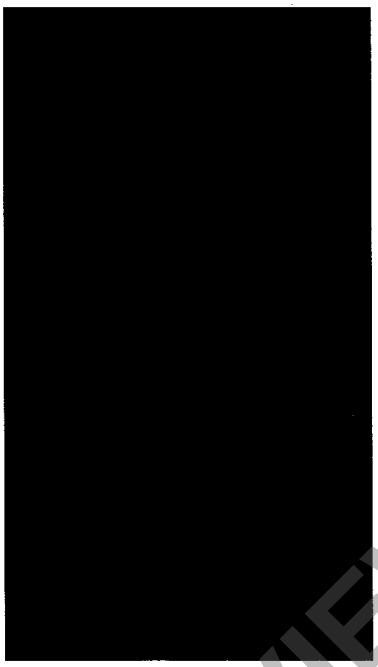
SERVICE MANUAL



MITSUBISHI DIESEL ENGINE

D04FD-TAA

for HYUNDAI HEAVY INDUSTRIES CO.,LTD.

November 2006

MITSUBISHI HEAVY INDUSTRIES, LTD.

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GENERAL

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Table 1-1 Main specifications (3 / 3)

Engine model				D04FD-TAA
Electrical system	Starter	Manufacturer		Mitsubishi Electronic Corporation
		Type		M008T60471
		Pinion meshing type		Pinion shift
		Output		24V - 5 kW
		Qty		1
		Ring gear and pinion ratio		10/127
		No-load characteristics	Voltage	23V
			Current	85A or below
			Speed	3300 min^{-1} or above
		Load characteristics	Voltage	9V
			Current	1400A or below
			Torque	88 N·m {9.0 kgf·m} [65 lbf·ft] or above
		Switching voltage	ON	16V or below
			OFF	When circuit is opened, plunger returns
	Alternator	Type		3-phase alternating current, with rectifier
		Manufacturer		Mitsubishi Electronic Corporation
		Model number		A004TU3599
		Output		24V-50A
		Rated voltage generating speed		1000 min^{-1}
		Rated output generating speed		5000 min^{-1}
		Permissible speed		8000 min^{-1}
		Regulated voltage		28.5 V ± 0.5V
		Speed ratio (to crank pulley speed)		Varies depending on specifications.
	Air heater	Type		Electric heater
		Capacity		2.1 kW

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2.3 Standard eyebolt tightening torque

Table 2-14 Standard eyebolt tightening torque

Threads Dia × Pitch (mm)	Width across flats (mm) [in.]	Strength classification		
		4T		
		N·m	kgf·m	lbf·ft
M8 × 1.25	12 [0.47]	8 ± 1	0.8 ± 0.1	5.8 ± 0.7
M10 × 1.25	14 [0.55]	15 ± 2	1.5 ± 0.2	11 ± 1.5
M12 × 1.25	17 [0.67]	25 ± 3	2.5 ± 0.3	18 ± 2.2
M14 × 1.5	19 [0.75]	34 ± 4	3.5 ± 0.4	25 ± 2.9
M16 × 1.5	22 [0.87]	44 ± 5	4.5 ± 0.5	33 ± 3.6
M18 × 1.5	24 [0.94]	74 ± 5	7.5 ± 0.5	54 ± 3.6
M20 × 1.5	27 [1.06]	98 ± 10	10.0 ± 1.0	72 ± 7.2
M24 × 1.5	32 [1.26]	147 ± 15	15.0 ± 1.5	109 ± 11
M27 × 1.5	41 [1.61]	226 ± 20	23.0 ± 2.0	166 ± 15

(Dry)

2.4 Standard union nut tightening torque

Table 2-15 Standard union nut tightening torque

Nominal diameter	Cap nut size M (mm)	Width across flats (mm) [in.]	N·m	kgf·m	lbf·ft
63	M14 × 1.5	19 [0.75]	39	4	29
80	M16 × 1.5	22 [0.87]	49	5	36
100	M20 × 1.5	27 [1.06]	78	8	58
120	M22 × 1.5	30 [1.18]	98	10	72
150	M27 × 1.5	32 [1.26]	157	16	116
180	M30 × 1.5	36 [1.42]	196	20	145
200	M30 × 1.5	36 [1.42]	196	20	145
220	M33 × 1.5	41 [1.61]	245	25	181
254	M36 × 1.5	41 [1.61]	294	30	217

(Maximum tolerance value: ±10%, dry)

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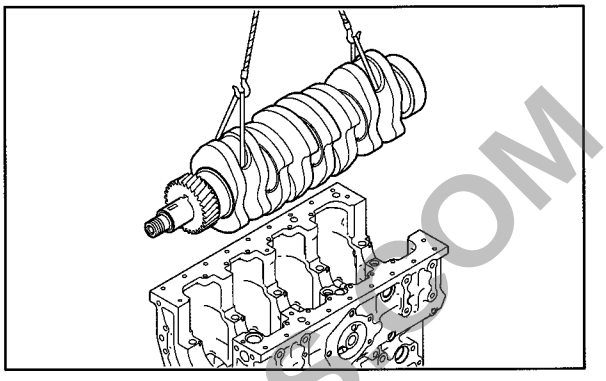
4.7 Removing crankshaft

Attach a sling to the crankshaft, hold it horizontally, and hoist the crankshaft slowly.

Note: (a) When lifting the crankshaft, do not allow wire chain to come into contact with the crankshaft. To avoid damage to the crankshaft when lifting, use a cloth belt or pad.

(b) Be careful not to damage main bearings.

(c) Mark each main bearing to the corresponding cylinder number for identification.



Removing crankshaft

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on the engine information plate, but most parameters must be obtained from specified web site or product support.

(4) Remove power from the ECM.

(5) Remove the ECM.

(6) Install the replacement ECM.

(7) Download the Flash file.
Connect the electronic service tool to the diagnostic connector.
Select "WinFlash" from the "Utilities" menu of the Mitsubishi ET.
Select the appropriate file.

(8) If necessary, use the Mitsubishi ET to clear the rating interlock in the Personality module. To clear the rating interlock, enter the factory password when the Mitsubishi ET is first connected. Activating the "Test ECM" mode will also clear the rating interlock.

(9) Use the Mitsubishi ET to program the parameters. Perform the following procedure.
If the "Copy configuration" procedure was successful, use the "Copy configuration, ECM replacement" function to load the configuration file into the ECM.

Note: During the following procedure, factory passwords may be required. If the "Copy configuration" procedure failed, configure the parameters individually. The parameters should match the parameters from step 3. Perform the "Fuel system verification test".

(10) Check for logged diagnostic codes. Clear logged events if they are unnecessary.

1.3 Self-diagnostics

The ECM has the ability to detect problems with the electronic system and with engine operation. When a problem is detected, a code is generated. An alarm may also be generated. There are two types of codes:

- Diagnostic
- Event

1.3.1 Diagnostic code

When a problem with the electronic system is detected, the ECM generates a diagnostic code. This indicates the specific problem with the circuitry.

Diagnostic codes can have two different states:

- Active
- Logged

Active diagnostic code

An active diagnostic code indicates that an active problem has been detected by the control system. Active codes require immediate attention. Always service active codes prior to servicing logged codes.

Logged code

Every generated code is stored in the permanent memory of the ECM. The codes are logged.

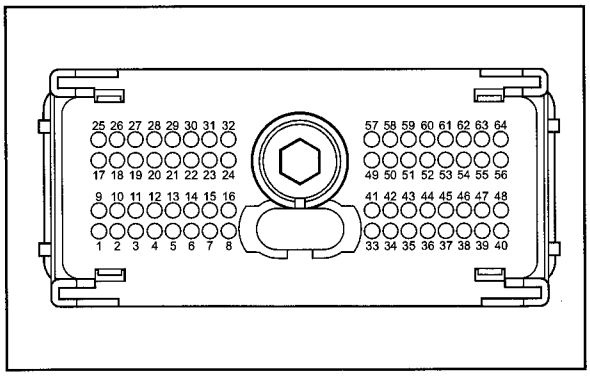
1.3.2 Event code

An event code is generated by the detection of an abnormal engine operating condition. For example, an event code will be generated if the oil pressure is too low. In this case, the event code indicates the symptom of a problem. Event code also have both "Active" and "Logged" states.

Logged codes may not indicate that a repair is needed. The problem may have been temporary. The problem may have been resolved since the logging of the code. If the system is powered, it is possible to generate an active diagnostic code whenever a component is disconnected. When the component is reconnected, the code is no longer active. Logged codes may be useful to help troubleshoot intermittent problems. Logged codes can also be used to review the performance of the engine and the electronic system.

1.4 ECM harness connector terminals

The ECM uses connectors that have 64 terminals to interface to the wiring harness.



Layout of the connector pins (view from the rear)

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4. Main specifications

Table 1-1 Main specifications (1 / 3)

Engine model				D04FD-TAA
Main specification	Type			Water cooled, 4 cycle diesel engine, turbocharged
	No. of cylinders - arrangement			4 cylinder in-line
	Combustion system			Direct injection
	Valve mechanism			Overhead (2 intake valves, 2 exhaust valves)
	Cylinder bore × stroke			102 × 130 mm [4.02 × 5.12 in.]
	Displacement			4.249 L [259 cu. in.]
	Compression ratio			16.5 : 1
	Fuel			Diesel fuel
	Firing order			1-3-4-2
	Direction of rotation			Counterclockwise when viewed from flywheel side
	Dimensions (varies depending on the specifications)	Length		881 mm [34.68 in.]
		Width		703 mm [27.68 in.]
		Height		989 mm [38.94 in.]
	Dry weight			Approx. 420 kg [926 lbs]
Engine main parts	Cylinder sleeve type			Dry
	Number of piston ring	Compression ring		2
		Oil ring		1 (with expander)
	Valve timing (when engine is hot)	Inlet valve	Open	BTDC 15°
			Close	ABDC 45°
		Exhaust valve	Open	BBDC 49°
			Close	ATDC 15°
	Starting system			Starter
	Starting aid system			Air heater
Fuel System	Type			Common rail fuel injection system
	Model number			CAT-CR200
	Manufacturer			Caterpillar Inc.
	Fuel filter type			Cartridge type paper element
Oil system	Lubricating type			Forced circulation type (oil pump pressure feed type)
	Engine oil	Classification		API classification CF-4 or above class
		Total capacity (including oil filter)		18.5 L [4.89 US gallons]
	Oil pump	Type		Gear type oil pump
		Delivery capacity		66 L [17.4 US gallons]/1800 min^{-1}
	Relief valve	Type		Piston valve type
		Valve opening pressure		0.35 ± 0.05 MPa {3.5 ± 0.5 kgf/cm^2} [50 ± 7 psi]
	Oil cooler type			Water-cooled, multi-plate type
	Oil filter type			Cartridge type paper element
	Safety valve opening pressure			1.1 MPa {11 kgf/cm^2} [157 psi]

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2.6 Inspecting water pump

Measure the water pump case bore and the shaft diameter at the bearing fitting portions as well as the inside and outside diameters of the bearings. If any of the measurements is out of the standard, replace the part with a new one.

Item		Nominal	Standard
Pump case bearing bore diameter		ø 52 mm [2.05 in.]	51.988 to 52.018 mm [2.0468 to 2.0479 in.]
		ø 62 mm [2.44 in.]	61.988 to 62.018 mm [2.4405 to 2.4416 in.]
Bearing	Inside diameter	ø 25 mm [0.98 in.]	24.880 to 25.000 mm [0.9795 to 0.9843 in.]
	Outside diameter	ø 52 mm [2.05 in.]	51.987 to 52.000 mm [2.0467 to 2.0472 in.]
		ø 62 mm [2.44 in.]	61.987 to 62.000 mm [2.4404 to 2.4409 in.]
Shaft bearing fitting section outer diameter		ø 25 mm [0.98 in.]	25.002 to 25.011 mm [0.9843 to 0.9847 in.]

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How to use this manual

This service manual consists of several Groups, which are arranged so as to allow you to make reference quickly to specifications, maintenance standards, adjustment procedures and service procedures including methods for disassembly, inspection, repair and reassembly of the Mitsubishi Diesel Engine (standard model for land use).
A short summary describing the content of each Group is given in the General Contents page, and there is also a detailed table of contents at the beginning of each Group.
Regarding the procedures for operation and periodical maintenance of the engine, refer to the Operation and Maintenance Manual. For information on the engine components and ordering of service parts, refer to the Parts Catalogue. Structure and function of the engine are described in the relevant training manuals.

Methods of presentation

(1)Index numbers alloted to parts in exploded views are not only a call-out of part names listed in the text but also an indication of the sequence of disassembly.
(2)Inspections to be conducted during disassembly process are indicated in boxes in the relevant exploded views.
(3)Maintenance standards required for inspection and repair works are indicated in the appropriate positions in the text. They are also collectively indicated in Group 2, the General Contents group.
(4)Fasteners to be tightened in "wet" condition, or with engine oil applied, are identified by [Wet] placed after tightening torque values. If no such indication is suffixed, the fastener should be tightened in "dry" condition, or without lubricating with engine oil.
(5)In this manual, important safety or other cautionary instructions are emphasized with the following marks headed.

⚠ DANGER

Indicates an immediately 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 an immediately hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, can result in property damage.

Note:

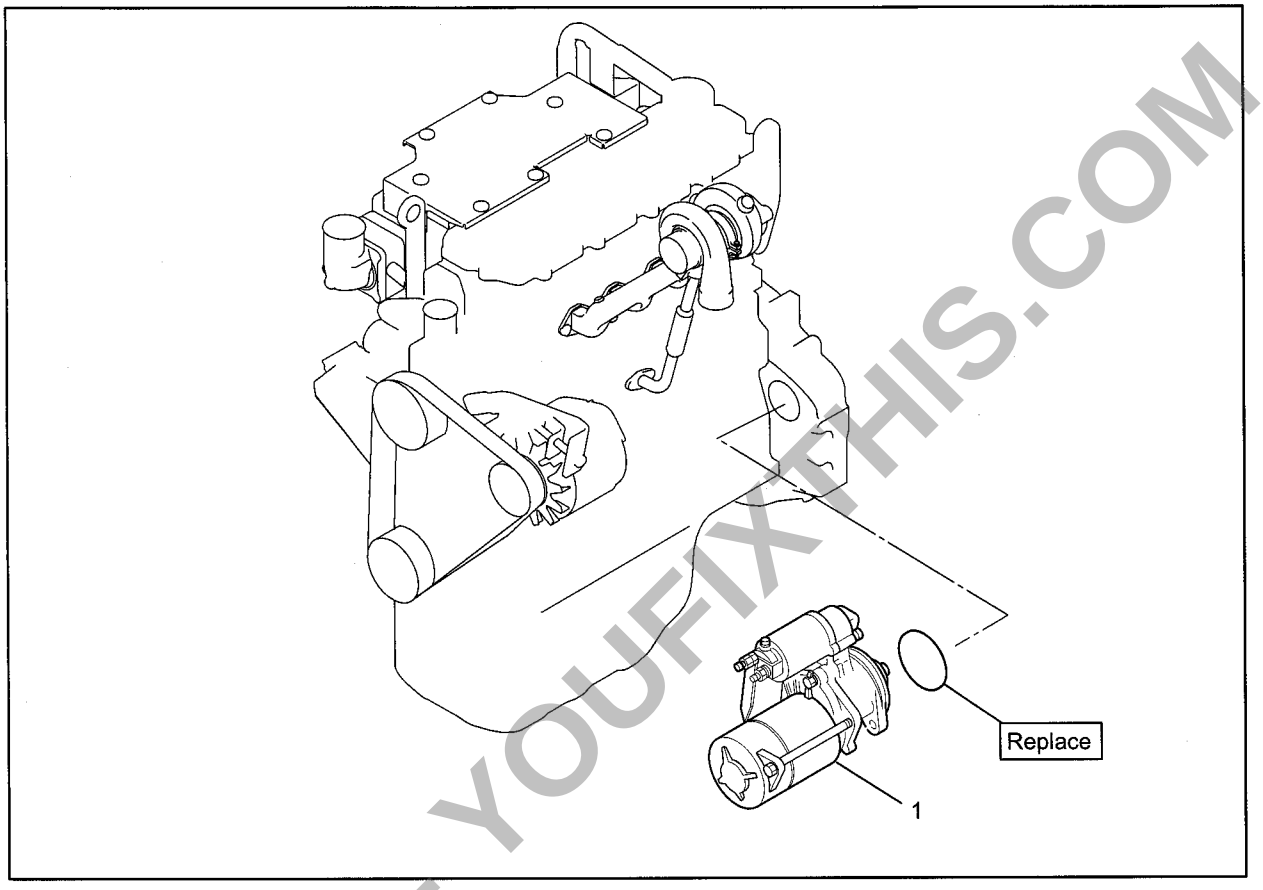
Indicates important information or information useful for operation or maintenance of the engine.

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1. Removing electrical system

1.1 Removing starter



Removing starter

Removing sequence

1 Starter, bolt, washer and O-ring

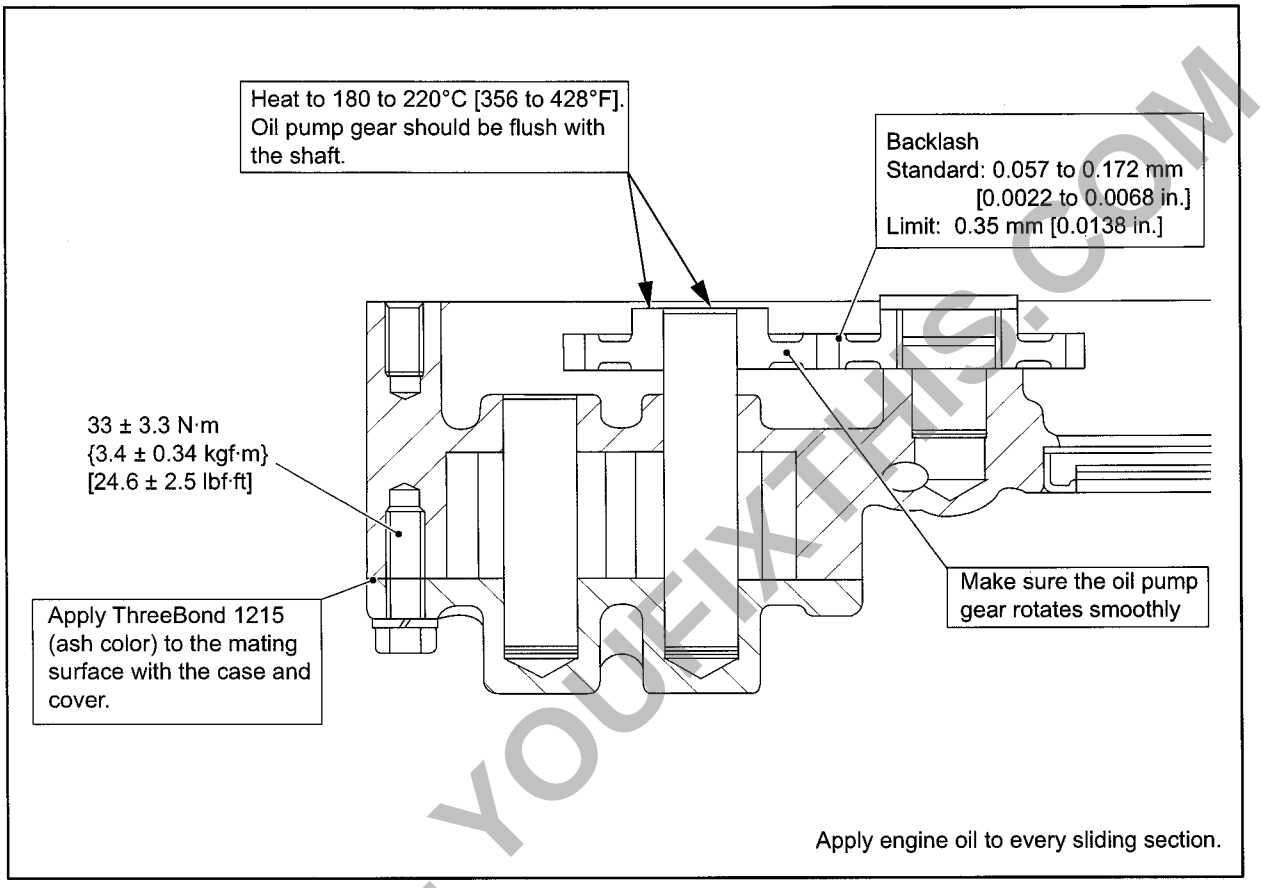
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2.3 Reassembling oil pump



Reassembling oil pump

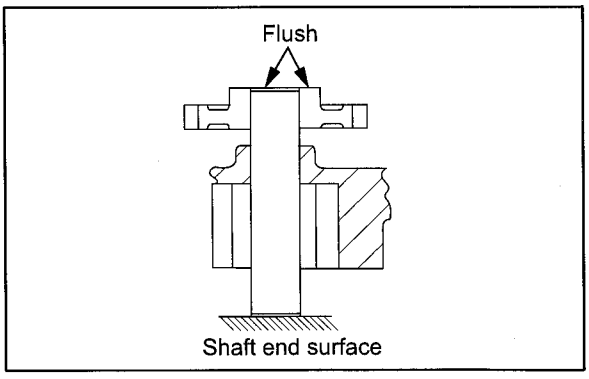
2.3.1 Reassembling oil pump gear and drive gear assembly

CAUTION

The oil pump gear and drive gear assembly is nonreusable parts. Replace the assembly with a new one.

(1) Heat the oil pump gear between 180 to 220°C [356 to 428°F].

(2) Support the shaft at end and force the gear onto the shaft until its end face is flush with the end of shaft.



Reassembling oil pump gear and drive gear assembly

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