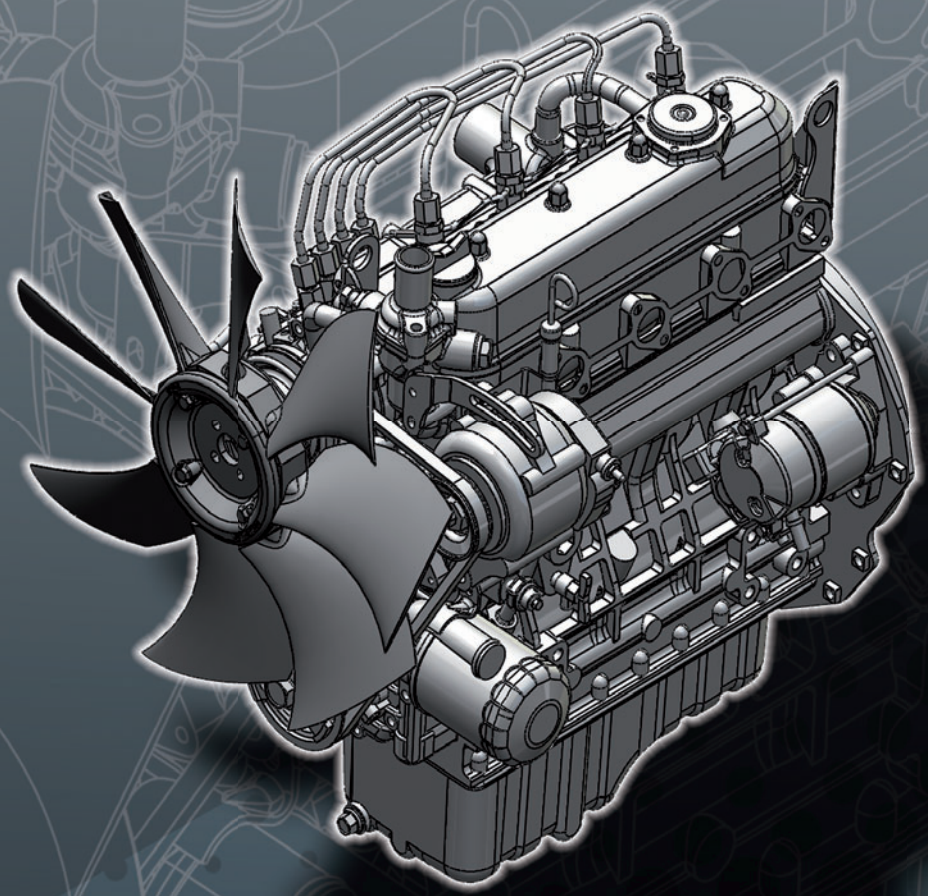
647124EN (23/04/2014)

ENGINE V1505

EURO 3

Repair Manual



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23 / 04 / 2014	- 3rd ISSUE

TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of 05-E3B / E3BG. 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.

March 2007

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.

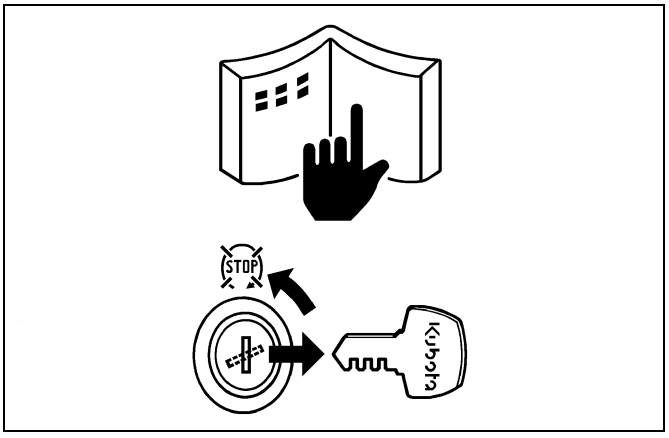
DANGER : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

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.

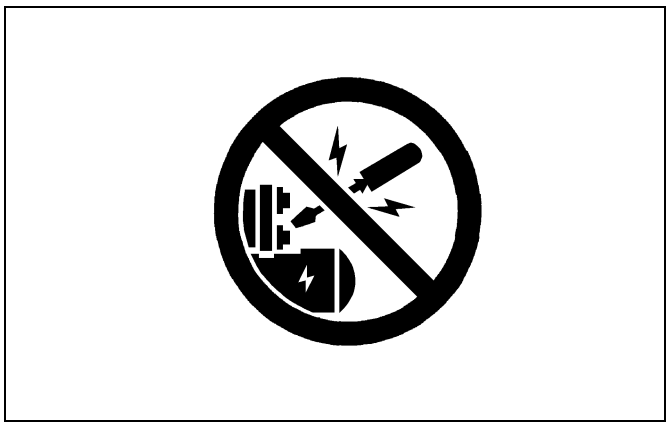
■ IMPORTANT : Indicates that equipment or property damage could result if instructions are not followed.

■ NOTE : Gives helpful information.



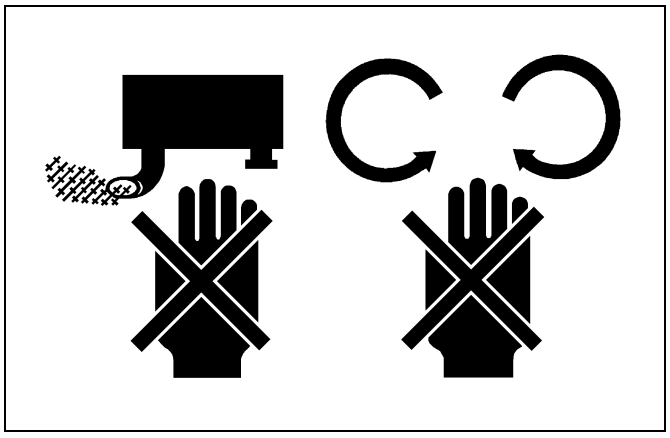
BEFORE SERVICING AND REPAIRING

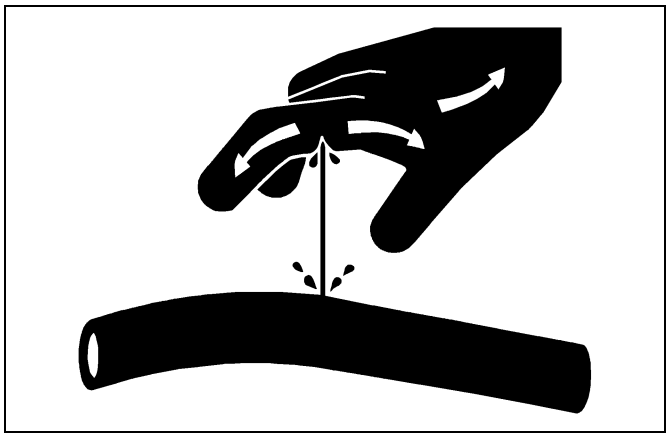
- Read all instructions and safety instructions in this manual and on your engine safety decals.
- Clean the work area and engine.
- Park the machine on a firm and level ground.
- Allow the engine to cool before proceeding.
- Stop the engine, and remove the key.
- Disconnect the battery negative cable.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

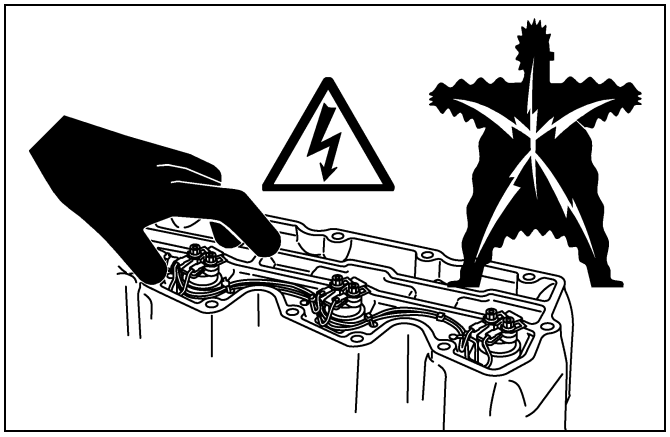


SAFETY STARTING

- 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.

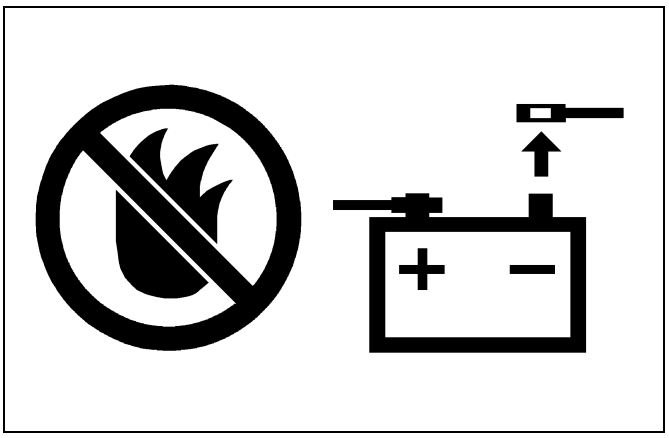






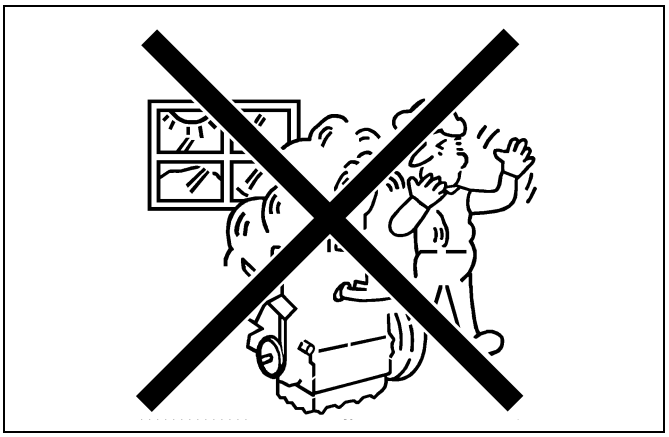
SAFETY WORKING

- 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 running.
- Never remove the radiator cap while the engine is running, 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.



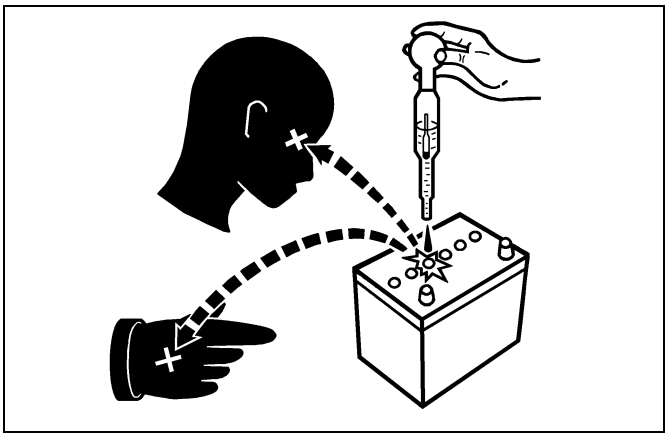
AVOID FIRES

- 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.



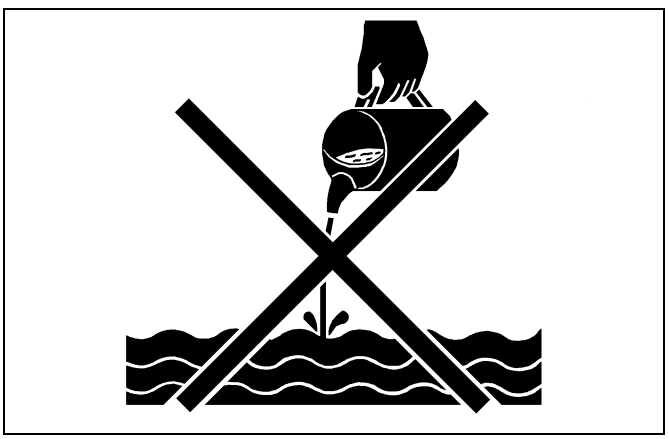
VENTILATE WORK AREA

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



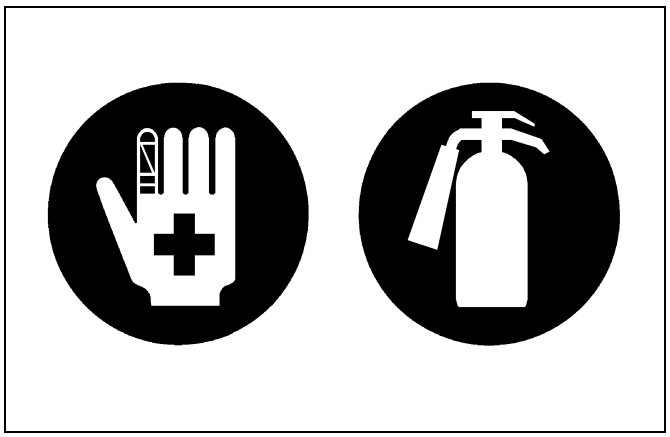
PREVENT ACID BURNS

- 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	D1005-E3B	D1105-E3B		D1105-T-E3B
Number of Cylinders	3			
Type	Vertical, Water-cooled, 4 cycle diesel engine			
Bore × Stroke mm (in.)	76.0 × 73.6 (2.99 × 2.90)	78.0 × 78.4 (3.07 × 3.09)		
Total Displacement cm^3 (cu.in.)	1001 (61.08)	1123 (68.53)		
ISO Net Continuous kW/min^{-1} (rpm) (HP/min^{-1} (rpm))	14.5 / 3000 (19.5 / 3000)	15.5 / 3000 (20.7/ 3000)	18.0 / 3600 (24.1 / 3600)	20.4 / 3000 (27.4 / 3000)
ISO/SAE Net Intermittent kW/min^{-1} (rpm) (HP/min^{-1} (rpm))	16.8 / 3000 (22.5 / 3000)	17.8 / 3000 (23.9 / 3000)	20.7 / 3600 (27.7 / 3600)	23.5 / 3000 (31.5 / 3000)
SAE Gross Intermittent kW/min^{-1} (rpm) (HP/min^{-1} (rpm))	17.5 / 3000 (23.5 / 3000)	18.5 / 3000 (24.8 / 3000)	21.7 / 3600 (29.1 / 3600)	24.5 / 3000 (32.8 / 3000)
Maximum Bare Speed (min^{-1} (rpm))	3200		3800	3200
Minimum Bare Idling Speed (min^{-1} (rpm))	900			
Combustion Chamber	Spherical type (E-TVCS)			
Fuel Injection Pump	Bosch MD type mini pump			
Governor	All speed mechanical governor			
Direction of Rotation	Counter-clockwise (viewed from flywheel side)			
Injection Nozzle	Mini Nozzle (DNOPD)			
Injection Timing	0.3142 rad (18.00 °) before T.D.C.	0.3142 rad (18.00 °) before T.D.C.	0.3491 rad (20.00 °) before T.D.C.	0.2967 rad (17.00 °) before T.D.C.
Firing Order	1-2-3			
Injection Pressure	13.73 MPa (140.0 kgf/cm^2, 1991 psi)			
Compression Ratio	24 : 1		23 : 1	
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, 1.2 kW			
Starting Support Device	By glow plug in combustion chamber			
EGR	None			
Battery	12 V, 65 AH, equivalent			
Charging Alternator	12 V, 480 W			
Fuel	Diesel Fuel No.2-D (ASTM D975)			
Lubricating Oil	Class CF lubricating oil as per API classification is recommended. For details on recommended lubricating oils, see page G-6, 9.			
Lubricating Oil Capacity	5.1 L (1.3 U.S.gals)			
Weight (Dry) kg (lbf)	93.0 (205.0)			97.0 (214)

* 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	D1305-E3B	V1505-E3B		V1505-T-E3B
Number of Cylinders	3	4		
Type	Vertical, Water-cooled, 4 cycle diesel engine			
Bore × Stroke mm (in.)	78.0 × 88.0 (3.07 × 3.46)	78.0 × 78.4 (3.07 × 3.09)		
Total Displacement cm^3 (cu.in.)	1261 (76.95)	1498 (91.41)		
ISO Net Continuous kW/min^{-1} (rpm) (HP/min^{-1} (rpm))	18.2 / 3000 (24.4 / 3000)	21.7 / 3000 (29.1 / 3000)	23.9 / 3600 (32.0 / 3600)	27.2 / 3000 (36.4 / 3000)
ISO/SAE Net Intermittent kW/min^{-1} (rpm) (HP/min^{-1} (rpm))	21.0 / 3000 (28.2 / 3000)	25.0 / 3000 (33.5 / 3000)	27.5 / 3600 (36.9 / 3600)	31.3 / 3000 (42.0 / 3000)
SAE Gross Intermittent kW/min^{-1} (rpm) (HP/min^{-1} (rpm))	21.7 / 3000 (29.1 / 3000)	26.5 / 3000 (35.5 / 3000)	29.0 / 3600 (38.9 / 3600)	33.0 / 3000 (44.2 / 3000)
Maximum Bare Speed (min^{-1} (rpm))	3200	3200	3800	3200
Minimum Bare Idling Speed (min^{-1} (rpm))	1300	900		
Combustion Chamber	Spherical type (E-TVCS)			
Fuel Injection Pump	Bosch MD type mini pump			
Governor	All speed mechanical governor			
Direction of Rotation	Counter-clockwise (viewed from flywheel side)			
Injection Nozzle	Mini Nozzle (DNOPD)			
Injection Timing	0.3142 rad (18.00 °) before T.D.C.	0.2967 rad (17.00 °) before T.D.C.	0.3491 rad (20.00 °) before T.D.C.	0.2967 rad (17.00 °) before T.D.C.
Firing Order	1-2-3	1-3-4-2		
Injection Pressure	13.73 MPa (140.0 kgf/cm^2, 1991 psi)			
Compression Ratio	24 : 1		23 : 1	
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, 1.1 kW	12 V, 1.2 kW		
Starting Support Device	By glow plug in combustion chamber			
EGR	None			
Battery	12 V, 65 AH, equivalent	12 V, 75 AH, equivalent		
Charging Alternator	12 V, 480 W			
Fuel	Diesel Fuel No.2-D (ASTM D975)			
Lubricating Oil	Class CF lubricating oil as per API classification is recommended. For details on recommended lubricating oils, see page G-6, 9.			
Lubricating Oil Capacity	5.7 L (1.5 U.S.gals)	6.7 L (1.8 U.S.gals)		
Weight (Dry) kg (lbf)	95.0 (209)	110.0 (242.5)		114.0 (251.3)

* 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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