diesel engines) to glow plug hole. (Refer to "5. SPECIAL TOOLS" at "GENERAL" Section.)
3. After making sure that the stop lever is set at the stop position (Non-injection), operate the engine at 200 to 300 min^{-1} (rpm) with the starter.
4. Read the maximum pressure. Measure the pressure more than twice.

■ **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	V2607-DI-T-E3B	Factory spec.	3.20 MPa / 250 min^{-1} (rpm) 32.6 kgf/cm^2 / 250 min^{-1} (rpm) 464 psi / 250 min^{-1} (rpm)
		Allowable limit	2.20 MPa / 250 min^{-1} (rpm) 22.4 kgf/cm^2 / 250 min^{-1} (rpm) 319 psi / 250 min^{-1} (rpm)
	V2607-DI-E3B V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	3.92 MPa / 250 min^{-1} (rpm) 40.0 kgf/cm^2 / 250 min^{-1} (rpm) 569 psi / 250 min^{-1} (rpm)
		Allowable limit	2.90 MPa / 250 min^{-1} (rpm) 29.6 kgf/cm^2 / 250 min^{-1} (rpm) 421 psi / 250 min^{-1} (rpm)

Tightening torque	Glow lead mounting nut	0.98 to 1.7 N·m 0.10 to 0.18 kgf·m 0.73 to 1.3 lbf·ft
	Glow plug	7.7 to 9.3 N·m 0.78 to 0.95 kgf·m 5.7 to 6.8 lbf·ft

(1) Compression Tester (2) Glow Plug Adaptor

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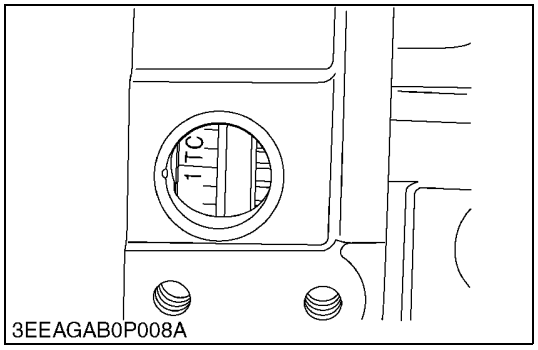

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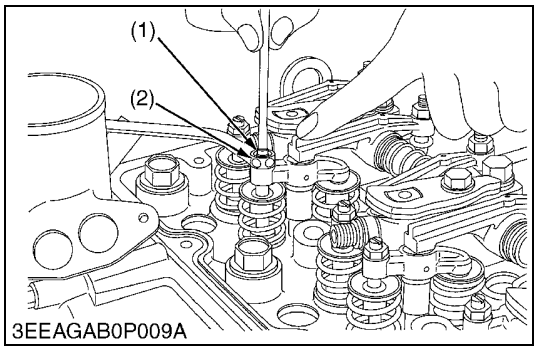

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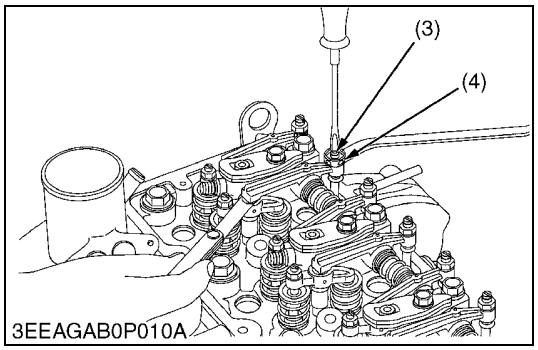

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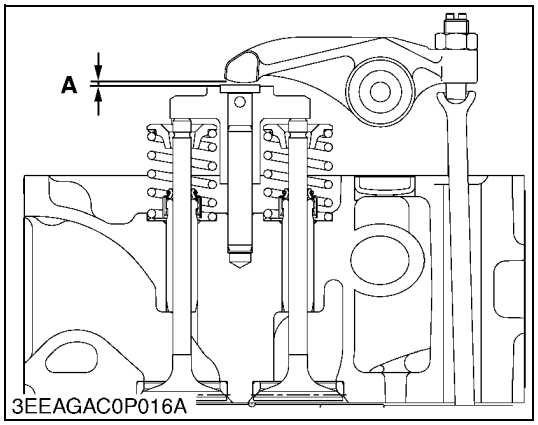

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Valve Clearance

■ **IMPORTANT**

- **Valve clearance must be checked and adjusted when engine is cold.**

1. Remove the high pressure pipes, glow lead, glow plugs and the cylinder head cover.
2. Align the 1TC mark of flywheel and the convex of flywheel housing timing windows so that the first piston (front cover side) comes to the compression top dead center.

[Adjustable type of valve bridge arm]
(V3007-DI-T-E3B / V3307-DI-T-E3B)

3. Before adjusting the valve clearance, adjust the valve bridge arm evenly to the valve stem.
4. Loosen the lock nut (2) of adjusting screw (1) and adjust with screw.
5. Slightly push the rocker arm with your fingers and screw in the adjusting screw (1) slowly until you feel the screw touch the top of valve stem, then tighten the lock nut (2).
6. Loosen the lock nut (4) of adjusting screw (3) (push rod side) and insert the feeler gauge between the rocker arm and the head of valve bridge arm. Set the adjusting screw (3) to the specified value, then tighten the lock nut.

[Adjustment unnecessary type of valve bridge arm]
(V2607-DI-E3B / V2607-DI-T-E3B / V3007-DI-T-E3B / V3307-DI-T-E3B)

3. Loosen the lock nut (4) of adjusting screw (3) (push rod side) and insert the feeler gauge between the rocker arm and the head of valve bridge arm. Set the adjusting screw (3) to the specified value, then tighten the lock nut.

Valve clearance (**A**)	Factory spec.	0.13 to 0.17 mm 0.0052 to 0.0066 in.

■ **NOTE**

- **After adjusting, tighten the lock nut (4) securely.**

Valve arrangement Adjustment cylinder Location of piston		IN.	EX.
When No.1 piston is at compression top dead center	1st	☆	☆
	2nd	☆	
	3rd		☆
	4th		
When No.1 piston is at overlap position	1st		
	2nd		☆
	3rd	☆	
	4th	☆	☆

Tightening torque	Cylinder head cover screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft
	Injection pipe retaining nut	23 to 36 N·m 2.3 to 3.7 kgf·m 17 to 26 lbf·ft

(1) Adjusting Screw
(2) Lock Nut
(3) Adjusting Screw
(4) Lock Nut

A : Valve Clearance

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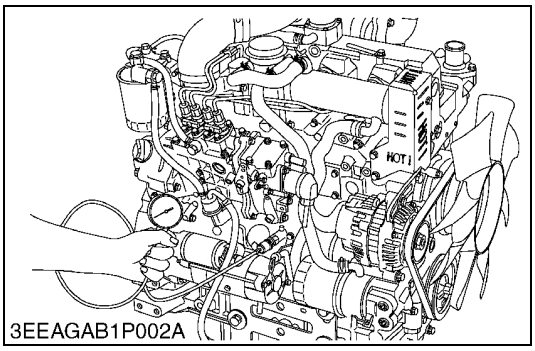
(2) Lubricating System



Engine Oil Pressure

1. Remove the oil switch and set a pressure tester (Code No. 07916-32032).
2. Start the engine. After warming up, measure the oil pressure of both idling and rated speeds.
3. If the oil pressure is less than the allowable limit, check the following.

- Engine oil insufficient
- Oil pump defective
- Oil strainer clogged
- Oil filter cartridge clogged
- Oil gallery clogged
- Excessive oil clearance
- Foreign matter in the relief valve

(When reassembling)

- After checking the engine oil pressure, tighten the engine oil pressure switch to the specified torque.

Engine oil pressure	At idle speed	Allowable limit	49 kPa 0.50 kgf/cm^2 7.1 psi
	At rated speed	Factory spec.	197 to 392 kPa 2.00 to 4.00 kgf/cm^2 28.5 to 56.8 psi
		Allowable limit	147 kPa 1.50 kgf/cm^2 21.3 psi

Tightening torque	Oil switch taper screw	15 to 19 N·m 1.5 to 2.0 kgf·m 11 to 14 lbf·ft

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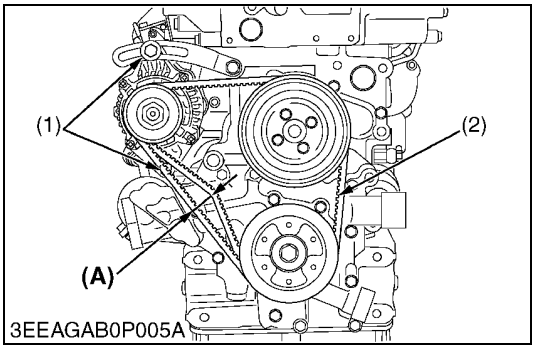
(3) Cooling System



Fan Belt Tension

1. Measure the deflection (**A**), depressing the fan belt (2) halfway between the fan drive pulley and alternator pulley at specified force 98 N (10 kgf, 22 lbf).
2. If the measurement is not within the factory specifications, loosen the alternator mounting screws (1) and relocate the alternator to adjust.

Deflection **(A)**	Factory spec.	10.0 to 12.0 mm 0.394 to 0.472 in.

(1) Alternator Mounting Screw **(A) Deflection**
(2) Fan Belt

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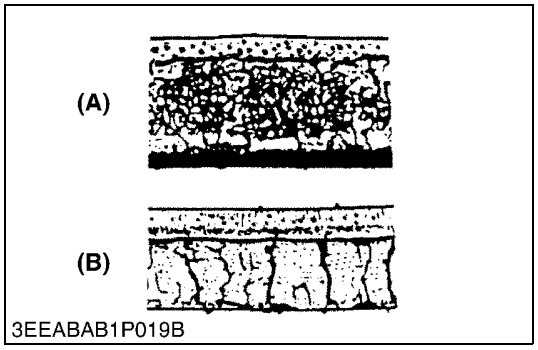

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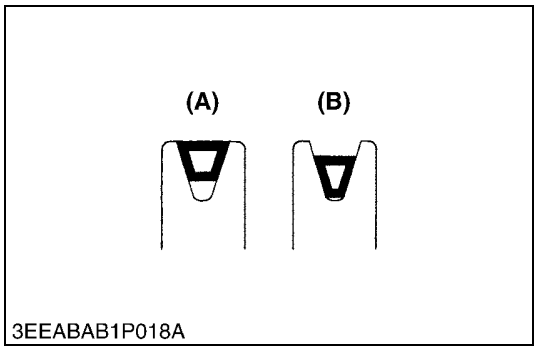
Fan Belt Damage and Wear

1. Check the fan belt for damage.
2. If the fan belt is damaged, replace it.
3. Check if the fan belt is worn and sunk in the pulley groove.
4. If the fan belt is nearly worn out and deeply sunk in the pulley groove, replace it.

(A) Good **(B) Bad**

W1021108



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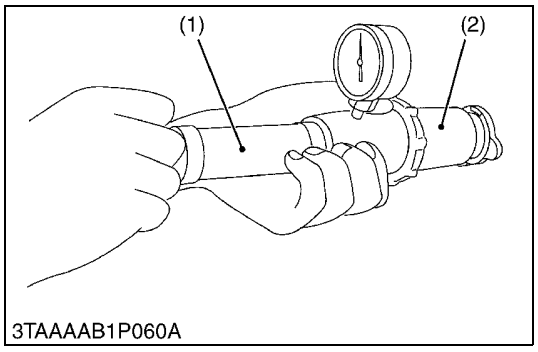
CAUTION

- **When removing the radiator cap, wait at least ten minutes after the engine has stopped and cooled down. Otherwise, hot water may gush out, scalding nearby people.**



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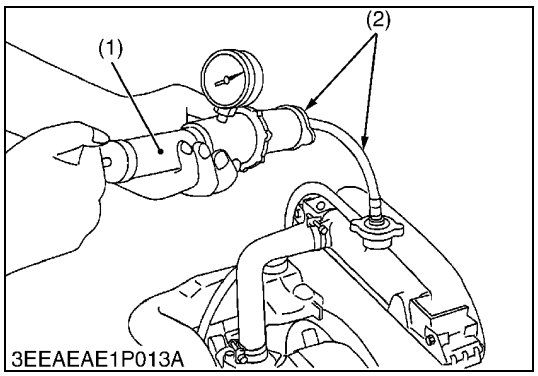
Radiator Cap Air Leakage

1. Set a radiator tester (1) and an adaptor (2) on the radiator cap.
2. Apply the specified pressure of 88 kPa (0.90 kgf/cm^2, 13 psi), and measure the time for the pressure to fall to 59 kPa (0.60 kgf/cm^2, 8.5 psi).
3. If the measurement is less than the factory specification, replace the radiator cap.

Pressure falling time	Factory spec.	More than 10 seconds for pressure fall 88 → 59 kPa (0.90 → 0.60 kgf/cm^2, 13 → 8.5 psi)

(1) Radiator Tester (2) Adaptor

W1054156



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Radiator Water Leakage

1. Pour a specified amount of water into the radiator.
2. Set a radiator tester (1) and an adaptor (2) and raise the water pressure to the specified pressure.
3. Check the radiator for water leaks.
4. For water leak from the pinhole, replace the radiator or repair with the radiator cement. When water leak is excessive, replace the radiator.

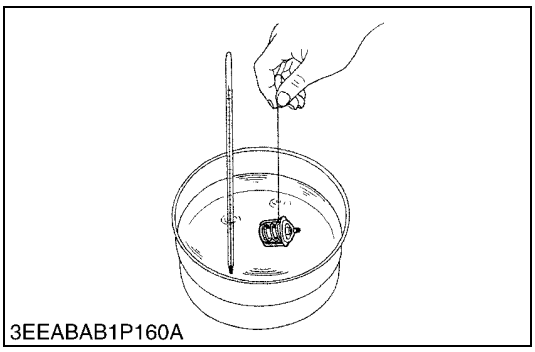
Radiator water leakage test pressure	Factory spec.	No leak at specified pressure

■ **NOTE**

- **The pressure of the leak test is different from each radiator specification.**
  Thus, do the leak test, refer to the test pressure of each radiator specification.

(1) Radiator Tester (2) Adaptor

W1016903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Thermostat Valve Opening Temperature

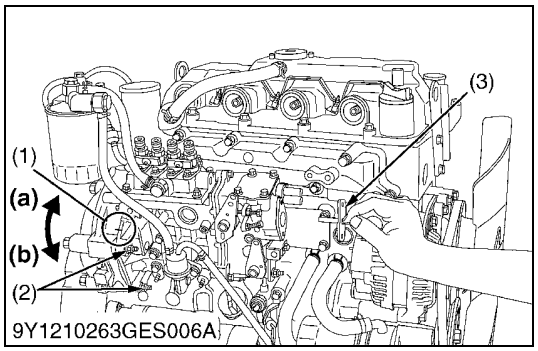
1. Push down the thermostat valve and insert a string between the valve and the valve seat.
2. Place the thermostat and a thermostat in a container with water and gradually heat the water.
3. Hold the string to suspend the thermostat in the water. When the water temperature rises, the thermostat valve will open, allowing it to fall down from the string.
   Read the temperature at this moment on the thermometer.
4. Continue heating the water and read the temperature when the valve has risen by about 8 mm (0.3 in.).
5. If the measurement is not acceptable, replace the thermostat.

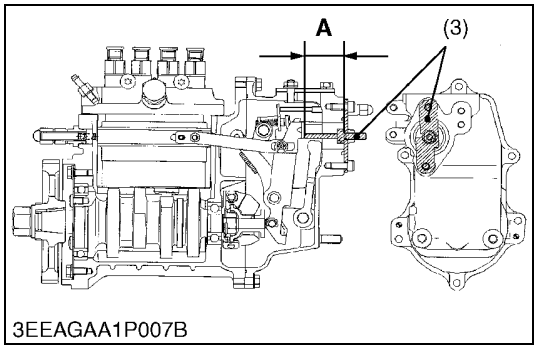
Thermostat's valve opening temperature	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	80 to 84 °C 176 to 183 °F
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	74.5 to 78.5 °C 166.1 to 173.3 °F

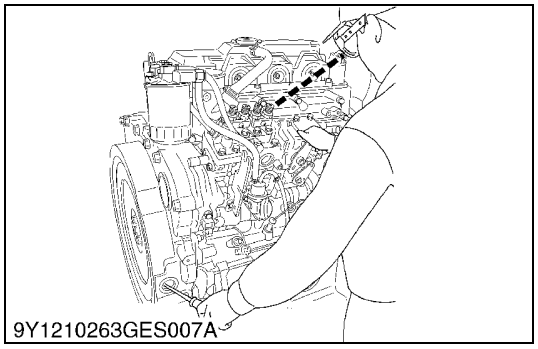
Temperature at which thermostat completely opens	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	95 °C 203 °F
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	90 °C 194 °F

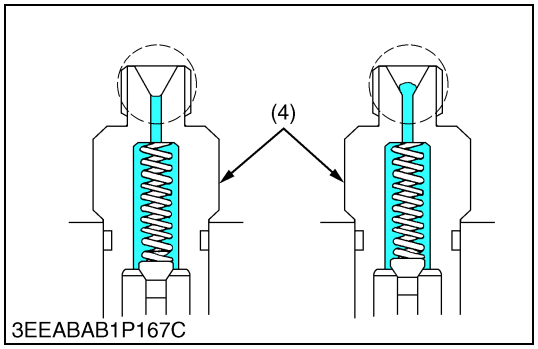
W1071639

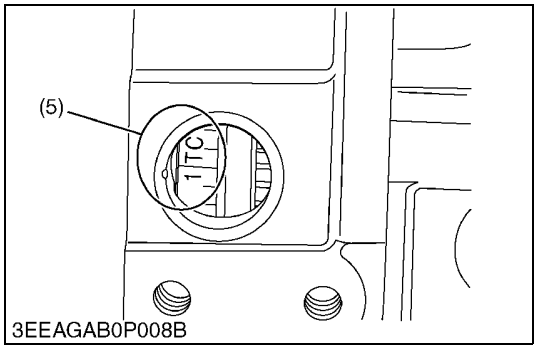
(4) Fuel System











Injection Timing (for V2607-DI-E3B)

1. Make sure of matching the injection timing align mark (1) of the injection pump unit and the flywheel housing, as shown in the illustration.
2. Remove the injection pipes.
3. Remove the stop solenoid.
4. Set the fuel control rack fixing tool (3) to fix injection pump control rack as shown in the illustration. (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.)
5. Turn the flywheel counterclockwise (viewed from flywheel side) until the fuel fills up to the hole of the delivery valve holder (4) for No.1 cylinder.
6. After the fuel fills up to the hole of the delivery valve holder (4) for No.1 cylinder, turn back (clockwise) the flywheel around 1.6 rad (90 °).
7. Turn the flywheel counterclockwise to set at around 0.17 rad (10 °) before T.D.C..
8. Slowly turn the flywheel counterclockwise and stop turning when the fuel begins to come up, to get the present injection timing.
9. Check to see the degree on flywheel.
   The flywheel has mark “1TC” (5) for the crank angle before the top dead center of No.1 piston.
10. If the injection timing is not within the specification, rotate the injection pump unit to adjust the injection timing.

■ **IMPORTANT**

- **When installing the injection pump unit to the engine body, follow the correct procedure.**
  See the “Injection Pump Unit”.

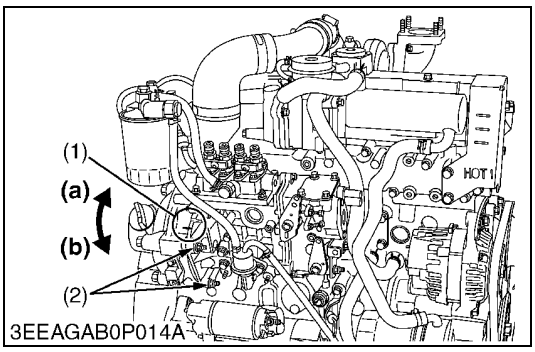
Injection Timing	Factory spec.	0.027 to 0.052 rad before T.D.C. (1.5 to 3.0 ° before T.D.C.)

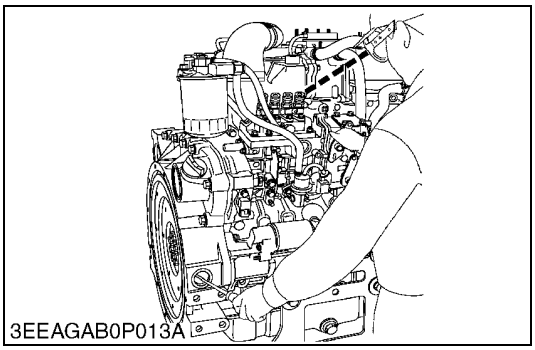
Tightening torque	Injection pipe retaining nut	23 to 36 N·m 2.3 to 3.7 kgf·m 17 to 26 lbf·ft
	Injection pump unit mounting nut	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

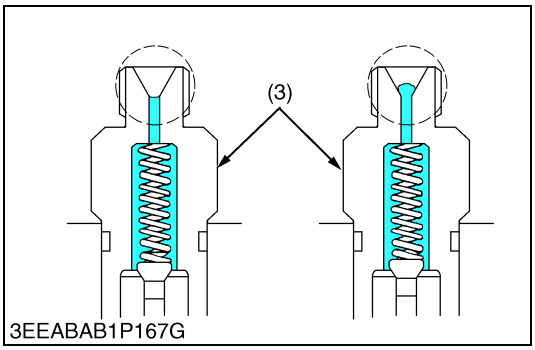
(1) Injection Timing Align Mark
(2) Injection Pump Unit Mounting Nut
(3) Fuel Control Rack Fixing Tool
(4) Delivery Valve Holder
(5) Mark “1TC”

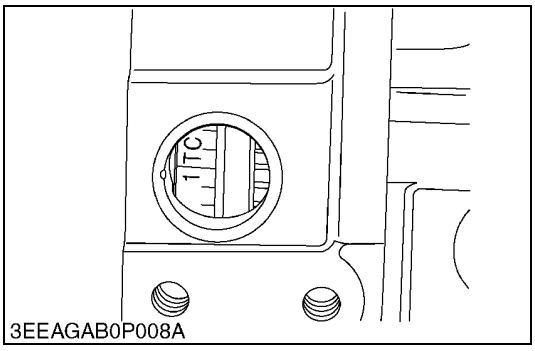
(a) Injection Timing Advanced
(b) Injection Timing Retarded
A : 34.9 to 35.1 mm (1.374 to 1.381 in.)

W1055758









Injection Timing (for V2607-DI-T-E3B / V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Make sure of matching the injection timing align mark (1) of the injection pump unit and the flywheel housing, as shown in the illustration.
2. Remove the injection pipes.
3. Remove the stop solenoid.
4. Turn the flywheel counterclockwise (viewed from flywheel side) until the fuel fills up to the hole of the delivery valve holder (3) for No.1 cylinder.
5. After the fuel fills up to the hole of the delivery valve holder (3) for No.1 cylinder, turn back (clockwise) the flywheel around 1.6 rad (90 °).
6. Turn the flywheel counterclockwise to set at around 0.17 rad (10 °) before T.D.C..
7. Slowly turn the flywheel counterclockwise and stop turning when the fuel begins to come up, to get the present injection timing.
8. Check to see the degree on flywheel.
   The flywheel has mark “1TC” for the crank angle before the top dead center of No.1 piston.
9. If the injection timing is not within the specification, rotate the injection pump unit to adjust the injection timing.

■ **IMPORTANT**

- **When installing the injection pump unit to the engine body, follow the correct procedure.**
  See the “Injection Pump Unit”.

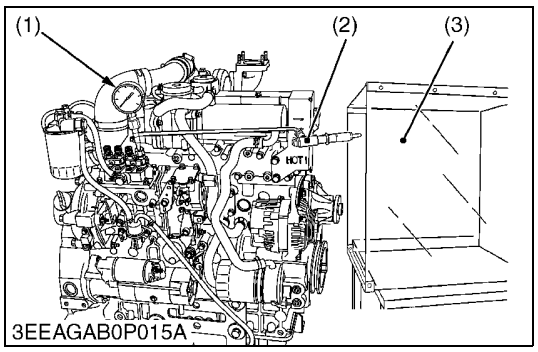
(Injection timing)

Model	Factory spec.
V2607-DI-T-E3B (Serial No. : 8G0001 to 8V9999)	0.0087 rad before T.D.C. to 0.017 rad after T.D.C. (0.50 ° before T.D.C. to 1.0 ° after T.D.C.)
V2607-DI-T-E3B (Serial No. : 8W0001 and above)	0.017 rad before T.D.C. to 0.0087 rad after T.D.C. (1.0 ° before T.D.C. to 0.50 ° after T.D.C.)
V3007-DI-T-E3B	0.00261 rad before T.D.C. to 0.0235 rad after T.D.C. (0.150 ° before T.D.C. to 1.35 ° after T.D.C.)
V3307-DI-T-E3B	0.00960 to 0.0357 rad after T.D.C. (0.550 to 2.05 ° after T.D.C.)

Tightening torque	Injection pipe retaining nut	23 to 36 N·m 2.3 to 3.7 kgf·m 17 to 26 lbf·ft
	Injection pump unit mounting nut	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

(1) Injection Timing Align Mark
(2) Injection Pump Unit Mounting Nut
(3) Delivery Valve Holder
(a) Injection Timing Advanced
(b) Injection Timing Retarded

W1089274



Fuel Tightness of Pump Element

1. Remove the engine stop solenoid.
2. Remove the injection pipes.
3. Install the injection pump pressure tester (1) to the injection pump.
4. Install the injection nozzle (2) jetted with the proper injection pressure to the injection pump pressure tester (1). (Refer to the figure.)
5. Set the speed control lever to the maximum speed position.
6. Operate the starter to increase the pressure.
7. If the pressure can not reach the allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

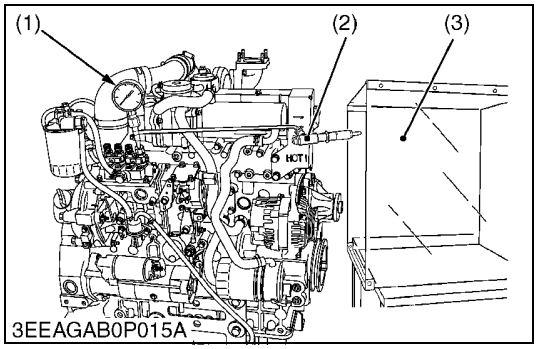
Fuel tightness of pump element	Allowable limit	18.63 MPa 190.0 kgf/cm^2 2702 psi

■ **NOTE**

- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**

(1) Injection Pump Pressure Tester (3) Protection Cover for Jetted Fuel
(2) Injection Nozzle

W1017430



Fuel Tightness of Delivery Valve

1. Remove the engine stop solenoid.
2. Remove the injection pipes.
3. Install a pressure tester to the fuel injection pump.
4. Install the injection nozzle (2) jetted with the proper injection pressure to the injection pump pressure tester (1).
5. Operate the starter to increase the pressure.
6. Stop the starter when the fuel jets from the injection nozzle (2). After that, turn the flywheel by the hand and raise the pressure to approx. 18.63 MPa (190.0 kgf/cm^2, 2702 psi).
7. Now turn the flywheel back about half a turn (to keep the plunger free). Maintain the flywheel at this position and clock the time taken for the pressure to drop from 18.63 to 17.66 MPa (from 190.0 to 180.0 kgf/cm^2, from 2702 to 2561 psi).
8. Measure the time needed to decrease the pressure from 18.63 to 17.66 MPa (from 190.0 to 180.0 kgf/cm^2, from 2702 to 2561 psi).
9. If the measurement is less than allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

Fuel tightness of delivery valve	Factory spec.	10 seconds 18.63 → 17.66 MPa 190.0 → 180.0 kgf/cm^2 2702 → 2561 psi
	Allowable limit	5 seconds 18.63 → 17.66 MPa 190.0 → 180.0 kgf/cm^2 2702 → 2561 psi

■ **NOTE**

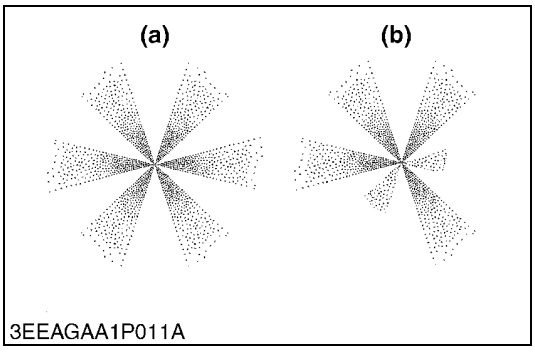
- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**

(1) Injection Pump Pressure Tester (3) Protection Cover for Jetted Fuel
(2) Injection Nozzle

W1017786

CAUTION

- **Check the nozzle injection pressure and condition after confirming that there is nobody standing in the direction the spray goes.**
- **If the spray from the nozzle directly contacts the human body, cells may be destroyed and blood poisoning may be caused.**



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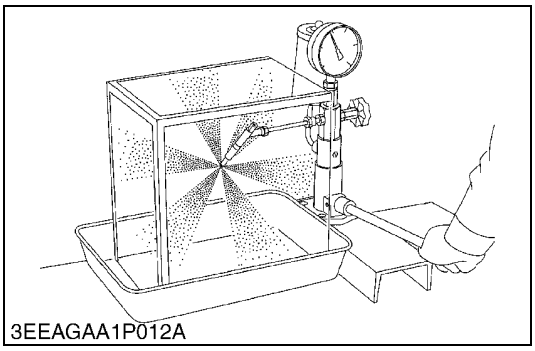
Nozzle Spraying Condition

1. Attach the injection nozzle to the nozzle tester, and check the nozzle spraying condition.
2. If the spraying condition is defective, replace the injection nozzle assembly or repair at Kubota-authorized nozzle service shop.

(a) Good **(b) Bad**

W10371670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Checking Nozzle Injection Pressure

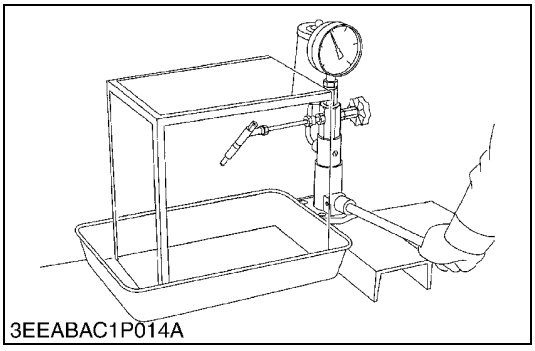
1. Attach the injection nozzle to the nozzle tester.
2. Slowly move the tester handle to measure the pressure at which fuel begins jetting out from the nozzle.
3. If the measurement is not within the factory specifications, replace the injection nozzle assembly or repair at Kubota-authorized nozzle service shop.

■ **NOTE**

- **Injection nozzle gasket must be replaced when the injection nozzle is removed for checking.**

Injection pressure (1st stage)	Factory spec.	V2607-DI-E3B V2607-DI-T-E3B	18.64 to 20.10 MPa 190.0 to 205.0 kgf/cm^2 2703 to 2915 psi
		V3007-DI-T-E3B V3307-DI-T-E3B	18.64 to 19.61 MPa 190.0 to 200.0 kgf/cm^2 2703 to 2844 psi

W1037280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Valve Seat Tightness

1. Attach the injection nozzle to the nozzle tester.
2. Raise the fuel pressure, and keep at 16.67 MPa (170.0 kgf/cm^2, 2418 psi) for 10 seconds.
3. If any fuel leak is found, replace the injection nozzle assembly or repair at Kubota-authorized nozzle service shop.

Valve seat tightness	Factory spec.	No fuel leak at 16.67 MPa 170.0 kgf/cm^2 2418 psi

W10374150

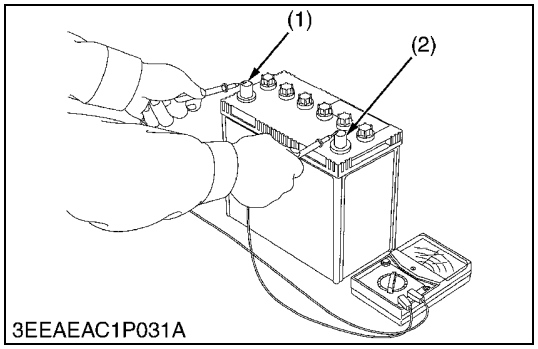
(5) Electrical System

CAUTION

- **To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.**
- **Never remove the battery cap while the engine is operating.**
- **Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately.**
- **Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.**

■ IMPORTANT

- **If the machine is to be operated for a short time without battery (using a slave battery for starting), use additional current (lights) while engine is operating and insulate terminal of battery. If this advice is disregarded, damage to alternator and regulator may result.**



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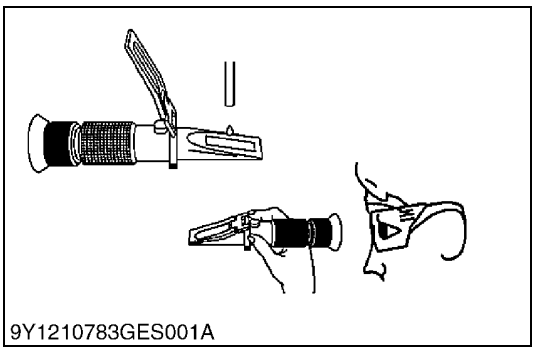
Battery Voltage

1. Stop the engine.
2. Measure the voltage with a circuit tester between the battery terminals.
3. If the battery voltage is less than the factory specification, check the battery specific gravity and recharge the battery.

Battery voltage	Factory spec.	More than 12 V

(1) Positive Terminal (2) Negative Terminal

W10125620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Battery Specific Gravity

- If battery acid (dilute sulfuric acid) gets on you it could cause blindness or burns, or could cause corrosion of machinery and tools so please be careful when handling.
- Wear safety glasses and rubber gloves when performing battery maintenance and inspection (measuring specific gravity, replenishing water, or charging).
- If the gas that is generated is ignited by an ignition source, it may explode so be very careful with sparks and fire.
- Keep your body and face as far away from the battery as you can when performing maintenance and inspection.
- Do not allow people who do not know how to handle a battery or who do not sufficiently understand the danger perform inspection or maintenance.

(Measurement items)

■ Zero adjustment

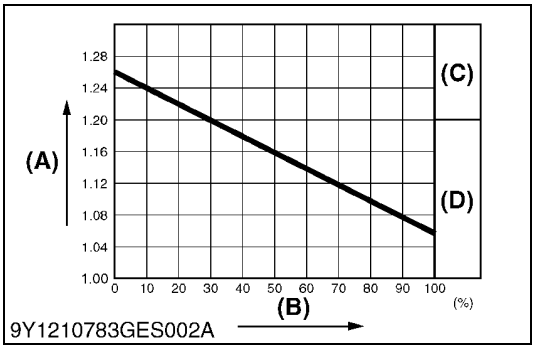
1. Open the cover and drip water on the prism surface using the included rod.
2. Close the cover.
3. Aim in a direction that is bright, look into the lens, and adjust the focus until the gradations can be seen clearly.
4. If the boundary line is not on the gradation baseline (0 position), turn the adjustment screw until it matches.
5. When zero adjustment is complete, wipe the prism and cover surface with a soft cloth or tissue paper.

■ Measurement of test fluid

1. Open the cover and drip test fluid on the prism surface using the included rod.
2. Close the cover.
3. Aim in a direction that is bright, look into the lens and read the gradation of the blue boundary line.
4. When the measurement is complete, wipe the prism and cover surface with a soft cloth or tissue paper.

(Reference)

Electrolyte specific gravity and amount of discharge.
Use the following table as a reference.



9Y1210783GES002A

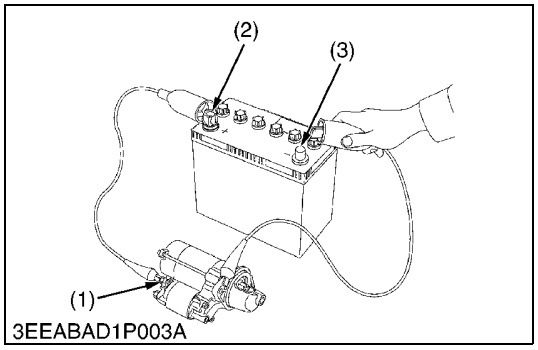
(A) Electrolyte Specific Gravity **(C) Good**
(B) Discharge **(D) Charging is necessary.**

■ NOTE

Temperature conversion of electrolyte specific gravity

- **Battery electrolyte specific gravity changes based on temperature.**
- **Insert the value identified on a specific gravity meter into the following conversion equation for temperature correction to learn an accurate specific gravity value.**
  (Standard temperature assumed to be 20 °C (68 °F))
  D_{20} = Dt + 0.0007 (t - 20)
  D_{20} = specific gravity value converted to standard temperature of 20 °C (68 °F)
  D_t = measured specific gravity value at the electrolyte temperature t °C

W1457168



Motor Test

CAUTION

- **Secure the starter to prevent it from jumping up and down while testing the motor.**

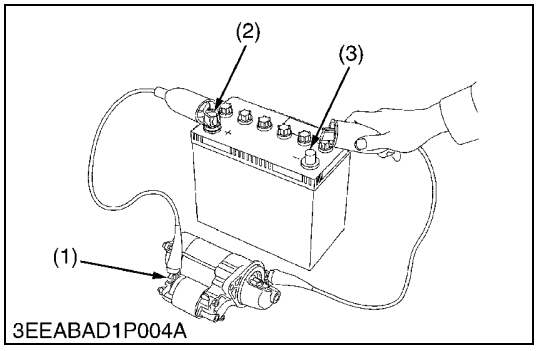
1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable from the battery.
3. Disconnect the leads from the starter **B** terminal.
4. Remove the starter from the engine.
5. Connect a jumper lead from the starter **C** terminal (1) to the battery positive terminal (2).
6. Connect a jumper lead momentarily between the starter's body and the battery negative terminal (3).
7. If the motor does not operate, starter is failure.
   Repair or replace the starter.

■ **NOTE**

- **B terminal : It is the terminal which connects the cable from the battery to the starter.**
- **C terminal : It is the terminal which connects the cable from the motor to the magnet switch.**

(1) **C** Terminal
(2) Positive Terminal
(3) Negative Terminal

W1019297



Magnetic Switch Test

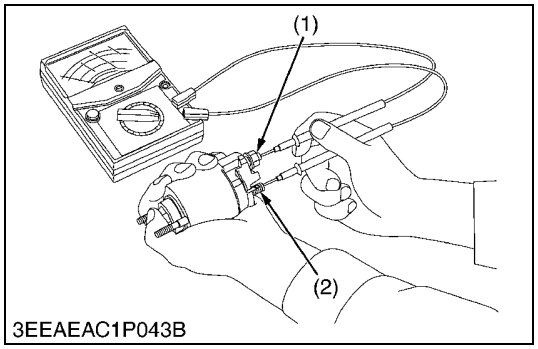
1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable from the battery.
3. Disconnect the leads from the starter **B** terminal.
4. Remove the starter from the engine.
5. Connect a jumper lead from the starter **S** terminal (1) to the battery positive terminal (2).
6. Connect a jumper lead momentarily between the starter's body and the battery negative terminal (3).
7. If the pinion gear does not pop out, the magnetic switch is failure.
   Repair or replace the starter.

■ **NOTE**

- **B terminal : It is the terminal which connects the cable from the battery to the starter.**
- **S terminal : It is the terminal which connects the cable from the starter switch to the magnet switch.**

(1) **S** Terminal
(2) Positive Terminal
(3) Negative Terminal

0000010743E

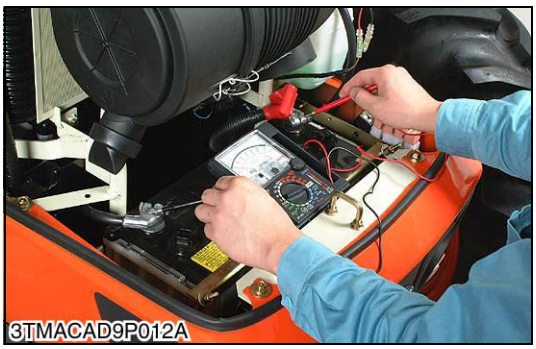


Magnet Switch Continuity Test

1. Check the continuity across the **C** terminal (1) and the **B** terminal (2) with a circuit tester, pushing in the plunger.
2. If not continuous or if a certain value is indicated, replace the magnet switch.

(1) **C** Terminal
(2) **B** Terminal

0000010771E



Alternator on Unit Test

(Before testing)

- Before alternator on unit test, check the battery terminal connections, circuit connection, fan belt tension, charging indicator lamp, fuses on the circuit, and abnormal noise from the alternator.
- Prepare full charged battery for the test.

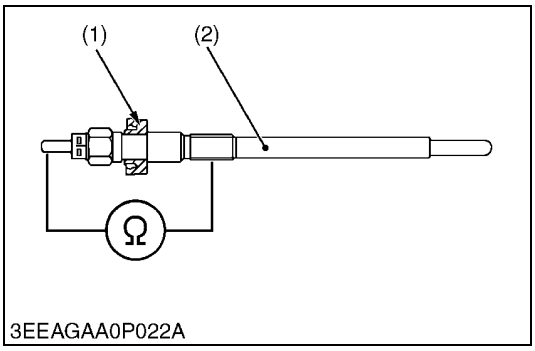
■ **NOTE**

- **Be careful not to touch the rotating engine parts while engine is operating.**
  Keep safety distance from the engine rotating parts.

1. Start the engine.
2. When the engine is operating measure the voltage between two battery terminals. If the voltage is between 13.8 V and 14.8 V, the alternator is operating normally.
3. If the results of alternator on unit test are not within the specifications, disassemble the alternator and check the each component part for finding out the failure. See the “DISASSEMBLING AND ASSEMBLING” and “SERVICING” for alternator.

Regulating voltage at no load	Factory spec.	13.8 to 14.8 V at 25 °C (77 °F)

0000010745E



Glow Plug Continuity

1. Remove the glow plug (2).
2. Measure the resistance with a circuit tester between the glow plug terminal and the glow plug housing.
3. If the factory specification is not indicated, glow plug (2) is damaged.

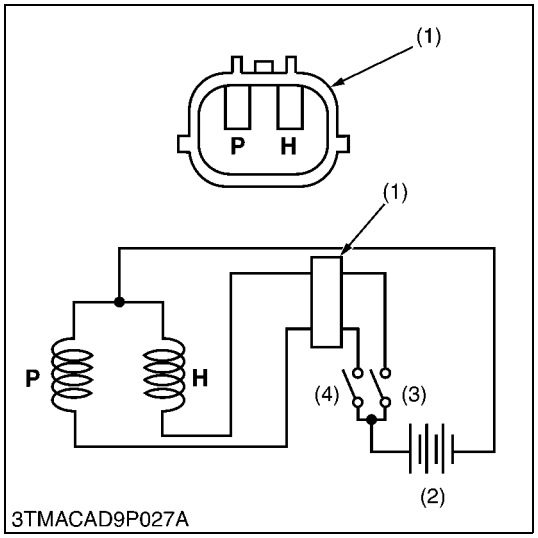
■ **NOTE**

- **Adjust the direction of the ditch to the terminal side when the seal (1) is installed in the glow plug (2).**

Resistance	Factory spec.	Approx. 0.95 Ω

(1) Seal (2) Glow Plug

W1036945



3TMACAD9P027A

Engine Stop Solenoid

1. Remove the engine stop solenoid from the engine.
2. Connect the jumper leads from the pulling coil **P** terminal to the switch (3), and from switch (3) to the battery positive terminal.
3. Connect the jumper leads from the holding coil **H** terminal to the switch (4), and from switch (4) to the battery positive terminal.
4. Connect the jumper leads from the engine stop solenoid body to the battery negative terminal.
5. When switch (4) is turn on, the plunger pull into the solenoid body and then turn off the switch (4), the plunger comes out.
6. Turn on the switch (3) then turn on the switch (4), the plunger pull into the solenoid body and it keep in holding position after turn off the switch (4).
7. If the plunger is not attracted, the engine stop solenoid is damaged.

■ **IMPORTANT**

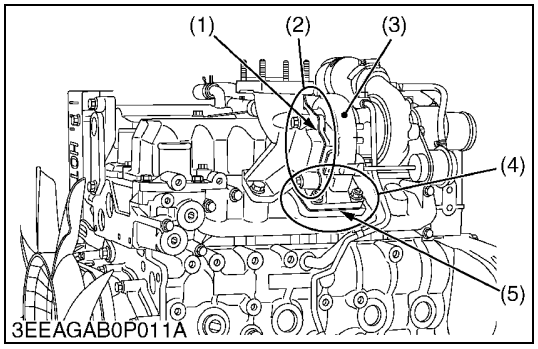
- **Never apply the current for pulling coil more than two seconds when inspecting.**

(1) Connector
(2) Battery
(3) Switch for Holding Coil
(4) Switch for Pulling Coil

P : Terminal for Pulling Coil
H : Terminal for Holding Coil

W1020600

(6) Turbocharger



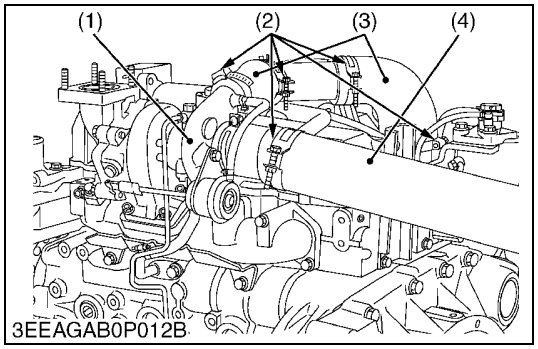
3EEAGAB0P011A

Turbine Side

1. Check the exhaust port (2) and inlet port (4) side of turbine housing (3) to see if there is no exhaust gas leak.
2. If any gas leak is found, retighten the bolts and nuts or replace the gasket (1) / (5) with new one.

(1) Gasket
(2) Exhaust Port
(3) Turbine Housing
(4) Inlet Port
(5) Gasket

W1076917



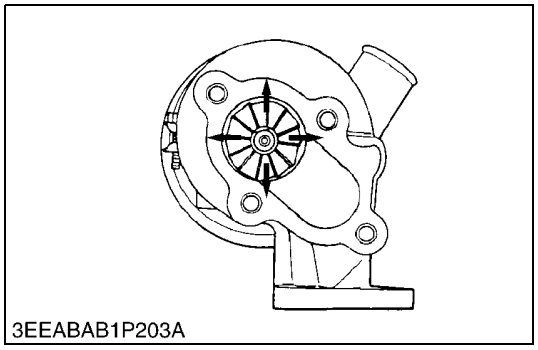
3EEAGAB0P012B

Compressor Side

1. Check the inlet hose (4) of the compressor cover (1) to see if there is no air leak.
2. Check for loose connections or cracks in the suction side of the intake hose (3).
3. If any air leak is found, change the clamp band (2) and / or intake hoses (3).

(1) Compressor Cover
(2) Clamp Band
(3) Intake Hose
(4) Inlet Hose

W1077032

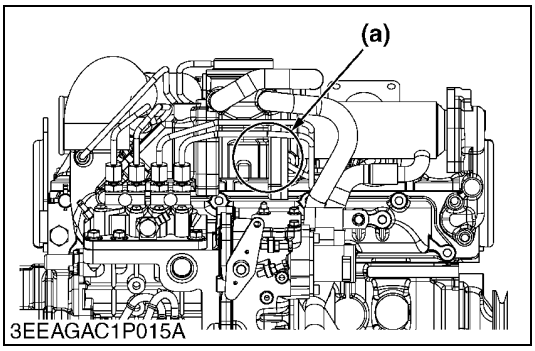

3EEABAB1P203A

Radial Clearance

1. If the wheel contact to the housing, replace the turbocharger assembly with new one.

W1077353

(7) EGR System



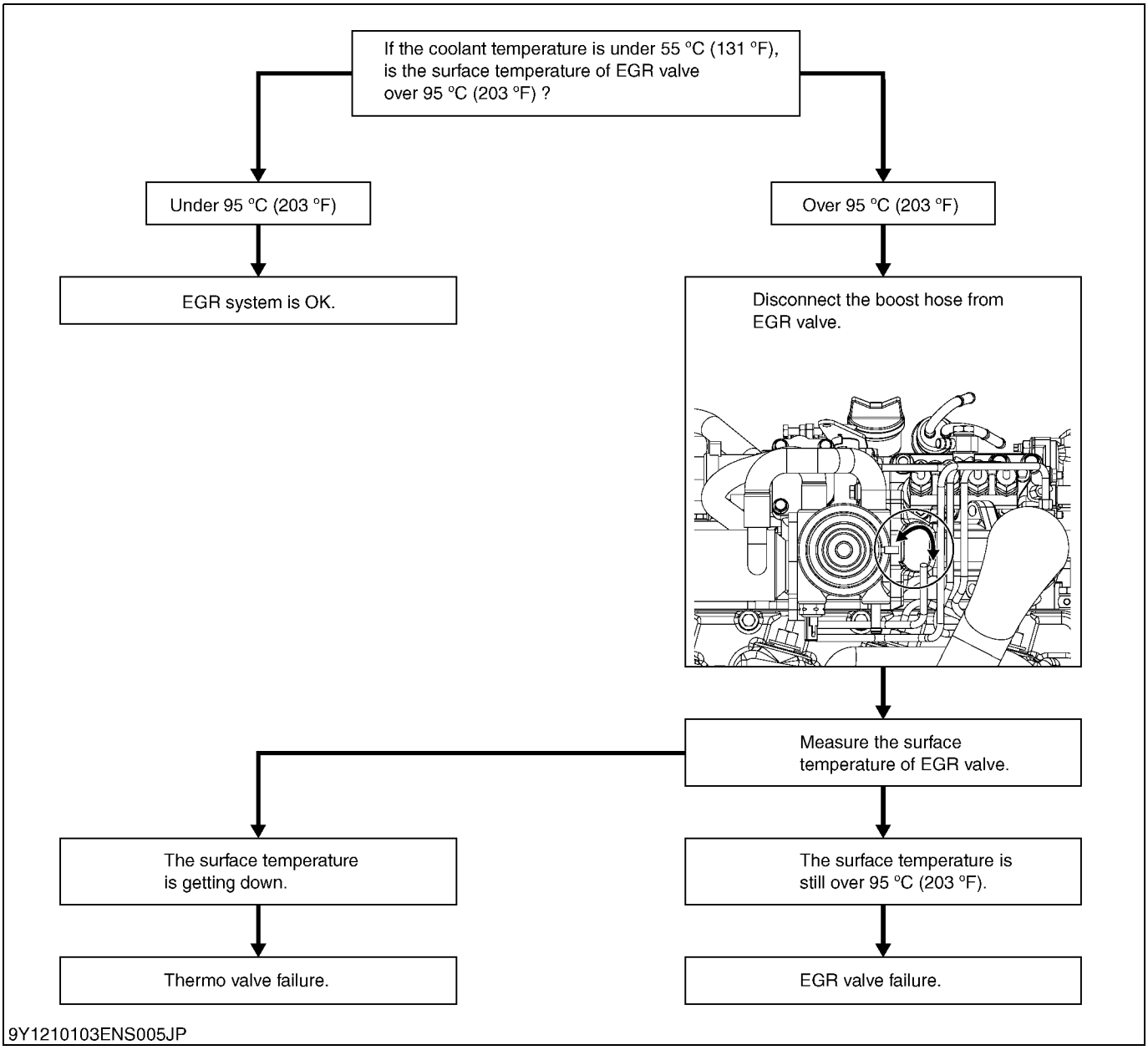
Checking Function of EGR System (for V2607-DI-T-E3B)

1. Check the coolant temperature and monitor the coolant temperature while checking 1) and 2).
2. If the coolant temperature is already 55 °C (131 °F), cool down the engine.
3. Start the engine and go to check 1) immediately.
4. After completing checking 1), arrange the coolant temperature is getting over 70 °C (158 °F).
5. If the coolant temperature is over 70 °C (158 °F), go to check 2).

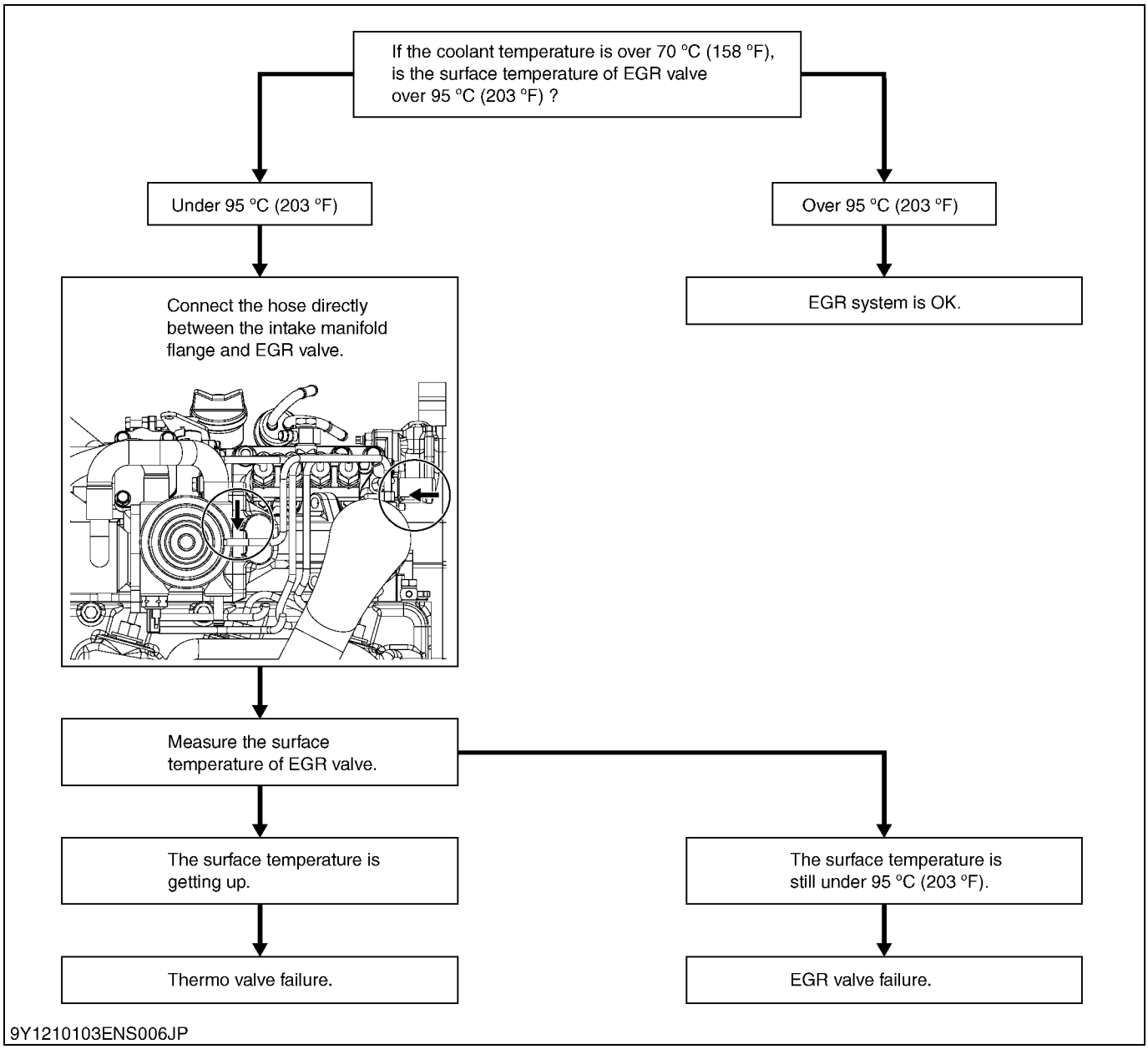
(a) Measuring Place of EGR Valve Surface Temperature

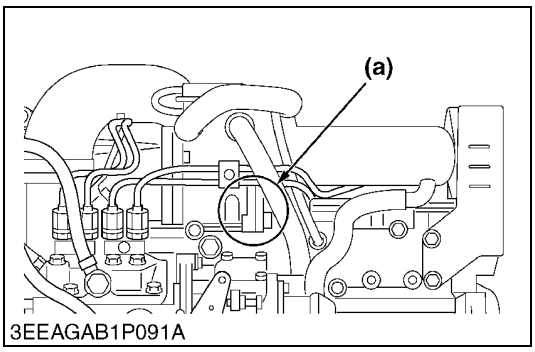
W1199201

1) If the coolant temperature is under 55 °C (131 °F), the surface temperature of EGR valve must be under 95 °C (203 °F).



2) If the coolant temperature is over 70 °C (158 °F), the surface temperature of EGR valve must be over 95 °C (203 °F).





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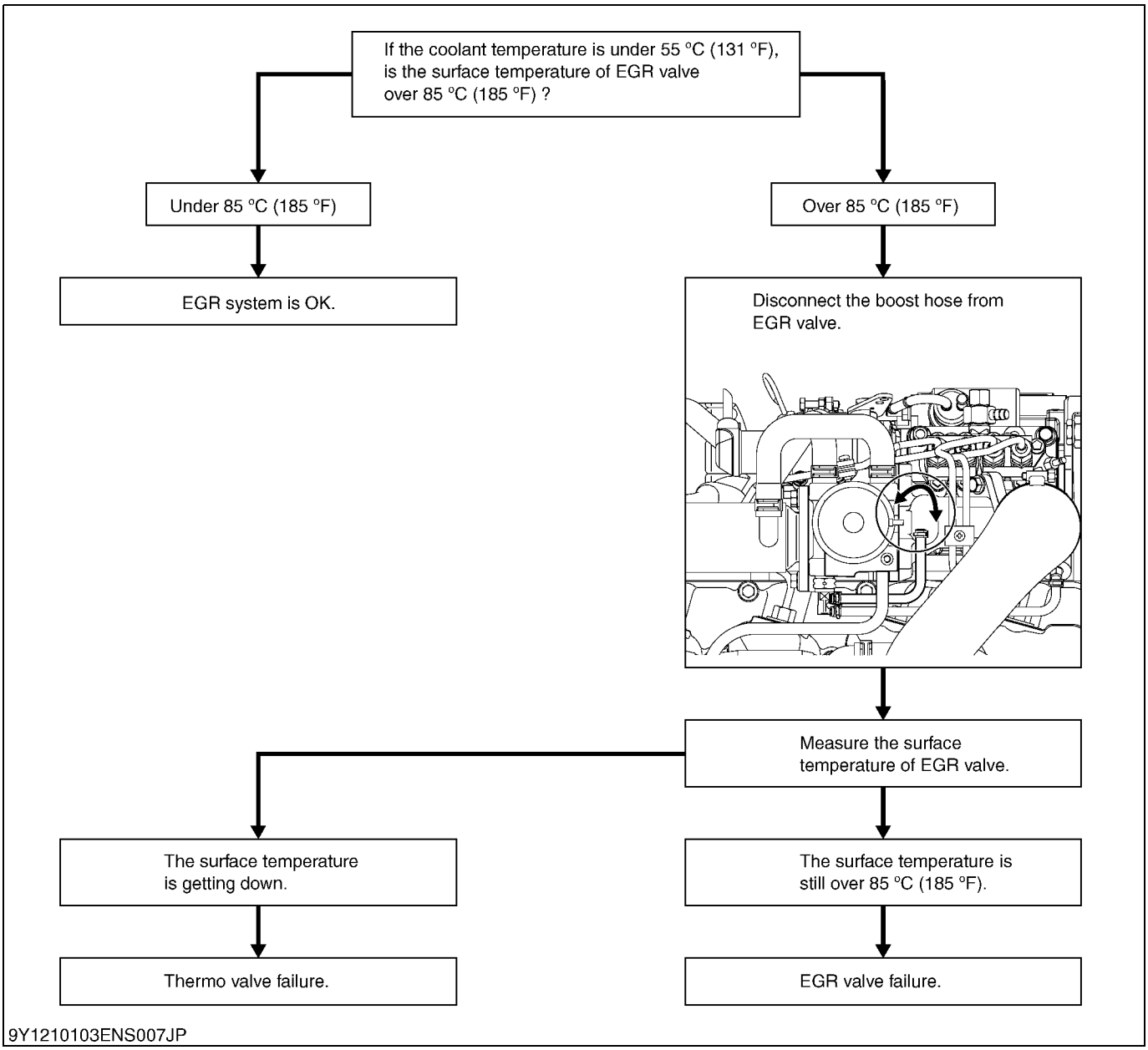
Checking Function of EGR System (for V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Check the coolant temperature and monitor the coolant temperature while checking 1) and 2).
2. If the coolant temperature is already 55 °C (131 °F), cool down the engine.
3. Start the engine and go to check 1) immediately.
4. After completing checking 1), arrange the coolant temperature is getting over 70 °C (158 °F).
5. If the coolant temperature is over 70 °C (158 °F), go to check 2).

(a) Measuring Place of EGR Valve Surface Temperature

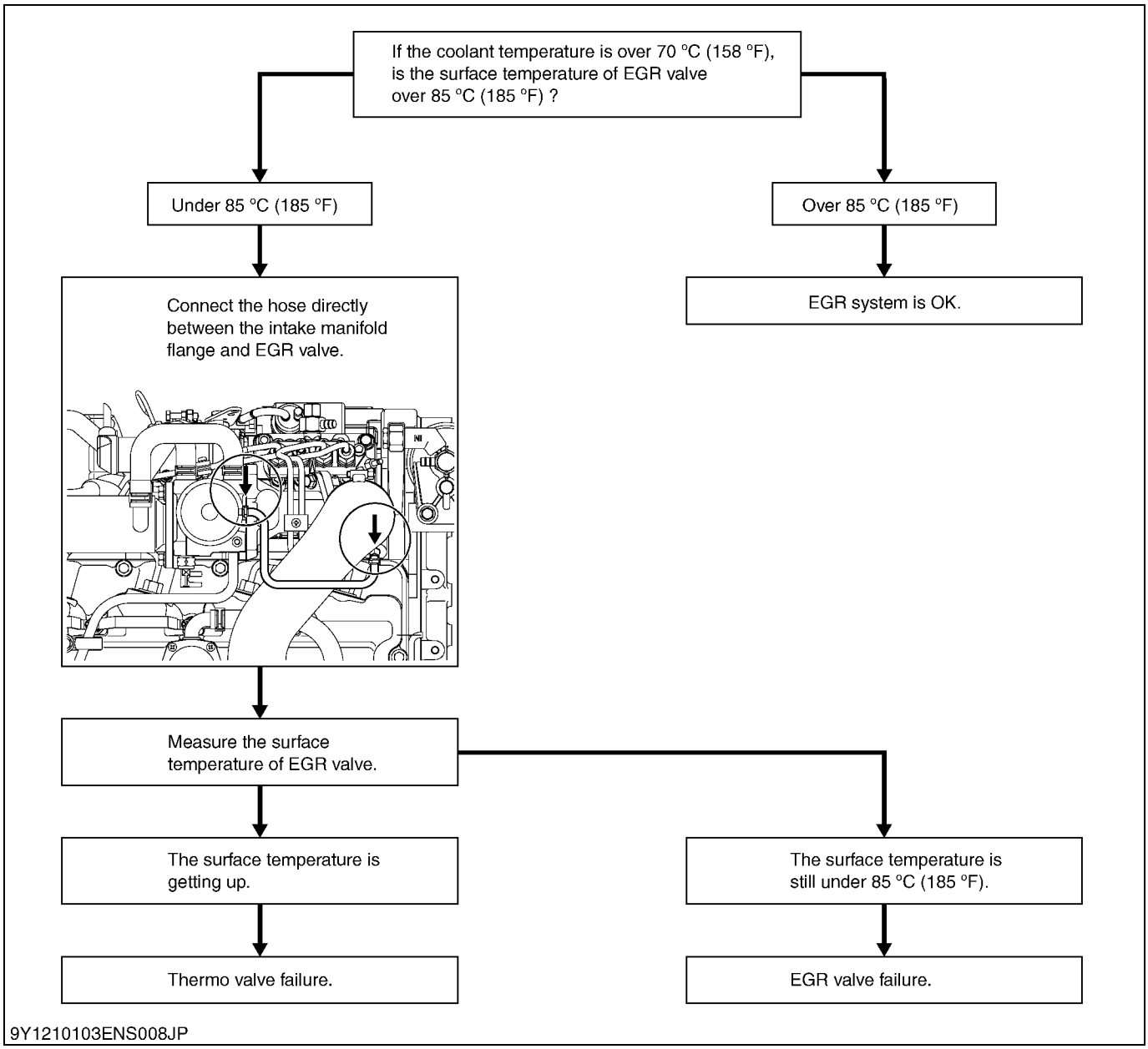
W1177055

1) If the coolant temperature is under 55 °C (131 °F), the surface temperature of EGR valve must be under 85 °C (185 °F).



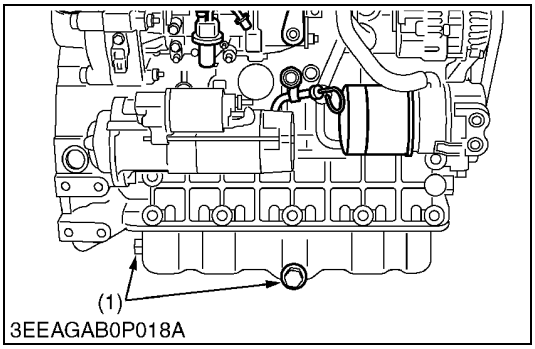
9Y1210103ENS007JP

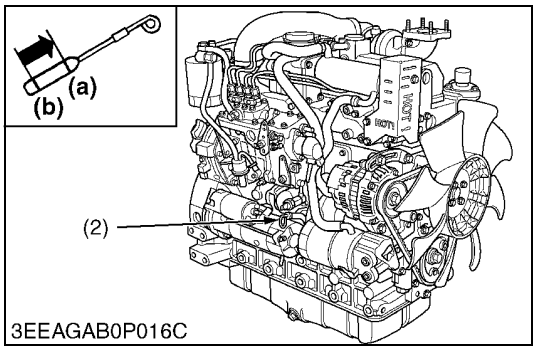
2) If the coolant temperature is over 70 °C (158 °F), the surface temperature of EGR valve must be over 85 °C (185 °F).

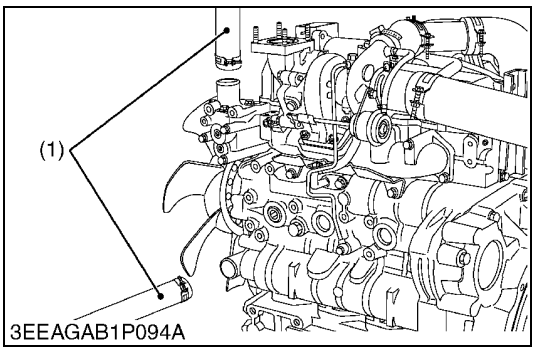


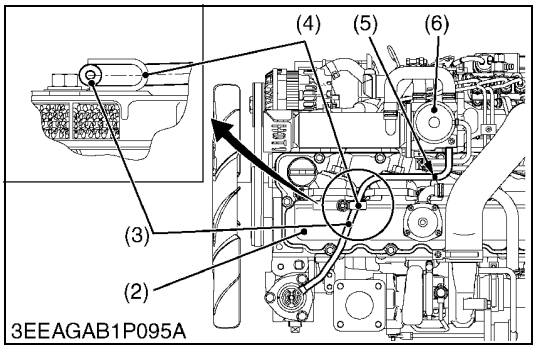
[2] DISASSEMBLING AND ASSEMBLING

(1) Draining Oil and Coolant









Draining Engine Oil

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. Remove the drain plug (1) to drain oil.
4. After draining, screw in the drain plug (1).

(When refilling)

- Fill the engine oil up to the upper line on the dipstick (2).

■ **IMPORTANT**

- **Never mix two different types of oil.**
- **Use the proper SAE Engine Oil according to ambient temperature.**

Tightening torque	Drain plug	45 to 53 N·m 4.5 to 5.5 kgf·m 33 to 39 lbf·ft

(1) Drain Plug
(2) Dipstick
(a) Upper Line
(b) Lower Line

W1023464

Draining Coolant

CAUTION

- **Never remove radiator cap while operating or immediately after stopping. Otherwise, hot water will spout out from the radiator. Wait for more than ten minutes to cool the radiator, before opening the cap.**

1. Open the radiator drain plug and remove the radiator cap.
2. Remove the radiator hose (1) from engine body.

[If air vent hose equipped]

3. Remove the air vent hose (3).

(When refilling)

- Adjust the mark (5) of the air vent hose (3) to upward side near the EGR valve (6).
- Fix the air vent hose (3) to the cylinder head cover (2) by using clamp belt (4).

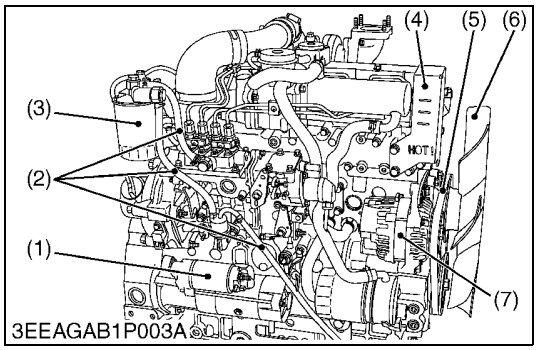
■ **NOTE**

- **Clamp the air vent hose (3) so as not to crush.**
- **Securely tighten clamp belts (4). If the clamp belt (4) is loose or improperly fitted, coolant may leak out and the engine could overheat.**

(1) Radiator Hose
(2) Cylinder Head Cover
(3) Air Vent Hose
(4) Clamp Belt
(5) Mark
(6) EGR Valve

W1023496

(2) External Components



Air Cleaner, Muffler and Others

1. Remove the air cleaner and muffler.
2. Remove the fan (6), fan belt (5), cover (4), fuel filter cartridge (3), fuel tubes (2), alternator (7) and starter (1).

(When reassembling)

- Check to see that there are no cracks on the belt surface.
- Mount the check valve with the ↓ mark toward the tank.

■ **IMPORTANT**

- **After reassembling the fan belt (5), be sure to adjust the fan belt tension.**
- **Do not confuse the direction of the fan (6). Attach the fan (6) with its marking facing frontward (toward the radiator).**

(1) Starter
(2) Fuel Tube
(3) Fuel Filter Cartridge
(4) Cover
(5) Fan Belt
(6) Fan
(7) Alternator

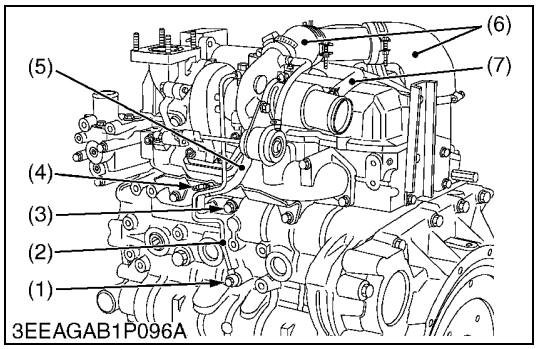
W1049622

CAUTION

- **While the engine is operating and or just after it stops, the turbocharger is hot, be careful not to touch the turbocharger.**

■ **NOTE**

- **When detaching and attaching the turbocharger assembly, be very careful not to allow dust, dirt and other foreign matter in the oil pipes.**
- **When the turbocharger assembly has been replace, pour fresh engine oil through the oil filler port of the turbocharger.**
- **Before starting the engine, make sure that air cleaner is in position.**



Oil Pipe and Intake Hose

1. Remove the joint bolt (1), bolt (3) and clamp band (4).
2. Disconnect the oil pipe 1 (2) and oil pipe 2 (5).
3. Remove the intake hose (6) and breather hose (7).

(When reassembling)

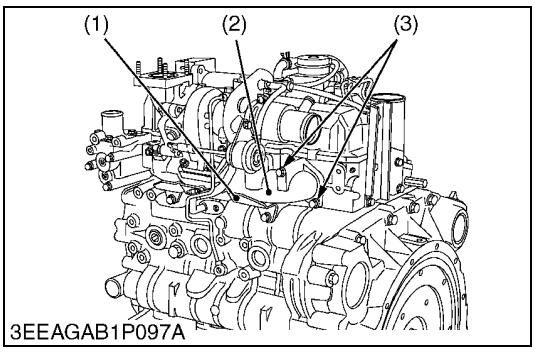
- Pour fresh engine oil through the oil filler port of the turbocharger.
- Replace the gasket with new one.
- Be careful not to allow dust, dirt and other foreign matters in the oil pipes (2) / (5).

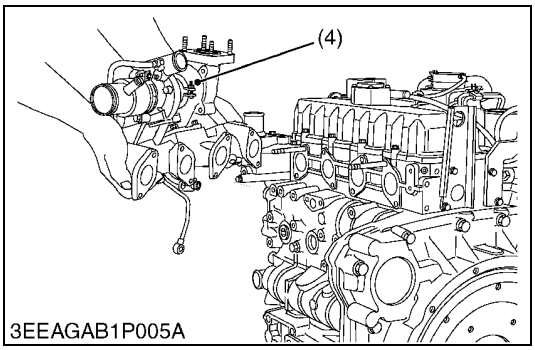
■ **NOTE**

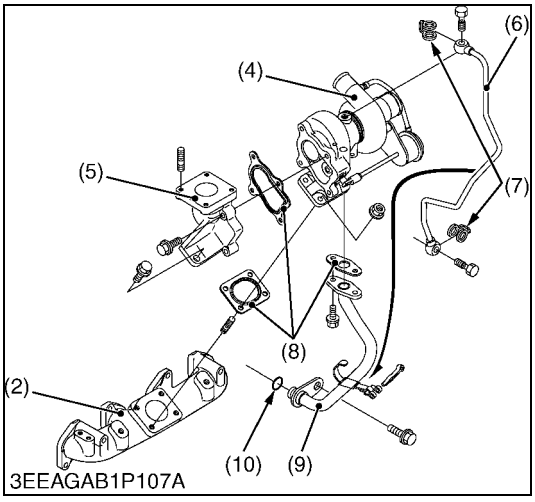
- **Tape or plug all openings to prevent foreign matters from damaging the oil cavities in the turbocharger.**

(1) Joint Bolt
(2) Oil Pipe 1
(3) Bolt
(4) Clamp Band
(5) Oil Pipe 2
(6) Intake Hose
(7) Breather Hose

W1025983







Turbocharger Assembly and Exhaust Manifold

1. Remove the cover (1) and exhaust manifold mounting screws (3).
2. Take off the turbocharger assembly (4) with exhaust manifold (2).
3. Remove the oil pipe 1 (6) and oil pipe 2 (9). (If necessary)
4. Remove the exhaust port (5) and exhaust manifold (2). (If necessary)

(When reassembling)

- Replace the gasket (8) with new one.

■ **NOTE**

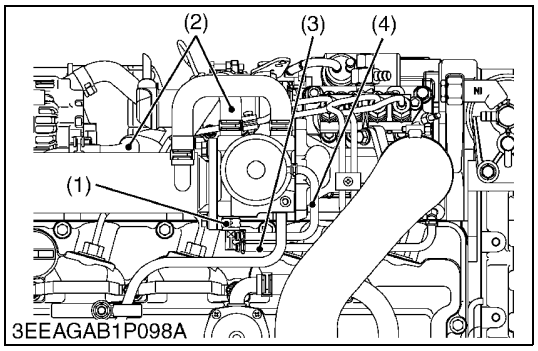
- **Be careful not to damage the O-ring (10).**

Tightening torque	Oil pipe 1 mounting screw	16 to 19 N·m 1.6 to 2.0 kgf·m 12 to 14 lbf·ft

(1) Cover
(2) Exhaust Manifold
(3) Exhaust Manifold Mounting Screw
(4) Turbocharger Assembly
(5) Exhaust Port
(6) Oil Pipe 1
(7) Oil Pipe Gasket
(8) Gasket
(9) Oil Pipe 2
(10) O-ring

W1078106

(3) Exhaust Gas Recirculation (EGR)



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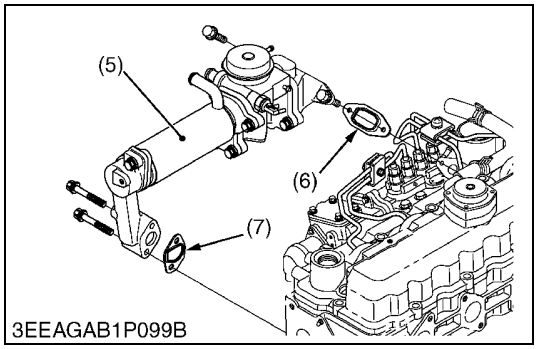

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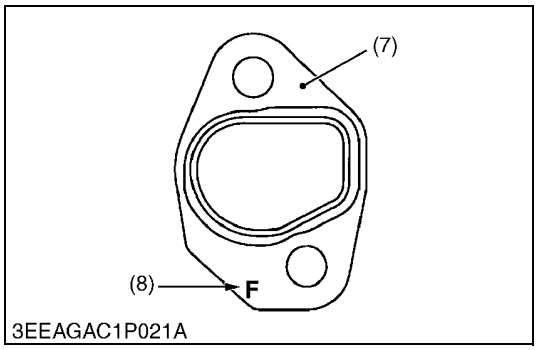

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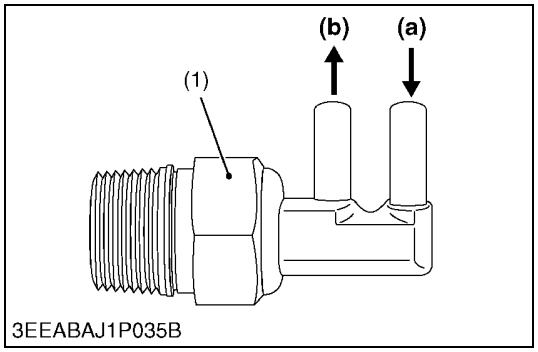

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EGR System Assembly

1. Disconnect the EGR valve coolat hoses (2) and the boost pressure hose 1 (3).
2. Disconnect the boost pressure hose 2 (4). (If necessary)
3. Remove the EGR system assembly (5).
4. Remove the thermo valve (1). (If necessary)

■ **NOTE**

- **If you drop the thermo valve (1), replace the thermo valve (1) with new one.**

(When reassembling)

- Securely connect the hoses.
- Replace the gasket 1(6) and 2 (7) with new one.

[V2607-DI-T-E3B]

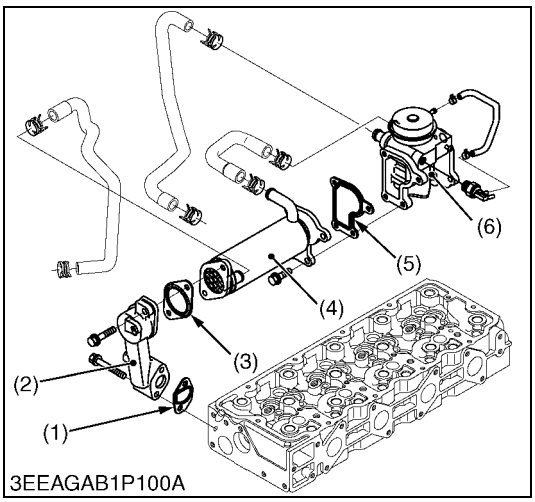
- When replacing the gasket 2 (7), set the mark **"F"** (8) downward.

Tightening torque	Thermo valve	30 to 39 N·m 3.0 to 4.0 kgf·m 22 to 28 lbf·ft

(1) Thermo Valve
(2) EGR Valve Coolat Hose
(3) Boost Pressure Hose 1
(4) Boost Pressure Hose 2
(5) EGR System Assembly
(6) Gasket 1
(7) Gasket 2
(8) Mark **"F"**

(a) Boost Pressure from Intake Manifold
(b) Boost Pressure to EGR Valve

W1103494



EGR Cooler and Flange (If necessary)

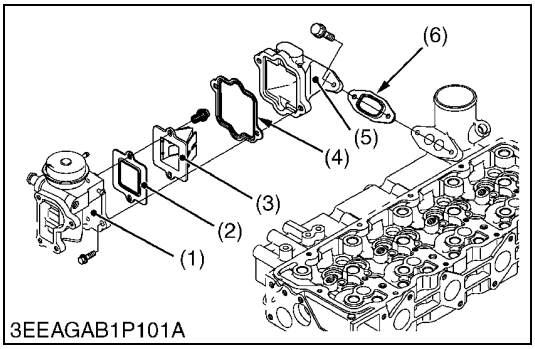
1. Remove the EGR cooler flange (2).
2. Remove the EGR cooler (4).

(When reassembling)

- Replace the gaskets (1) / (3) / (5) with new ones.

(1) Gasket
(2) EGR Cooler Flange
(3) Gasket
(4) EGR Cooler
(5) Gasket
(6) EGR Valve

W1118406



EGR Valve and Reed Valve (If necessary)

1. Remove the EGR valve (1) from the EGR valve flange (5).
2. Remove the reed valve (3) from the EGR valve (1).

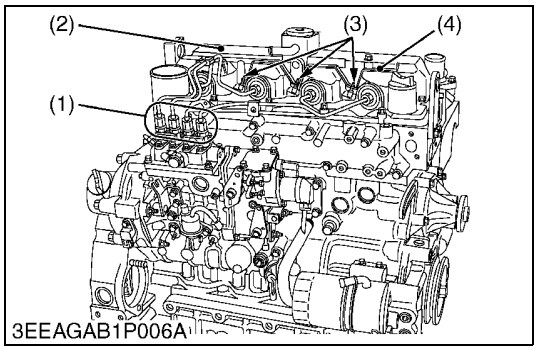
(When reassembling)

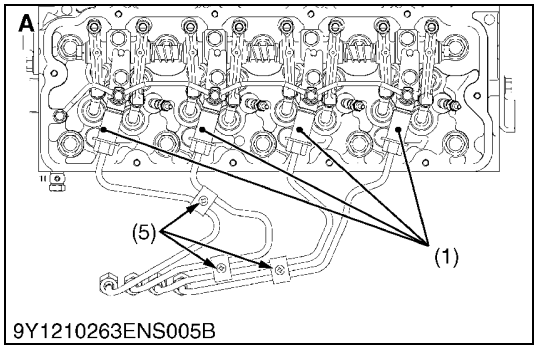
- Replace the gaskets (2) / (4) / (6) with new ones.

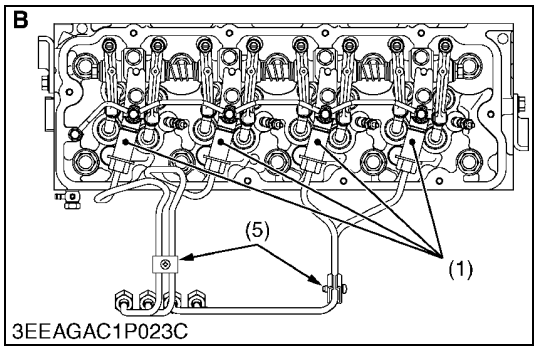
(1) EGR Valve
(2) Gasket
(3) Reed Valve
(4) Gasket
(5) EGR Valve Flange
(6) Gasket

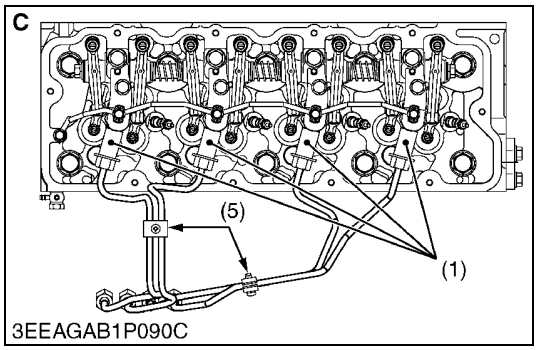
W1119991

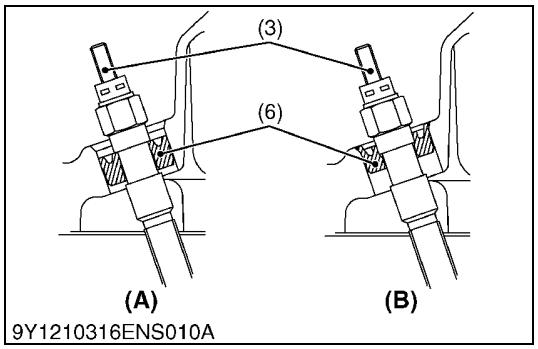
(4) Cylinder Head and Valves











Cylinder Head Cover

1. Remove the glow lead (4) and the glow plugs (3).
2. Remove the injection pipes (1).
3. Remove the cylinder head cover (2).

(When reassembling)

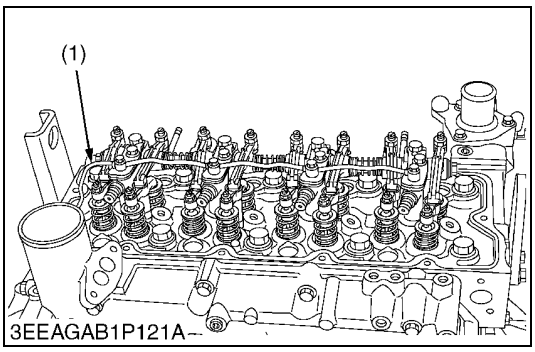
- Check to see that the cylinder head cover gasket is not detective.
- Tighten the head cover mounting screws to specified torque.
- Check the position of the injection pipe clamps (5) to reduce the vibration of the injection pipes (1). (See the figure.)
- Adjust the direction of the ditch to the terminal side when the seal (6) is installed in the glow plug (3).
- After installing the glow plug (3), confirm that the seal (6) was set to the specified position.

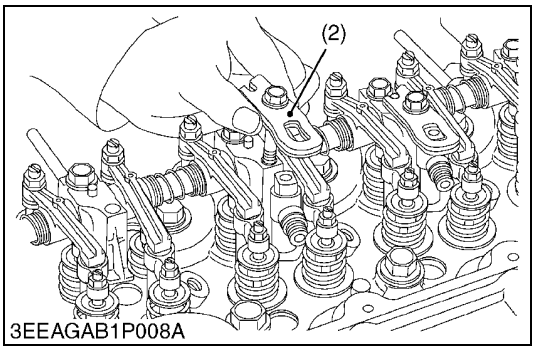
Tightening torque	Cylinder head cover screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft
	Injection pipe retaining nut	23 to 36 N·m 2.3 to 3.7 kgf·m 17 to 26 lbf·ft
	Glow plug	7.7 to 9.3 N·m 0.78 to 0.95 kgf·m 5.7 to 6.8 lbf·ft

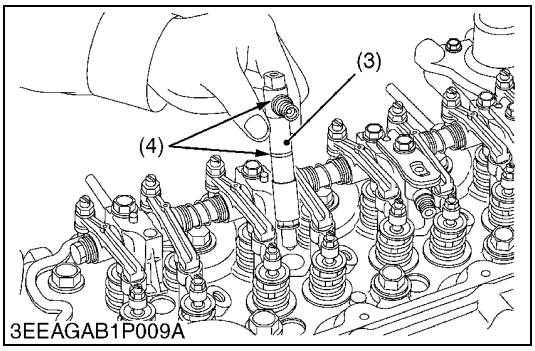
(1) Injection Pipe
(2) Cylinder Head Cover
(3) Glow Plug
(4) Glow Lead
(5) Injection Pipe Clamp
(6) Seal

A : V2607-DI-E3B
B : V2607-DI-T-E3B
C : V3007-DI-T-E3B / V3307-DI-T-E3B
(A) Good
(B) Bad

W1021753







Nozzle Holder

1. Remove the overflow pipe (1).
2. Remove the nozzle holder clamps (2), nozzle holder assembly (3) and nozzle gaskets.

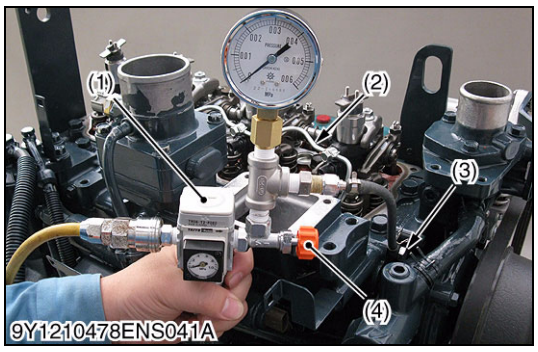
(When reassembling)

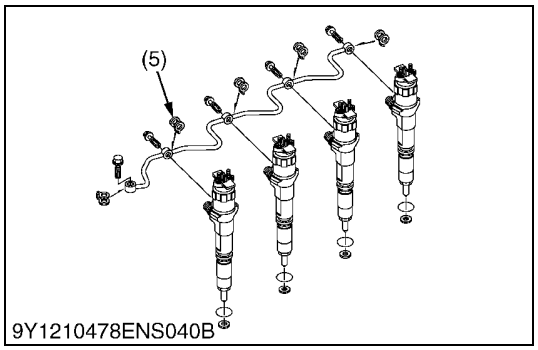
- Be sure to place the nozzle gaskets and the O-rings (4).

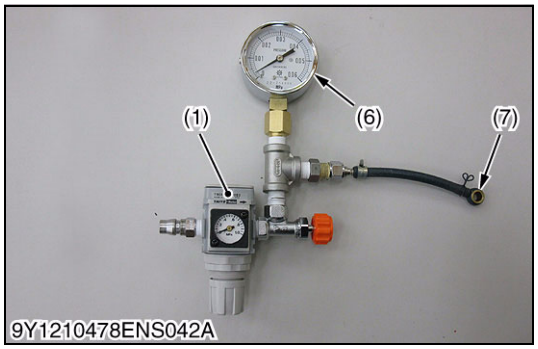
Tightening torque	Nozzle holder clamp screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Overflow pipe assembly retaining screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft

(1) Overflow Pipe
(2) Nozzle Holder Clamp
(3) Nozzle Holder Assembly
(4) O-ring

W1049737







Check the Fuel Leakage of the Overflow Pipe

1. Connect the fuel pipe joint (7) of air pressure adjustment equipment to the eye joint bolt (3).
2. Tighten the valves (4).
3. Connect the air hose to the air pressure adjustment equipment.
4. Adjust air pressure of the regulator (1) between 0.03 and 0.05 MPa (0.3 and 0.5 kgf/cm^2, 5 and 7 psi).
5. Open the valve (4) gradually, then add 0.03 MPa (0.3 kgf/cm^2, 4 psi) pressure.
6. Tighten the valves (4).
7. Check the decreased pressure after 4 seconds.

■ **NOTE**

- **If the decreased pressure is higher than 0.001 MPa (0.01 kgf/cm^2, 0.1 psi), it means that there is fuel leakage. Replace the gasket (5), then check the fuel leakage again.**

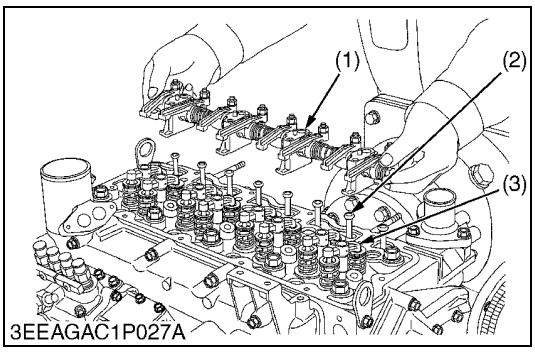
Leakage Check	Decreased pressure after 4 seconds is lower than 0.001 MPa (0.01 kgf/cm^2, 0.1 psi)

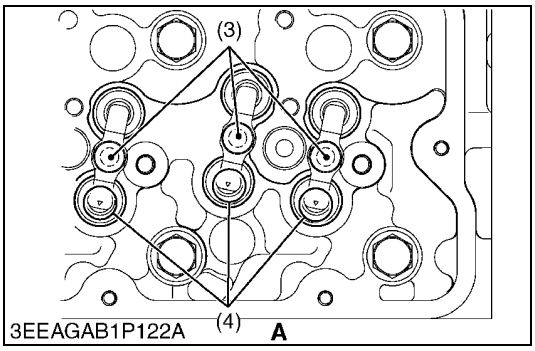
Specification of components

Parts Name	Specification or Code No.
Regulator (1)	0.030 to 0.86 MPa 0.31 to 8.7 kgf/cm^2 4.4 to 120 psi
Pressure Gauge (6)	0 to 0.06 MPa 0 to 0.6 kgf/cm^2 0 to 8 psi
Fuel Pipe Joint (7)	14117-42560

(1) Regulator
(2) Overflow Pipe
(3) Eye Joint Bolt
(4) Valve
(5) Gasket
(6) Pressure Gauge
(7) Fuel Pipe Joint

W1437956





Rocker Arm, Push Rod and Valve Bridge Arm

1. Remove the rocker arm (1) as a unit.
2. Remove the push rods (2).
3. Remove the valve bridge arm (3).

(When reassembling)

- When putting the push rods (2) onto the tappets, check to see if their ends are properly engaged with the grooves.
- When installing the valve bridge arm (3), apply engine oil to the valve bridge shaft sufficiently and check whether to move smoothly.

[V2607-DI-E3B / V2607-DI-T-E3B]

- When installing the valve bridge arm (3), apply engine oil to the valve bridge shaft sufficiently and face the mark (4) to intake side **(A)**.

■ **IMPORTANT**

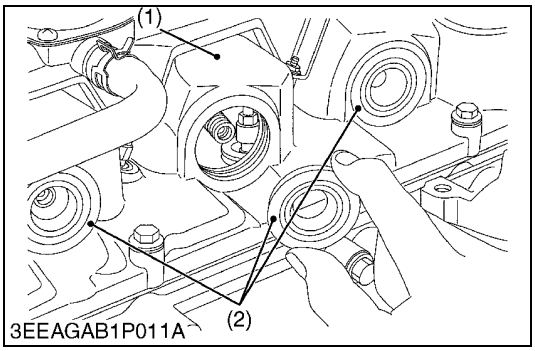
- **After reassembling the rocker arm (1), be sure to adjust the valve clearance. See the "Valve Clearance".**

Tightening torque	Rocker arm bracket screw	V2607-DI-E3B V2607-DI-T-E3B	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
		V3007-DI-T-E3B V3307-DI-T-E3B	49 to 55 N·m 5.0 to 5.7 kgf·m 37 to 41 lbf·ft

(1) Rocker Arm
(2) Push Rod
(3) Valve Bridge Arm
(4) Mark

A : Intake Side

W1050212



Injection Nozzle Oil Seal (If necessary)

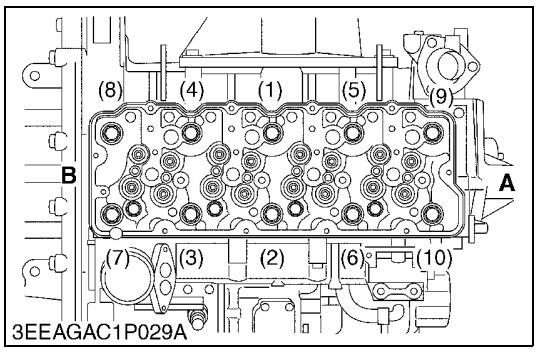
1. Remove the injection nozzle oil seal (2) from cylinder head cover (1).

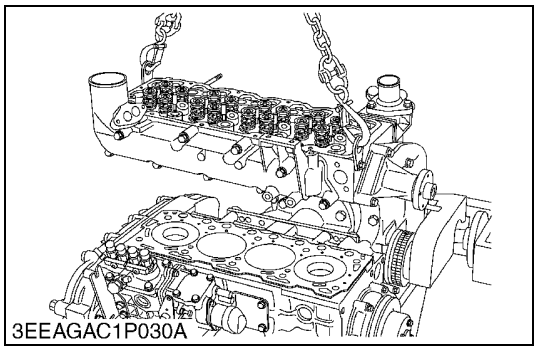
(When reassembling)

- When installing the injection nozzle oil seal (2), use new one.

(1) Cylinder Head Cover
(2) Injection Nozzle Oil Seal

W1054100





Cylinder Head

1. Remove the cylinder head screw in the order of (10) to (1), and remove the cylinder head.
2. Remove the cylinder head gasket.

(When reassembling)

- Replace the head gasket with a new one.
- When mounting the gasket, set it to the knock pin hole. Take care not to mount it reversely.
- The cylinder head should be free of scratches and dust.
- Take care for handling the gasket not to damage it.
- Install the cylinder head.
- Tighten the cylinder head screw gradually in the order of (1) to (10) after applying engine oil.
- Be sure to adjust the valve clearance. See the “Valve Clearance”.
- It is not necessary to retighten the cylinder head screw after operating the engine for 30 minutes.

■ **IMPORTANT**

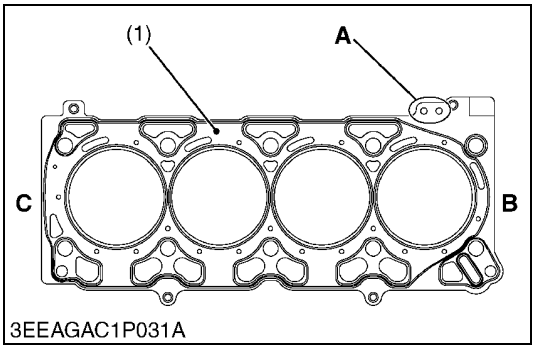
- **When replacing a piston, piston pin bush, connecting rod or crankpin bearing, select the cylinder head gasket thickness to meet with the top clearance refer to the “Selecting Cylinder Head Gasket”.**

Tightening torque	Cylinder head mounting screw	V2607-DI-E3B V2607-DI-T-E3B	147 to 156 N·m 15.0 to 16.0 kgf·m 109 to 115 lbf·ft
		V3007-DI-T-E3B V3307-DI-T-E3B	187 to 196 N·m 19.0 to 20.0 kgf·m 138 to 144 lbf·ft

(10) to (1) : To Loosen
(1) to (10) : To Tighten

A : Front Cover Side
B : Flywheel Housing Side

W1170923



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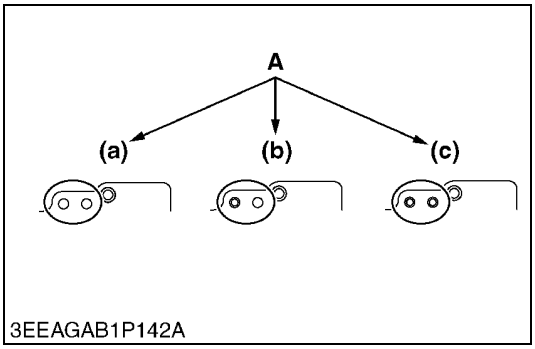

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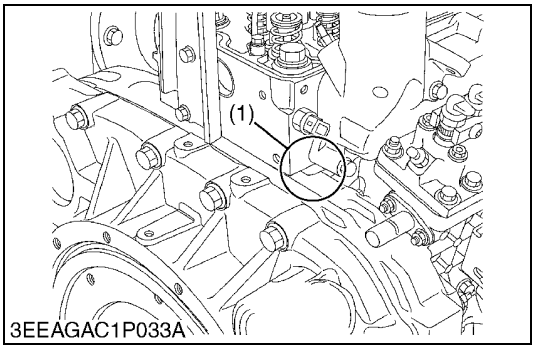

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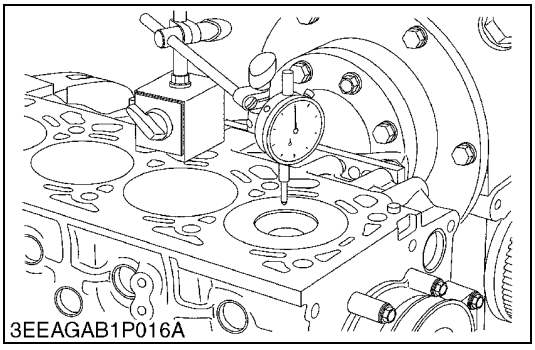
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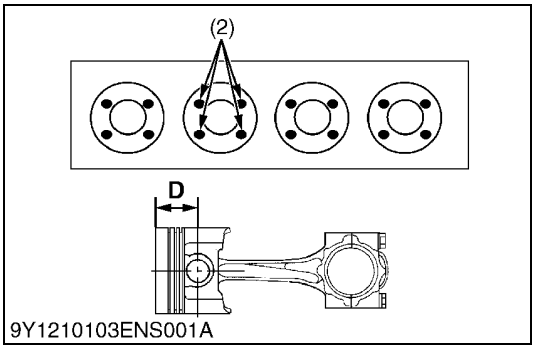

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Selecting Cylinder Head Gasket (for V2607-DI-E3B / V2607-DI-T-E3B)

■ Replacing the Cylinder Head Gasket

1. Make sure to note the hole **(a)**, **(b)** or **(c)** of cylinder head gasket (1) in advance.
2. Replace the same hole **(a)**, **(b)** or **(c)** as the original cylinder head gasket (1).

■ Selecting the Cylinder Head Gasket

- Select the cylinder head gasket (1) thickness to meet with the top clearance when replacing the piston, piston pin bush, connecting rod or crankpin bearing.

1. Measure the piston head's protrusion or recessing from the crankcase cylinder face (4 spots per each piston and average of four pistons) using the dial gauge as shown in figure.
2. Select the suitable cylinder head gasket (1) refer to the table below.

Hole of Cylinder Head Gasket	Thickness of cylinder head gasket		Part Code	Piston Head's protrusion or recessing from the level of crankcase cylinder face. (average of 4 pistons)
	Before tightening	After tightening		
Without hole **(a)**	1.10 mm 0.0433 in.	1.00 mm 0.0394 in.	1J700-03310	0.250 to 0.350 mm 0.00985 to 0.0137 in.
1 hole **(b)**	1.20 mm 0.0472 in.	1.10 mm 0.0433 in.	1J700-03320	0.350 to 0.450 mm 0.0138 to 0.0177 in.
2 holes **(c)**	1.30 mm 0.0512 in.	1.20 mm 0.0472 in.	1J700-03330	0.450 to 0.550 mm 0.0178 to 0.0216 in.

■ NOTE

- **Select the H05 piston first when you replace the piston. Select the H00 or H10 piston when the H05 piston does not cover the range in the table.**

Piston	Piston Height (H)
H05	39.10 to 39.15 mm 1.540 to 1.541 in.
H00	39.05 to 39.10 mm 1.538 to 1.539 in.
H10	39.15 to 39.20 mm 1.542 to 1.543 in.

(1) Cylinder Head Gasket
(2) Measuring Point
A : Hole of Cylinder Head Gasket
B : Flywheel Housing Side
C : Front Cover Side
D : Piston Height (H)

(a) Without Hole (0 Through Hole)
(b) 1 Hole (1 Through Hole)
(c) 2 Holes (2 Through Holes)

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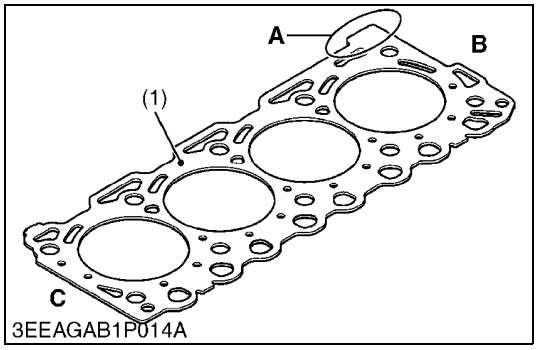

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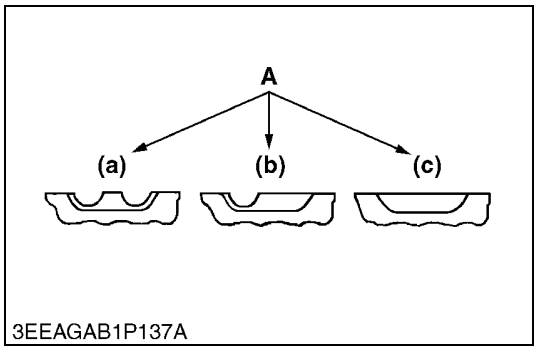

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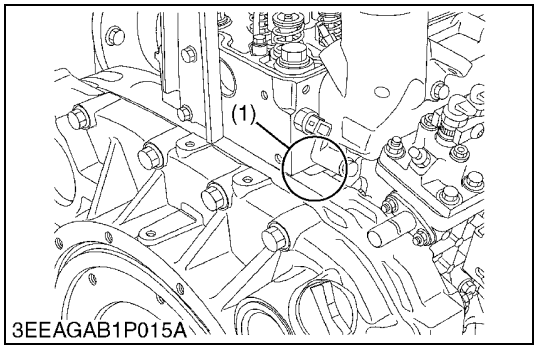

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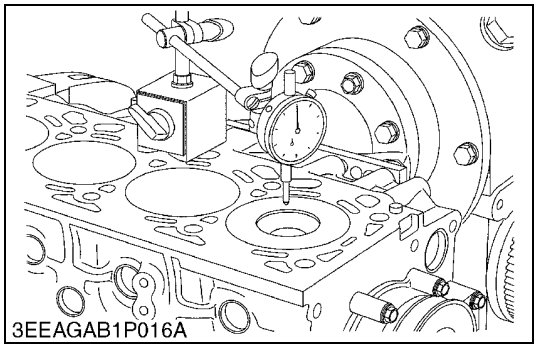
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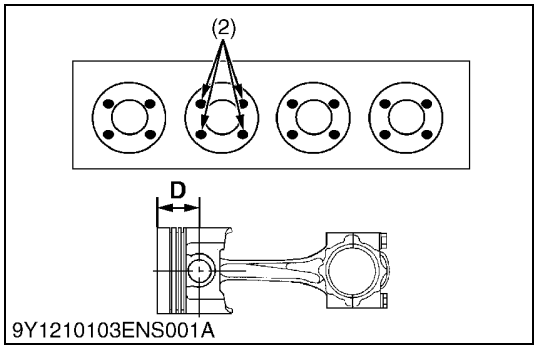

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Selecting Cylinder Head Gasket (for V3007-DI-T-E3B / V3307-DI-T-E3B)

■ Replacing the Cylinder Head Gasket

1. Make sure to note the notch **(a)**, **(b)** or **(c)** of cylinder head gasket (1) in advance.
2. Replace the same notch **(a)**, **(b)** or **(c)** as the original cylinder head gasket (1).

■ Selecting the Cylinder Head Gasket

- Select the cylinder head gasket (1) thickness to meet with the top clearance when replacing the piston, piston pin bush, connecting rod or crankpin bearing.

1. Measure the piston head's protrusion or recessing from the crankcase cylinder face (4 spots per each piston and average of four pistons) using the dial gauge as shown in figure.
2. Select the suitable cylinder head gasket (1) refer to the table below.

Notch of Cylinder Head Gasket	Thickness of cylinder head gasket		Part Code	Piston Head's protrusion or recessing from the level of crankcase cylinder face. (average of 4 pistons)
	Before tightening	After tightening		
2 notches **(a)**	0.900 mm 0.0354 in.	0.800 mm 0.0315 in.	1G777-03310	0.0775 to 0.150 mm 0.00306 to 0.00590 in.
1 notch **(b)**	1.00 mm 0.0394 in.	0.900 mm 0.0354 in.	1G777-03600	0.150 to 0.250 mm 0.00591 to 0.00984 in.
Without notch **(c)**	1.10 mm 0.0433 in.	1.00 mm 0.0394 in.	1G777-03610	0.2500 to 0.3425 mm 0.009843 to 0.01348 in.

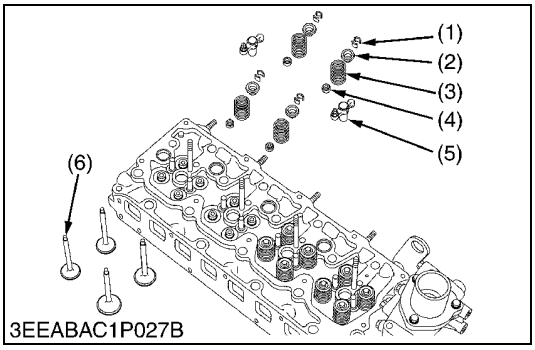
■ NOTE

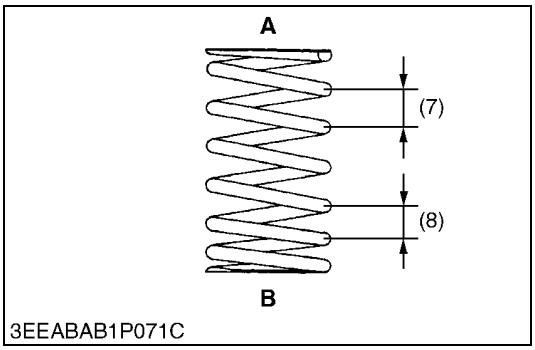
- **Select the H05 piston first when you replace the piston. Select the H00 or H10 piston when the H05 piston does not cover the range in the table.**

Piston	Piston Height (H)
H05	46.10 to 46.15 mm 1.815 to 1.816 in.
H00	46.05 to 46.10 mm 1.813 to 1.814 in.
H10	46.15 to 46.20 mm 1.817 to 1.818 in.

(1) Cylinder Head Gasket
(2) Measuring Point
A : Notch of Cylinder Head Gasket
B : Flywheel Housing Side
C : Front Cover Side
D : Piston Height (H)
(a) 2 Notches
(b) 1 Notch
(c) Without Notch

W1022965





Valve

1. Remove the valve spring collets (1) after compressing the valve spring (3) with the valve spring retainer (2).

(When reassembling)

- Wash the valve stem and valve guide hole, and apply engine oil sufficiently.
- After installing the valve spring collets (1), lightly tap the stem tip to assure proper fit with a plastic hammer.

[V3007-DI-T-E3B / V3307-DI-T-E3B only]

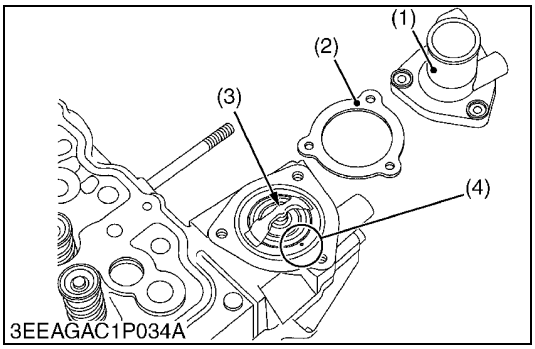
- Install the valve spring (3) with its smaller pitch (8) end downward (at the cylinder head side **(B)**).

(1) Valve Spring Collet
(2) Valve Spring Retainer
(3) Valve Spring
(4) Valve Stem Seal
(5) Valve Bridge Arm
(6) Valve
(7) Large Pitch
(8) Smaller Pitch

A : Valve Spring Retainer Side
B : Cylinder Head Side

W1053044

(5) Thermostat



Thermostat Assembly

1. Remove the thermostat cover mounting screws, and remove the thermostat cover (1).
2. Remove the thermostat assembly (3).

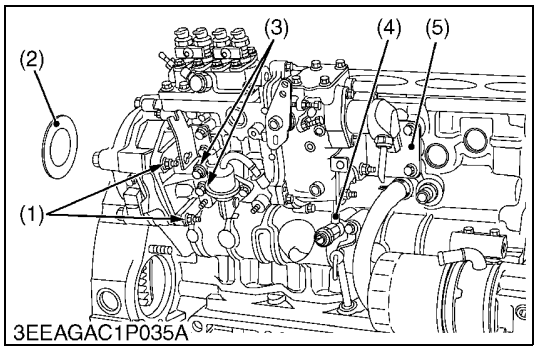
(When reassembling)

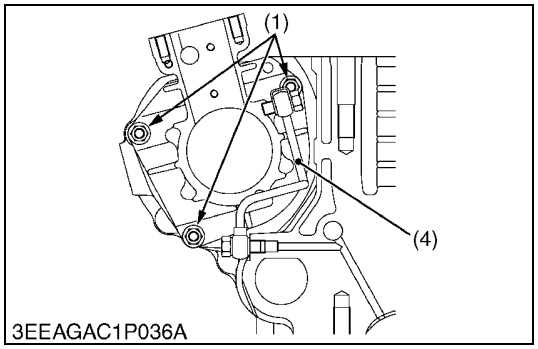
- Attach the thermostat assembly (3) with its hole (4) facing toward the front cover side.

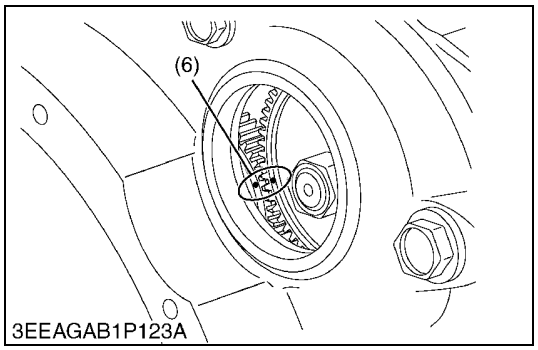
(1) Thermostat Cover
(2) Thermostat Cover Gasket
(3) Thermostat Assembly
(4) Hole

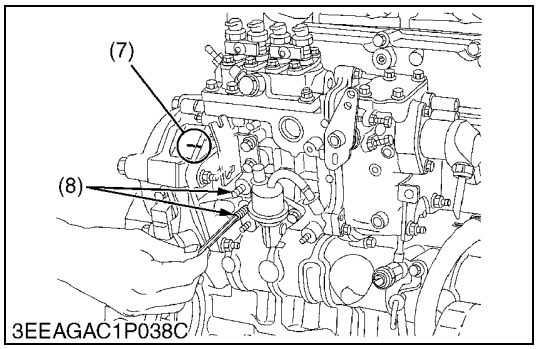
W1072747

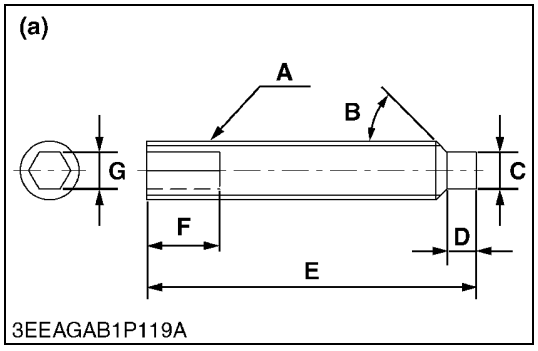
(6) Injection Pump Unit











Injection Pump Unit (for V2607-DI-E3B / V2607-DI-T-E3B)

(Removing the fuel injection pump unit)

1. Detach the window cover (2) for the fuel injection pump unit from the flywheel housing.
2. Place the piston of the 4th cylinder at the top dead center in the compression stroke. Fix the flywheel with the flywheel stopper.

■ **IMPORTANT**

- **Look for the alignment mark (6) on the idle gear and the injection pump gear. Using a white marking pen or the like, put an alignment mark (6) on the engaged tooth of the both gears. This helps to reassemble these gears in mesh later.**

■ **NOTE**

- **When the already existing alignment marks (6) align with each other, there is no need to put another alignment mark (6).**

3. Unscrew the two plugs (3) of the injection pump unit.
4. Tighten the upper fuel camshaft lock screw (8) until it comes into contact with the fuel camshaft. Make sure the camshaft does not move any longer.
5. Tighten the lower fuel camshaft lock screw (8) until it comes into contact with the fuel camshaft.

■ **NOTE**

- **Never overtighten the lock screws when they have come into contact with the camshaft. Otherwise the injection pump itself may get damaged.**
- **Use of a socket set screw (dog point type) is recommended for best results. Such screw can be constructed as shown in figure (a).**

6. Disconnect the lubricating oil pipe (4).
7. Using a white marking pen or the like, put an injection timing mark (7) on the injection pump unit and on the crankcase 1.
8. Loosen the three injection pump unit mounting nuts (1).
9. Remove the injection pump unit support (5) and take out the injection pump unit.

A	M8 × Pitch 1.25
B	0.79 rad (45 °)
C	5.0 mm dia. (0.20 in. dia.)
D	4.0 mm (0.16 in.)
E	45 mm (1.8 in.)
F	10 mm (0.39 in.) : Conspicuously Painted
G	5.0 mm (0.20 in.)

(1) Injection Pump Unit Mounting Nut
(2) Window Cover
(3) Plug
(4) Lubricating Oil Pipe
(5) Injection Pump Unit Support
(6) Alignment Mark
(7) Injection Timing Mark
(8) Fuel Camshaft Lock Screw (Socket Set Screw Dog Point Type)

(To be continued)

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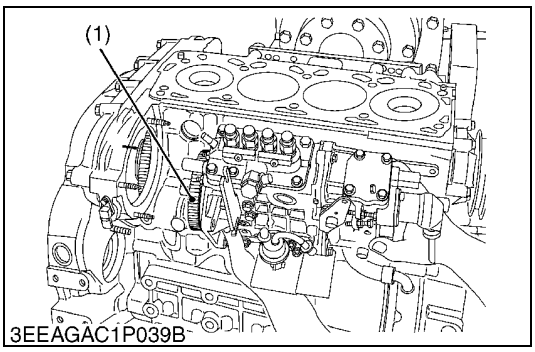

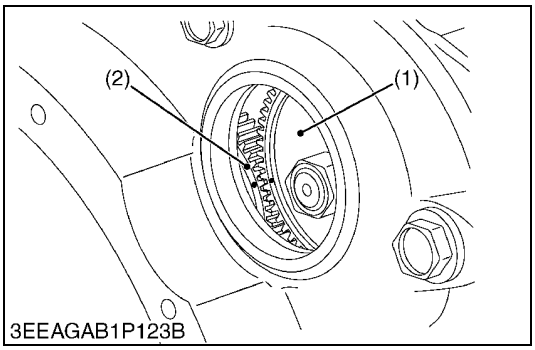

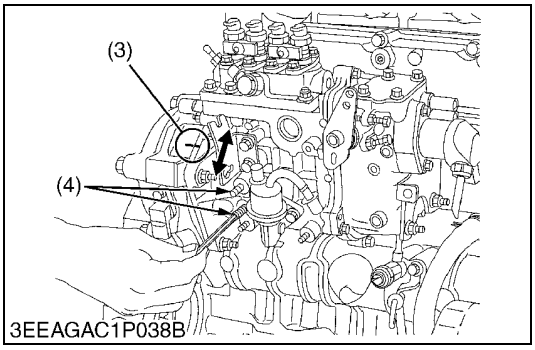

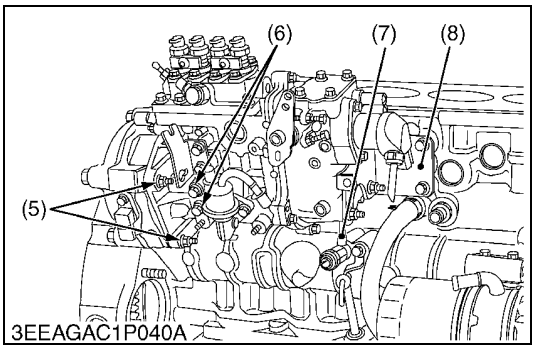

(Continued)

(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. Install the injection pump unit to the crankcase 1.
3. Make sure of aligning the alignment marks of the injection pump gear (1) and the idle gear (2).
4. Take off the fuel camshaft lock screws (4) and tighten the plugs (6) for plugging.
5. Moving the injection pump unit clockwise (viewed from front cover side), align the injection timing marks (3) on the injection pump unit and on the crankcase 1.
6. Tighten the injection pump unit mounting nut (5) to the specified torque.
7. Reconnect the lubricating oil pipe (7) and place the injection pump unit support (8) and the window cover of the injection pump unit.
8. Remove the flywheel stopper.
9. Check the injection timing. (See the “Injection Timing”.)
10. If the injection timing is not within the specification, repeat “4.” to “9.” again.

Tightening torque	Injection pump unit mounting nut	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	Lubricating oil pipe mounting screw	16 to 19 N·m 1.6 to 2.0 kgf·m 12 to 14 lbf·ft

(1) Injection Pump Gear
(2) Idle Gear
(3) Injection Timing Mark
(4) Fuel Camshaft Lock Screw (Socket Set Screw Dog Point Type)
(5) Injection Pump Unit Mounting Nut
(6) Plug
(7) Lubricating Oil Pipe
(8) Injection Pump Unit Support

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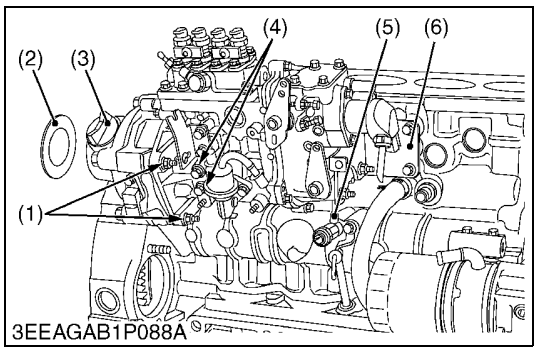

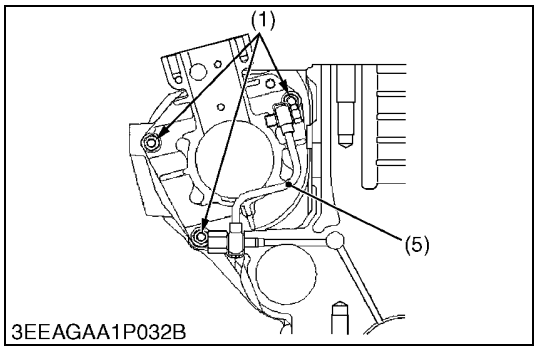

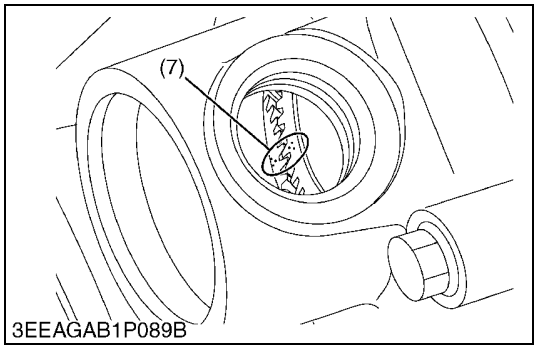

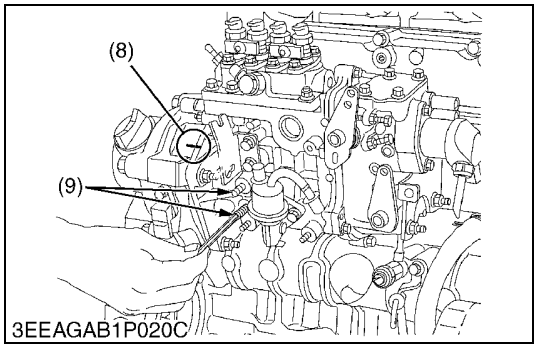

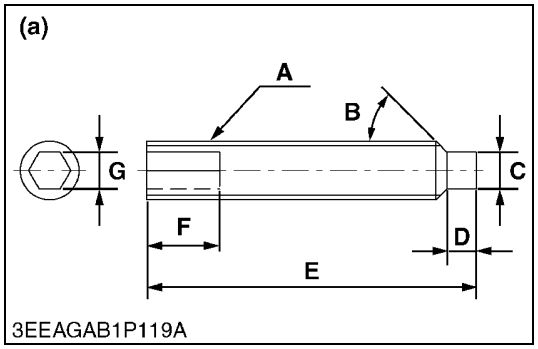

Injection Pump Unit (for V3007-DI-T-E3B / V3307-DI-T-E3B)

(Removing the fuel injection pump unit)

1. Detach the window cover (2) for the fuel injection pump unit from the flywheel housing and remove the oil cap (3).
2. Place the piston of the 4th cylinder at the top dead center in the compression stroke. Fix the flywheel with the flywheel stopper.

■ **IMPORTANT**

- **Look for the alignment mark (7) on the idle gear and the injection pump gear. Using a white marking pen or the like, put an alignment mark (7) on the engaged tooth of the both gears. This helps to reassemble these gears in mesh later.**

■ **NOTE**

- **When the already existing alignment marks (7) align with each other, there is no need to put another alignment mark (7).**

3. Unscrew the two plugs (4) of the injection pump unit.
4. Tighten the upper fuel camshaft lock screw (9) until it comes into contact with the fuel camshaft. Make sure the camshaft does not move any longer.
5. Tighten the lower fuel camshaft lock screw (9) until it comes into contact with the fuel camshaft.

■ **NOTE**

- **Never overtighten the lock screws when they have come into contact with the camshaft. Otherwise the injection pump itself may get damaged.**
- **Use of a socket set screw (dog point type) in recommended for best results. Such screw can be constructed as shown in figure (a).**

6. Disconnect the lubricating oil pipe (5).
7. Using a white marking pen or the like, put an injection timing mark (8) on the injection pump unit and on the crankcase 1
8. Loosen the three injection pump unit mounting nuts (1).
9. Remove the injection pump unit support (6) and take out the injection pump unit.

A	M8 × Pitch 1.25
B	0.79 rad (45 °)
C	5.0 mm dia. (0.20 in. dia.)
D	4.0 mm (0.16 in.)
E	45 mm (1.8 in.)
F	10 mm (0.39 in.) : Conspicuously Painted
G	5.0 mm (0.20 in.)

(1) Injection Pump Unit Mounting Nut
(2) Window Cover
(3) Oil Cap
(4) Plug
(5) Lubricating Oil Pipe
(6) Injection Pump Unit Support
(7) Alignment Mark
(8) Injection Timing Mark
(9) Fuel Camshaft Lock Screw (Socket Set Screw Dog Point Type)

(To be continued)

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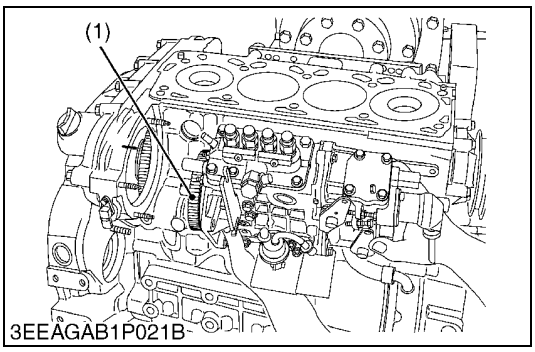

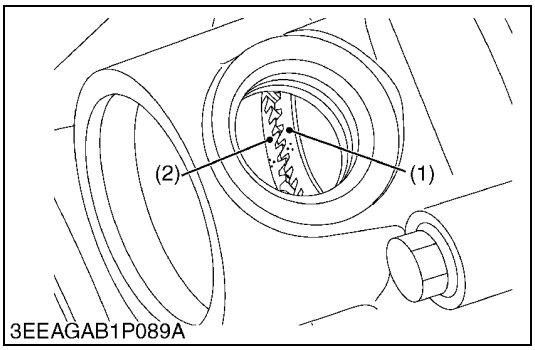

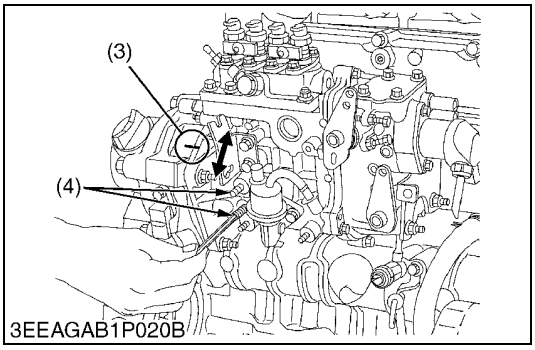

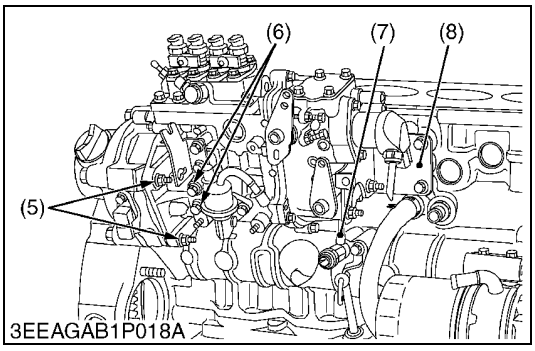

(Continued)

(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. Install the injection pump unit to the crankcase 1.
3. Make sure of aligning the alignment marks of the injection pump gear (1) and the idle gear (2).
4. Take off the fuel camshaft lock screws (4) and tighten the plugs (6) for plugging.
5. Moving the injection pump unit clockwise (viewed from front cover side), align the injection timing marks (3) on the injection pump unit and on the crankcase 1.
6. Tighten the injection pump unit mounting nut (5) to the specified torque.
7. Reconnect the lubricating oil pipe (7) and place the injection pump unit support (8) and the window cover of the injection pump unit.
8. Remove the flywheel stopper.
9. Check the injection timing. (See the “Injection Timing”.)
10. If the injection timing is not within the specification, repeat “4.” to “9.” again.

Tightening torque	Injection pump unit mounting nut	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	Lubricating oil pipe mounting screw	16 to 19 N·m 1.6 to 2.0 kgf·m 12 to 14 lbf·ft

(1) Injection Pump Gear
(2) Idle Gear
(3) Injection Timing Mark
(4) Fuel Camshaft Lock Screw (Socket Set Screw Dog Point Type)
(5) Injection Pump Unit Mounting Nut
(6) Plug
(7) Lubricating Oil Pipe
(8) Injection Pump Unit Support

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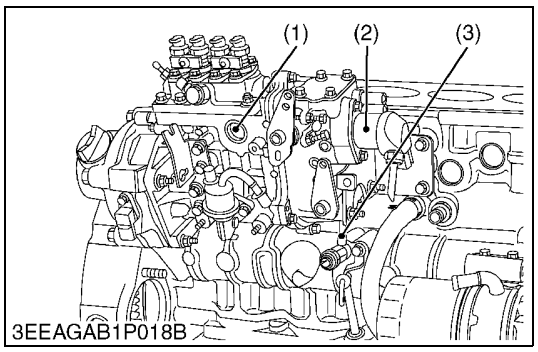

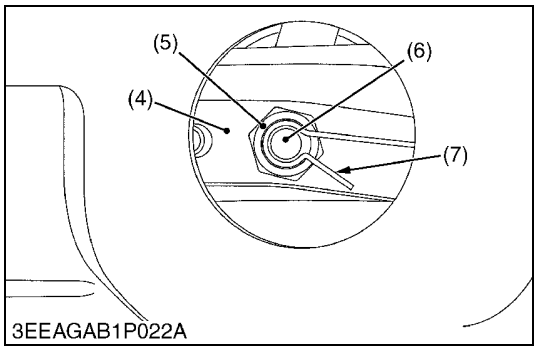

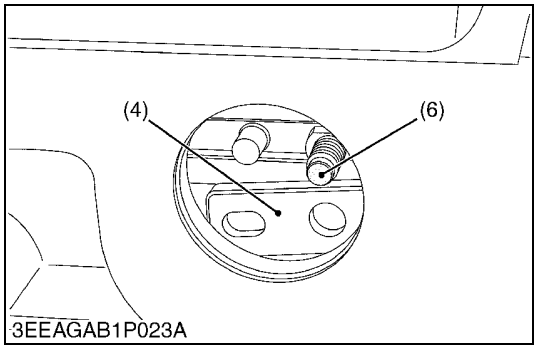

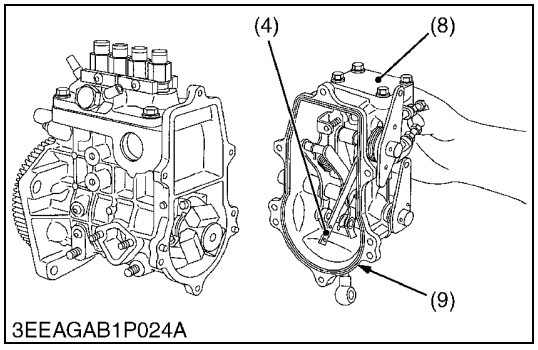

Governor Housing Assembly

1. Remove the injection pump unit from the engine. (See the "Injection Pump Unit".)
2. Remove the lubricating oil pipe (3).
3. Remove the stop solenoid (2).
4. Detach the sight cover (1) from the injection pump unit.
5. Unhook the start spring (7) from the rack pin (6) of injection pump assembly.
6. Remove the lock nut (5).

■ **NOTE**

- **Be careful not to drop the nut inside.**

7. Slide off the governor connecting rod (4) from the rack pin (6) of injection pump assembly.
8. For convenient sake, temporarily hook the start spring (7) on the rack pin (6) hole of the governor connecting rod (4).
9. Remove the governor housing mounting screws.
10. Detach the governor housing assembly (8) from the injection pump unit.

(When reassembling)

- When reassembling the inside parts, put the oil on each inside part slightly.
- After sliding on the governor connecting rod (4) to the rack pin (6), tighten the nut with the specified torque with using the jig for keeping the governor connecting rod (4) horizontal. (See the "Replacing Injection Pump Assembly".)
- After tightening the nut, hook the start spring (7) on the rack pin (6).
- Check the movement of control rack of injection pump assembly by the stop lever.

■ **NOTE**

- **When installing the governor housing assembly (8) to the injection pump unit, be careful not to damage O-ring (9).**
- **When linking the governor connecting rod (4) to the rack pin (6) of injection pump, use the jig for keeping the governor connecting rod (4) horizontal. Otherwise the control rack may be stuck, and causes to be difficult to start the engine or hunting of governor. (See the "Replacing Injection Pump Assembly".)**

Tightening torque	Governor housing mounting screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft
	Lock nut	2.9 to 4.0 N·m 0.29 to 0.41 kgf·m 2.1 to 2.9 lbf·ft

(1) Sight Cover
(2) Stop Solenoid
(3) Lubricating Oil Pipe
(4) Governor Connecting Rod
(5) Lock Nut
(6) Rack Pin
(7) Start Spring
(8) Governor Housing Assembly
(9) O-ring

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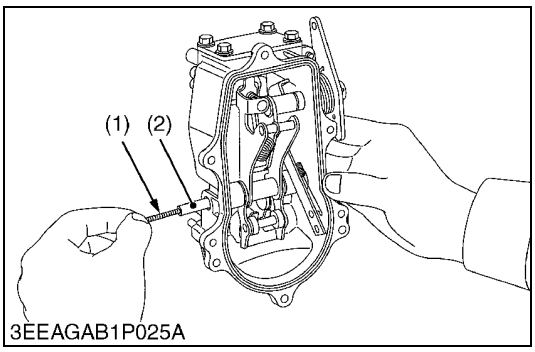

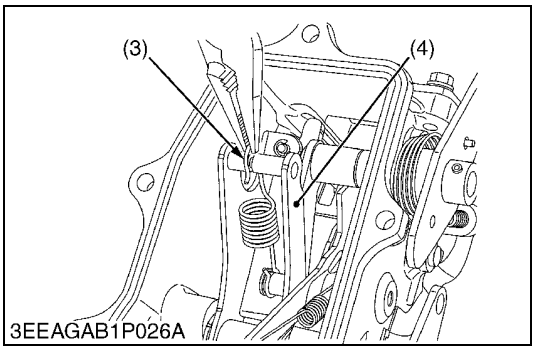

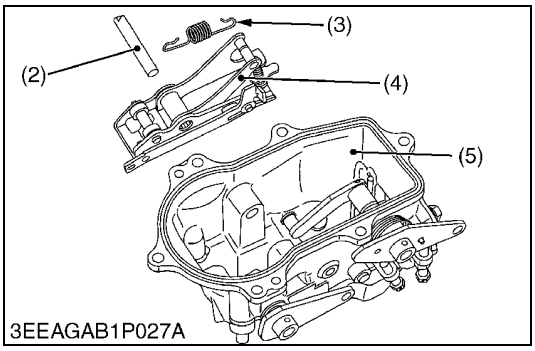

Governor Fork Lever Assembly

1. Pull off the governor fork lever shaft (2) with the extra bolt (Dia. : 4.0 mm (0.16 in.), Pitch : 0.7 mm (0.03 in.), Length : more than 25 mm (0.98 in.)) (1).
2. Unhook the governor spring (3) at the governor fork lever (4) side.
3. Remove the governor fork lever assembly from the governor housing (5).

(When reassembling)

- After reassembling the governor housing assembly, check the movement of the governor fork lever assembly, the speed control lever and the stop lever.

■ **NOTE**

- **When assembling the inside parts, put the oil on each inside part slightly.**
- **Be careful not to deform the start spring.**

(1) Extra Bolt (Dia. : 4.0 mm (0.16 in.), Pitch : 0.7 mm (0.03 in.), Length : more than 25 mm (0.98 in.))
(2) Governor Fork Lever Shaft
(3) Governor Spring
(4) Governor Fork Lever
(5) Governor Housing

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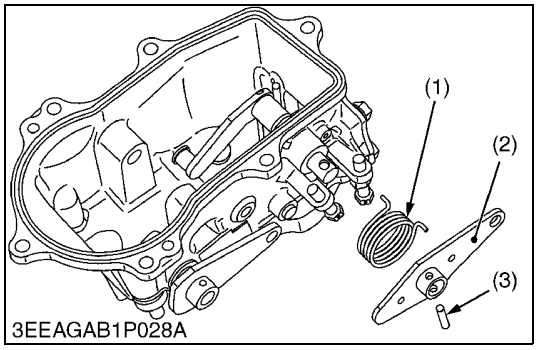

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Governor Lever

1. Remove the spring pin (3).
2. Remove the speed control lever (2) and the return spring (1).
3. Remove the governor lever assembly (4) from the governor housing.
4. Remove the start spring (6).

(1) Return Spring
(2) Speed Control Lever
(3) Spring Pin
(4) Governor Lever Assembly
(5) O-ring
(6) Start Spring

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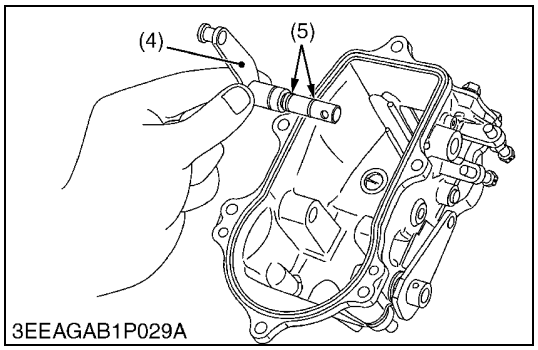

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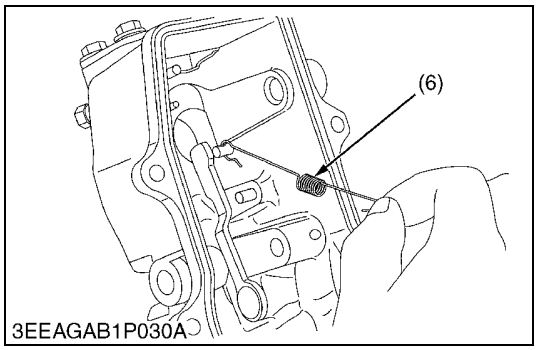

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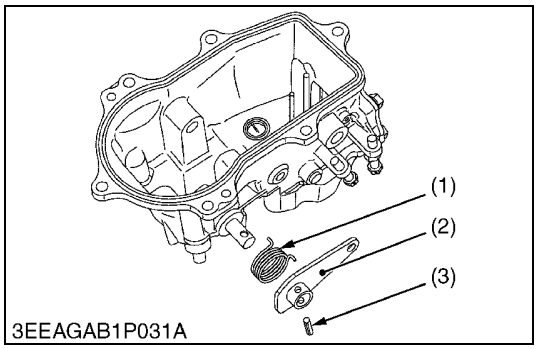

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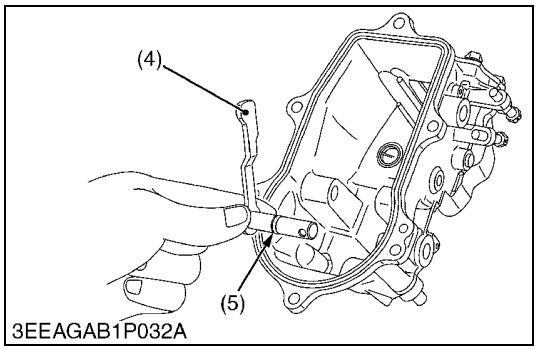
Stop Lever

1. Remove the spring pin (3).
2. Remove the stop lever (2) and the return spring (1).
3. Remove the stop lever shaft (4).

(1) Return Spring
(2) Stop Lever
(3) Spring Pin
(4) Stop Lever Shaft
(5) O-ring

W1143531



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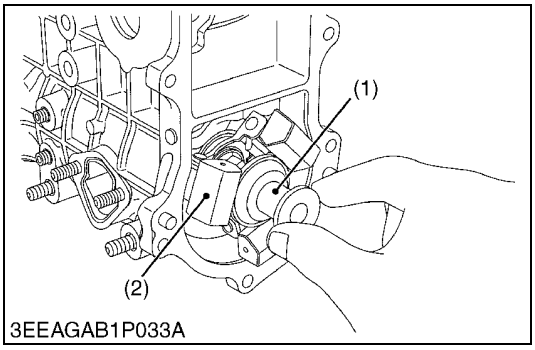

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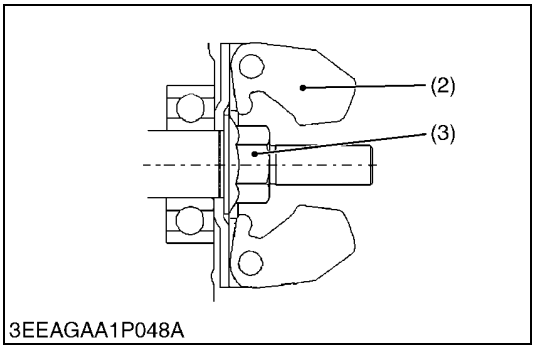

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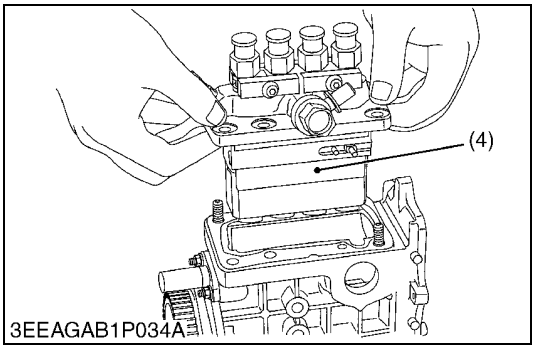

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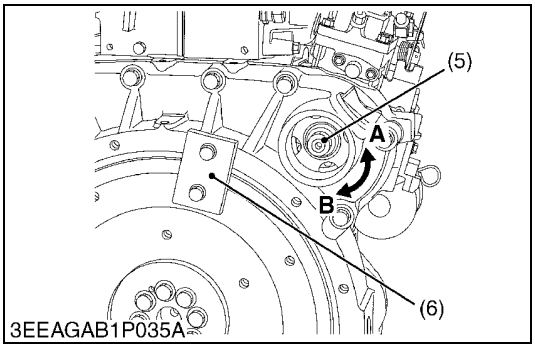

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Fuel Camshaft and Governor Weight

1. Separate the governor housing assembly from the injection pump unit. (See the “Injection Pump Unit”.)
2. Remove the governor sleeve (1).
3. Remove the injection pump assembly (4).
4. Remove the fuel camshaft lock screws.
5. Install the injection pump unit to the crankcase 1 again and temporarily tighten unit.
6. Fix the flywheel with the flywheel stopper (6) and loosen the injection pump gear mounting nut (5).
7. Remove the governor weight mounting nut (3) and the governor weight (2).
8. Separate the injection pump unit from the crankcase 1.

■ **NOTE**

- **Do not use the fuel camshaft lock screws, when removing the governor weight mounting nut (3). Otherwise, the lock screws or injection pump housing might get damage.**

■ **IMPORTANT**

- **This injection pump gear mounting nut (5) has left-handed screw. To loose this nut, rotate clockwise (viewed from flywheel side).**

Tightening torque	Injection pump assembly mounting screw		24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Injection pump assembly mounting nut		18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	Injection pump gear mounting nut (left-handed screw)	V2607-DI-E3B V2607-DI-T-E3B	93.2 to 102 N·m 9.50 to 10.5 kgf·m 68.8 to 75.9 lbf·ft
		V3007-DI-T-E3B V3307-DI-T-E3B	138 to 156 N·m 14.0 to 16.0 kgf·m 102 to 115 lbf·ft
	Governor weight mounting nut		63 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft

(1) Governor Sleeve
(2) Governor Weight
(3) Governor Weight Mounting Nut
(4) Injection Pump Assembly
(5) Injection Pump Gear Mounting Nut
(6) Flywheel Stopper

A : To Tighten
B : To Loosen

(To be continued)
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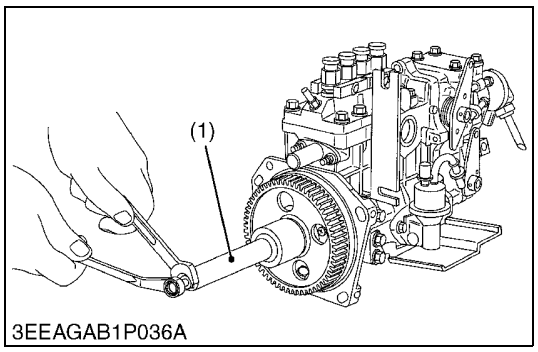

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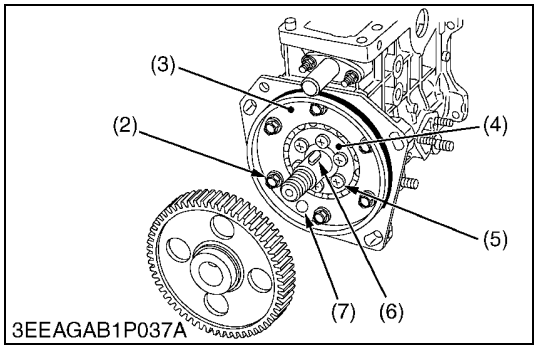

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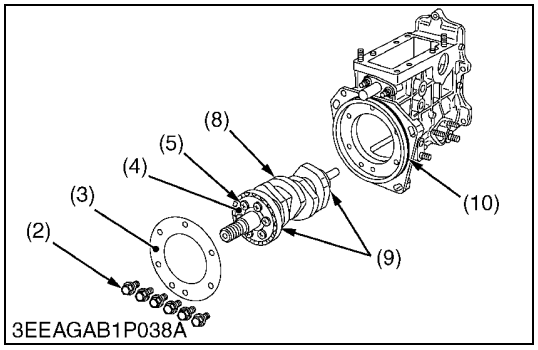

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(Continued)

1. Pull out the injection pump gear using gear puller (1). (Refer to "5. SPECIAL TOOLS" at "GENERAL" section.)
2. Loosen the fuel camshaft stopper mounting screws (2) and remove the fuel camshaft stopper (3).
3. Pull out the fuel camshaft (8) and bearings (9) together.
4. Loosen the fuel camshaft bearing stopper mounting screws (5).
5. After removing the fuel camshaft bearing stopper (4), press out the bearings (9).

■ **NOTE**

- **Do not use the fuel camshaft lock bolts, when removing the governor weight mounting nut. Otherwise, the lock bolts or injection pump housing might get damage.**

(When reassembling)

- Press the bearings (9) into the fuel camshaft.
- Confirm that the oil hole (7) set in position and attach the fuel camshaft bearing stopper (4). Then tighten the fuel camshaft bearing stopper mounting screws (5) with the specified torque.
- Install the fuel camshaft and bearings (9) to the injection pump housing.
- Attach the fuel camshaft stopper (3) and tighten the fuel camshaft stopper mounting screws (2) with the specified torque.
- Install the injection pump gear and mounting nut to the fuel camshaft and temporarily tighten nut.
- Install the injection pump unit to the crankcase 1 and temporarily tighten unit.
- Fix the flywheel with the flywheel stopper. Then tighten the injection pump gear mounting nut and the governor weight mounting nut with specified torque.
- Install the injection pump assembly to the injection pump housing.
- Install the governor sleeve to the fuel camshaft.
- Check the movement of the governor sleeve.

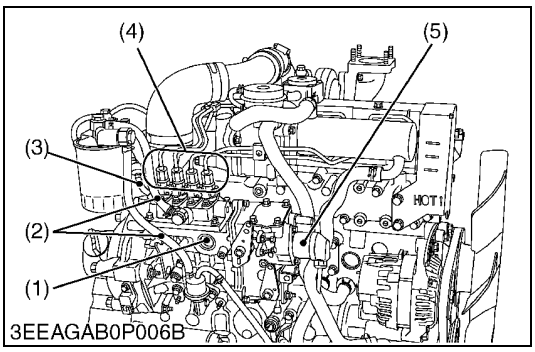
■ **NOTE**

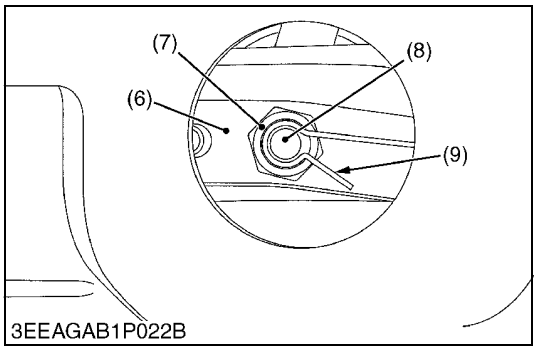
- **Be careful not to damage the O-ring (10).**
- **Be careful the direction of the governor sleeve.**
- **When reassembling the inside parts, put the oil on each inside part slightly.**

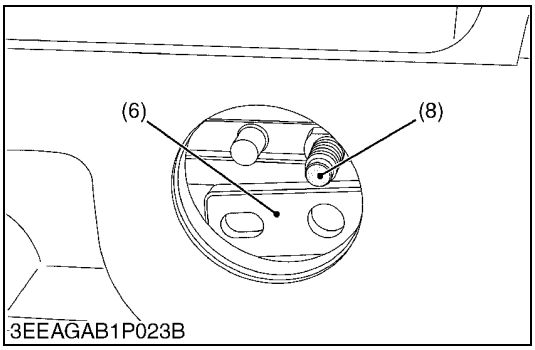
Tightening torque	Fuel camshaft stopper mounting screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft
	Fuel camshaft bearing stopper mounting screw	3.9 to 4.2 N·m 0.39 to 0.43 kgf·m 2.9 to 3.1 lbf·ft

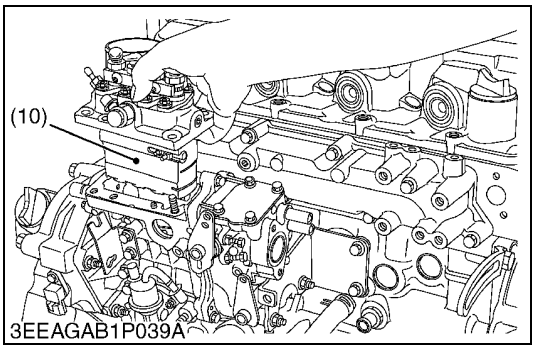
(1) Injection Pump Gear Puller
(2) Fuel Camshaft Stopper Mounting Screw
(3) Fuel Camshaft Stopper
(4) Fuel Camshaft Bearing Stopper
(5) Fuel Camshaft Bearing Stopper Mounting Screw
(6) Key Way of Fuel Camshaft
(7) Oil Hole
(8) Fuel Camshaft
(9) Bearing
(10) O-ring

W1029456









Replacing Injection Pump Assembly (If necessary)

- **The injection pump can be replaced with the crankshaft in whatever position.**

1. Disconnect all injection pipes (4).
2. Disconnect the fuel hose (2) and fuel overflow pipe (3).
3. Disconnect the connector from the stop solenoid (5). Then remove the stop solenoid (5).
4. Detach the sight cover (1) from the injection pump unit.
5. Unhook the start spring (9), and remove the lock nut (7).
6. Slide off the governor connecting rod (6) from the rack pin (8) of injection pump assembly (10).
7. Remove the injection pump mounting screws and nuts, and take out the injection pump assembly (10).

■ **NOTE**

- **Be careful not to drop the lock nut (7).**
- **Be careful not to deform the start spring (9).**
- **When taking out the injection pump assembly (10), be careful not to hit it against the governor connecting rod (6).**

(When reassembling)

- Install the new injection pump according to the installing procedure.

(1) Sight Cover
(2) Fuel Hose
(3) Fuel Overflow Pipe
(4) Injection Pipe
(5) Stop Solenoid
(6) Governor Connecting Rod
(7) Lock Nut
(8) Rack Pin
(9) Start Spring
(10) Injection Pump Assembly

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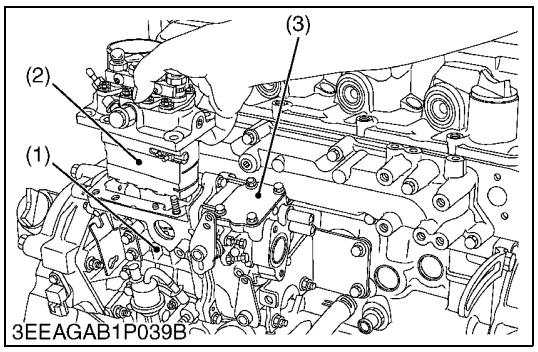
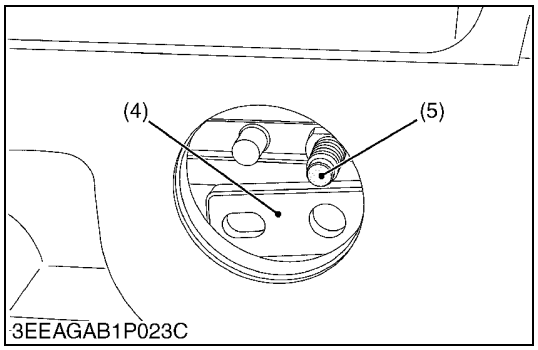
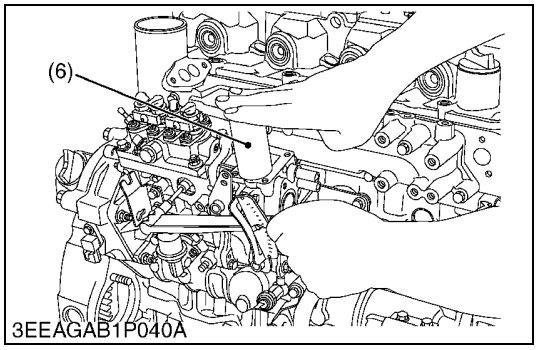
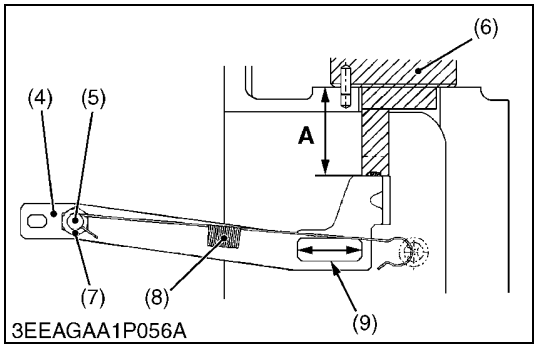
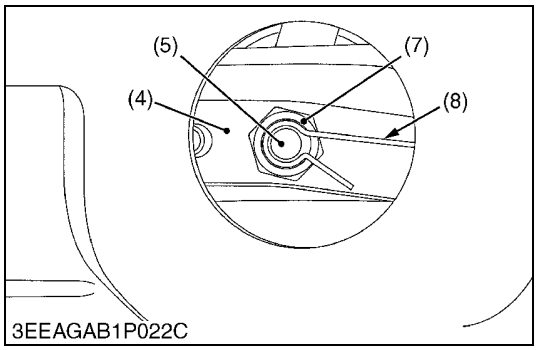










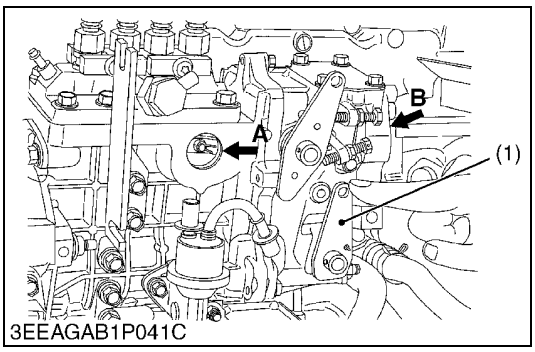
Installing Procedure of Injection Pump Assembly

1. Install the fuel injection pump assembly (2) in its unit (1), and tighten the mounting screws and nuts.
2. Hook the governor connecting rod (4) to the rack pin (5) of the fuel injection pump assembly (2).
3. Tighten the mounting screws and nuts with the specified torque, not to slide off the governor connecting rod (4) from the rack pin (5).
4. Remove the top cover (3) and place the service jig (6) to the hole of the fuel injection pump unit (1). (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.)
5. Make sure the permanent magnet at the tip of the service jig (6) is attracted to the governor connecting rod (4).
6. Slightly tighten the lock nut (7) of the governor connecting rod (4).
7. Holding down the service jig (6) by hand, tighten up the lock nut (7) to the specified torque.
8. Hook the start spring (8) to the rack pin (5).

(1) Fuel Injection Pump Unit
(2) Fuel Injection Pump Assembly
(3) Top Cover
(4) Governor Connecting Rod
(5) Rack Pin
(6) Service Jig
(7) Lock Nut
(8) Start Spring
(9) Sliding Point between Governor Fork Lever and Governor Connecting Rod

A : 27.95 to 28.05 mm (1.100 to 1.104 in.)

(To be continued)
W1069371



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(Continued)

1. Move the stop lever (1) and visually check to see if the fuel injection pump control rack comes smoothly back to the start position by the counter force of the start spring.
2. If the control rack fails to move back smoothly, remove the start spring and the lock nut, take the above steps from 2 of the former page again.
3. Inject the engine oil (0.075 L (0.020 U.S. gals) or more) into the pump housing and the governor housing in the direction of the arrow (horizontal) before the engine operates.
4. Finally fit the sight cover and the stop solenoid back into place.

Tightening torque	Lock nut	2.9 to 4.0 N·m 0.29 to 0.41 kgf·m 2.1 to 2.9 lbf·ft
	Injection pump assembly mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Injection pump assembly mounting nut	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

(1) Stop Lever

A : Engine Oil
(0.075 L (0.020 U.S. gals) or more)
B : Engine Oil
(0.075 L (0.020 U.S. gals) or more)
(A+B (Total) : 0.15 to 0.18 L
(0.040 to 0.047 U.S. gals))

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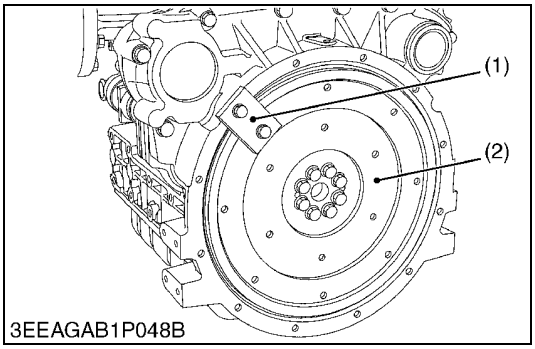

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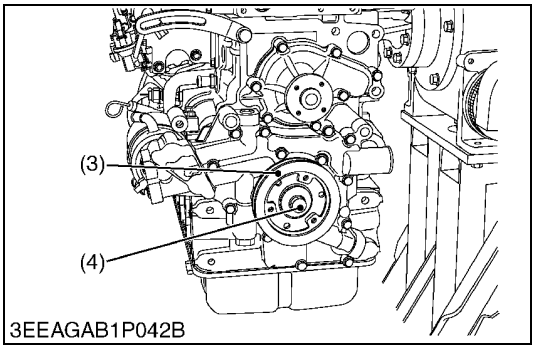

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Fan Drive Pulley

1. Set the stopper (1) to the flywheel (2).
2. Remove the crankshaft screw (4).
3. Draw out the fan drive pulley (3).

(When reassembling)

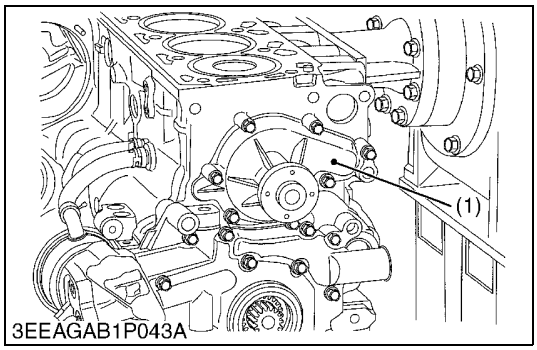
- Tighten the crankshaft screw (4) to specified torque after applying engine oil.

Tightening torque	Crankshaft screw	255 to 274 N·m 26.0 to 28.0 kgf·m 188 to 202 lbf·ft

(1) Stopper
(2) Flywheel
(3) Fan Drive Pulley
(4) Crankshaft Screw

W1185033

(7) Water Pump and Oil Cooler



Water Pump (If necessary)

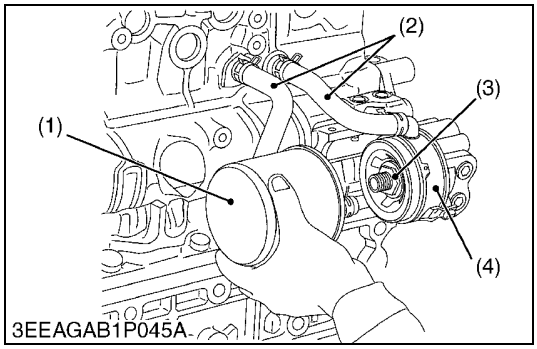
1. Remove the water pump (1).

(When reassembling)

- When mounting the water pump (1), use the new water pump gasket.

(1) Water Pump

W1187742



Oil Cooler

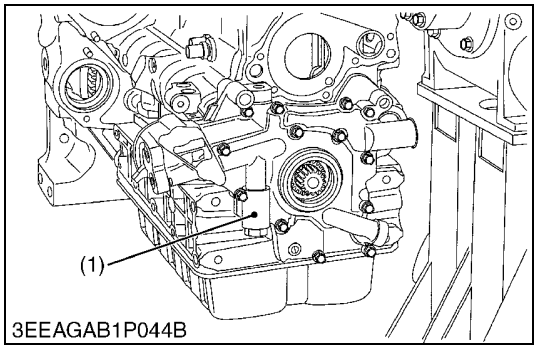
1. Remove the water pipe (2).
2. Remove the oil filter cartridge (1) and the oil cooler joint screw (3).
3. Remove the oil cooler (4).

Tightening torque	Oil cooler joint screw	V2607-DI-E3B V2607-DI-T-E3B	64 to 73 N·m 6.5 to 7.5 kgf·m 47 to 54 lbf·ft
		V3007-DI-T-E3B V3307-DI-T-E3B	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Oil Filter Cartridge
(2) Water Pipe
(3) Oil Cooler Joint Screw
(4) Oil Cooler

W1032266

(8) Front Cover



Front Cover

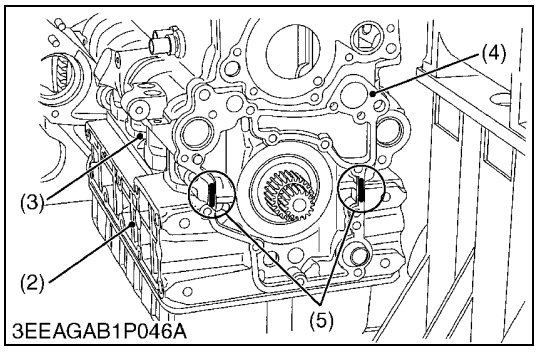
1. Remove the front cover (1).

(When reassembling)

- Confirm that the front cover gasket (4) set in position.
- Confirm that the liquid gasket coating surface is free of water, dust and oil in order to maintain sealing effect.

■ **NOTE**

- **Assemble the adhesive-applied parts within ten minutes.**
- **Apply a liquid gasket (Three Bond 1217H or equivalent) (5) to the seam between crankcase 1 (3) and crankcase 2 (2).**



Tightening torque	Front cover mounting screw	**[7T screw]** V2607-DI-E3B V2607-DI-T-E3B V3007-DI-T-E3B V3307-DI-T-E3B	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
		[10T screw] V3007-DI-T-E3B V3307-DI-T-E3B	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft

(1) Front Cover
(2) Crankcase 2
(3) Crankcase 1
(4) Front Cover Gasket
(5) Liquid Gasket

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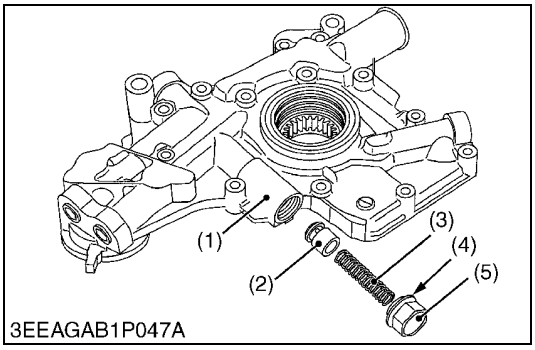


Relief Valve

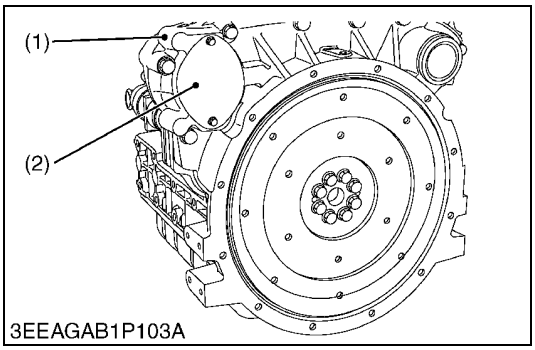
1. Remove the relief valve retaining screw (5).
2. Remove the relief valve (2), the spring (3) and the packing (4).

Tightening torque	Relief valve retaining screw	69 to 78 N·m 7.0 to 8.0 kgf·m 51 to 57 lbf·ft

(1) Front Cover
(2) Relief Valve
(3) Spring
(4) Packing
(5) Relief Valve Retaining Screw

W1081251

(9) Flywheel and Timing Gears



Side PTO (Option for V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Remove the PTO cover 2 (2) from the flywheel housing (1).
2. Remove the PTO cover 1 (3) with PTO gear assembly (5) from the flywheel housing (1).

(When reassembling)

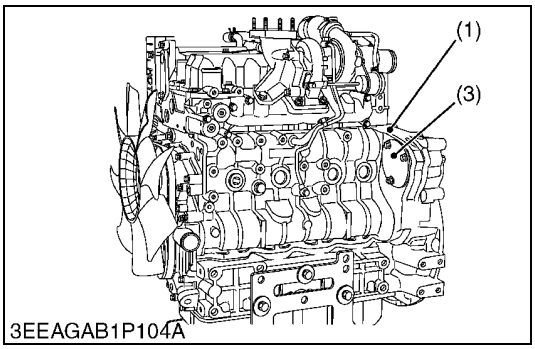
- Be sure to place the O-ring (4).

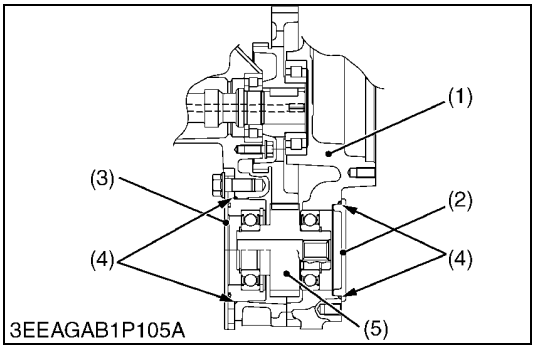
■ **NOTE**

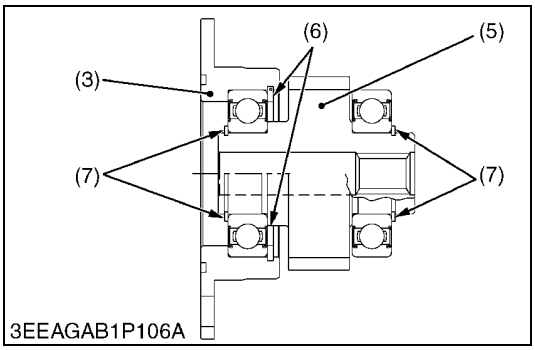
- **Be careful not to damage the O-ring (4).**

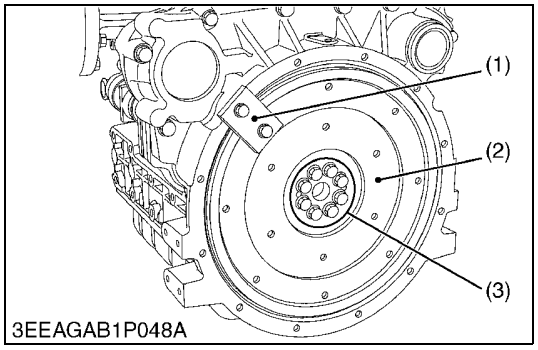
(1) Flywheel Housing
(2) PTO Cover 2
(3) PTO Cover 1
(4) O-ring
(5) PTO Gear Assembly
(6) Snap Ring 1
(7) Snap Ring 2

W1124264









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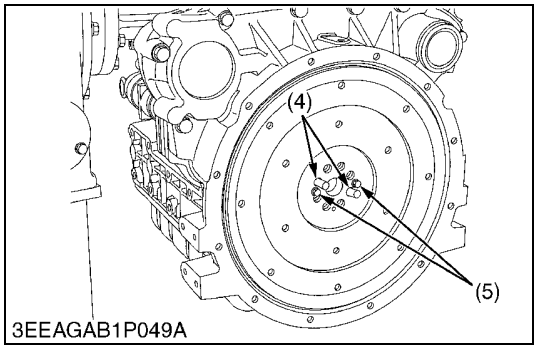

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Flywheel

1. Install the stopper (1) to the flywheel (2) so that the flywheel (2) does not turn.

■ **NOTE**

- **Do not use an impact wrench. Serious damage will occur.**
- **There is one positioning pin in the crankshaft gear and it is installed in the flywheel (2).**

2. Detach the flywheel screws (3) and set the flywheel guide screws (4).

[V2607-DI-E3B / V2607-DI-T-E3B]

3. Remove the flywheel (2).

[V3007-DI-T-E3B / V3307-DI-T-E3B]

3. Remove the flywheel (2) using jack-up screws (5).

(When reassembling)

- Apply engine oil to the flywheel screws (3).
- Before fitting the flywheel (2) and the crankshaft gear together, wipe oil, dust and other foreign substances off their mating faces.
- The flywheel (2) and the crankshaft gear are fitting together in just one position. Make sure they are tightly fit and drive the screws.

Tightening torque	Flywheel screw	98.1 to 107 N·m 10.0 to 11.0 kgf·m 72.4 to 79.5 lbf·ft

(1) Stopper
(2) Flywheel
(3) Flywheel Screw
(4) Flywheel Guide Screw
(5) Jack-up Screw

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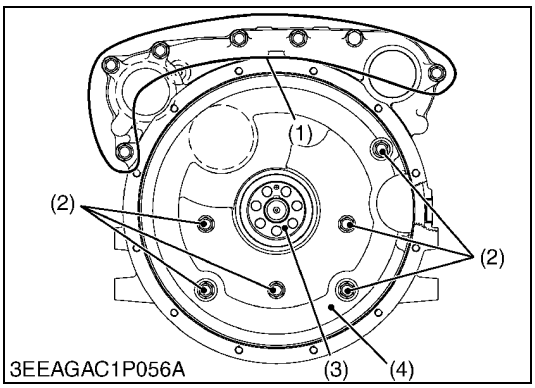
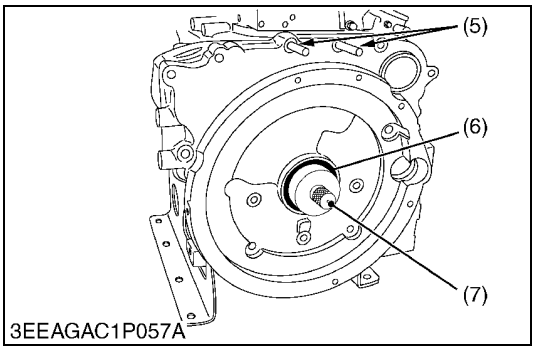
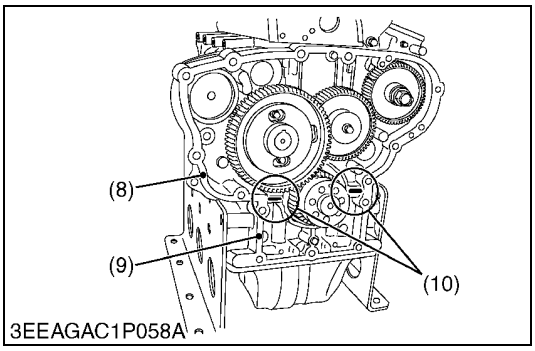
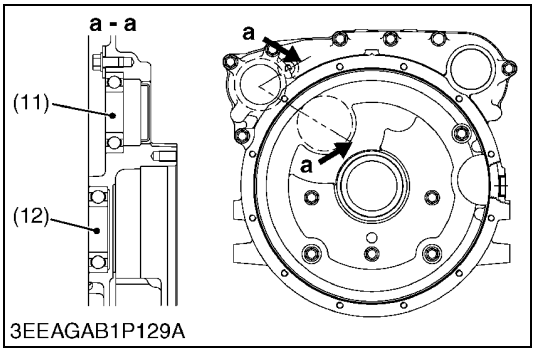








Flywheel Housing (for V2607-DI-E3B / V2607-DI-T-E3B)

1. Remove the outside flywheel housing mounting screws (1).
2. Remove the inside flywheel housing mounting screws (2).
3. Remove the flywheel housing (4).

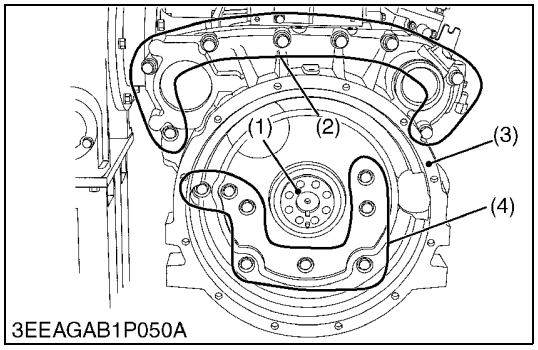
(When reassembling)

- Apply engine oil to the flywheel housing oil seal (6).
- Set the flywheel guide screws (5) and the flywheel housing guide jig (7) to the crankshaft gear (3). (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.)
- Apply a liquid gasket (Three Bond 1217H or equivalent) (10) to the seam between crankcase 1 (8) and crankcase 2 (9), and set gasket.
- Assemble the adhesive-applied parts within ten minutes.
- Confirm that the bearing 1 (11) and the bearing 2 (12) set in position.

Tightening torque	Flywheel housing mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

(1) Flywheel Housing Mounting Screw (Outside)
(2) Flywheel Housing Mounting Screw (Inside)
(3) Crankshaft Gear
(4) Flywheel Housing
(5) Flywheel Guide Screw
(6) Oil Seal
(7) Jig
(8) Crankcase 1
(9) Crankcase 2
(10) Liquid Gasket
(11) Bearing 1
(12) Bearing 2

W1231029



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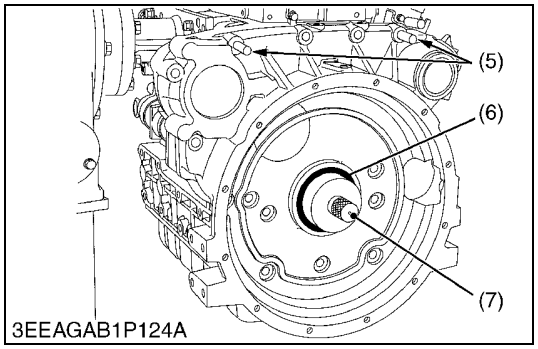

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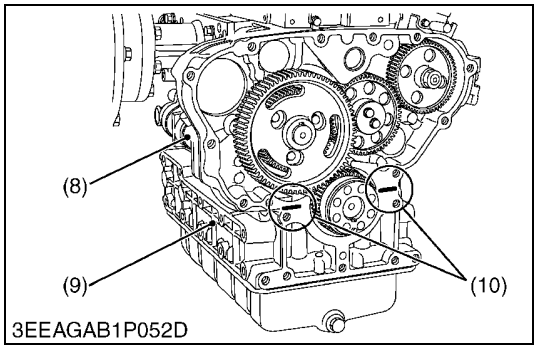

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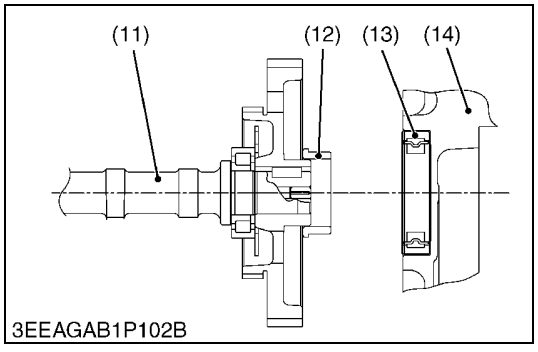

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Flywheel Housing (for V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Remove the outside flywheel housing mounting screws (2).
2. Remove the inside flywheel housing mounting screws (4).
3. Remove the flywheel housing (3).

(When reassembling)

- Apply engine oil to the flywheel housing oil seal (6).
- Set the flywheel guide screw (5) and the flywheel housing guide jig (7) to the crankshaft gear (1). (Refer to "5. SPECIAL TOOLS" at "GENERAL" section.)
- Apply a liquid gasket (Three Bond 1217H or equivalent) (10) to the seam between crankcase 1 (8) and crankcase 2 (9).
- Assemble the adhesive-applied parts within ten minutes.

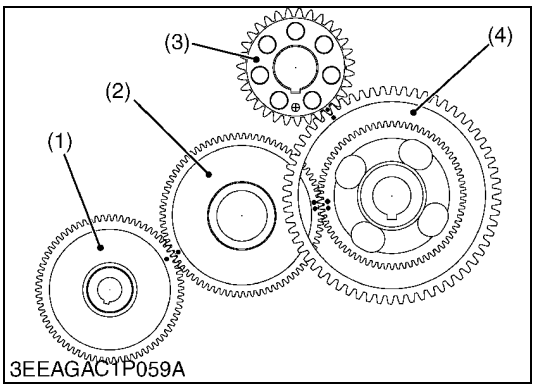
For Side PTO Model (Option)

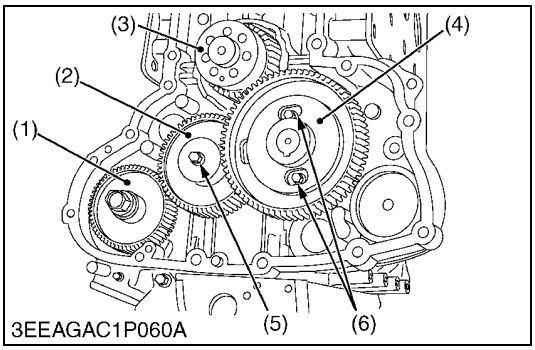
- Install the inside roller bearing (12) of the camshaft (11) in the outside roller bearing (13) of the flywheel housing (14).

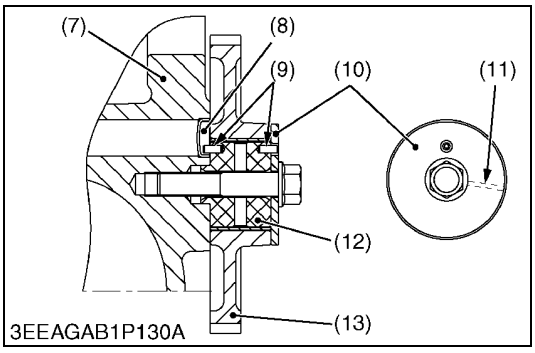
Tightening torque	Flywheel housing mounting screw	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

(1) Crankshaft Gear
(2) Flywheel Housing Mounting Screw (Outside)
(3) Flywheel Housing
(4) Flywheel Housing Mounting Screw (Inside)
(5) Flywheel Guide Screw
(6) Oil Seal
(7) Jig
(8) Crankcase 1
(9) Crankcase 2
(10) Liquid Gasket
(11) Camshaft
(12) Roller Bearing (Inside)
(13) Roller Bearing (Outside)
(14) Flywheel Housing

W1034007







Camshaft and Idle Gear (for V2607-DI-E3B / V2607-DI-T-E3B)

1. Rotate the cylinder head side of the engine crankcase to the lower side.
2. Remove the camshaft set screws (6) and draw out the cam gear (4).
3. Remove the idle gear mounting screws (5) and draw out the idle gear (2).

■ **NOTE**

- **If the cylinder head side of the engine crankcase does not become lower side, the tappets drop and become the trouble to the camshaft. The camshaft will not be able to be drawn out.**

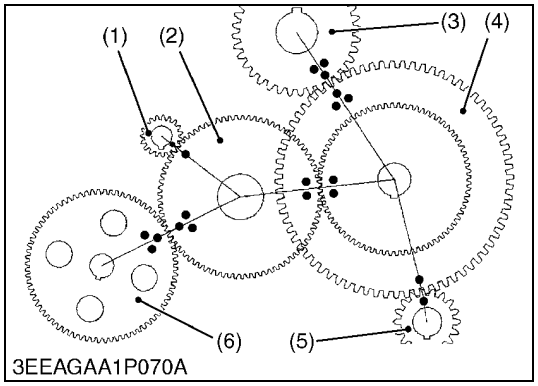
(When reassembling)

- When installing the idle gear (2) and cam gear (4), be sure to place the 4th cylinder piston at the top dead center in compression then, align all mating marks on each gear to assemble the timing gears, set the cam gear last.
- Mount the injection pump gear (1) after installing the flywheel housing.
- Make sure the idle gear shaft (12) is clean.
- Apply oil to the idle gear shaft (12) and set the crankcase 1 (7).
- Set the idle gear (13) and the collar (10) with the oil groove (11) facing crankcase 1 side.

Tightening torque	Camshaft set screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Idle gear mounting screw	49 to 55 N·m 5.0 to 5.7 kgf·m 37 to 41 lbf·ft

(1) Injection Pump Gear
(2) Idle Gear
(3) Crank Gear
(4) Cam Gear
(5) Idle Gear Mounting Screw
(6) Camshaft Set Screw
(7) Crankcase 1
(8) Plug
(9) Spring Pin
(10) Collar
(11) Oil Groove
(12) Idle Gear Shaft
(13) Idle Gear

W1294222



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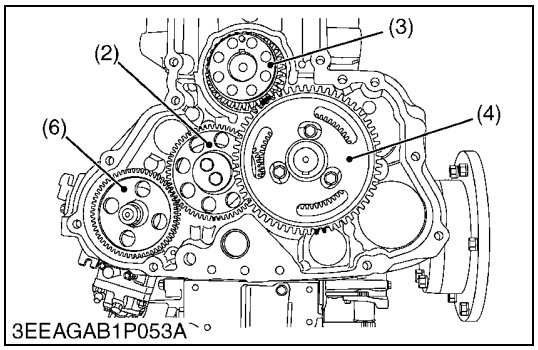

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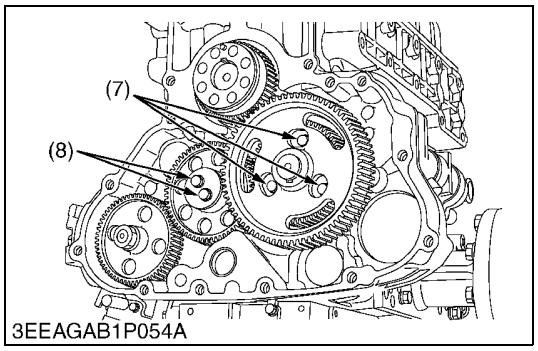

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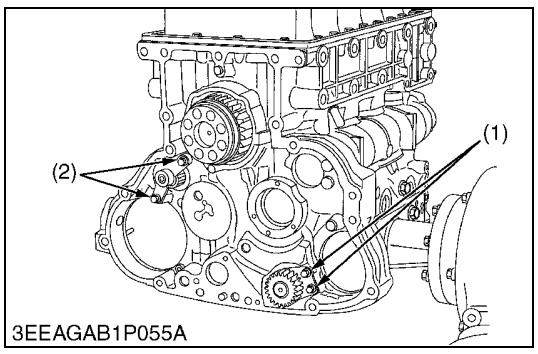

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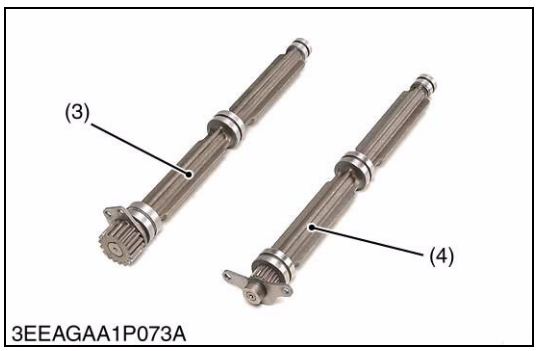

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Camshaft and Idle Gear (for V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Rotate the cylinder head side of the engine crankcase to the lower side.
2. Remove the camshaft set screws (7) and draw out the cam gear (4).
3. Remove the idle gear mounting screws (8) and draw out the idle gear (2).

■ **NOTE**

- **If the cylinder head side of the engine crankcase does not become lower side, the tappets drop and become the trouble to the camshaft. The camshaft will not be able to be drawn out.**

(When reassembling)

- When installing the idle gear (2) and cam gear (4), be sure to place the 4th cylinder piston at the top dead center in compression then, align all mating marks on each gear to assemble the timing gears, set the cam gear last.
- Mount the injection pump gear (6) after installing the flywheel housing.

Tightening torque	Camshaft set screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Idle gear mounting screw	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft

(1) Balancer 2 Gear (Option)
(2) Idle Gear
(3) Crank Gear
(4) Cam Gear
(5) Balancer 1 Gear (Option)
(6) Injection Pump Gear
(7) Camshaft Set Screw
(8) Idle Gear Mounting Screw

W1189797

Balancer Shaft (Option for V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Remove the balancer shaft 1 set screws (1) and draw out the balancer shaft 1 (3).
2. Remove the balancer shaft 2 set screws (2) and draw out the balancer shaft 2 (4).

(When reassembling)

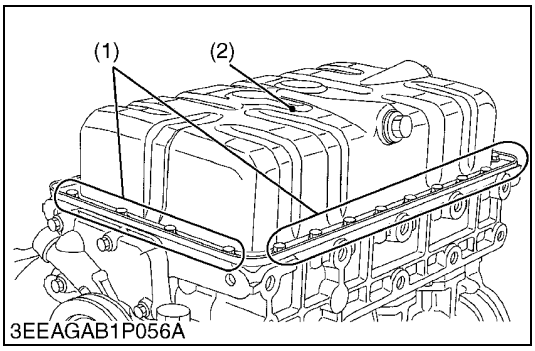
- When installing the balancer shaft 1 (3) and 2 (4), be sure to place the 4th cylinders piston at the top dead center in compression then, align all mating marks on each gear to assemble the timing gears, set the cam gear last.

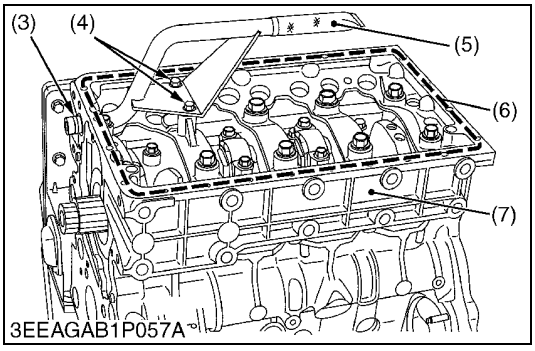
Tightening torque	Balancer shaft set screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

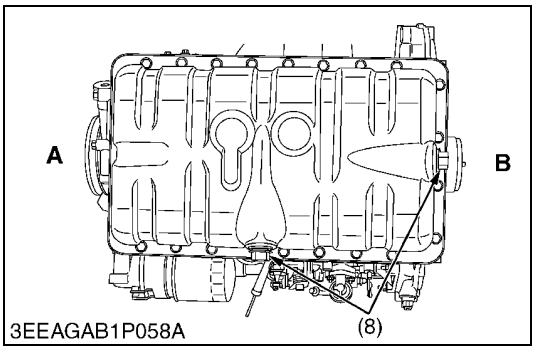
(1) Balancer Shaft 1 Set Screw
(2) Balancer Shaft 2 Set Screw
(3) Balancer Shaft 1
(4) Balancer Shaft 2

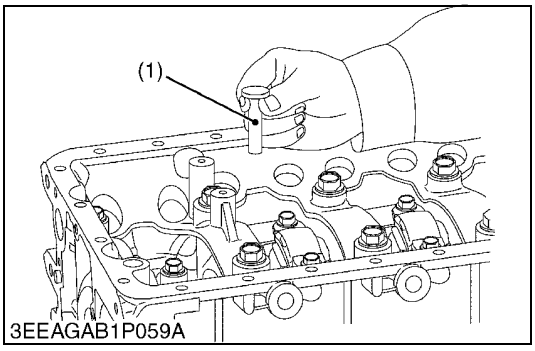
W1191037

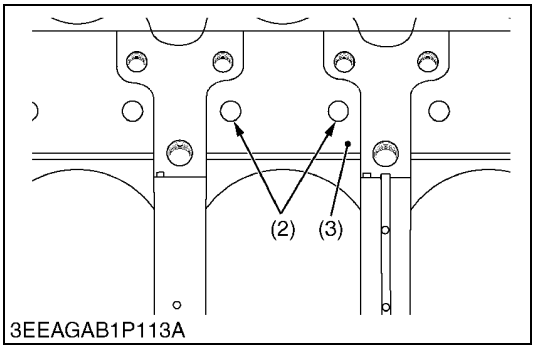
(10) Piston and Connecting Rod











Oil Pan and Oil Strainer

1. Unscrew the oil pan mounting screws (1) and remove the oil pan (2).
2. Unscrew the oil strainer mounting screws (4), and remove the oil strainer (5).

(When reassembling)

- Install the oil strainer (5), using care not to damage the O-ring (3).
- Apply liquid gasket (Three Bond 1217H or equivalent) (6) to the crankcase 2 (7) as shown in the figure.
- Confirm that the liquid gasket coating surface is free of water, dust and oil in order to maintain sealing effect.
- Carefully apply the adhesive evenly.

■ **NOTE**

- **When mounting the adhesive-applied parts, take care to fit them to the mating parts.**
- **Assemble the adhesive-applied parts within ten minutes.**
- **To avoid uneven tightening, tighten mounting screws (1) in diagonal order from the center.**
- **After cleaning the oil strainer (5), install it.**
- **Attach the oil pan (2) so that the drain plugs (8) will approach the flywheel housing side (B).**

(1) Oil Pan Mounting Screw
(2) Oil Pan
(3) O-ring
(4) Oil Strainer Mounting Screw
(5) Oil Strainer
(6) Liquid Gasket
(7) Crankcase 2
(8) Drain Plug
A : Front Cover Side
B : Flywheel Housing Side

W1057949

Tappet

1. Remove the tappets (1) from the tappet bore (2) of the crankcase 1 (3) using magnetic tool.

(When reassembling)

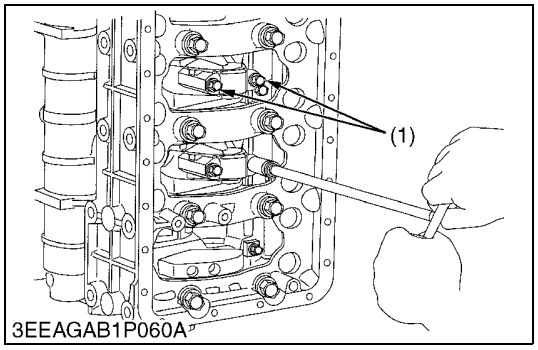
- Before installing the tappets (1), apply engine oil thinly around them.

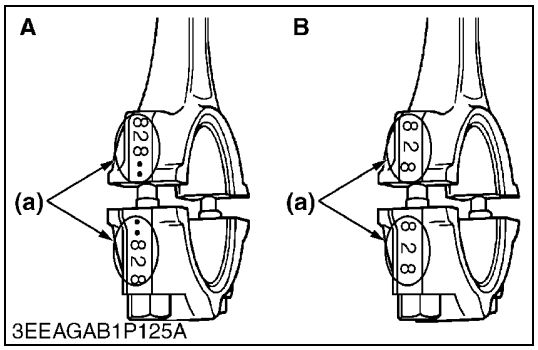
■ **NOTE**

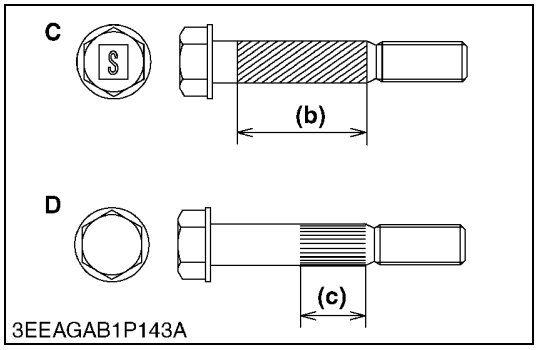
- **Mark the cylinder number to the tappets (1) to prevent interchanging.**

(1) Tappet
(2) Tappet Bore
(3) Crankcase 1

W1036026







Connecting Rod Cap

1. Remove the connecting rod screws (1) from connecting rod cap.
2. Remove the connecting rod caps.

(When reassembling)

- Align the marks **(a)** with each other. (Face the marks toward the injection pump.)
- Apply engine oil to the connecting rod screws (1) and lightly screw it in by hand, then tighten it to the specified torque.
  If the connecting rod screw (1) won't be screwed in smoothly, clean the threads.
  If the connecting rod screw (1) is still hard to screw in, replace it.
- When using the existing crank pin metal again, put tally marks on the crank pin metal and the connecting rod in order to keep their positioning.

■ **NOTE**

- **At the time of reassembling the connecting rod caps, use a combination of the connecting rod screws with the same specified tightening torque.**

Tightening torque	Connecting rod screw	V2607-DI-T-E3B [Serial No. : 8G0001 to 9K9999] (Fig. C)	45 to 49 N·m 4.5 to 5.0 kgf·m 33 to 36 lbf·ft
		V2607-DI-E3B V2607-DI-T-E3B [Serial No. : 9L0001 and above] (Fig. D)	41 to 45 N·m 4.1 to 4.6 kgf·m 30 to 33 lbf·ft
		V3007-DI-T-E3B V3307-DI-T-E3B	69 to 73 N·m 7.0 to 7.5 kgf·m 51 to 54 lbf·ft

(1) Connecting Rod Screw

(a) Mark

(b) Serration (Spiral) : 26 mm (1.0 in.)

(c) Serration (Axial direction) : 13 mm (0.51 in.)

A : V2607-DI-E3B / V2607-DI-T-E3B

B : V3007-DI-T-E3B / V3307-DI-T-E3B

C : Old Connecting Rod Screw

D : New Connecting Rod Screw

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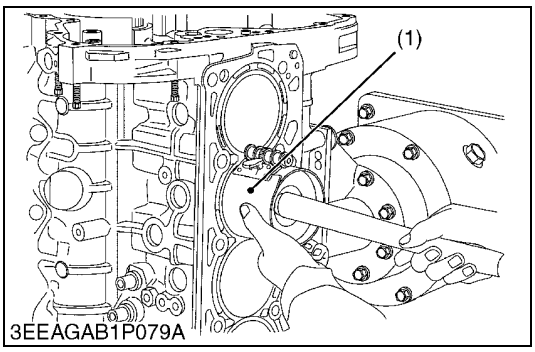

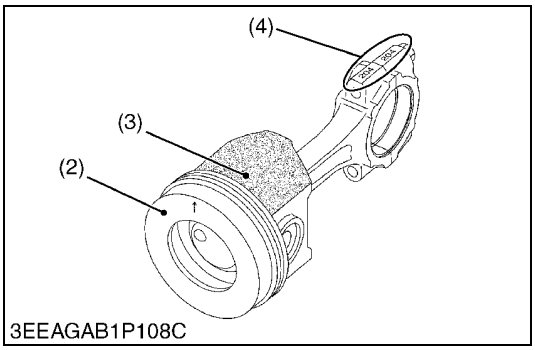

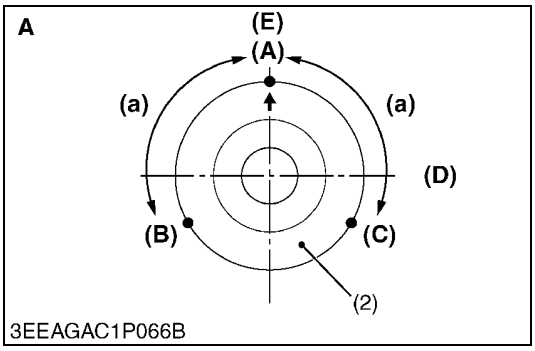

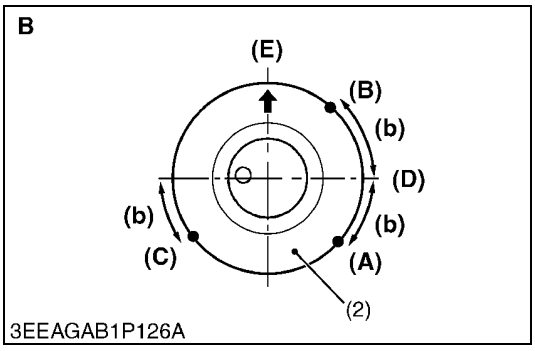

Piston

1. Completely clean carbon in the cylinders.
2. Turn the flywheel and set a piston to the top dead center.
3. Pull out the piston upward by lightly tapping it from the bottom of the crankcase with the grip of a hammer.

(When reassembling)

- Before inserting the piston into the cylinder, apply enough engine oil to the cylinder.
- When inserting the piston into the cylinder, face the mark (4) on the connecting rod to the injection pump.

■ **IMPORTANT**

- **Do not change the combination of cylinder and piston. Make sure of the position of each piston by marking. For example, mark "1" on the No. 1 position.**
- **When inserting the piston into the cylinder, place the gap of each piston ring like the figure.**
- **Carefully insert the pistons using a piston ring compressor (1). Otherwise, their chrome-plated section of piston rings may be scratched, causing trouble inside the liner.**
- **When inserting the piston in place, be careful not to get the molybdenum disulfide coating (3) torn off its skirt. This coating is useful in minimizing the clearance with the cylinder liner. Just after the piston pin has been press-fitted, in particular, the piston is still hot and the coating is easy to peel off. Wait until the piston cools down.**

(1) Piston Ring Compressor
(2) Piston
(3) Molybdenum Disulfide Coating
(4) Mark

(a) 2.09 rad (120 °)
(b) 0.79 rad (45 °)

(A) Top Ring Gap
(B) Second Ring Gap
(C) Oil Ring Gap
(D) Piston Pin Hole
(E) Injection Pump Side

A : V2607-DI-E3B / V2607-DI-T-E3B
B : V3007-DI-T-E3B / V3307-DI-T-E3B

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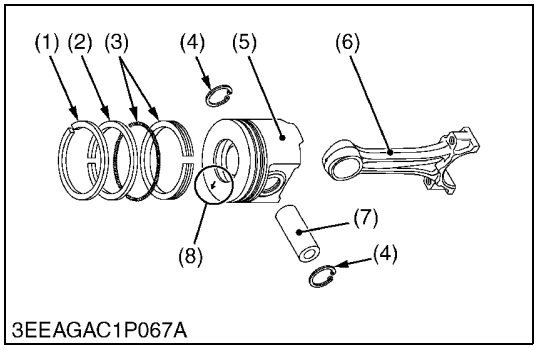

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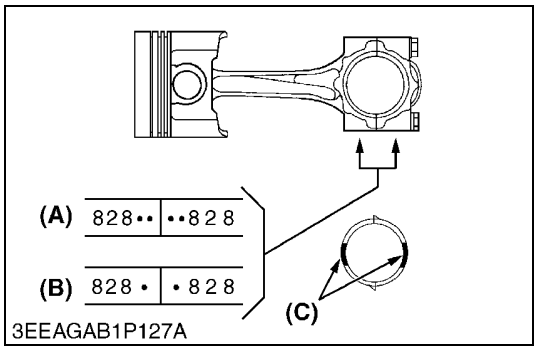

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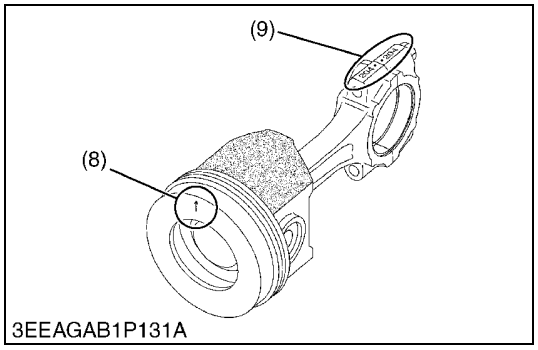

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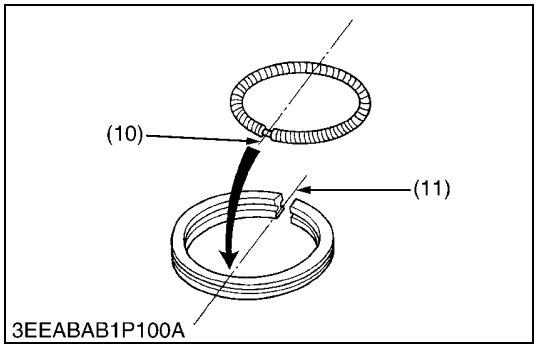

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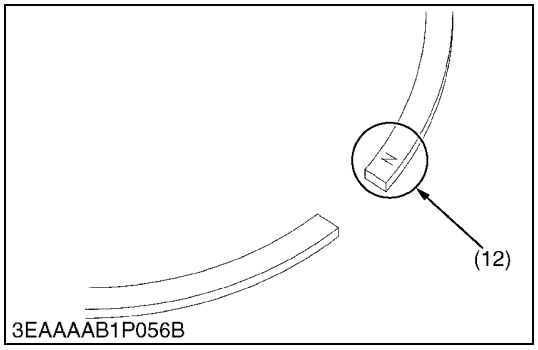

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Piston Ring and Connecting Rod (for V2607-DI-E3B / V2607-DI-T-E3B)

1. Remove the piston rings using a piston ring tool.
2. Remove the piston pin (7), and separate the connecting rod (6) from the piston (5).

(When reassembling)

- Make sure the combination of the crankpin bearing ID color and the connecting rod mark.

Connecting rod mark	Crankpin bearing ID color (Figure **(C)**)
2 stamps (Figure **(A)**)	Blue
1 stamp (Figure **(B)**)	Without color

- When installing the ring, assemble the rings so that the manufacture's mark (12) near the gap faces the top of the piston (5).
- When installing the oil ring (3) onto the piston (5), place the expander joint (11) on the opposite side of the oil ring gap (10).
- Apply engine oil to the piston pin (7).
- When installing the piston pin (7), immerse the piston (5) in 80 °C (176 °F) oil for 10 to 15 minutes and insert the piston pin (7) to the piston (5).
- Assemble the piston (5) to the connecting rod (6) with the ↑ mark (8) and the connecting rod numbering mark (9) facing same side.
- The end faces of the oil ring (3) are plated with hard chrome. In putting the piston (5) into the cylinder, be careful not to get the oil ring (3) scratched by the cylinder. Use the piston ring fitter to tighten up the oil ring (3). If the ring's planting is scratched, it may get stuck on the cylinder wall, causing a serious trouble.

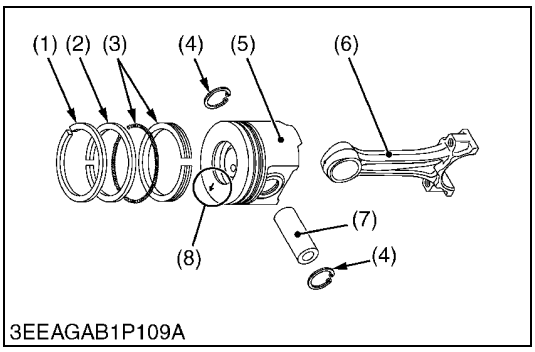
■ **IMPORTANT**

- **Mark the same number on the connecting rod (6) and the piston (5) so as not to change the combination.**

(1) Top Ring
(2) Second Ring
(3) Oil Ring
(4) Piston Pin Snap Pin
(5) Piston
(6) Connecting Rod
(7) Piston Pin
(8) Mark (↑)
(9) Numbering Mark
(10) Oil Ring Gap
(11) Expander Joint
(12) Manufacture's Mark

(A) Connecting Rod Mark : 2 Stamps
(B) Connecting Rod Mark : 1 Stamp
(C) Crankpin Bearing ID Color : Blue or without Color

W1234893



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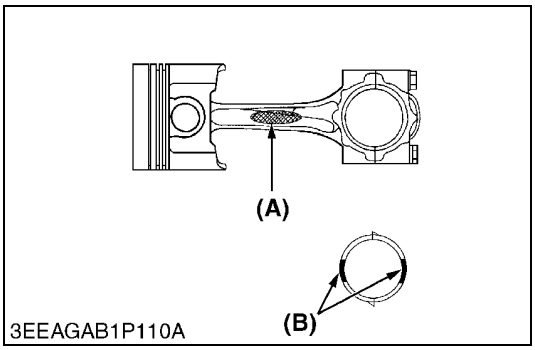

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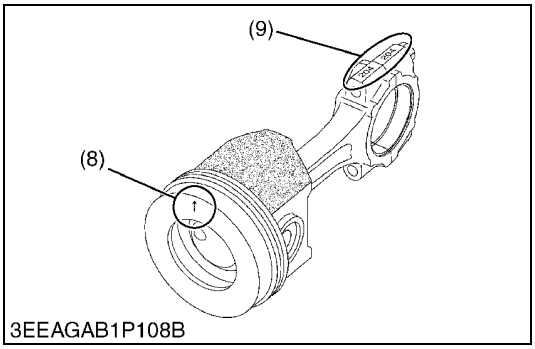

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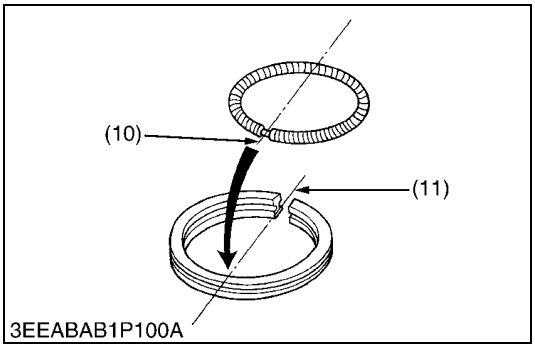

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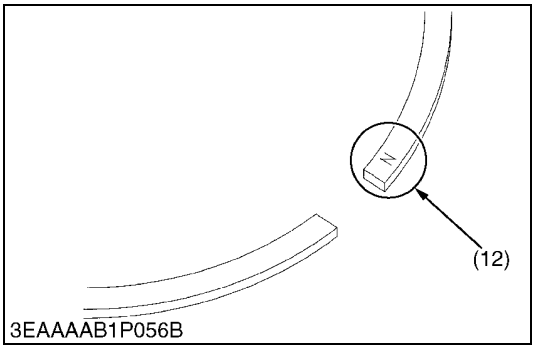

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Piston Ring and Connecting Rod (for V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Remove the piston rings using a piston ring tool.
2. Remove the piston pin (7), and separate the connecting rod (6) from the piston (5).

(When reassembling)

- Be sure to fix the crankpin bearing I.D.color **(B)** and the connecting rod I.D.color **(A)** are same colors.
- When installing the ring, assemble the rings so that the manufacture's mark (12) near the gap faces the top of the piston (5).
- When installing the oil ring (3) onto the piston (5), place the expander joint (11) on the opposite side of the oil ring gap (10).
- Apply engine oil to the piston pin (7).
- When installing the piston pin (7), immerse the piston (5) in 80 °C (176 °F) oil for 10 to 15 minutes and insert the piston pin (7) to the piston (5).
- Assemble the piston (5) to the connecting rod (6) with the ↑ mark (8) and the connecting rod numbering mark (9) facing same side.
- The end faces of the oil ring (3) are plated with hard chrome. In putting the piston (5) into the cylinder, be careful not to get the oil ring (3) scratched by the cylinder. Use the piston ring fitter to tighten up the oil ring (3). If the ring's planting is scratched, it may get stuck on the cylinder wall, causing a serious trouble.

■ **IMPORTANT**

- **Mark the same number on the connecting rod (6) and the piston (5) so as not to change the combination.**

(1) Top Ring
(2) Second Ring
(3) Oil Ring
(4) Piston Pin Snap Pin
(5) Piston
(6) Connecting Rod
(7) Piston Pin
(8) Mark (↑)
(9) Numbering Mark
(10) Oil Ring Gap
(11) Expander Joint
(12) Manufacture's Mark

(A) Connecting Rod ID Color : Blue or without Color
(B) Crankpin Bearing ID Color : Blue or without Color

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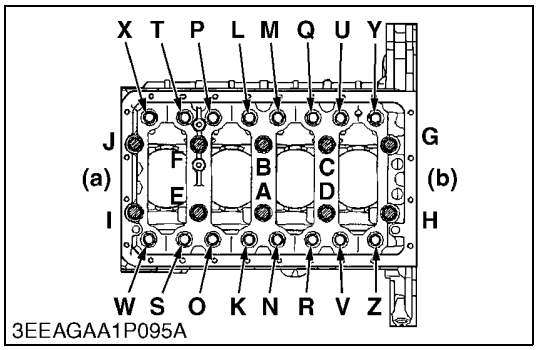
(11) Crankshaft and Crankcase



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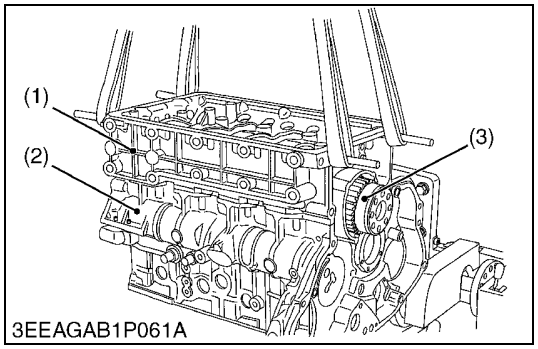

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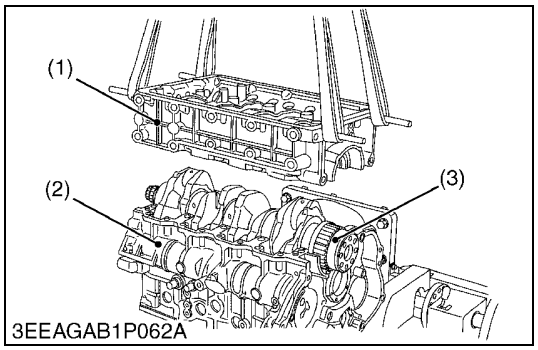

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Crankshaft and Crankcase

1. Remove the crankcase 2 mounting screw and crankcase 2 flange screw in the order of **Z** to **A**.
2. Remove the crankcase 2 (1) from the crankcase 1 (2).
3. Remove the crankshaft (3).

(1) Crankcase 2
(2) Crankcase 1
(3) Crankshaft

(a) Front Cover Side
(b) Flywheel Housing Side
A to J :Crankcase 2 Mounting Screw
K to Z :Crankcase 2 Flange Screw

(To be continued)
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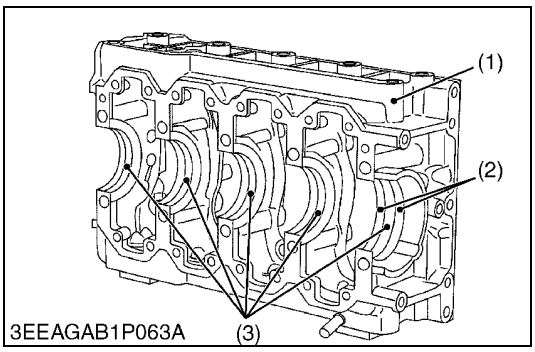

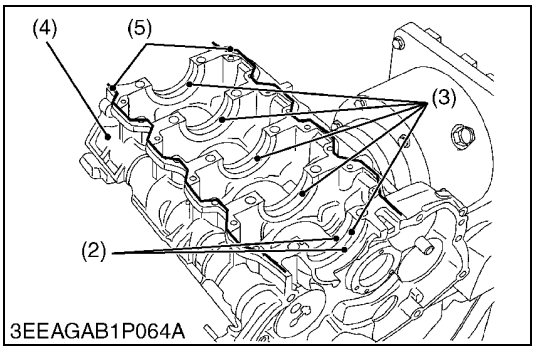

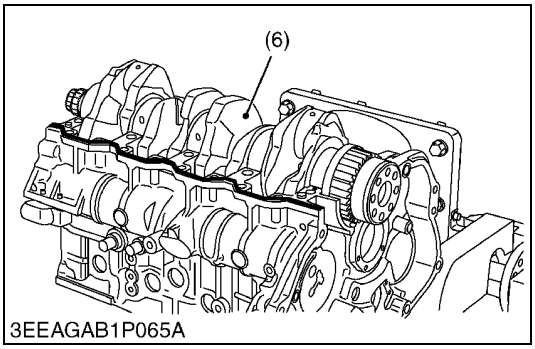

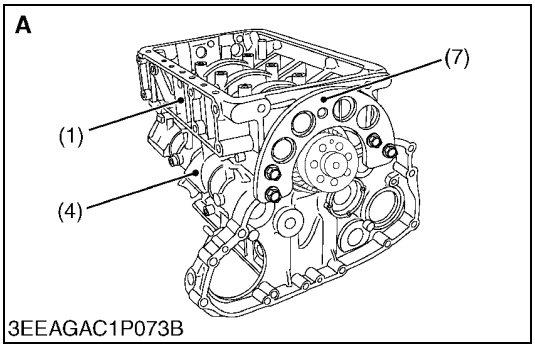

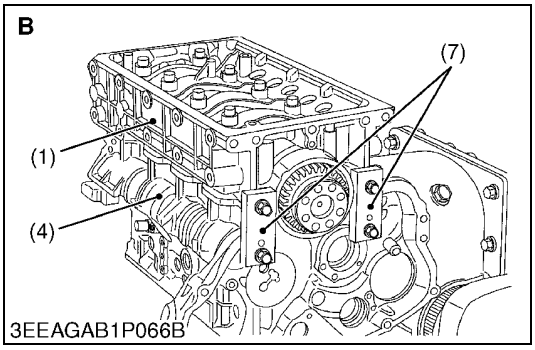

(Continued)
(When reassembling)

- Make sure the crankcase 1 (4) and 2 (1) are clean.
- Reassemble the crankshaft bearing (3) into crankcase 1 (4) and 2 (1).
- Reassemble the thrust bearing (2), with the oil groove facing outside, into both flywheel housing edge journal side of the crankcase 1 (4) and 2 (1).
- Apply oil to the thrust bearing and set the crankshaft (6).
- Apply liquid gasket (Three Bond 1217H or equivalent) (5) to the crankcase 1 as shown in the figure.
- Confirm that the liquid gasket coating surface is free of water, dust and oil in order to maintain sealing effect.
- Carefully apply the adhesive evenly.
- Match the crankcase 1 (4) and 2 (1), referring to the flywheel housing's contoured face.
- Tighten the crankcase 2 mounting screws (**A** to **J**) and the crankcase 2 flange screws (**K** to **Z**) loosely after applying engine oil.
- Tighten up the jig (7) to the specified torque same as the flywheel housing screw. (Refer to "5. SPECIAL TOOLS" at "GENERAL" section.) This helps to minimize the level difference between the crankcase 1 (4) and the crankcase 2 (1) (at the flywheel side). Possible gap must be 0.05 mm (0.002 in.) or smaller.
- Tighten the crankcase 2 mounting screw and the crankcase 2 flange screw in the order of **A** to **Z**. (Refer to previous page.)

■ **NOTE**

- **When mounting the adhesive-applied parts, take care to fit them to the mating parts.**
- **Assemble the adhesive-applied parts within ten minutes.**

Tightening torque	Crankcase 2 mounting screw (**A** to **J**)	V2607-DI-E3B V2607-DI-T-E3B	128 to 137 N·m 13.0 to 14.0 kgf·m 94.1 to 101 lbf·ft
		V3007-DI-T-E3B V3307-DI-T-E3B	138 to 147 N·m 14.0 to 15.0 kgf·m 102 to 108 lbf·ft
	Crankcase 2 flange screw (**K** to **Z**)	V2607-DI-E3B V2607-DI-T-E3B	49 to 55 N·m 5.0 to 5.7 kgf·m 37 to 41 lbf·ft
		V3007-DI-T-E3B V3307-DI-T-E3B	59 to 63 N·m 6.0 to 6.5 kgf·m 44 to 47 lbf·ft
	Flywheel housing mounting screw	V2607-DI-E3B V2607-DI-T-E3B	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
		V3007-DI-T-E3B V3307-DI-T-E3B	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

(1) Crankcase 2
(2) Thrust Bearing
(3) Crankshaft Bearing
(4) Crankcase 1
(5) Liquid Gasket
(6) Crankshaft
(7) Jig

A : V2607-DI-E3B / V2607-DI-T-E3B
B : V3007-DI-T-E3B / V3307-DI-T-E3B

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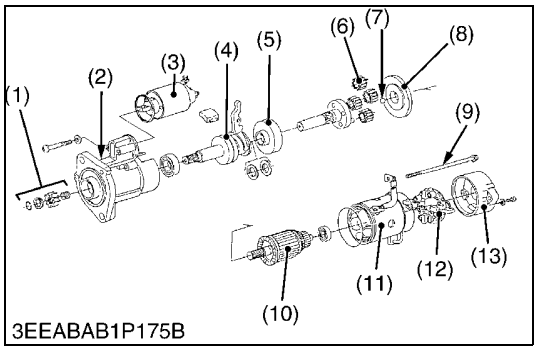
(12) Starter



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Disassembling Motor

1. Disconnect the solenoid switch (3).
2. Remove the 2 through screws (9) and the 2 brush holder lock screws. Take out the rear end frame (13) and the brush holder (12).
3. Disconnect the armature (10) and the yoke (11). Remove also the ball (7) from the tip of the armature (10).
4. Remove the set of packing (8), the 4 planetary gears (6) and another packing.
5. Take out the shaft assembly. Take note of the position of the lever.

■ **IMPORTANT**

- **Before disconnecting the yoke (11), put tally marks on the yoke (11) and the front bracket (2).**
- **Take note of the positions of the set of packing (8) and the setup bolt.**
- **Apply grease to the gears, bearings, shaft's sliding part and ball (7).**

■ **NOTE**

- **Do not damage to the brush and commutator.**

(When reassembling)

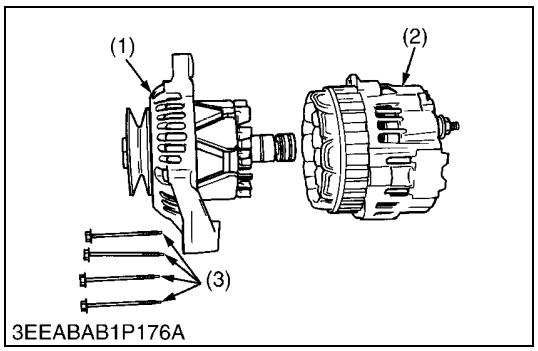
- Apply grease (DENSO CO. No.50 or equivalent) to the parts indicated in the figure.

Tightening torque	Starter's terminal **B** mounting nut	9.8 to 11 N·m 1.0 to 1.2 kgf·m 7.3 to 8.6 lbf·ft

(1) Gear
(2) Front Bracket
(3) Solenoid Switch
(4) Overrunning Clutch
(5) Internal Gear
(6) Planetary Gear
(7) Ball
(8) Set of Packing
(9) Through Screw
(10) Armature
(11) Yoke
(12) Brush Holder
(13) Rear End Frame

W1074237

(13) Alternator



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Front Bracket

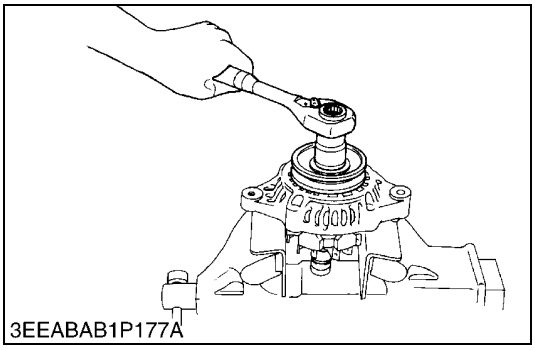
1. Remove the 4 screws (3).
2. Separate the front bracket (1) and the rear bracket (2) from each other.

■ **IMPORTANT**

- **Put a tally line on the front bracket (1) and the rear bracket (2) for reassembling them later.**

(1) Front Bracket
(2) Rear Bracket
(3) Screw

W1074745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Pulley

1. Hold the rotor (base of the claw) in a vise. Loosen the lock nut using a M24 box wrench.

Tightening torque	Alternator pulley nut	58.4 to 78.9 N·m 5.95 to 8.05 kgf·m 43.1 to 58.2 lbf·ft

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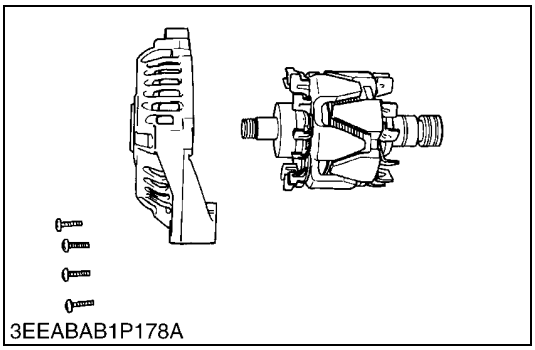
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Rotor

1. Remove the 4 screws and detach the bearing retainer.
2. Temporarily install the nut on the pulley screw, and detach the rotor.

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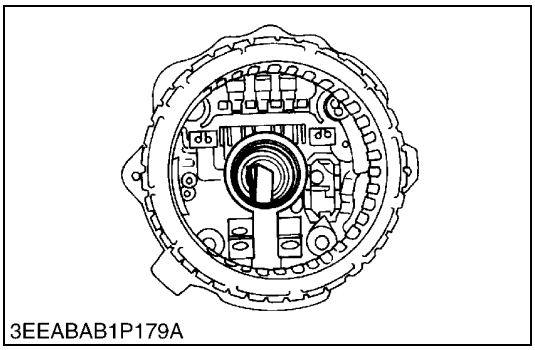
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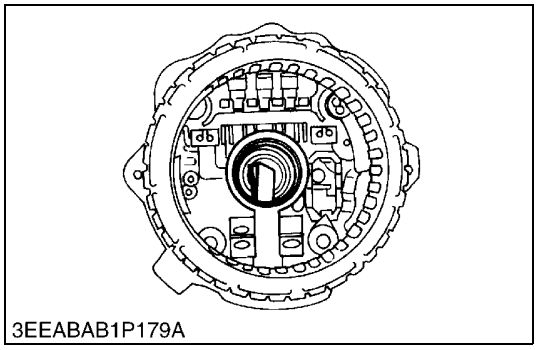
Brush

1. When the rotor is detached, the 2 brushes are found to stretch out of the shaft hole.

W1075045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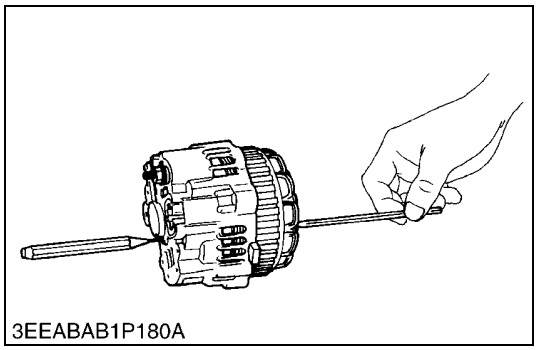
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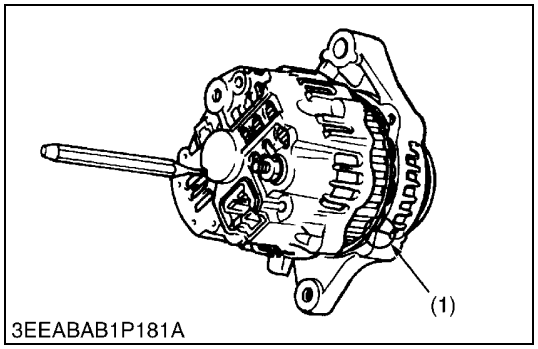

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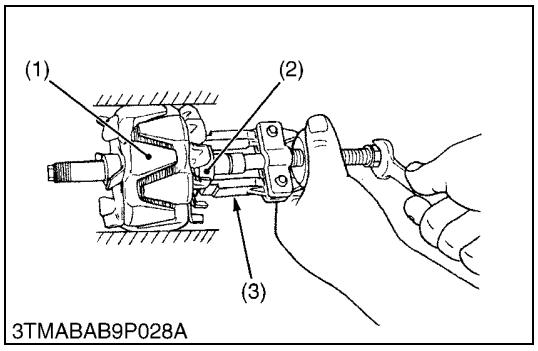

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Reassembling the Brush

1. Fit the brush with its sliding face in the clockwise direction when viewed from front.

■ **IMPORTANT**

- **Be sure to keep the 2 brushes deep in the brush holder. Otherwise the rotor and the rear section can not be fitted into the position.**
- **Use a 4.0 mm (0.16 in.) hex. wrench to push the brushes into place.**
- **Using a pin-pointed (2.0 mm (0.079 in.)) punch, keep the brushes from popping out.**

2. Match the tally line of the front section with that of the rear section.
3. Tighten the 4 screws, and draw out the pin-pointed punch out of the brush holder.

(1) Marking

W1075117

Bearing at Slip Ring Side

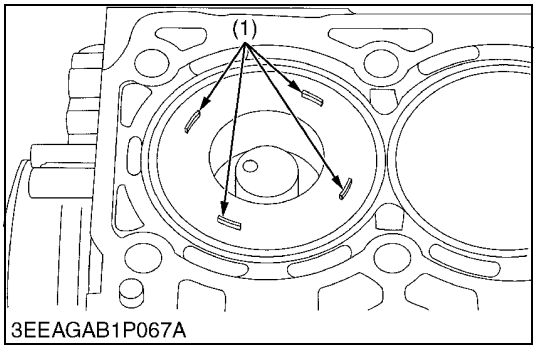
1. Lightly secure the rotor (1) with a vise to prevent damage, and remove the bearing (2) with a puller (3).

(1) Rotor
(2) Bearing
(3) Puller

W1019701

[3] SERVICING

(1) Cylinder Head and Valves



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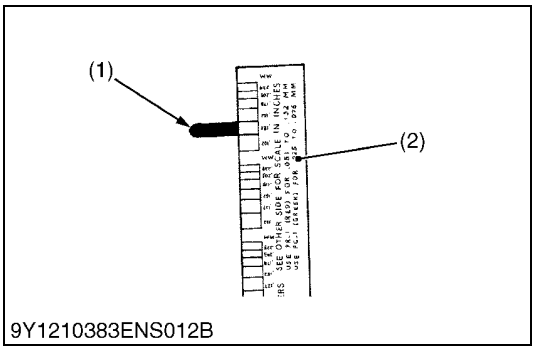

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Top Clearance

1. Remove the cylinder head.
2. With the piston at TDC, use grease to affix three or four plastigauges of a diameter 1.5 mm (0.059 in.) x 5.0 to 7.0 mm (0.20 to 0.27 in.) long to the crown of the piston; keep the gauges away from the intake valve and combustion chamber fittings.
3. Take the piston to an intermediate position, install the cylinder head and tighten the head bolts to the specified torque.
4. Turn the crankshaft so the piston goes through TDC.
5. Remove the cylinder head and compare the width of the crushed plastigages with the scale.
6. If they are out of spec, check the oil clearance of the crank pin, journals and piston pin.

■ **NOTE**

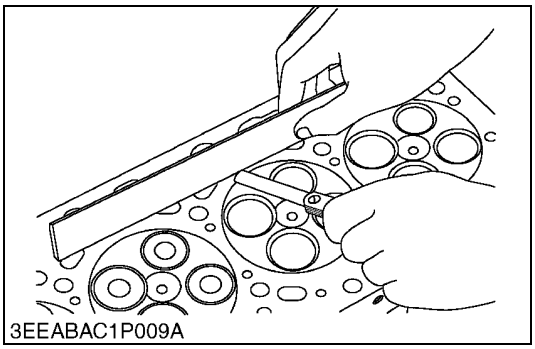
- **Top clearance = Width of the crushed plastigauge.**

Top clearance	Factory spec.	0.60 to 0.80 mm 0.024 to 0.031 in.

Tightening torque	Cylinder head mounting screw	V2607-DI-E3B V2607-DI-T-E3B	147 to 156 N·m 15.0 to 16.0 kgf·m 109 to 115 lbf·ft
		V3007-DI-T-E3B V3307-DI-T-E3B	187 to 196 N·m 19.0 to 20.0 kgf·m 138 to 144 lbf·ft

(1) Plastigauge (2) Scale

W1049122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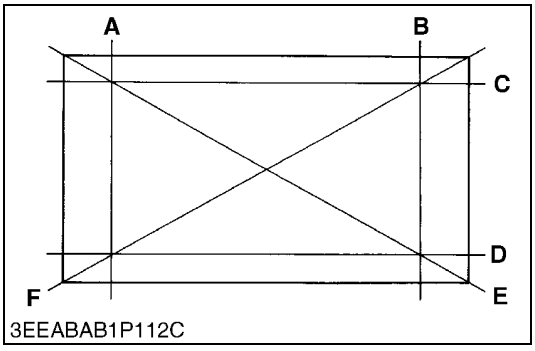
Cylinder Head Surface Flatness

1. Clean the cylinder head surface.
2. Place a straightedge on the cylinder head's four sides (**A**), (**B**), (**C**) and (**D**) and two diagonal (**E**) and (**F**) as shown in the figure. Measure the clearance with a feeler gauge.
3. If the measurement exceeds the allowable limit, correct it with a surface grinder.

■ **IMPORTANT**

- **Be sure to check the valve recessing after correcting.**



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Cylinder head surface flatness	Allowable limit	0.05 mm 0.002 in.

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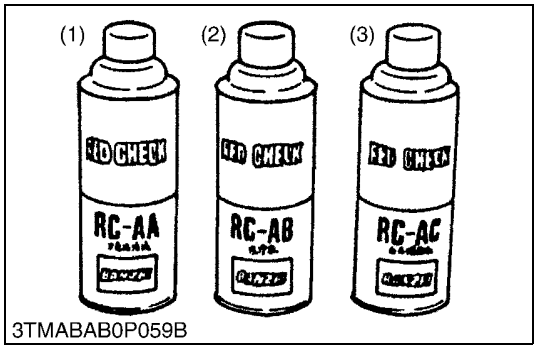

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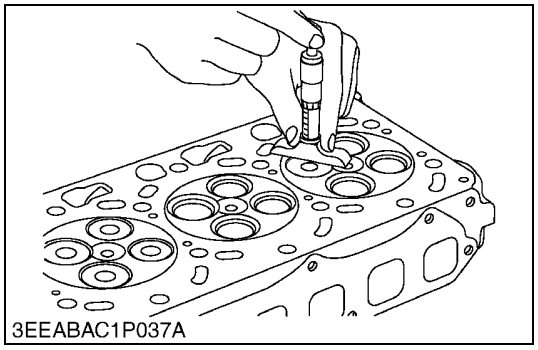
Cylinder Head Flaw

1. Prepare an air spray red check.
2. Clean the surface of the cylinder head with the detergent (2).
3. Spray the cylinder head surface with the red permeative liquid (1). Leave it five to ten minutes after spraying.
4. Wash away the red permeative liquid on the cylinder head surface with the detergent (2).
5. Spray the cylinder head surface with the white developer (3).
6. If flawed, it can be identified as red marks.

(1) Red Permeative Liquid
(2) Detergent
(3) White Developer

W1076542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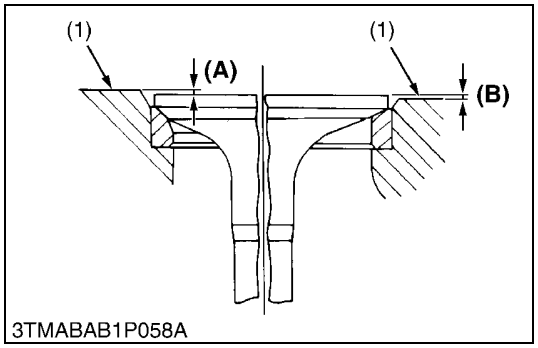
Valve Recessing

1. Clean the cylinder head, the valve face and seat.
2. Insert the valve into the valve guide.
3. Measure the valve recessing with a depth gauge.
4. If the measurement exceeds the allowable limit, replace the valve.
   If it still exceeds the allowable limit after replacing the valve, replace the cylinder head.

Valve recessing (Intake and exhaust)	Factory spec.	(recessing) 0.65 to 0.85 mm 0.026 to 0.033 in.
	Allowable limit	(recessing) 1.20 mm 0.0472 in.



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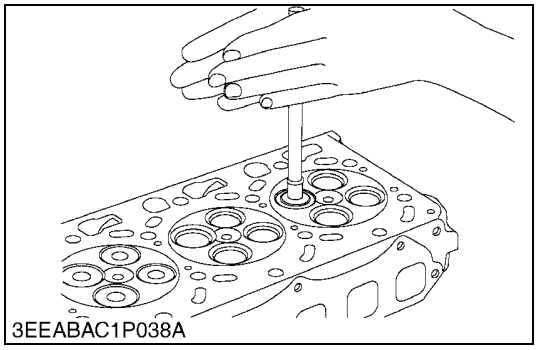
(1) Cylinder Head Surface
(A) Recessing
(B) Protrusion

W1061543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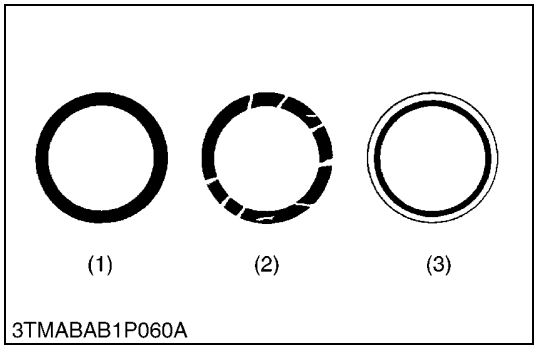
Valve Lapping

1. Apply compound evenly to the valve lapping surface.
2. Insert the valve into the valve guide. Lap the valve onto its seat with a valve flapper or screwdriver.
3. After lapping the valve, wash the compound away and apply oil, then repeat valve lapping with oil.
4. Apply prussian blue to the contact surface to check the seated rate. If it is less than 70 %, repeat valve lapping again.

■ **IMPORTANT**

- **When valve lapping is performed, be sure to check the valve recessing and adjust the valve clearance after assembling the valve.**



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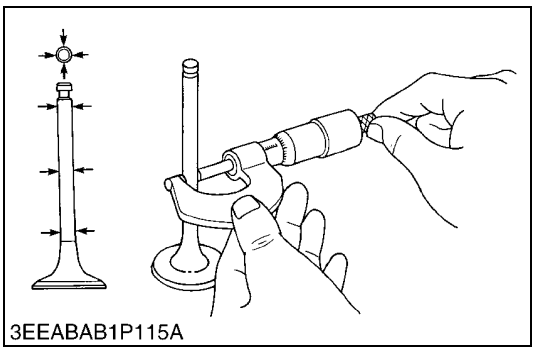
(1) Correct
(2) Incorrect
(3) Incorrect

W1061709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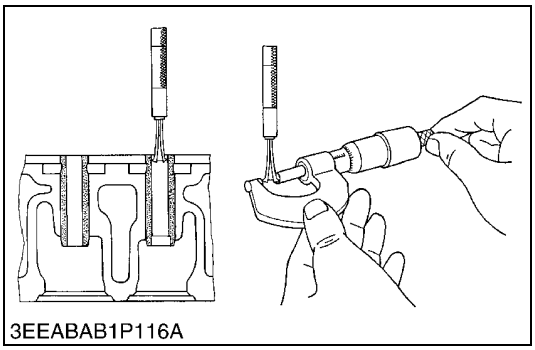
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Clearance between Valve Stem and Valve Guide

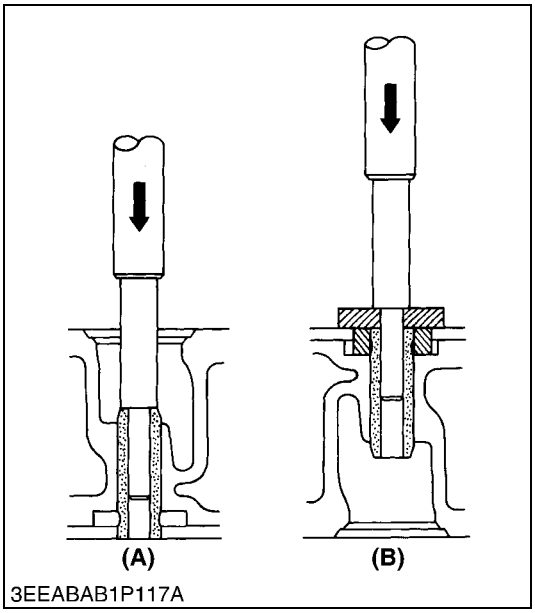
1. Remove carbon from the valve guide section.
2. Measure the valve stem O.D. with an outside micrometer.
3. Measure the valve guide I.D. of the cylinder head at the most wear part as shown in the figure below with a small hole gauge. And calculate the clearance.
4. If the clearance exceeds the allowable limit, replace the valves. If it still exceeds the allowable limit, replace the valve guide.

Clearance between valve stem and guide (Intake)	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	0.030 to 0.057 mm 0.0012 to 0.0022 in.
		Allowable limit	0.10 mm 0.0039 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	0.055 to 0.085 mm 0.0022 to 0.0033 in.
		Allowable limit	0.10 mm 0.0039 in.
Clearance between valve stem and guide (Exhaust)	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	0.045 to 0.072 mm 0.0018 to 0.0028 in.
		Allowable limit	0.10 mm 0.0039 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	0.055 to 0.085 mm 0.0022 to 0.0033 in.
		Allowable limit	0.10 mm 0.0039 in.

Valve stem O.D. (Intake)	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	5.968 to 5.980 mm 0.2350 to 0.2354 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	6.960 to 6.975 mm 0.2741 to 0.2746 in.
Valve stem O.D. (Exhaust)	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	5.953 to 5.965 mm 0.2344 to 0.2348 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	6.960 to 6.975 mm 0.2741 to 0.2746 in.

Valve guide I.D. (Intake and exhaust)	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	6.010 to 6.025 mm 0.2367 to 0.2372 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	7.030 to 7.045 mm 0.2768 to 0.2773 in.

W1061883



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Replacing Valve Guide

(When removing)

1. Using a valve guide replacing tool, press out the used valve guide. (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.)

(When installing)

1. Clean a new valve guide, and apply engine oil to it.
2. Using a valve guide replacing tool, press in a new valve guide until it is flush with the cylinder head as shown in the figure.
3. Ream precisely the I.D. of the valve guide to the specified dimension.

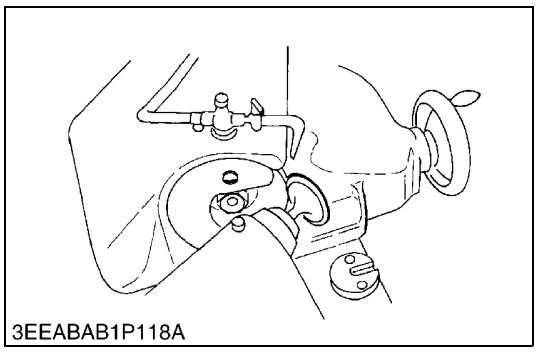
Valve guide I.D. (Intake and exhaust)	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	6.010 to 6.025 mm 0.2367 to 0.2372 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	7.030 to 7.045 mm 0.2768 to 0.2773 in.

■ **IMPORTANT**

- **Do not hit the valve guide with a hammer, etc. during replacement.**

(A) When Removing **(B) When Installing**

W1062212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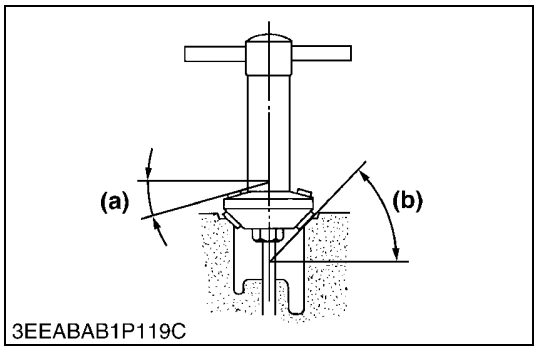

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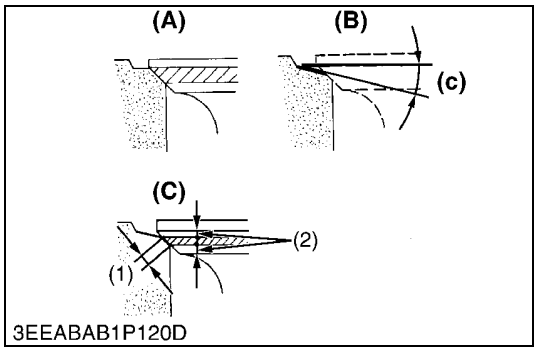

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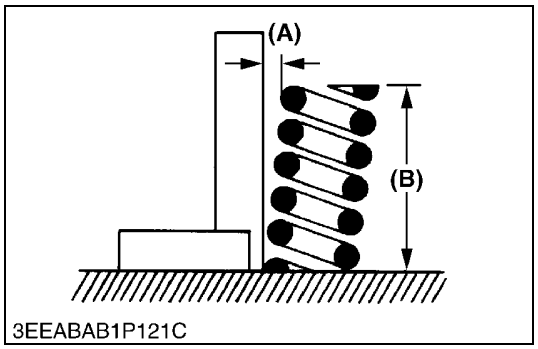

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Correcting Valve and Valve Seat

■ **NOTE**
- **Before correcting the valve and seat, check the valve stem and the I.D. of valve guide section, and repair them if necessary.**
- **After correcting the valve seat, be sure to check the valve recessing.**

1) Correcting Valve

1. Correct the valve with a valve refacer.

Valve face angle (Intake and exhaust)	Factory spec.	0.79 rad 45 °

2) Correcting Valve Seat

1. Slightly correct the seat surface with a 0.79 rad (45 °) valve seat cutter.
2. Resurface the seat surface with a 0.26 rad (15 °) valve seat cutter so that the width is close to specified valve seat width.

Valve seat width (Intake and exhaust)	Factory spec.	3.3 to 3.6 mm 0.13 to 0.14 in.

3. After resurfacing the seat, inspect for even valve seating, apply a thin film of compound between the valve face and valve seat, and fit them with valve lapping tool.
4. Check the valve seating with prussian blue. The valve seating surface should show good contact all the way around.

Valve seat angle (Intake and exhaust)	Factory spec.	0.79 rad 45 °

(1) Valve Seat Width
(2) Identical Dimensions

(A) Check Contact
(B) Correct Seat Width
(C) Check Contact
(a) 0.26 rad (15 °)
(b) 0.79 rad (45 °)
(c) 0.52 rad (30 °)

W10283500

Free Length and Tilt of Valve Spring

1. Measure the free length (**B**) with vernier calipers. If the measurement is less than the allowable limit, replace it.
2. Put the spring on a surface plate, place a square on the side of the spring, and check to see if the entire side is contact with the square. Rotate the spring and measure the maximum tilt (**A**). If the measurement exceeds the allowable limit, replace.
3. Check the entire surface of the spring for scratches. Replace it, if any.

Tilt (**A**)	Allowable limit	1.0 mm 0.039 in.

Free length (**B**)	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	35.4 to 35.9 mm 1.40 to 1.41 in.
		Allowable limit	34.9 mm 1.37 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	35.1 to 35.6 mm 1.39 to 1.40 in.
		Allowable limit	34.6 mm 1.36 in.

(A) Tilt
(B) Free length

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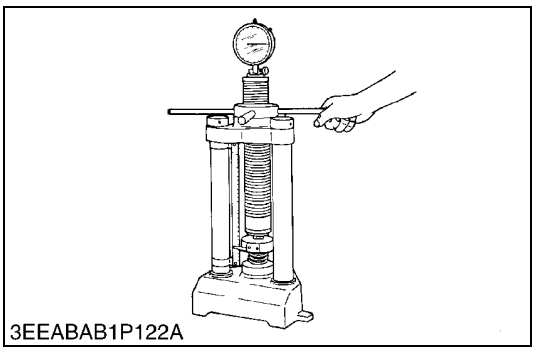
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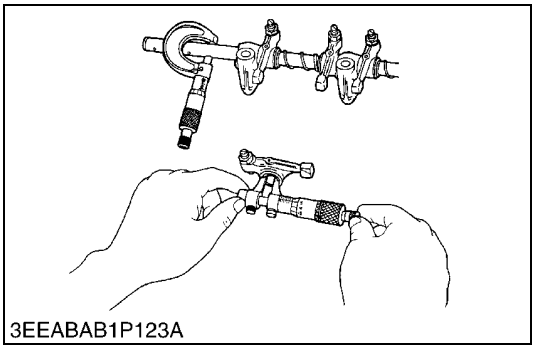
Valve Spring Setting Load

1. Place the valve spring on a tester and compress it to the same length it is actually compressed in the engine.
2. Read the compression load on the gauge.
3. If the measurement is less than the allowable limit, replace it.

Setting load / setting length	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	60.8 N / 29.7 mm 6.20 kgf / 29.7 mm 13.7 lbf / 1.17 in.
		Allowable limit	45.9 N / 29.7 mm 4.68 kgf / 29.7 mm 10.3 lbf / 1.17 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	63.5 N / 31.5 mm 6.48 kgf / 31.5 mm 14.3 lbf / 1.24 in.
		Allowable limit	45.9 N / 31.5 mm 4.68 kgf / 31.5 mm 10.3 lbf / 1.24 in.

W1063470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Oil Clearance between Rocker Arm Shaft and Bearing

1. Measure the rocker arm bearing I.D. with an inside micrometer.
2. Measure the rocker arm shaft O.D. with an outside micrometer, and then calculate the oil clearance.
3. If the clearance exceeds the allowable limit, replace the rocker arm and measure the oil clearance again. If it still exceeds the allowable limit, replace also the rocker arm shaft.

Oil clearance of rocker arm shaft and bearing	Factory spec.	0.016 to 0.045 mm 0.00063 to 0.0017 in.
	Allowable limit	0.15 mm 0.0059 in.

Rocker arm shaft O.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	13.973 to 13.984 mm 0.55012 to 0.55055 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	14.973 to 14.984 mm 0.58949 to 0.58992 in.

Rocker arm I.D. for shaft	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	14.000 to 14.018 mm 0.55119 to 0.55188 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	15.000 to 15.018 mm 0.59056 to 0.59125 in.

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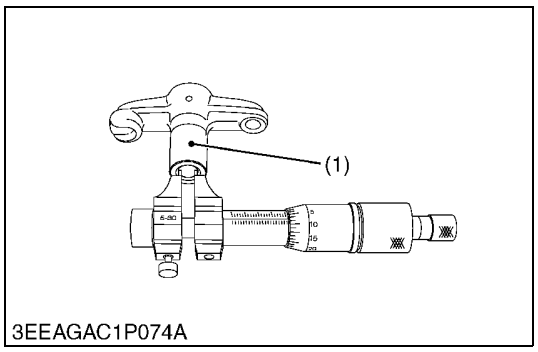

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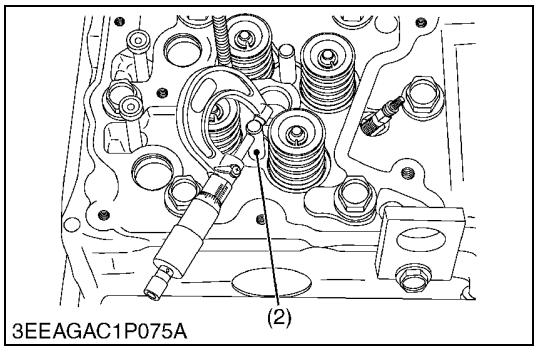

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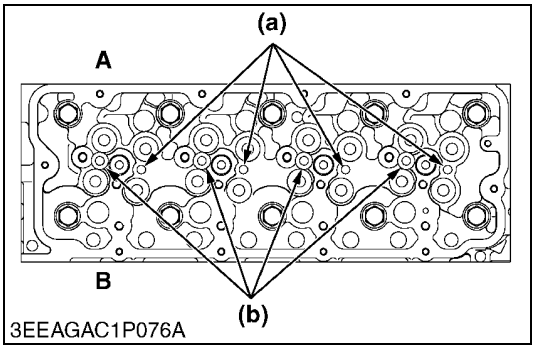
Oil Clearance between Valve Bridge Arm and Valve Bridge Shaft

1. Measure the valve bridge arm (1) I.D. with an inside micrometer.
2. Measure the valve bridge shaft (2) O.D. with an outside micrometer, and then calculate the oil clearance.
3. If the clearance exceeds the allowable limit, replace the valve bridge arm (1) and measure the oil clearance again. If it still exceeds the allowable limit, replace also the valve bridge shaft (2).

Oil clearance between valve bridge arm and valve bridge shaft	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	0.018 to 0.057 mm 0.00071 to 0.0022 in.
		Allowable limit	0.15 mm 0.0059 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	0.018 to 0.042 mm 0.00071 to 0.0016 in.
		Allowable limit	0.15 mm 0.0059 in.
Valve bridge shaft O.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	8.023 to 8.032 mm 0.3159 to 0.3162 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	9.023 to 9.032 mm 0.3553 to 0.3555 in.
Valve bridge arm I.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	8.050 to 8.080 mm 0.3170 to 0.3181 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	9.050 to 9.065 mm 0.3563 to 0.3568 in.

(1) Valve Bridge Arm (2) Valve Bridge Shaft

W1042581



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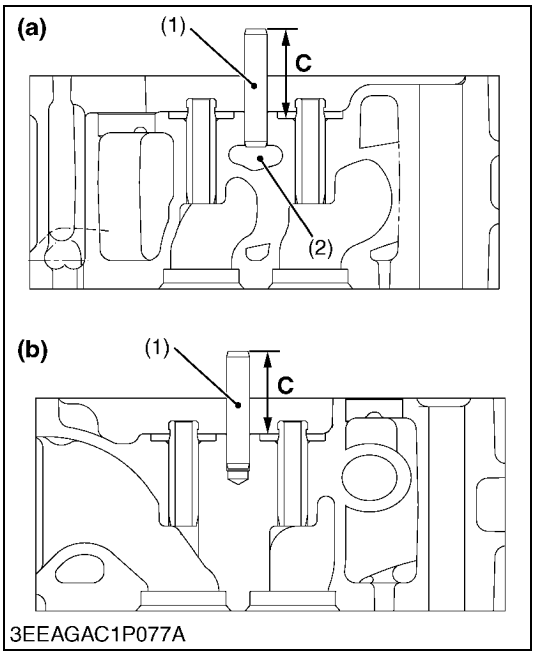

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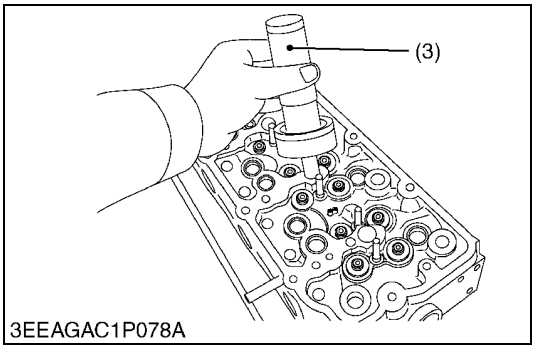

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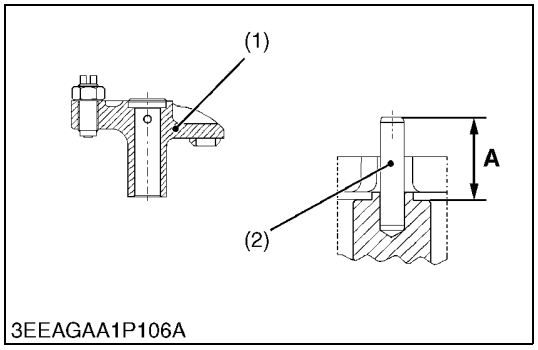
Replacing Valve Bridge Shaft (for V2607-DI-E3B / V2607-DI-T-E3B)(If necessary)

1. Remove the used valve bridge shaft (1).
2. Clean the valve bridge shaft mounting hole.
3. Apply the liquid seal (Three Bond 1386B or equivalent) to the tip of the valve bridge shaft when installing shaft at the position shown in figure **(a)**.
4. Using valve bridge shaft replacing tool (3), press in the new shaft. (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.)

(1) Valve Bridge Shaft
(2) Coolant Passage
(3) Valve Bridge Shaft Replacing Tool

A : Intake Side
B : Exhaust Side
C : 31.30 to 31.70 mm (1.233 to 1.248 in.)
(a) Shaft Hole (Through To The Coolant Passage)
(b) Shaft Hole (Not Through To The Coolant Passage)

W1283273



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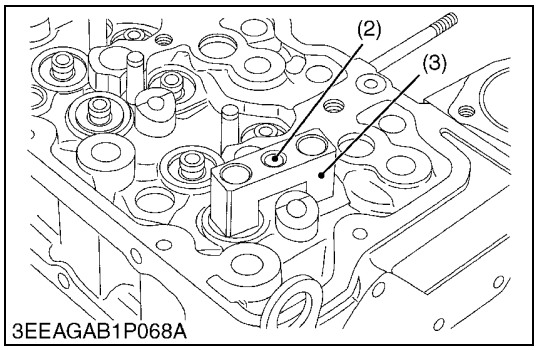
Replacing Valve Bridge Shaft (for V3007-DI-T-E3B / V3307-DI-T-E3B) (If necessary)

1. Remove the used valve bridge shaft (2).
2. Clean the valve bridge shaft mounting hole.
3. Using valve bridge shaft replacing tool (3), press in the new shaft. (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.)

(1) Valve Bridge Arm **A : 31.1 to 31.7 mm (1.23 to 1.24 in.)**
(2) Valve Bridge Shaft
(3) Valve Bridge Shaft Replacing Tool

W1042985



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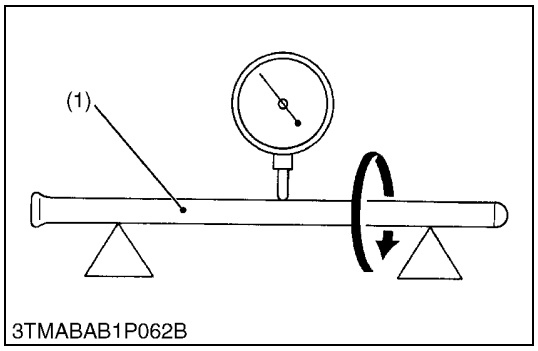
Push Rod Alignment

1. Place the push rod on V blocks.
2. Measure the push rod alignment.
3. If the measurement exceeds the allowable limit, replace the push rod.

Push rod alignment	Allowable limit	0.25 mm 0.0098 in.

(1) Push Rod

W10292900



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Oil Clearance between Tappet and Tappet Bore

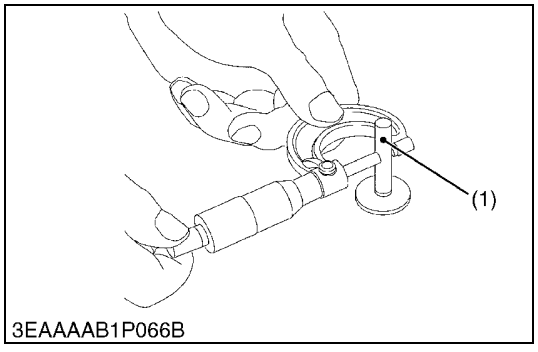
1. Measure the tappet O.D. with an outside micrometer.
2. Measure the I.D. of the tappet bore at the most wear part with a small hole gauge.
3. If the oil clearance exceeds the allowable limit or the tappet is damaged, replace the tappet.

Oil clearance between tappet and tappet bore	Factory spec.	0.020 to 0.050 mm 0.00079 to 0.0019 in.
	Allowable limit	0.07 mm 0.003 in.

Tappet O.D.	Factory spec.	9.965 to 9.980 mm 0.3924 to 0.3929 in.
Tappet bore I.D.	Factory spec.	10.000 to 10.015 mm 0.39370 to 0.39429 in.

(1) Tappet (2) Tappet Bore

W1043774



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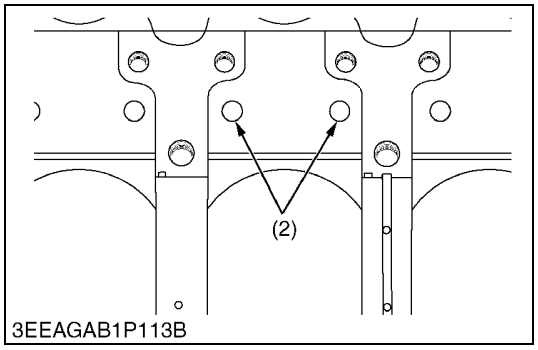

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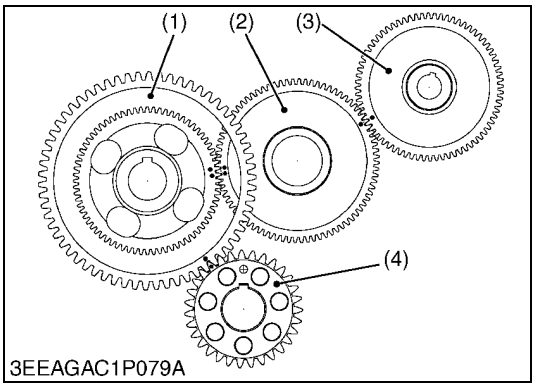
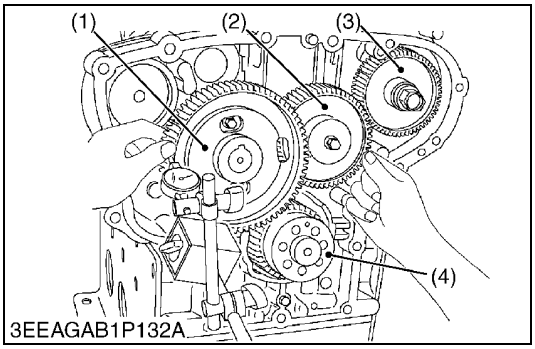
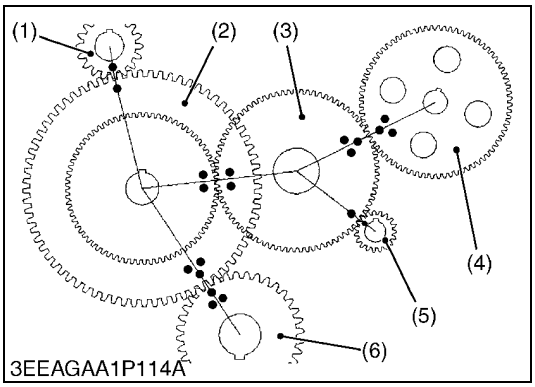
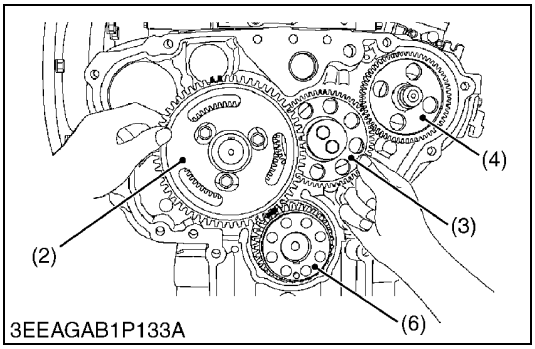
(2) Timing Gears









Timing Gear Backlash (for V2607-DI-E3B / V2607-DI-T-E3B)

1. Set a dial indicator (lever type) with its tip on the gear tooth.
2. Move the gear to measure the backlash, holding its mating gear.
3. If the backlash exceeds the allowable limit, check the oil clearance of the shafts and the gear.
4. If the oil clearance is proper, replace the gear.

Backlash between crank gear and cam gear	Factory spec.	0.0400 to 0.137 mm 0.00158 to 0.00539 in.
	Allowable limit	0.22 mm 0.0087 in.
Backlash between cam gear and idle gear	Factory spec.	0.0460 to 0.136 mm 0.00182 to 0.00535 in.
	Allowable limit	0.22 mm 0.0087 in.
Backlash between idle gear and injection pump gear	Factory spec.	0.0460 to 0.136 mm 0.00182 to 0.00535 in.
	Allowable limit	0.22 mm 0.0087 in.

(1) Cam Gear
(2) Idle Gear
(3) Injection Pump Gear
(4) Crank Gear

W1249019

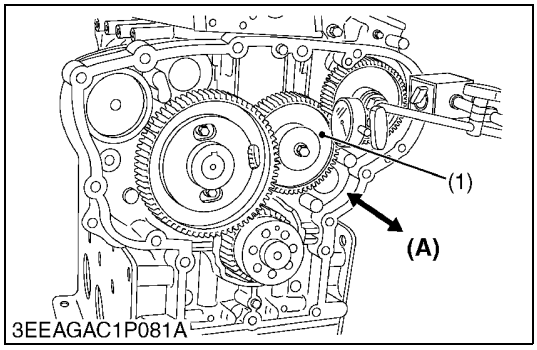
Timing Gear Backlash (for V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Set a dial indicator (lever type) with its tip on the gear tooth.
2. Move the gear to measure the backlash, holding its mating gear.
3. If the backlash exceeds the allowable limit, check the oil clearance of the shafts and the gear.
4. If the oil clearance is proper, replace the gear.

Backlash between crank gear and cam gear	Factory spec.	0.0410 to 0.139 mm 0.00162 to 0.00547 in.
	Allowable limit	0.22 mm 0.0087 in.
Backlash between cam gear and idle gear	Factory spec.	0.0410 to 0.134 mm 0.00162 to 0.00527 in.
	Allowable limit	0.22 mm 0.0087 in.
Backlash between idle gear and injection pump gear	Factory spec.	0.0410 to 0.134 mm 0.00162 to 0.00527 in.
	Allowable limit	0.22 mm 0.0087 in.
(for balancer model) Backlash between cam gear and balancer 1 gear	Factory spec.	0.0410 to 0.134 mm 0.00162 to 0.00527 in.
	Allowable limit	0.22 mm 0.0087 in.
(for balancer model) Backlash between idle gear and balancer 2 gear	Factory spec.	0.0410 to 0.129 mm 0.00162 to 0.00507 in.
	Allowable limit	0.22 mm 0.0087 in.

(1) Balancer 1 Gear (Option)
(2) Cam Gear
(3) Idle Gear
(4) Injection Pump Gear
(5) Balancer 2 Gear (Option)
(6) Crank Gear

W1064048



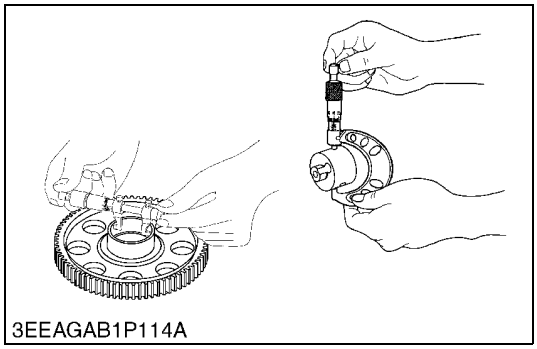
Idle Gear Side Clearance

1. Set a dial indicator with its tip on the idle gear (1).
2. Measure the side clearance by moving the idle gear (1) to the front and rear.
3. If the measurement exceeds the allowable limit, replace the idle gear collars.

Side clearance of idle gear	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	0.050 to 0.20 mm 0.0020 to 0.0078 in.
		Allowable limit	0.90 mm 0.035 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	0.15 to 0.25 mm 0.0059 to 0.0098 in.
		Allowable limit	0.90 mm 0.035 in.

(1) Idle Gear **(A) Side Clearance of Idle Gear**

W1064208



Oil Clearance between Idle Gear Shaft and Idle Gear Bushing

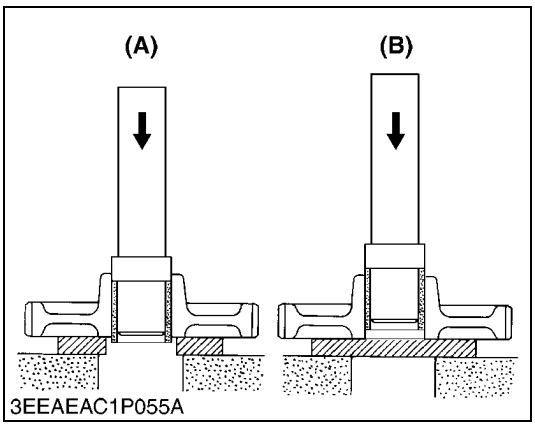
1. Measure the idle gear shaft O.D. with an outside micrometer.
2. Measure the idle gear bushings I.D. with an inside micrometer, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the bushing.

Oil clearance between idle gear shaft and idle gear bushing	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	0.025 to 0.096 mm 0.00099 to 0.0037 in.
		Allowable limit	0.10 mm 0.0039 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	0.050 to 0.091 mm 0.0020 to 0.0035 in.
		Allowable limit	0.10 mm 0.0039 in.

Idle gear shaft O.D.	Factory spec.	34.959 to 34.975 mm 1.3764 to 1.3769 in.

Idle gear bushing I.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	35.000 to 35.055 mm 1.3780 to 1.3801 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	35.025 to 35.050 mm 1.3790 to 1.3799 in.

W1064968



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Replacing Idle Gear Bushing

(When removing)

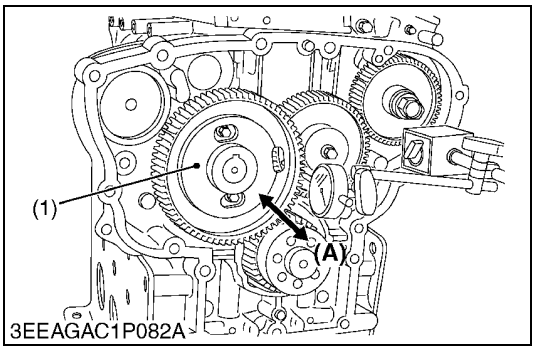
1. Using an idle gear bushing replacing tool, press out the used bushing. (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.)

(When installing)

1. Clean a new idle gear bushing and idle gear bore, and apply engine oil to them.
2. Using an idle gear bushing replacing tool, press in a new bushing (service parts) to the specified dimension. (See figure.)

(A) When Removing **(B) When Installing**

W10302410



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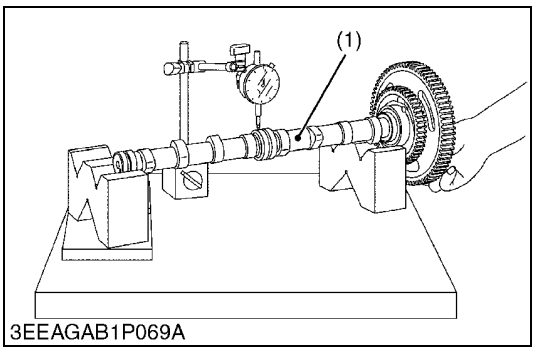
Camshaft Side Clearance

1. Set a dial indicator with its tip on the camshaft.
2. Measure the side clearance by moving the cam gear (1) to the front and rear.
3. If the measurement exceeds the allowable limit, replace the camshaft bearing.

Side clearance of camshaft	Allowable limit	0.10 mm 0.0039 in.

(1) Cam Gear **(A) Side Clearance of Camshaft**

W1064307



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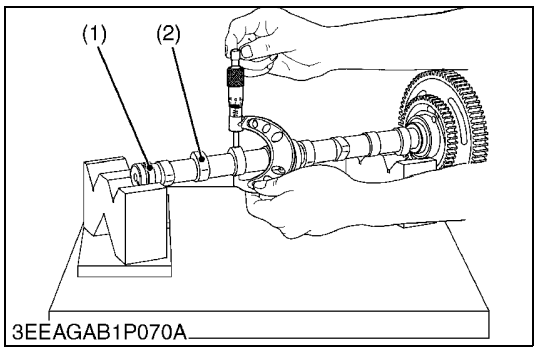
Camshaft Alignment

1. Support the camshaft (1) with V block on the surface plate and set a dial indicator with its tip on the intermediate journal at right angle.
2. Rotate the camshaft (1) on the V blocks and get the misalignment (half of the measurement value).
3. If the misalignment exceeds the allowable limit, replace the camshaft (1).

Camshaft alignment	Allowable limit	0.01 mm 0.0004 in.

(1) Camshaft

W1064422



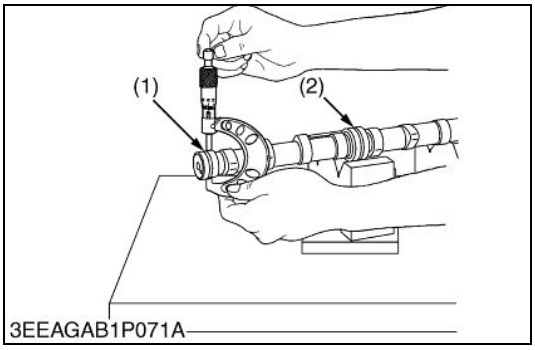
Cam Height

1. Measure the height of the cam (2) at its highest point with an outside micrometer.
2. If the measurement is less than the allowable limit, replace the camshaft (1).

Intake cam height	V2607-DI-E3B	Factory spec.	32.70 mm 1.287 in.
		Allowable limit	32.20 mm 1.268 in.
	V2607-DI-T-E3B	Factory spec.	32.60 mm 1.283 in.
		Allowable limit	32.10 mm 1.264 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	37.50 mm 1.476 in.
		Allowable limit	37.00 mm 1.457 in.
Exhaust cam height	V2607-DI-E3B	Factory spec.	33.20 mm 1.307 in.
		Allowable limit	32.70 mm 1.287 in.
	V2607-DI-T-E3B	Factory spec.	33.00 mm 1.299 in.
		Allowable limit	32.50 mm 1.280 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	37.90 mm 1.492 in.
		Allowable limit	37.40 mm 1.472 in.

(1) Camshaft (2) Cam

W1064551



Oil Clearance between Camshaft Journal and Cylinder Block Bore

1. Measure the camshaft journal O.D. with an outside micrometer.
2. Measure the cylinder block bore I.D. for camshaft with an inside micrometer.
3. If the clearance exceeds the allowable limit, replace the camshaft.

Oil clearance between camshaft journal and cylinder block bore	Factory spec.	0.050 to 0.091 mm 0.0020 to 0.0035 in.
	Allowable limit	0.15 mm 0.0059 in.

Camshaft journal 1 O.D.	Factory spec.	34.934 to 34.950 mm 1.3754 to 1.3759 in.

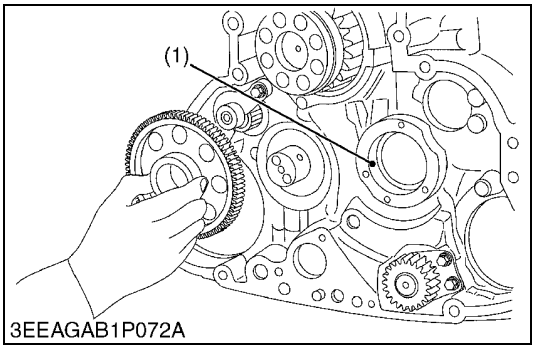
Cylinder block bore 1 I.D.	Factory spec.	35.000 to 35.025 mm 1.3780 to 1.3789 in.

Camshaft journal 2 O.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	41.934 to 41.950 mm 1.6510 to 1.6515 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	43.934 to 43.950 mm 1.7297 to 1.7303 in.

Cylinder block bore 2 I.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	42.000 to 42.025 mm 1.6536 to 1.6545 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	44.000 to 44.025 mm 1.7323 to 1.7332 in.

(1) Camshaft Journal 1 (2) Camshaft Journal 2

W1064798

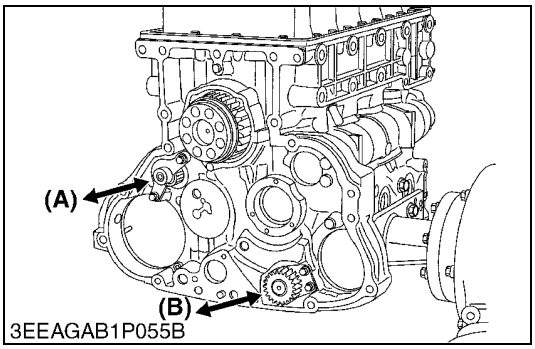


Replacing Camshaft Cover (for V3007-DI-T-E3B / V3307-DI-T-E3B) (If necessary)

1. Remove the used camshaft cover and clean the hole.
2. Install the new camshaft cover (1) until bumping using camshaft cover replacing tool. (Refer to "5. SPECIAL TOOLS" at "GENERAL" section.)

(1) Camshaft Cover

W1048526



Balancer Shaft Side Clearance (for V3007-DI-T-E3B / V3307-DI-T-E3B Balancer Model)

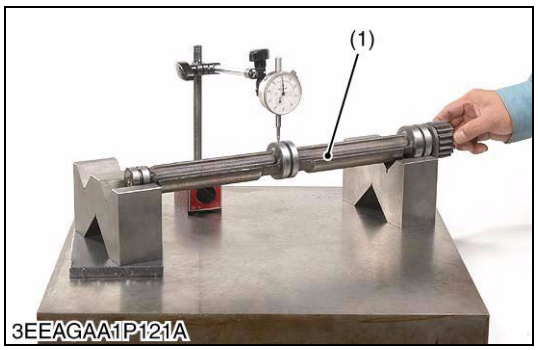
1. Set a dial indicator with tip on the balancer shaft.
2. Measure the side clearance by moving the balancer shaft to the front and rear.
3. If the measurement exceeds the allowable limit, replace the balancer shaft.

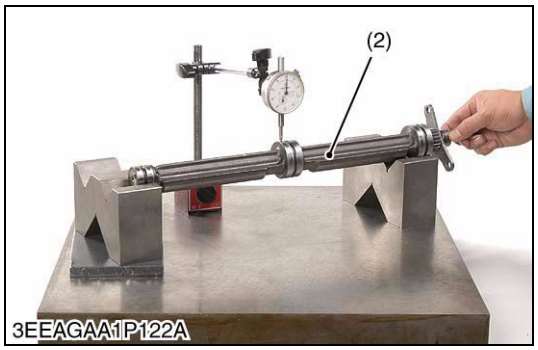
Side clearance of balancer shaft 1	Factory spec.	0.070 to 0.22 mm 0.0028 to 0.0086 in.
	Allowable limit	0.30 mm 0.012 in.

Side clearance of balancer shaft 2	Factory spec.	0.070 to 0.32 mm 0.0028 to 0.012 in.
	Allowable limit	0.34 mm 0.013 in.

(A) Side Clearance of Balancer Shaft 2 **(B) Side Clearance of Balancer Shaft 1**

W1065273





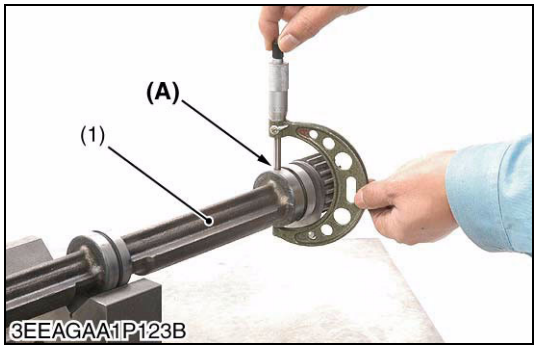
Balancer Shaft Alignment (for V3007-DI-T-E3B / V3307-DI-T-E3B Balancer Model)

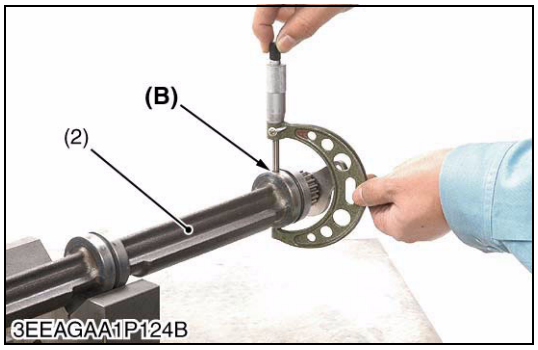
1. Support the balancer shaft with V blocks on the surface plate and set a dial indicator with its tip on the intermediate journal at high angle.
2. Rotate the balancer shaft on the V block and get the misalignment (half of the measurement value).
3. If the misalignment exceeds the allowable limit, replace the balancer shaft.

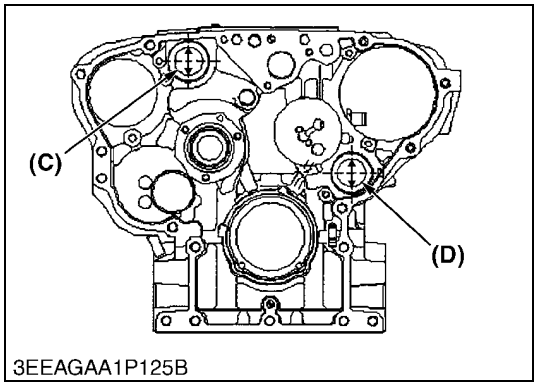
Balancer shaft 1, 2 alignment	Allowable limit	0.02 mm 0.0008 in.

(1) Balancer Shaft 1 (2) Balancer Shaft 2

W1065448







Oil Clearance of Balancer Shaft Journal (for V3007-DI-T-E3B / V3307-DI-T-E3B Balancer Model)

1. Measure the balancer shaft journal O.D. (**(A)** and **(B)**) with an outside micrometer.
2. Measure the cylinder block bore I.D. (**(C)** and **(D)**) for balancer shaft with an inside micrometer.
3. If the clearance exceeds the allowable limit, replace the balancer shaft bearing. If it still exceeds the allowable limit, replace also the balancer shaft.

Oil clearance of balancer shaft 1 journal	Factory spec.	0.0600 to 0.146 mm 0.00237 to 0.00574 in.
	Allowable limit	0.20 mm 0.0079 in.
Balancer shaft 1 journal O.D. **(A)**	Factory spec.	48.934 to 48.950 mm 1.9266 to 1.9271 in.
Balancer shaft 1 bearing I.D. **(C)**	Factory spec.	49.010 to 49.080 mm 1.9296 to 1.9322 in.
Oil clearance of balancer shaft 2 journal	Factory spec.	0.0500 to 0.136 mm 0.00197 to 0.00535 in.
	Allowable limit	0.20 mm 0.0079 in.
Balancer shaft 2 journal O.D. **(B)**	Factory spec.	48.934 to 48.950 mm 1.9266 to 1.9271 in.
Balancer shaft 2 bearing I.D. **(D)**	Factory spec.	49.000 to 49.070 mm 1.9292 to 1.9318 in.

(1) Balancer Shaft 1
(2) Balancer Shaft 2

(A) Balancer Shaft 1 Journal O.D.
(B) Balancer Shaft 2 Journal O.D.
(C) Balancer Shaft 1 Bearing I.D.
(D) Balancer Shaft 2 Bearing I.D.

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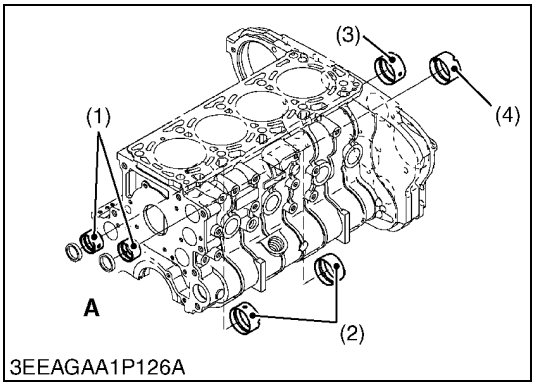

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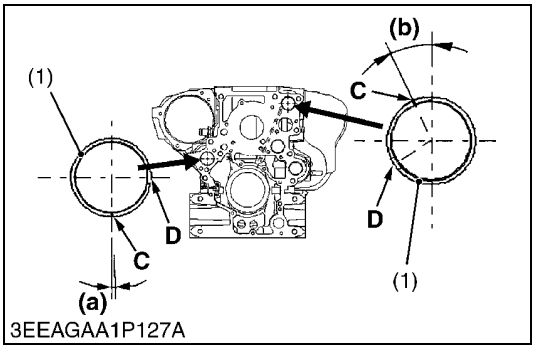

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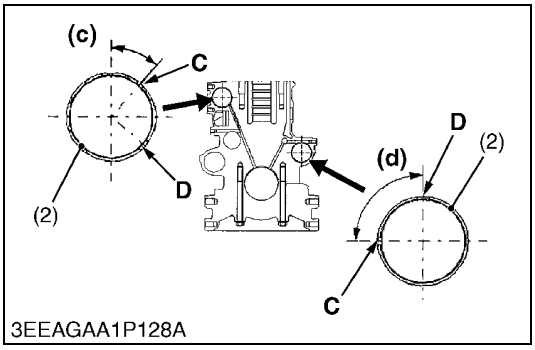

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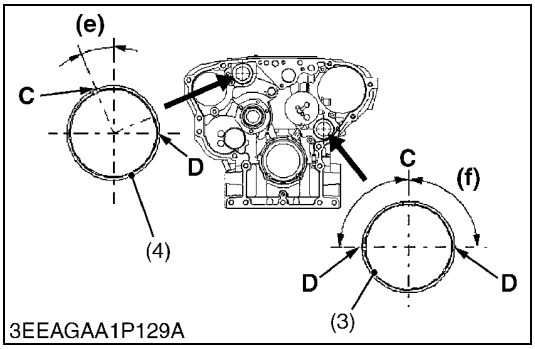

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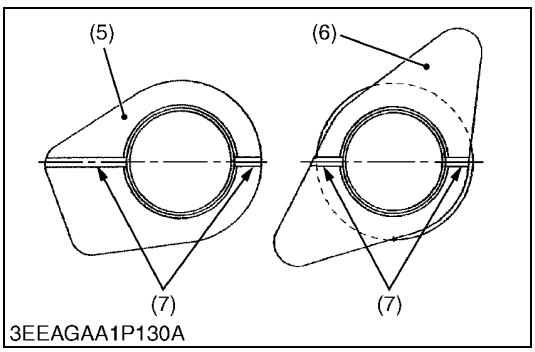

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Replacing Balancer Shaft Bearing (for V3007-DI-T-E3B / V3307-DI-T-E3B Balancer Model)

1. Remove the used balancer shaft bearings (1), (2), (3) and (4).
2. Set the new bearing to the balancer shaft bearing replacing tools. (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.) Confirm that the cut off position of the bearing (**C**) matched with the pin of the replacing tool.
3. Install the new bearing from flywheel housing side keeping the ditch (7) of the replacing tool horizontal.
   (The installing order : bearing D (1) → bearing C (2) → bearing A (4), B (3))

■ **IMPORTANT**

- **Be sure to align the oil hole of bearing and crankcase. Otherwise the balancer shaft may be seized and engine may get damaged.**
- **Apply engine oil to the bearing surface.**

(Reference)

Bearing	Code No.	Quantity
Bearing A	1G772-26960	1
Bearing B	1G772-26970	1
Bearing C	1G772-26980	2
Bearing D	1G772-26990	2

(1) Bearing D (for Balancer Shaft 1 and 2)
(2) Bearing C (for Balancer Shaft 1 and 2)
(3) Bearing B (for Balancer Shaft 2)
(4) Bearing A (for Balancer Shaft 1)
(5) Balancer Shaft 1 Bearing Replacing Tool (3 kinds of tools available)
(6) Balancer Shaft 2 Bearing Replacing Tool (3 kinds of tools available)
(7) Ditch

A : Front Cover Side
B : Flywheel Housing Side
C : Cut Off Position of Bearing
D : Oil Hole Position of Bearing
(a) 0.035 rad (2.0 °)
(b) 0.44 rad (25 °)
(c) 0.72 rad (41 °)
(d) 1.6 rad (90 °)
(e) 0.393 rad (22.5 °)
(f) 1.6 rad (90 °)

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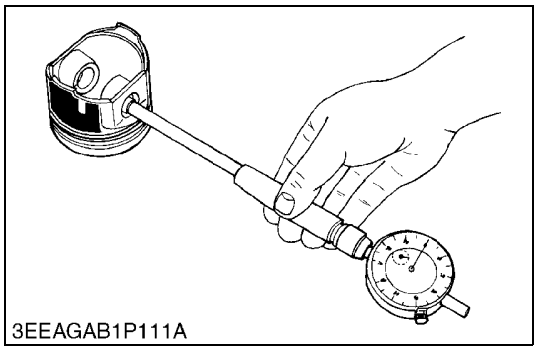
(3) Piston and Connecting Rod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Piston Pin Bore I.D.

1. Measure the piston pin bore I.D. in both the horizontal and vertical directions with a cylinder gauge.
2. If the measurement exceeds the allowable limit, replace the piston.

Piston pin bore I.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	26.000 to 26.013 mm 1.0237 to 1.0241 in.
		Allowable limit	26.05 mm 1.026 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	28.000 to 28.013 mm 1.1024 to 1.1028 in.
		Allowable limit	28.05 mm 1.104 in.

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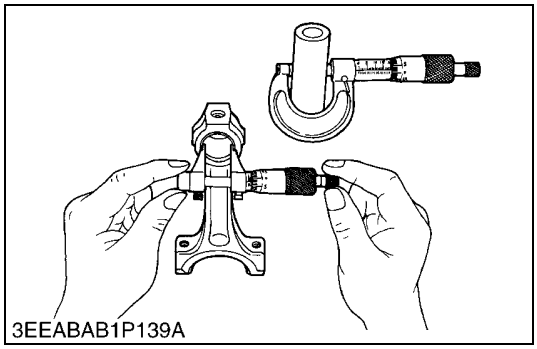
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Oil Clearance between Piston Pin and Small End Bushing

1. Measure the O.D. of the piston pin where it contacts the bushing with an outside micrometer.
2. Measure the I.D. of the piston pin bushing at the connecting rod small end with a cylinder gauge. Calculate the oil clearance.
3. If the clearance exceeds the allowable limit, replace the bushing. If it still exceeds the allowable limit, replace the piston pin.

Oil clearance between piston pin and small end bushing	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	0.014 to 0.034 mm 0.00056 to 0.0013 in.
		Allowable limit	0.15 mm 0.0059 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	0.020 to 0.040 mm 0.00079 to 0.0015 in.
		Allowable limit	0.15 mm 0.0059 in.

Piston pin O.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	26.006 to 26.011 mm 1.0239 to 1.0240 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	28.006 to 28.011 mm 1.1026 to 1.1027 in.

Small end bushing I.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	26.025 to 26.040 mm 1.0246 to 1.0252 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	28.031 to 28.046 mm 1.1036 to 1.1041 in.

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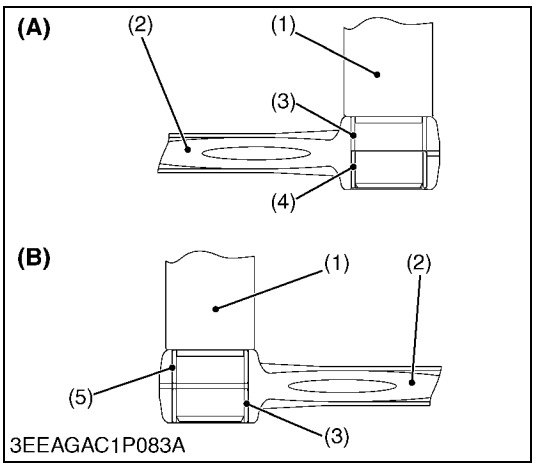

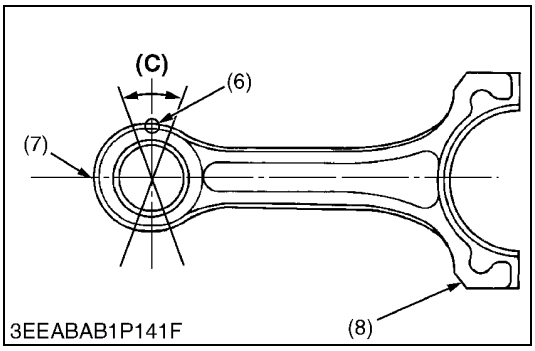

Replacing Small End Bushing (for V2607-DI-E3B / V2607-DI-T-E3B)

(When removing)

1. Press out the used bushing.

(When installing)

1. Clean a new small end bushing and bore, and apply engine oil to them.
2. Set the guide (4) to the bore of the connecting rod (2).
3. Insert a new first bushing (3) onto the small end bushing replacing tool. (Refer to “5. SPECIAL TOOLS” at “GENERAL“ section.)
4. Press-fit it with a press so that the seam (6) of bushing position as shown in the figure.
5. Turn the connecting rod inside out, and press-fit the second bushing similarly.

(1) Small End Bushing Replacing Tool
(2) Connecting Rod
(3) First Bushing
(4) Guide
(5) Second Bushing
(6) Seam
(7) Oil Hole
(8) Mark

(A) When Installing First Bushing
(B) When Installing Second Bushing
(C) 0.26 rad (15 °)

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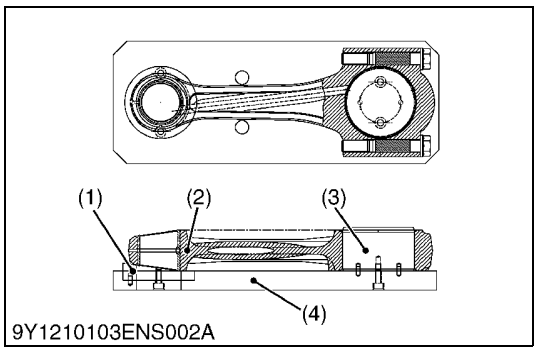

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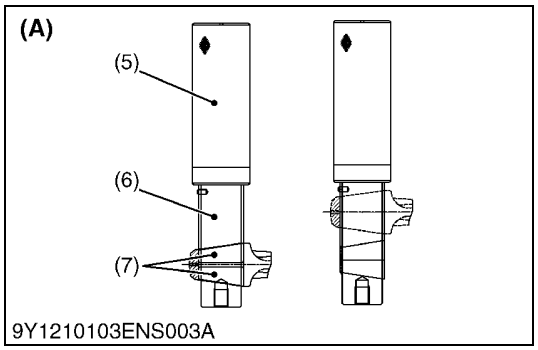

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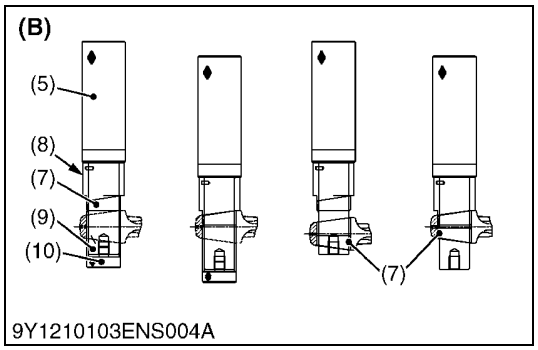

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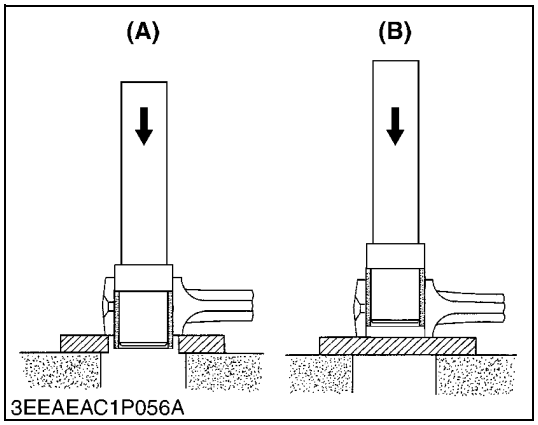

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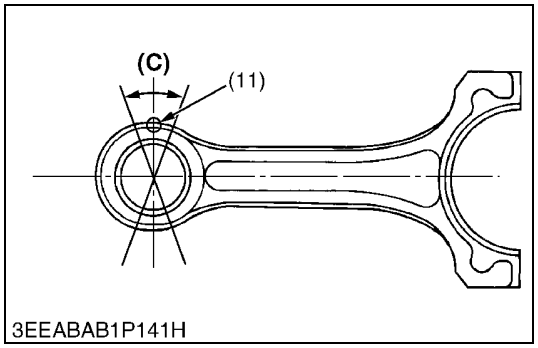

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Replacing Small End Bushing (for V3007-DI-T-E3B / V3307-DI-T-E3B)

[Serial No. : to 9DZ999]

(When removing)

1. Install the guide 3 onto the replacing tool shaft.
2. Press out the used bushing using replacing tool.

(When installing)

1. Clean a new small end bushing and apply engine oil to it.
2. Install the guide 4, new bushing, the guide 5 and bolt onto the replacing tool shaft.
3. Press-fit the new bushing with a press.
4. Turn the connecting rod inside out.
5. Press-fit another new bushing similarly.

[Serial No. : 9E0001 and above]

(When removing)

1. Press out the used bushing using a small end bushing replacing tool. (Refer to “5. SPECIAL TOOLS” at “GENERAL“ section.)

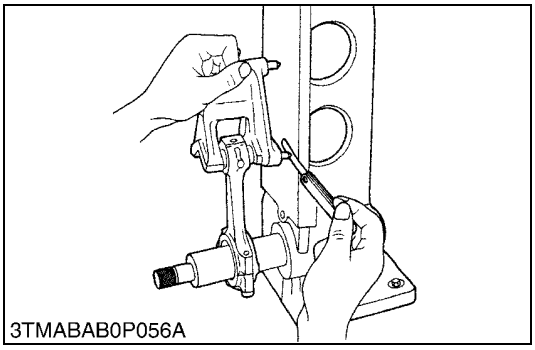
(When installing)

1. Clean a new small end bushing and bore, and apply engine oil to them.
2. Insert a new bushing onto the tool and press-fit it with a press so that the seam (11) of bushing position as shown in the figure, until it is flash with the connecting rod.

(1) Guide 1
(2) Connecting Rod
(3) Guide 2
(4) Base
(5) Shaft
(6) Guide 3
(7) Bushing
(8) Guide 4
(9) Guide 5
(10) Bolt
(11) Seam

(A) When Removing
(B) When Installing
(C) 0.26 rad (15 °)

W1415434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Connecting Rod Alignment

■ **NOTE**
- **Since the I.D. of the connecting rod small end bushing is the basis of this check, check the bushing for wear beforehand.**

1. Remove the piston pin from the piston.
2. Install the piston pin in the connecting rod.
3. Install the connecting rod on the connecting rod alignment tool.
4. Put a gauge over the piston pin, and move it against the face plate.
5. If the gauge does not fit squarely against the face plate, measure the space between the pin of the gauge and the face plate.
6. If the measurement exceeds the allowable limit, replace the connecting rod.

Connecting rod alignment	Allowable limit	0.05 mm 0.002 in.

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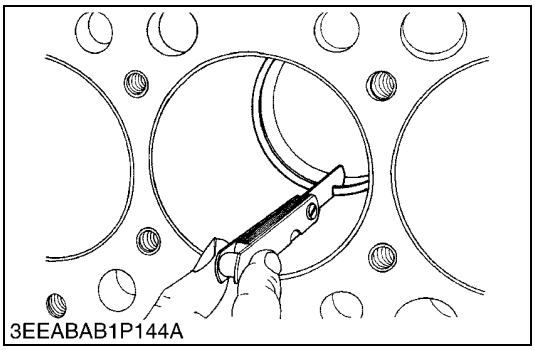
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Piston Ring Gap

1. Insert the piston ring into the lower part of the liner (the least worn part) with the piston.
2. Measure the ring gap with a feeler gauge.
3. If the gap exceeds the allowable limit, replace the piston ring.

Top ring	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	0.20 to 0.35 mm 0.0079 to 0.013 in.
		Allowable limit	1.25 mm 0.0492 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	0.25 to 0.40 mm 0.0099 to 0.015 in.
		Allowable limit	1.25 mm 0.0492 in.

Second ring	Factory spec.	0.30 to 0.45 mm 0.012 to 0.017 in.
	Allowable limit	1.25 mm 0.0492 in.

Oil ring	Factory spec.	0.25 to 0.45 mm 0.0099 to 0.017 in.
	Allowable limit	1.25 mm 0.0492 in.

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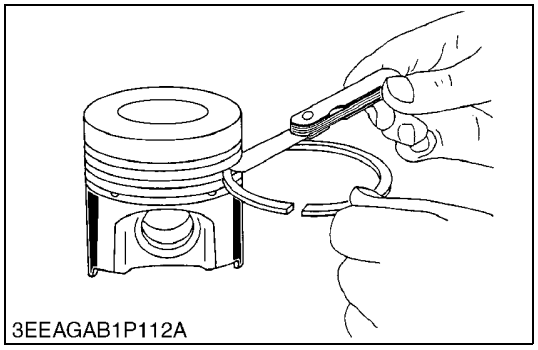
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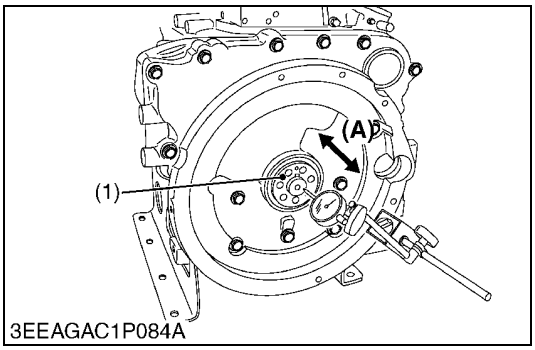
Clearance between Piston Ring and Groove

1. Clean the rings and the ring grooves, and install each ring in its groove.
2. Measure the clearance between the ring and the groove with a feeler gauge or depth gauge.
3. If the clearance exceeds the allowable limit, replace the piston ring.
4. If the clearance still exceeds the allowable limit with new ring, replace the piston.

Factory spec.	Top ring	0.050 to 0.090 mm 0.0020 to 0.0035 in.
	Second ring	0.090 to 0.12 mm 0.0036 to 0.0047 in.
	Oil ring	0.020 to 0.060 mm 0.00079 to 0.0023 in.
Allowable limit	Top ring	0.15 mm 0.0059 in.
	Second ring	0.20 mm 0.0079 in.
	Oil ring	0.15 mm 0.0059 in.

W1066183

(4) Crankshaft



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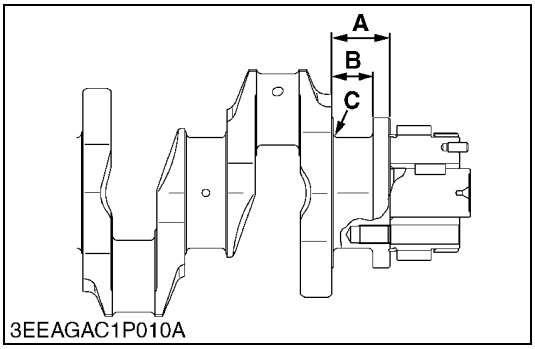

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Crankshaft Side Clearance

1. Set a dial indicator with its tip on the end of the crankshaft (1).
2. Measure the side clearance by moving the crankshaft (1) to the front and rear.
3. If the measurement exceeds the allowable limit, replace the thrust bearings.
4. If the same size bearing is out of specifications because of the crankshaft journal wear, replace it with an oversize one referring to the table and figure.

Side clearance of crankshaft	Factory spec.	0.15 to 0.35 mm 0.0059 to 0.013 in.
	Allowable limit	0.50 mm 0.020 in.

(Reference)

- Oversize dimensions of crankshaft journal.

[V2607-DI-E3B / V2607-DI-T-E3B]

Oversize	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension **A**	37.50 to 37.70 mm 1.477 to 1.484 in.	37.60 to 37.80 mm 1.481 to 1.488 in.
Dimension **B**	26.20 to 26.25 mm 1.032 to 1.035 in.	26.40 to 26.45 mm 1.040 to 1.041 in.
Dimension **C**	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius
The crankshaft journal must be fine-finished to higher than ∇∇∇∇.		(0.8S)

[V3007-DI-T-E3B / V3307-DI-T-E3B]

Oversize	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension **A**	41.10 to 42.10 mm 1.619 to 1.657 in.	41.20 to 42.20 mm 1.622 to 1.661 in.
Dimension **B**	28.20 to 28.25 mm 1.111 to 1.112 in.	28.40 to 28.45 mm 1.119 to 1.120 in.
Dimension **C**	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius
The crankshaft journal must be fine-finished to higher than ∇∇∇∇.		(0.8S)

(1) Crankshaft **(A) Side Clearance of Crankshaft**

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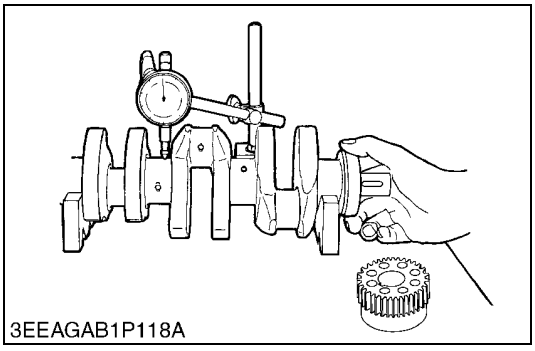
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Crankshaft Alignment

1. Support the crankshaft with V block on the surface plate and set a dial indicator with its tip on the intermediate journal at right angle.
2. Rotate the crankshaft on the V block and get the misalignment (half of the measurement value).
3. If the misalignment exceeds the allowable limit, replace the crankshaft.

Crankshaft alignment	Allowable limit	0.02 mm 0.0008 in.

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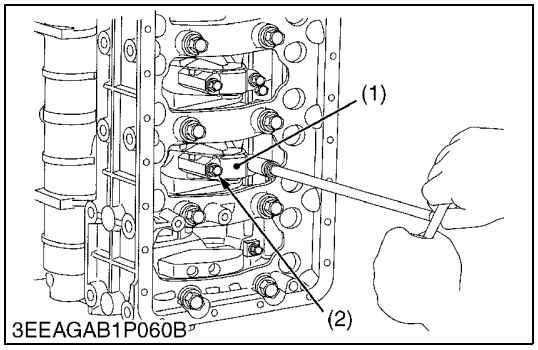

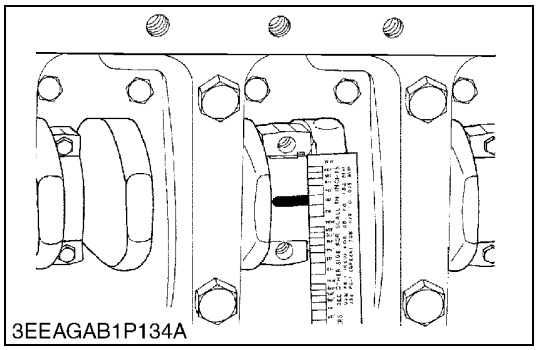

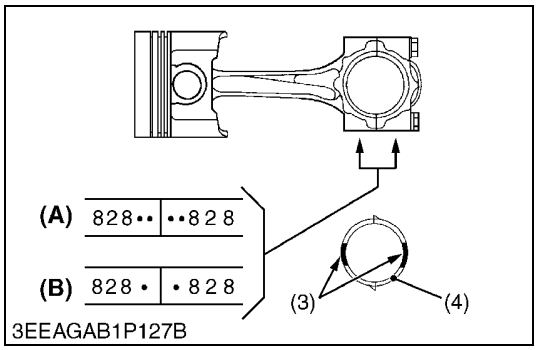

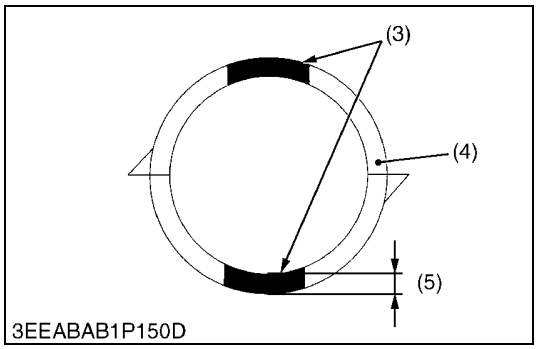

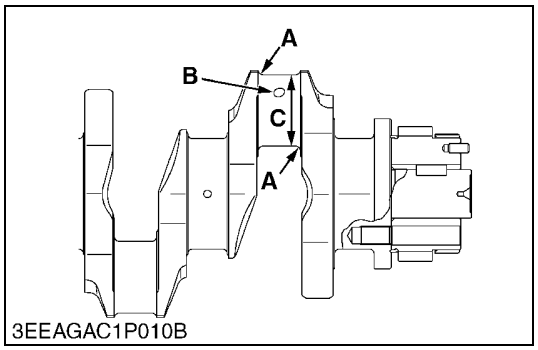

Oil Clearance between Crankpin and Crankpin Bearing (for V2607-DI-E3B / V2607-DI-T-E3B)

1. Clean the crankpin and crankpin bearing (4).
2. Put a strip of plastigage on the center of the crankpin.
3. Install the connecting rod cap (1) and tighten the connecting rod screws (2) to the specified torque, and remove the cap again.
4. Measure the amount of the flattening with the scale, and get the oil clearance.
5. If the oil clearance exceeds the allowable limit, replace the crankpin bearing (4).
6. If the same size bearing is useless because of the crankpin wear, replace it with an undersize one referring to the table and figure.

■ **NOTE**

- **Never insert the plastigage into the crankpin oil hole.**
- **Be sure not to move the crankshaft while the connecting rod screws (2) are tightened.**

Crankpin O.D.	Factory spec.	46.980 to 46.991 mm 1.8496 to 1.8500 in.

Oil clearance between crankpin and crankpin bearing	Factory spec.	0.011 to 0.058 mm 0.00044 to 0.0022 in.
	Allowable limit	0.20 mm 0.0079 in.

■ **IMPORTANT**

- **STD size crankpin bearing (4).**
  To replace it with a specific STD service part, make sure the combination of the crankpin bearing ID color (3) and the connecting rod mark.

Connecting rod		Crankpin bearing		
Mark	Large-end in. dia.	ID color	Part code	Center wall thick
Figure **(A)**	50.010 to 50.020 mm 1.9689 to 1.9692 in.	Blue (L class)	1J700-22310	1.496 to 1.501 mm 0.05890 to 0.05909 in.
Figure **(B)**	50.000 to 50.010 mm 1.9685 to 1.9688 in.	Without color (S class)	1J700-22330	1.491 to 1.496 mm 0.05870 to 0.05889 in.

(Reference)

- Undersize dimensions of crankpin

Undersize	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension **A**	3.3 to 3.7 mm radius 0.13 to 0.14 in. radius	3.3 to 3.7 mm radius 0.13 to 0.14 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	46.780 to 46.791 mm dia. 1.8418 to 1.8421 in. dia.	46.580 to 46.591 mm dia. 1.8339 to 1.8342 in. dia.
(0.8S) The crankpin must be fine-finished to higher than ∇∇∇∇. *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

(1) Connecting Rod Cap
(2) Connecting Rod Screw
(3) ID Color
(4) Crankpin Bearing
(5) Center Wall Thick

(A) Connecting Rod Mark : 2 Stamps
(B) Connecting Rod Mark : 1 Stamp

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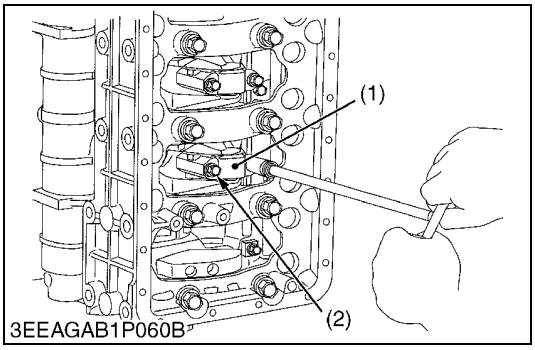
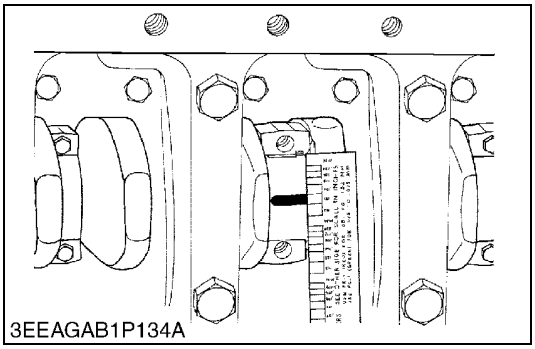
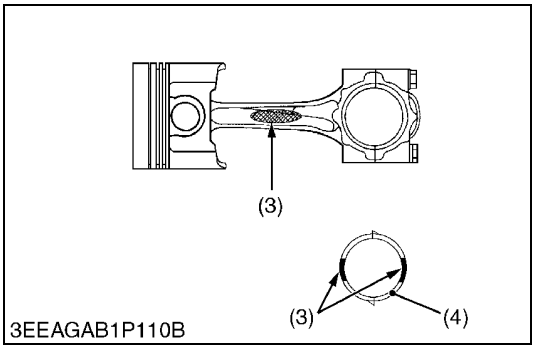
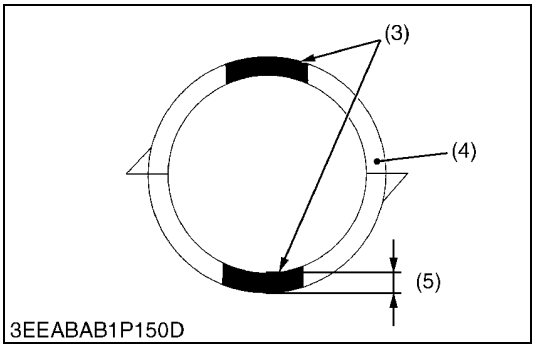
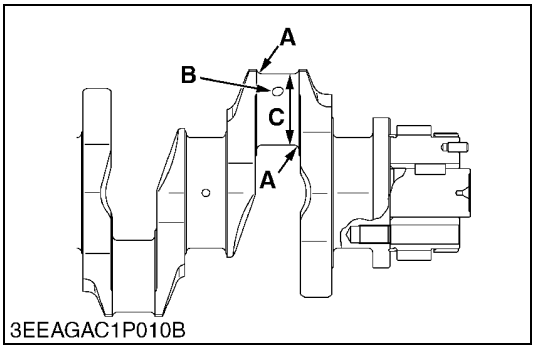










Oil Clearance between Crankpin and Crankpin Bearing (for V3007-DI-T-E3B / V3307-DI-T-E3B)

1. Clean the crankpin and crankpin bearing (4).
2. Put a strip of plastigage on the center of the crankpin.
3. Install the connecting rod cap (1) and tighten the connecting rod screws (2) to the specified torque, and remove the cap again.
4. Measure the amount of the flattening with the scale, and get the oil clearance.
5. If the oil clearance exceeds the allowable limit, replace the crankpin bearing (4).
6. If the same size bearing is useless because of the crankpin wear, replace it with an undersize one referring to the table and figure.

■ **NOTE**

- **Never insert the plastigage into the crankpin oil hole.**
- **Be sure not to move the crankshaft while the connecting rod screws (2) are tightened.**

Crankpin O.D.	Factory spec.	49.980 to 49.991 mm 1.9678 to 1.9681 in.

Oil clearance between crankpin and crankpin bearing	Factory spec.	0.017 to 0.048 mm 0.00067 to 0.0018 in.
	Allowable limit	0.20 mm 0.0079 in.

■ **IMPORTANT**

- **STD size crankpin bearing (4).**
  To replace it with a specific STD service part, make sure the crankpin bearing (4) has the same ID color (3) as the connecting rod.

ID Color	Connecting rod	Crankpin bearing		
	Large-end in. dia.	Class	Part code	Center wall thick
Blue	53.010 to 53.020 mm 2.0870 to 2.0874 in.	L	1G772-22310	1.496 to 1.501 mm 0.05890 to 0.05909 in.
Without color	53.000 to 53.010 mm 2.0867 to 2.0870 in.	S	1G772-22330	1.491 to 1.496 mm 0.05870 to 0.05889 in.

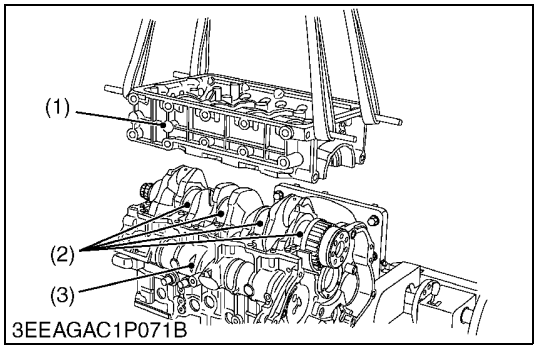
(Reference)

- Undersize dimensions of crankpin

Undersize	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension **A**	3.3 to 3.7 mm radius 0.13 to 0.14 in. radius	3.3 to 3.7 mm radius 0.13 to 0.14 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	49.780 to 49.791 mm dia. 1.9599 to 1.9602 in. dia.	49.580 to 49.591 mm dia. 1.9520 to 1.9524 in. dia.
(0.8S) The crankpin must be fine-finished to higher than ∇∇∇∇. *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

(1) Connecting Rod Cap
(2) Connecting Rod Screw
(3) ID Color
(4) Crankpin Bearing
(5) Center Wall Thick

W1067389



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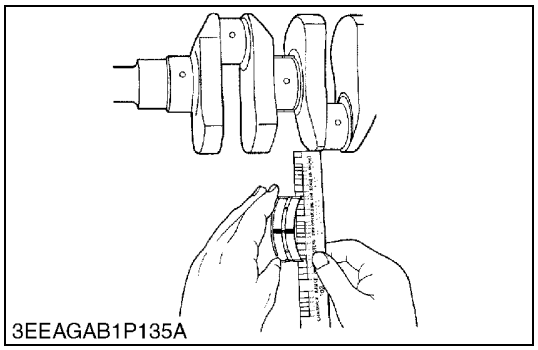
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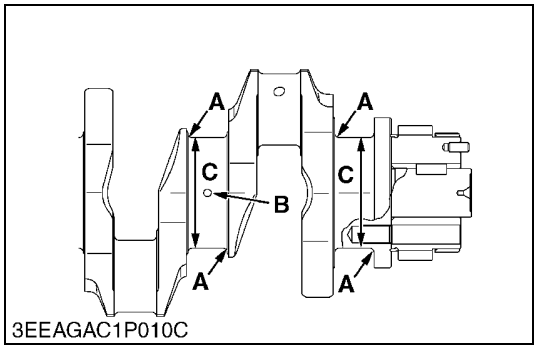

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Oil Clearance between Crankshaft Journal and Crankshaft Bearing

1. Clean the crankshaft journal (2) and crankshaft bearing.
2. Put a strip of press gauge on the center of the journal.

■ **IMPORTANT**

- **Never insert the press gauge into the oil hole of the journal.**

3. Install the crankcase 2 (1) and tighten the crankcase 2 mounting screws to the specified torque, and remove the crankcase 2 (1) again.
4. Measure the amount of the flattening with the scale and get the oil clearance.
5. If the clearance exceeds the allowable limit, replace the crankshaft bearing.

Crankshaft journal O.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	72.977 to 72.990 mm 2.8732 to 2.8736 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	79.977 to 79.990 mm 3.1487 to 3.1492 in.

Oil clearance between crankshaft journal and crankshaft bearing	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	0.030 to 0.051 mm 0.0012 to 0.0020 in.
		Allowable limit	0.20 mm 0.0079 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	0.030 to 0.073 mm 0.0012 to 0.0028 in.
		Allowable limit	0.20 mm 0.0079 in.

(Reference)

- Undersize dimensions of crankshaft journal.

[V2607-DI-E3B / V2607-DI-T-E3B]

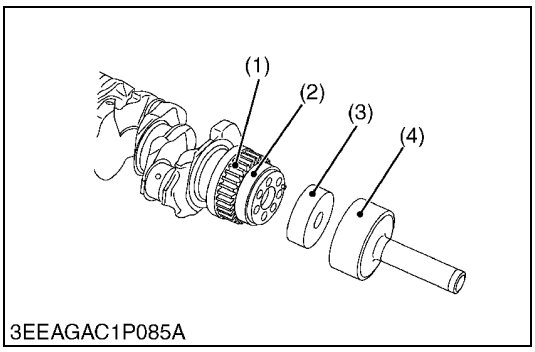
Undersize	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension **A**	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	72.777 to 72.790 mm dia. 2.8653 to 2.8657 in. dia.	72.577 to 72.590 mm dia. 2.8574 to 2.8578 in. dia.
The crankshaft journal must be fine-finished to higher than ∇∇∇∇ (0.8S). *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

[V3007-DI-T-E3B / V3307-DI-T-E3B]

Undersize	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension **A**	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	79.777 to 79.790 mm dia. 3.1409 to 3.1413 in. dia.	79.577 to 79.590 mm dia. 3.1330 to 3.1334 in. dia.
The crankshaft journal must be fine-finished to higher than ∇∇∇∇ (0.8S). *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

(1) Crankcase 2
(2) Crankshaft Journal
(3) Crankcase 1

W1261077



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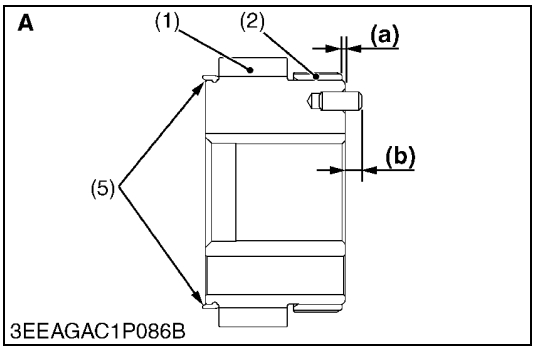

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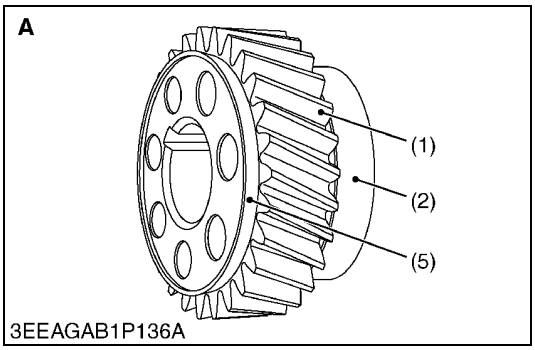

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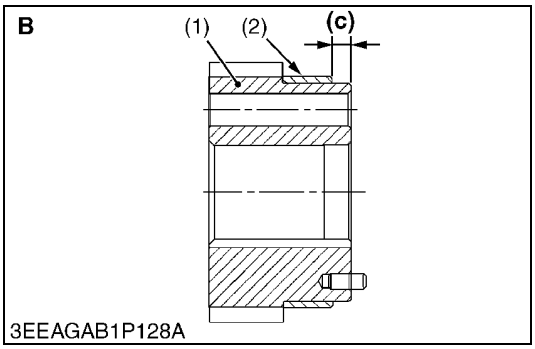

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Replacing Crankshaft Sleeve

1. Remove the used crankshaft sleeve (2).
2. Set the sleeve guide (3) to the crankshaft gear (1).
3. Heat a new crankshaft sleeve (2) to a temperature between 150 and 200 °C (302 and 392 °F), and fix the sleeve to the crankshaft as shown in figure.
4. Press fit the sleeve using the crankshaft sleeve replacing tool (4). (Refer to “5. SPECIAL TOOLS” at “GENERAL” section.)

■ **NOTE**

- **Mount the sleeve with its largely chamfered surface facing outward.**
- **Keep the space ((a) or (c)) between the edge of the crankshaft gear (1) and the crankshaft sleeve (2).**
- **Be sure to place the seal (5) when reassembling.**

(1) Crankshaft Gear
(2) Crankshaft Sleeve
(3) Sleeve Guide
(4) Crankshaft Sleeve Replacing Tool
(5) Seal

(a) 0.850 to 1.15 mm (0.0335 to 0.0452 in.)
(b) 5.5 mm (0.22 in.)
(c) More than 6.5 mm (0.26 in.)

A : V2607-DI-E3B / V2607-DI-T-E3B
B : V3007-DI-T-E3B / V3307-DI-T-E3B

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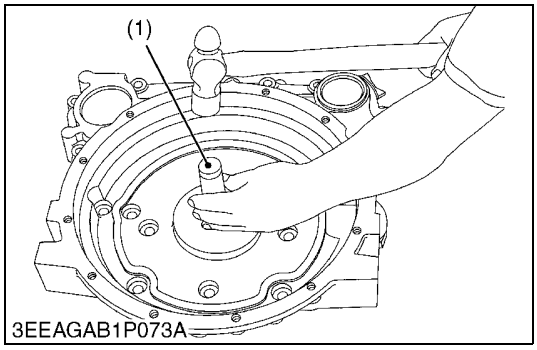

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Replacing Flywheel Housing Oil Seal

1. Remove the used oil seal (2).
2. Clean the new flywheel housing oil seal (2) and apply engine oil to it.
3. Install the new oil seal (2) to the specific position using the flywheel housing oil seal replacing tool (1). (Refer to "5. SPECIAL TOOLS" at "GENERAL" section.)

(1) Flywheel Housing Oil Seal Replacing Tool
(2) Oil Seal
(3) Flywheel Housing

(a) 0 to 0.50 mm (0 to 0.019 in.)
(b) 1.0 mm (0.039 in.)

A : V2607-DI-E3B / V2607-DI-T-E3B
B : V3007-DI-T-E3B / V3307-DI-T-E3B

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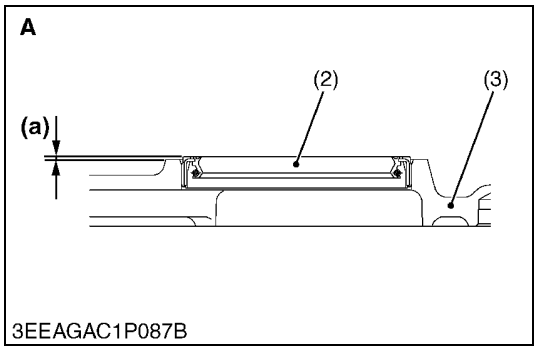

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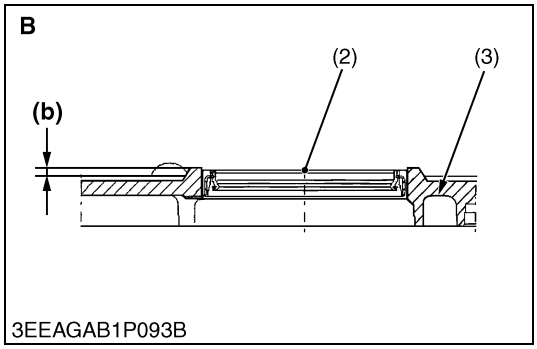

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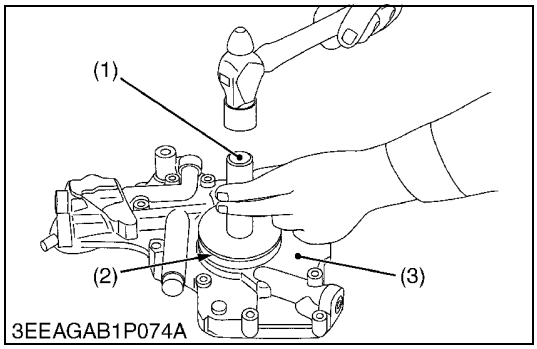

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Replacing Front Cover Oil Seal

1. Remove the used front cover oil seal (2).
2. Clean a new front cover oil seal (2) and apply engine oil to it.
3. Install the new oil seal (2) using the front cover oil seal replacing tool (1). (Refer to "5. SPECIAL TOOLS" at "GENERAL" section.)

(1) Front Cover Oil Seal Replacing Tool
(2) Oil Seal
(3) Front Cover

A : 2.0 mm (0.079 in.)

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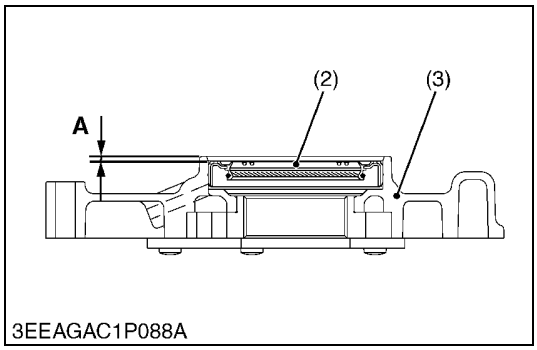

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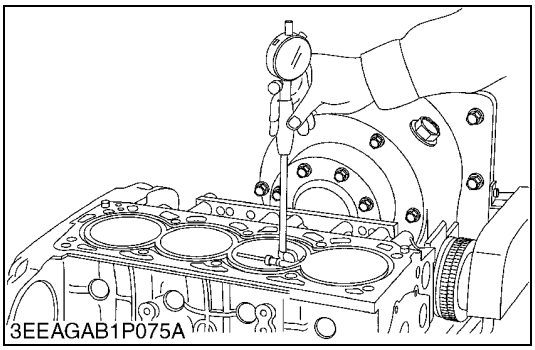
(5) Cylinder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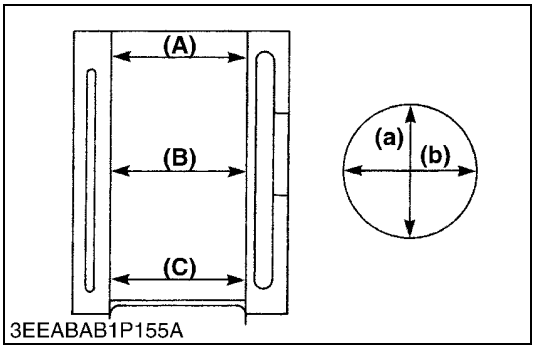

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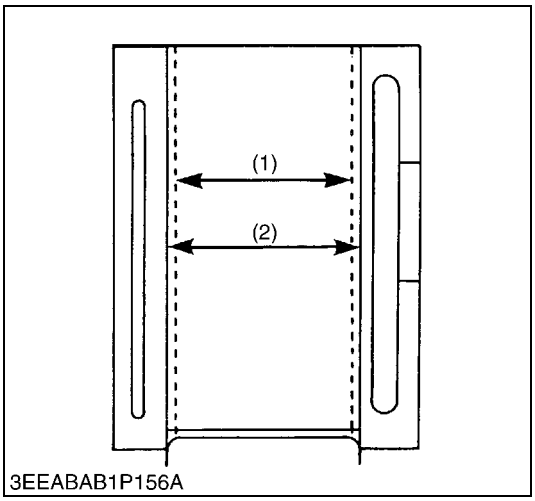

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Cylinder Wear

1. Measure the I.D. of the cylinder at the six positions (see figure) with a cylinder gauge to find the maximum and minimum I.D.'s.
2. Get the difference (Maximum wear) between the maximum and the minimum I.D.'s.
3. If the wear exceeds the allowable limit, bore and hone to the oversize dimension. (Refer to **"Correcting Cylinder"**.)
4. Visually check the cylinder wall for scratches. If deep scratches are found, the cylinder should be bored. (Refer to **"Correcting Cylinder"**.)

Cylinder Bore I.D.	V2607-DI-E3B V2607-DI-T-E3B	Factory spec.	87.000 to 87.022 mm 3.4252 to 3.4260 in.
		Allowable limit	87.15 mm 3.431 in.
	V3007-DI-T-E3B V3307-DI-T-E3B	Factory spec.	94.000 to 94.022 mm 3.7008 to 3.7016 in.
		Allowable limit	94.15 mm 3.707 in.

(A) Top
(B) Middle
(C) Bottom (Skirt)
(a) Right-angled to piston pin
(b) Piston pin direction

W1070089

Correcting Cylinder (Oversize)

1. When the cylinder is worn beyond the allowable limit, bore and hone it to the specified dimension.

[V2607-DI-E3B / V2607-DI-T-E3B]

Cylinder I.D. (Oversize)	Factory spec.	87.250 to 87.272 mm 3.4350 to 3.4359 in.
Maximum wear	Allowable limit	87.40 mm 3.441 in.
Finishing	Hone to 2.2 to 3.0 μm Rz (0.000087 to 0.00011 in. Rz) ∇∇∇.	

2. Replace the piston and piston rings with oversize 0.25 mm (0.0098 in.) ones.

[V3007-DI-T-E3B / V3307-DI-T-E3B]

Cylinder I.D. (Oversize)	Factory spec.	94.500 to 94.522 mm 3.7205 to 3.7213 in.
Maximum wear	Allowable limit	94.65 mm 3.726 in.
Finishing	Hone to 2.2 to 3.0 μm Rz (0.000087 to 0.00011 in. Rz) ∇∇∇.	

2. Replace the piston and piston rings with oversize 0.5 mm (0.02 in.) ones.

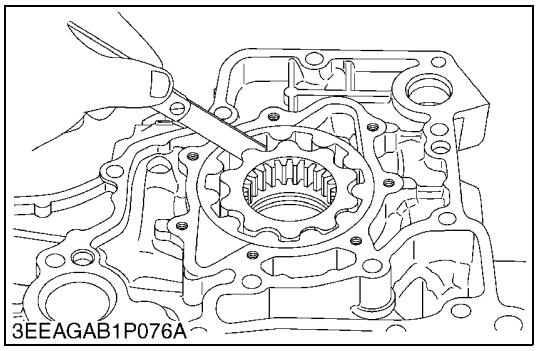
■ **NOTE**

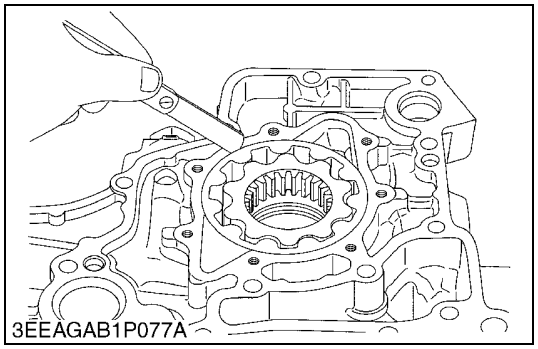
- **When the oversize cylinder is worn beyond the allowable limit, replace the cylinder block with a new one.**

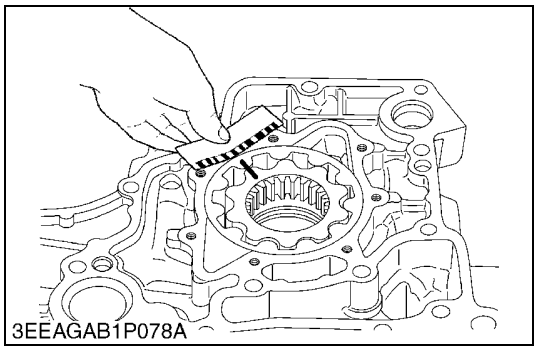
(1) Cylinder I.D. (Before Correction) (2) Cylinder I.D. (Oversize)

W10344480

(6) Oil Pump







Rotor Lobe Clearance

1. Measure the clearance between lobes of the inner rotor and the outer rotor with a feeler gauge.
2. If the clearance exceeds the allowable limit, replace the oil pump rotor assembly.

Clearance between inner rotor and outer rotor	Factory spec.	0.030 to 0.090 mm 0.0012 to 0.0035 in.
	Allowable limit	0.30 mm 0.012 in.

W1071254

Clearance between Outer Rotor and Pump Body

1. Measure the clearance between the outer rotor and the pump body with a feeler gauge.
2. If the clearance exceeds the allowable limit, replace the oil pump rotor assembly.

Clearance between outer rotor and pump body	Factory spec.	0.100 to 0.184 mm 0.00394 to 0.00724 in.
	Allowable limit	0.30 mm 0.012 in.

W1071334

Clearance between Rotor and Cover

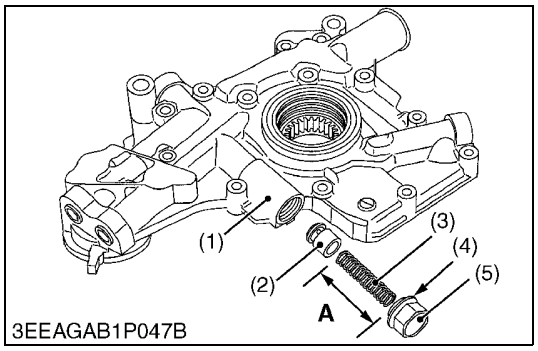
1. Put a strip of plastigage onto the rotor face with grease.
2. Install the cover and tighten the screws with the specified torque.
3. Remove the cover carefully, and measure the amount of the flattening with the scale and get the clearance.
4. If the clearance exceeds the allowable limit, replace oil pump rotor assembly and the cover.

Clearance between rotor and cover	Factory spec.	0.025 to 0.075 mm 0.00099 to 0.0029 in.
	Allowable limit	0.225 mm 0.00886 in.

Tightening torque	Oil pump cover screw	7.9 to 9.3 N·m 0.80 to 0.95 kgf·m 5.8 to 6.8 lbf·ft

W1148218

(7) Relief Valve



Free Length of Relief Valve Spring

1. Measure the free length **(A)** with vernier calipers. If the measurement is less than the allowable limit, replace it.
2. Check the entire surface of the spring for scratches. Replace it, if any.

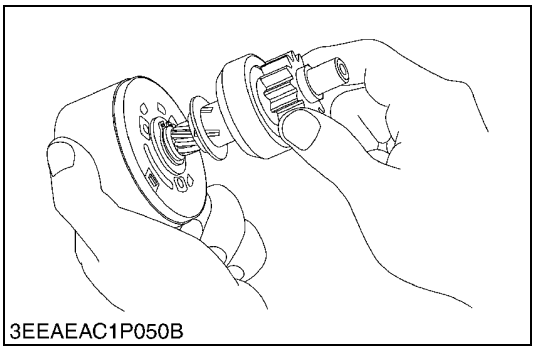
Free length **(A)**	Factory spec.	60.0 to 60.5 mm 2.37 to 2.38 in.
	Allowable limit	55.0 mm 2.17 in.

Tightening torque	Relief valve retaining screw	69 to 78 N·m 7.0 to 8.0 kgf·m 51 to 57 lbf·ft

(1) Front Cover
(2) Relief Valve
(3) Spring
(4) Packing
(5) Relief Valve Retaining Screw
A : Free Length

W1265606

(8) Starter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Overrunning Clutch

1. Inspect the pinion for wear or damage.
2. If there is any defect, replace the overrunning clutch assembly.
3. Check that the pinion turns freely and smoothly in the overrunning direction and does not slip in the cranking direction.
4. If the pinion slips or does not rotate in the both directions, replace the overrunning clutch assembly.

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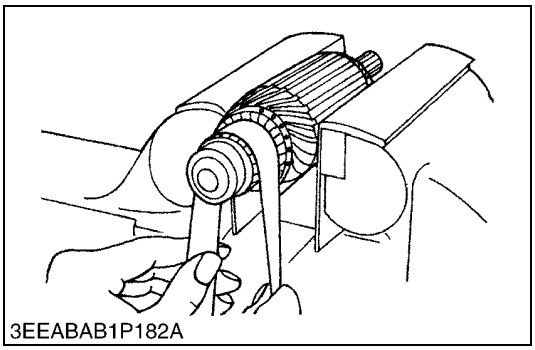
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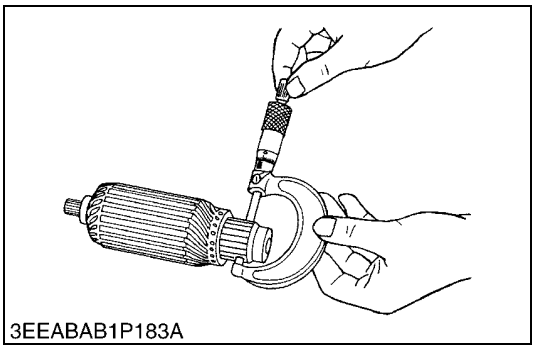
Commutator and Mica

1. Check the contact face of the commutator for wear, and grind the commutator with emery paper if it is slightly worn.
2. Measure the commutator O.D. with an outside micrometer at several points.
3. If the minimum O.D. is less than the allowable limit, replace the armature.
4. If the difference of the O.D.'s exceeds the allowable limit, correct the commutator on a lathe to the factory specification.
5. Measure the mica undercut.
6. If the undercut is less than the allowable limit, correct if with a saw blade and chamfer the segment edges.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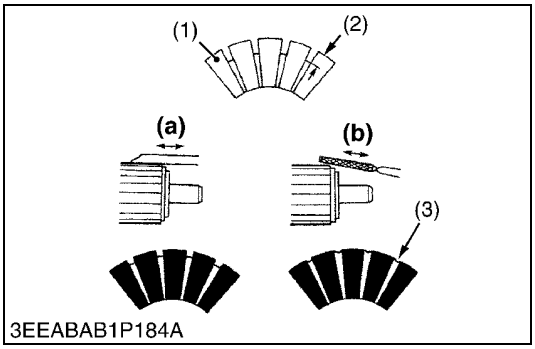
Commutator O.D.	Factory spec.	32.0 mm 1.26 in.
	Allowable limit	31.4 mm 1.24 in.

Mica under cut	Factory spec.	0.50 mm 0.020 in.
	Allowable limit	0.20 mm 0.0079 in.



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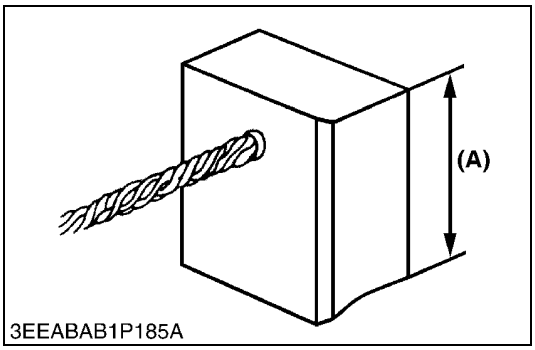
(1) Segment
(2) Depth of Mica
(3) Mica
(a) Good
(b) Bad

W1075277



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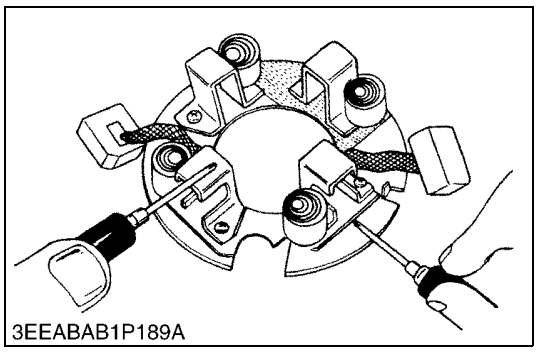
Brush Wear

1. If the contact face of the brush is dirty or dusty, clean it with emery paper.
2. Measure the brush length **(A)** with vernier calipers.
3. If the length is less than the allowable limit, replace the yoke assembly and brush holder.

Brush length **(A)**	Factory spec.	18.0 mm 0.709 in.
	Allowable limit	11.0 mm 0.433 in.

(A) Brush Length

W1075476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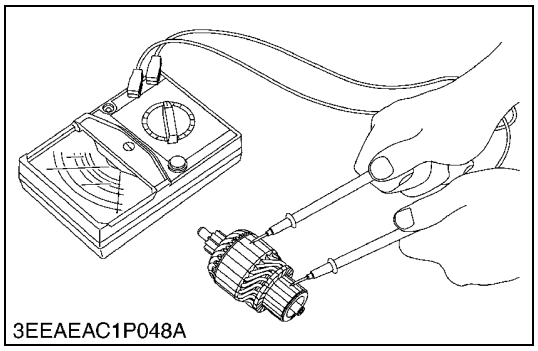
Brush Holder

1. Check the continuity across the brush holder and the holder support with an ohmmeter.
2. If it conducts, replace the brush holder.

Resistance	Brush holder – Holder support	Infinity

W1076066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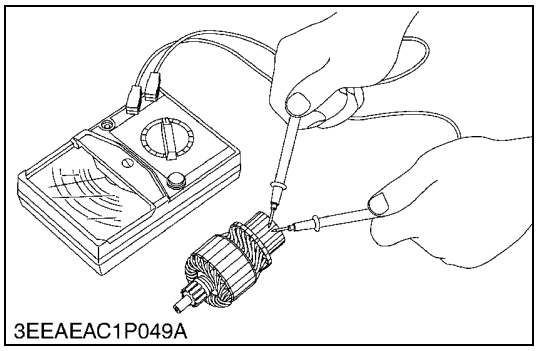
Armature Coil

1. Check the continuity across the commutator and armature coil core with an ohmmeter.
2. If it conducts, replace the armature.
3. Check the continuity across the segments of the commutator with an ohmmeter.
4. If it does not conduct, replace the armature.

Resistance	Commutator – Armature coil core	Infinity
	Segment – Segment	0 Ω

W1075693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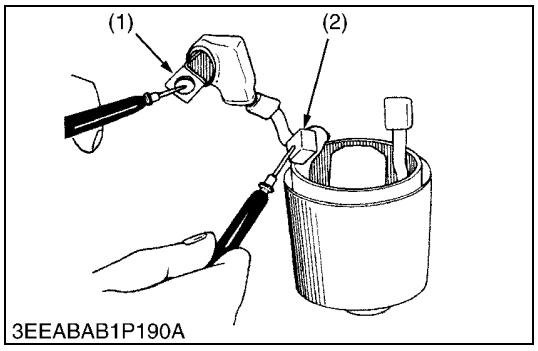

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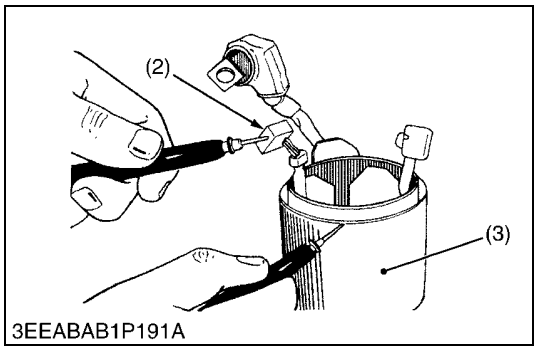
Field Coil

1. Check the continuity across the lead (1) and brush (2) with an ohmmeter.
2. If it does not conduct, replace the yoke assembly.
3. Check the continuity across the brush (2) and yoke (3) with an ohmmeter.
4. If it conducts, replace the yoke assembly.

Resistance	Lead (1) – Brush (2)	0 Ω
	Brush (2) – Yoke (3)	Infinity

(1) Lead
(2) Brush
(3) Yoke

W1076156



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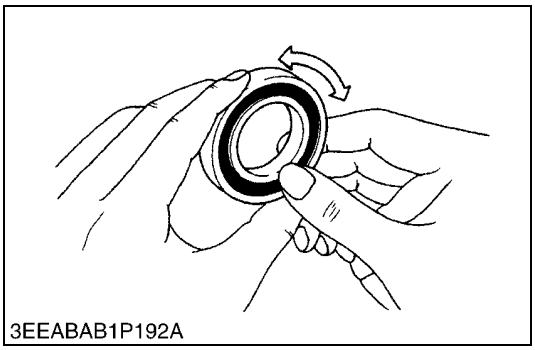
(9) Alternator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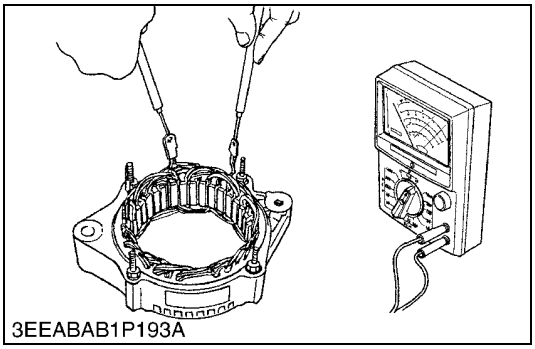
Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

W1076281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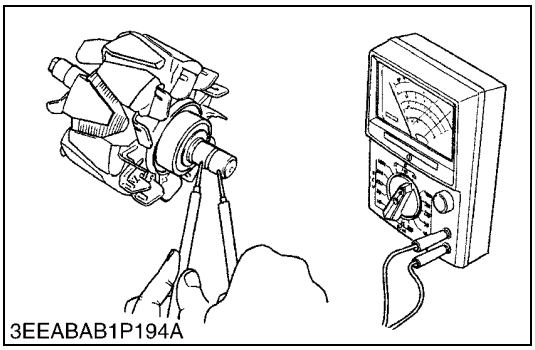
Stator

1. Measure the resistance across each lead of the stator coil with resistance range of circuit tester.
2. If the measurement is not within factory specification, replace it.
3. Check the continuity across each stator coil lead and core with resistance range of circuit tester.
4. If infinity is not indicated, replace it.

Resistance	Factory spec.	Less than 1.0 Ω

W1019964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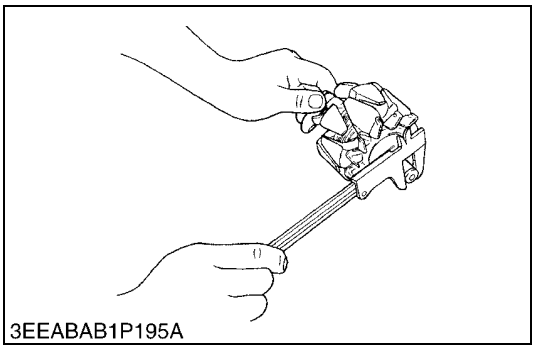
Rotor

1. Measure the resistance across the slip rings with an ohmmeter.
2. If the resistance is not the factory specification, replace it.
3. Check the continuity across the slip and core with an ohmmeter.
4. If infinity is not indicated, replace it.

Resistance	Factory spec.	2.8 to 3.3 Ω

W1076422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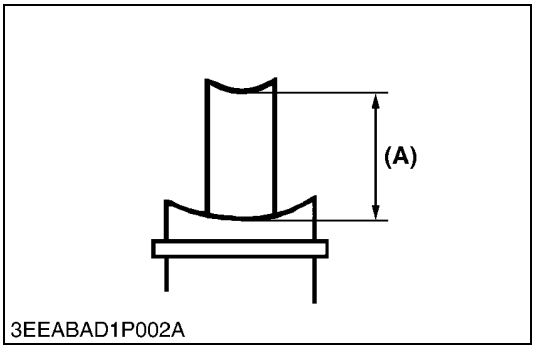
Slip Ring

1. Check the slip ring for score.
2. If scored, correct with an sand paper or on a lathe.
3. Measure the O.D. of slip ring with vernier calipers.
4. If the measurement is less than the allowable limit, replace it.

Slip ring O.D.	Factory spec.	22.7 mm 0.894 in.
	Allowable limit	22.1 mm 0.870 in.

W1076592



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Brush Wear

1. Measure the brush length **(A)** with vernier calipers.
2. If the measurement is less than allowable limit, replace it.
3. Make sure that the brush moves smoothly.
4. If the brush is defective, replace it.

Brush length **(A)**	Factory spec.	18.5 mm 0.728 in.
	Allowable limit	5.0 mm 0.20 in.

(A) Brush Length

W1076714

EDITOR:
KUBOTA FARM & INDUSTRIAL MACHINERY SERVICE, LTD.
64, ISHIZU-KITAMACHI, SAKAI-KU, SAKAI-CITY, OSAKA, 590-0823, JAPAN
PHONE : (81)72-241-1129
FAX : (81)72-245-2484
E-mail : ks_g.ksos-pub@kubota.com

KUBOTA Corporation

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