WSM

WORKSHOP MANUAL
DIESEL ENGINE

V3800-CR-TE4,V3800-CR-TIE4,
V3800-CR-TE4C,V3800-CR-TIE4C

Kubota

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INFORMATION

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1. SAFETY FIRST

⚠ 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.**

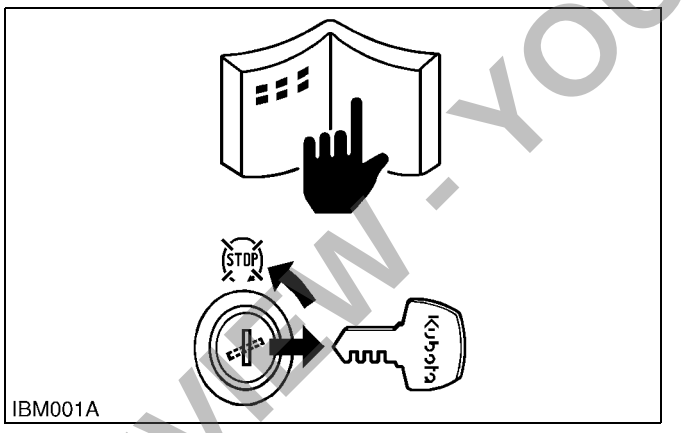
⚠ WARNING
- **Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

⚠ CAUTION
- **Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**

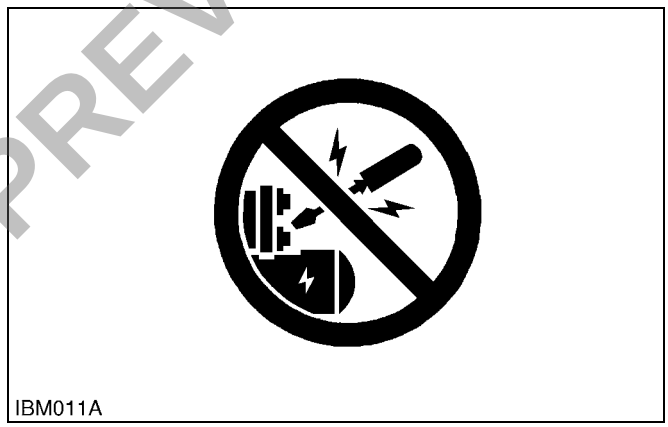
■ IMPORTANT
- **Indicates that equipment or property damage could result if instructions are not followed.**

■ NOTE
- **Gives helpful information.**

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IBM001A


IBM011A

BEFORE YOU START SERVICE

- 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 stable and level ground.
- Let the temperature of the engine decrease before you start a job.
- Stop the engine, then remove the key.
- Disconnect the battery negative cable.
- Hang a **"DO NOT OPERATE"** tag in the operator station.

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START SAFELY

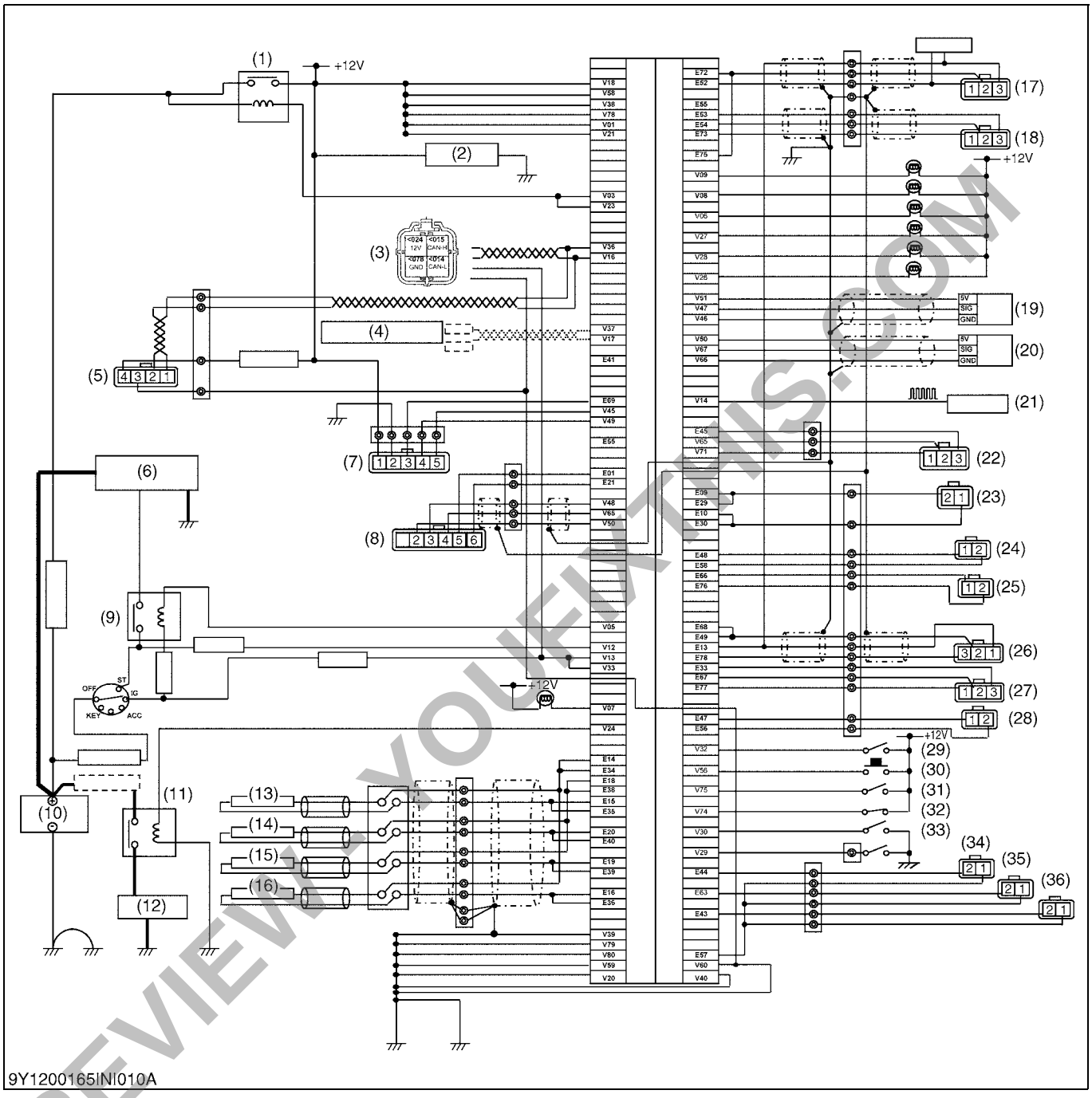
- Do not do the procedures below when you start the engine.
  - short across starter terminals
  - bypass the safety start switch
- Do not make unauthorized modifications to the engine. This can cause damage and decrease the engine life.

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[4] SYSTEM WIRING DIAGRAM



(1) Main Relay
(2) Fuel Feed Pump
(3) CAN1 Connector (For Service)
(4) CAN2 Connector (For OEM Machine)
(5) EGR Valve
(6) Starter
(7) Air Flow Sensor
(8) Intake Throttle Valve
(9) Starter Relay
(10) Battery
(11) Intake Air Heater Relay
(12) Intake Air Heater
(13) Injector 1
(14) Injector 2
(15) Injector 3
(16) Injector 4
(17) Crankshaft Position Sensor
(18) Camshaft Position Sensor
(19) Accel Sensor 1
(20) Accel Sensor 2
(21) Vehicle Speed Sensor
(22) DPF Differential Pressure Sensor (ΔP)
(23) SCV (Suction Control Valve)
(24) Fuel Temperature Sensor
(25) Coolant Temperature Sensor
(26) Rail Pressure Sensor
(27) Boost Sensor
(28) Intake Air Temperature Sensor
(29) Stop Switch
(30) Parked Regeneration Switch
(31) Parking Switch
(32) Regeneration Inhibit Switch
(33) Neutral Switch
(34) DPF Temperature Sensor (T_0)
(35) DPF Temperature Sensor (T_1)
(36) DPF Temperature Sensor (T_2)

DPF: Diesel Particulate Filter

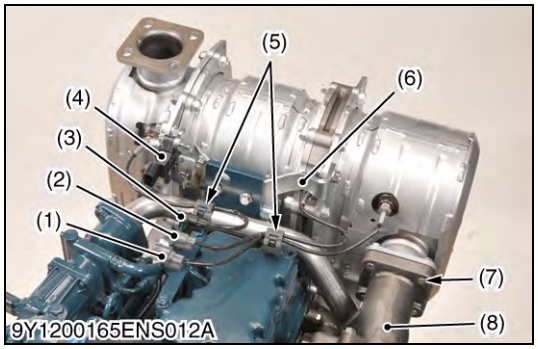
■ **NOTE**

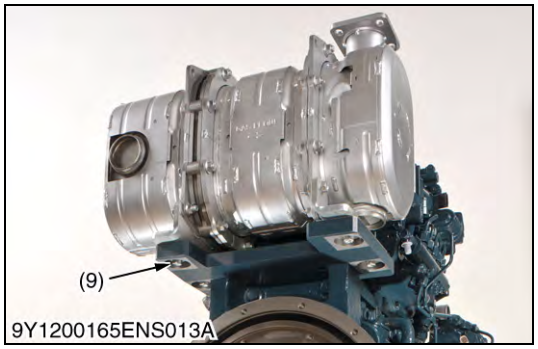
- **Terminal names and terminal numbers marked with * have become invalid.**

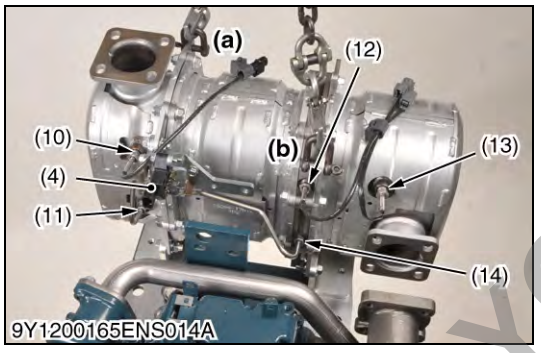
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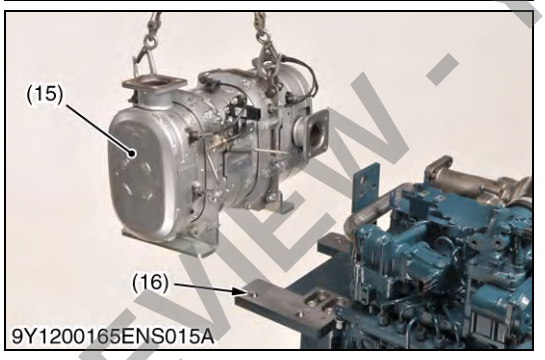
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Muffler Full Assembly (DPF)

■ **IMPORTANT**

- **Since the DPF that was dropped or given a shock cannot be reused even if there is no damage outwardly, replace it with a new one.**

■ **NOTE**

- **Always work in the workshop equipped with a electric hoist (including mobile hoist).**
- **Put a product (engine) on a stable ground, and set the parking brake.**
- **As the DPF muffler full assembly is hot just after the engine shutdown, make sure to start operation after it gets cool.**
- **Make sure not to let any foreign substances enter the opening section during the operation.**
- **Make sure not to damage the DPF muffler full assembly by falling or impact as it contains a ceramic filter.**
- **Before removing the DPF muffler full assembly from a product (engine), connect the diagnosis tool (Diagmaster), check the failure history, and save the project.**
- **Before removing the DPF for cleaning, keep the records of the engine serial number, DPF muffler full assembly part number, DPF muffler full assembly serial number, and engine operating time, which are required in preparing the DPF cleaning order from.**
  Since the engine operating time is recorded in the ECU, check the operating time by connecting the service tool (Diagmaster).
- **When installing and removing the muffler full assembly (DPF), make sure that the temperature sensor, differential pressure sensor, and differential pressure pipe do not make contact with surrounding parts.**

1. Disconnect the harness from the connector (1), (2), (3) of temperature sensor and differential pressure sensor (4).
2. Remove the connector (1), (2), (3) of temperature sensor from the bracket.
3. Remove the 2 clamps (5).
4. Remove the DPF stay 1 (6).
5. Remove the 4 screws (7) of muffler flange (8).
6. Remove the muffler full assembly (DPF) mounting screws (9).
7. Set the shackle to the position **(a)**, **(b)** of the muffler full assembly (DPF) (15). (Refer to the photo)
8. Hoist the muffler full assembly (DPF) (15) and remove the muffler full assembly (DPF) (15).
9. Remove the DPF bracket (16).

(1) Connector of Temperature Sensor (T_0)
(2) Connector of Temperature Sensor (T_1)
(3) Connector of Temperature Sensor (T_2)
(4) Differential Pressure Sensor
(5) Clamp
(6) DPF Stay 1
(7) Screw of Muffler Flange
(8) Muffler Flange
(9) Muffler Full Assembly (DPF) Mounting Screw
(10) Temperature Sensor (T_2)
(11) Differential Pressure Pipe
(12) Temperature Sensor (T_1)
(13) Temperature Sensor (T_0)
(14) Differential Pressure Pipe
(15) Muffler Full Assembly (DPF)
(16) DPF Bracket

(To be continued)

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[2] TIGHTENING TORQUES OF 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 × 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 × Pitch	N·m	kgf·m	lbf·ft
Injector clamp nut	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Overflow pipe joint screw	M6 × 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
Cylinder head cover 1 screw	M6 × 1.0	6.87 to 11.2	0.700 to 1.15	5.07 to 8.31
Cylinder head cover 2 screw	M6 × 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
Injection pipe retaining nut	M12 × 1.5	23 to 36	2.3 to 3.7	17 to 26
Oil pressure switch taper screw	R 1/8	15 to 19	1.5 to 2.0	11 to 14
Supply pump mounting nut	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Supply pump gear mounting nut	M14 × 1.5	59 to 68	6.0 to 7.0	44 to 50
Overflow pipe joint screw	M8	7.9 to 12	0.80 to 1.3	5.8 to 9.4
Overflow pipe joint screw	M10	16 to 19	1.6 to 2.0	12 to 14
Supply pump gear cover mounting screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Common rail mounting screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Coolant temperature sensor taper screw	–	16 to 23	1.6 to 2.4	12 to 17
Camshaft position sensor mounting screw	–	4 to 5	0.4 to 0.6	3 to 4
Crankshaft position sensor mounting screw	–	4 to 5	0.4 to 0.6	3 to 4
Intake air temperature sensor mounting screw	–	30 to 39	3.0 to 4.0	22 to 28
Injector terminal nut	–	1.6 to 2.2	0.16 to 0.23	1.2 to 1.6
Rocker arm bracket nut	M10 × 1.25	49 to 55	5.0 to 5.7	37 to 41
*Cylinder head mounting screw	M12 × 1.25	98.1 to 107	10.0 to 11.0	72.4 to 79.5
Oil cooler joint screw	M20 × 1.5	40 to 44	4.0 to 4.5	29 to 32
*Crankshaft screw	M16 × 1.5	255 to 274	26.0 to 28.0	188 to 202
Gear case cover mounting screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Relief valve retaining screw	M22 × 1.5	69 to 78	7.0 to 8.0	51 to 57
Idle gear mounting screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Camshaft set screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Camshaft position pulsar gear mounting screw	M5	4.7 to 5.6	0.48 to 0.58	3.5 to 4.1
Plate mounting screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
*Connecting rod screw	M10 × 1.25	79 to 83	8.0 to 8.5	58 to 61
*Flywheel screw	M12 × 1.25	98.1 to 107	10.0 to 11.0	72.4 to 79.5
Flywheel housing mounting screw	M12 × 1.25	78 to 90	7.9 to 9.2	58 to 66

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[2] DISASSEMBLING AND ASSEMBLING

(1) Draining Engine Oil and Coolant

Draining Engine Oil

1. Start and increase the temperature of the engine for approximately 5 minutes.
2. Put an oil pan below the engine.
3. Remove the drain plug to drain the oil.
4. After you drain, tighten the drain plug.

(When reassembling)

- Fill the engine oil until the upper line on the dipstick.

IMPORTANT

- **Do not mix different types of oil.**
- **Use the correct SAE Engine Oil by reference to the ambient temperature.**

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Draining Coolant

CAUTION

- **Do not remove the radiator cap while you operate or immediately after you stop the engine. If not, hot water can flow out from the radiator. Only open the cap after more than 10 minutes for the temperature of the radiator to decrease.**

1. Prepare a bucket.
2. Open the drain cock to drain the coolant.
3. After you drain, close the drain cock.

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1. TROUBLESHOOTING

This -.2 shows only mechanical failures. The failures related to the common rail system (CRS), refer to the diagnosis manual (DM) for common rail system engine (9Y120-01740).

Symptom	Probable Cause	Solution	Reference Page
The engine does not start	No fuel	Fill up the fuel	–
	Air in the fuel system	Bleed the air	–
	Water in the fuel system	Change the fuel and repair or replace the fuel system	G-14
	The fuel pump is defective	Replace	–
	The fuel hose is clogged	Clean or replace	G-14
	The fuel filter is clogged	Replace	G-16
	The viscosity of fuel at low temperature is too high	Replace the specified fuel	I-5, G-8
	The cetane number of fuel is low	Replace the specified fuel	I-5, G-8
	Fuel leakage because of loose injection pipe retaining nut	Tighten the retaining nut	1-S30
	The injector is clogged	Replace	1-S34
	The supply pump is defective	Replace	1-S40
	Seizure of the crankshaft, camshaft, piston or bearing	Repair or replace	–
	Compression leakage from the cylinder	Replace the head gasket Tighten the cylinder head screw	1-S37, 1-S38
	Incorrect valve timing	Examine the timing gear	1-S44
	Piston ring and cylinder are worn out	Replace	1-S67, 1-S71
	Incorrect valve clearance	Adjust valve clearance	1-S14
The starter does not operate	Discharged battery	Charge or replace	–
	Starter is defective	Repair or replace	1-S18
	The key switch is defective	Replace	–
	The connection of the wires is incorrect	Examine or correct	–

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2. SPECIFICATIONS

Model	V3800-CR-TE4	V3800-CR-TE4C	V3800-CR-TIE4	V3800-CR-TIE4C
Number of Cylinder	4			
Engine Type	Vertical, water-cooled, 4-cycle DI diesel engine			
Bore x Stroke	100 × 120 mm (3.94 × 4.72 in.)			
Total Displacement	3769 cm^3 (230.0 cu.in.)			
SAE Gross Continuous	64.7 kW / 2600 min^{-1} (rpm) (86.8 HP / 2600 min^{-1} (rpm))		75.0 kW / 2600 min^{-1} (rpm) (101 HP / 2600 min^{-1} (rpm))	
SAE Gross Intermittent	74.5 kW / 2600min^{-1} (rpm) (99.9 HP / 2600 min^{-1} (rpm))		86.3 kW / 2600min^{-1} (rpm) (116 HP / 2600 min^{-1} (rpm))	
Maximum Bare Speed	2800 min^{-1} (rpm)			
Minimum Bare Idling Speed	800 min^{-1} (rpm)			
Combustion Chamber	Reentrant Type, Center Direct Injection Type (E-CDIS)			
Fuel Injection Pump	DENSO Common Rail System			
Governor				
Injector				
Fuel Injection Timing				
Fuel Injection Pressure				
Direction of Rotation	Counter-clockwise (Viewed from flywheel side)			
Firing Order	1-3-4-2			
Compression Ratio	17.5			
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			
Starter Motor	12 V, 3.0 kW			
Starting Support Device	Intake Air Heater in Intake Manifold			
EGR	External EGR (EGR Cooler + Electric EGR Valve + Reed Valve)			
Battery	12 V, 136 AH equivalent			
Charging Alternator	12 V, 540 W			
Fuel	Diesel Fuel No. 2-D S15, see page G-8.			
Lubricating Oil	Class CJ-4 lubricating oil as per API classification is recommended. For details on recommended lubricating oils, see page G-8.			
Lubricating Oil Capacity	13.2 L (3.49 U.S.gals)			
Weight (Dry)	325 kg (716 lbs)			

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4. MAINTENANCE CHECK LIST

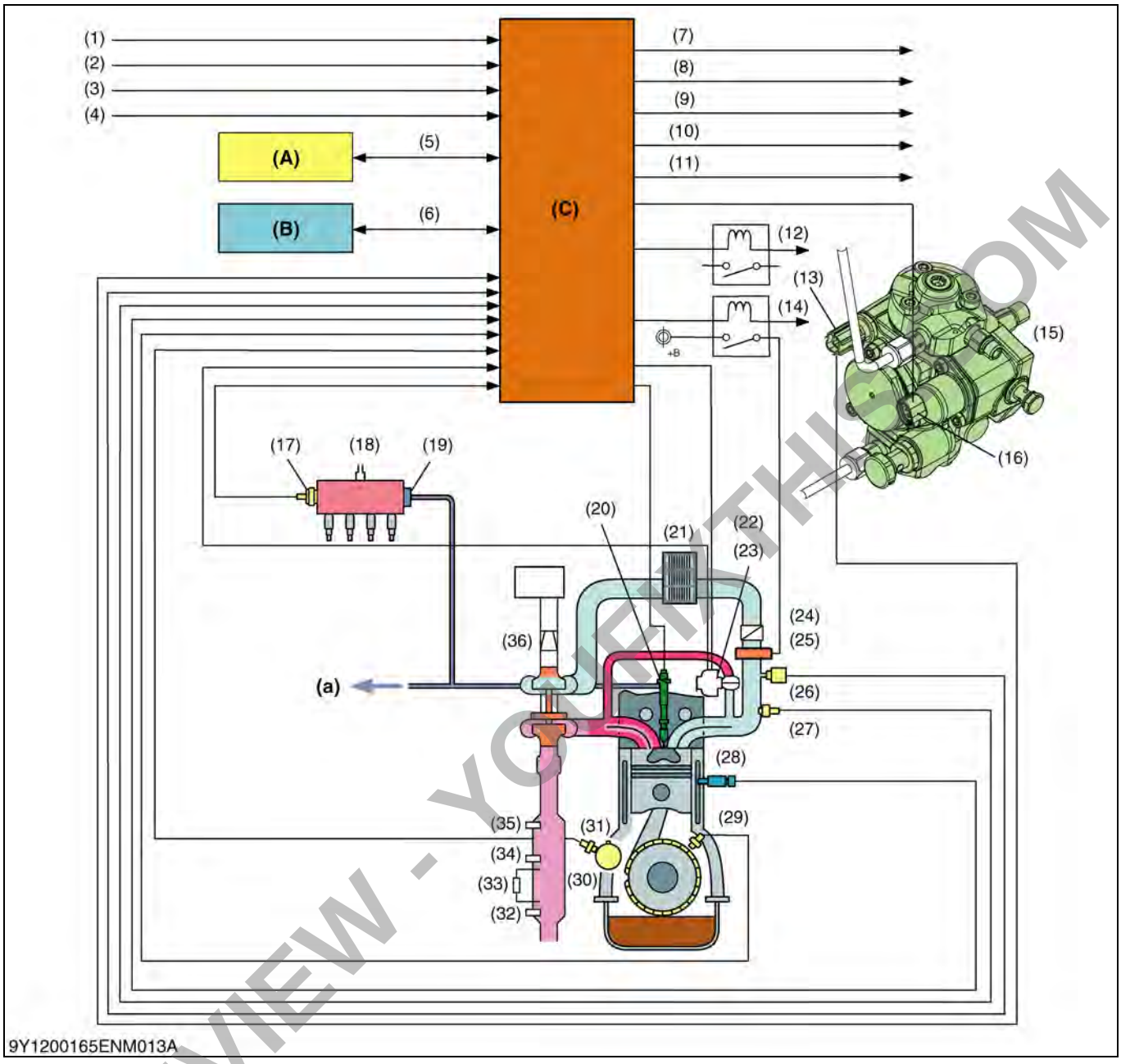
To make sure that the engine operates safely for a long time, refer to the table below to do regular inspections.

Inspection Item		Service Interval									
		Daily	Initial 50 hrs	Every 50 hrs	Every 250 hrs	Every 500 hrs	Every 1000 hrs	Every 1500 hrs	Every 3000 hrs	Every 1 year	Every 2 years
	Check of engine oil level	❍									
	Check of fuel level	❍									
	Check of coolant level	❍									
	Check of fan belt	❍									
	Check of fuel hoses and clamp bands			❍							
	Check of draining of water separator			❍							
	Check of radiator hoses and clamp bands				❍						
	Cleaning of air cleaner element (Replace the element after 6-times cleaning)				❍						
	Adjustment of fan belt tension				❍						
	Check of intake air line				❍						
	Change of engine oil		❍			❍					
	Replacement of oil filter cartridge		❍			❍					
★1	Replacement of fuel filter cartridge					❍					
	Cleaning of water separator					❍					
★2	Cleaning of fuel tank interior					❍					
★2	Cleaning of water jacket and radiator interior					❍					
★2	Replacement of fan belt					❍					❍
★2	Check of valve clearance						❍				
★2,★3	Check of injector tip							❍			
★2,★3	Check of EGR cooler							❍			
★3	Replacement of oil separator element							❍			
★2	Check of PCV (Positive Crankcase Ventilation) valve							❍			
★2,★3	Check of turbocharger								❍		
★2,★3	Cleaning of DPF								❍		
★2,★3	Check of EGR system								❍		
★2	Replacement of air cleaner element									❍	
★2	Check of DPF differential pressure pipes and hoses									❍	
★2	Check of EGR piping									❍	
	Check of intake air line									❍	
	Check of exhaust manifold (Crack, gas leakage and mounting screw)									❍	
★2	Replacement of oil separator rubber hose										❍
★2	Replacement of rubber hose of DPF differential pressure sensor										❍
★2	Replacement of intake hose (After air flow sensor) and inter cooler hose										❍
★2	Replacement of pressure detection hose of boost sensor										❍
★2	Replacement of EGR cooler hose										❍
★2	Replacement of water hose										❍
★2	Replacement of lubricant hose										❍
	Change of radiator coolant (L.L.C.)										❍
★2	Replacement of radiator hoses and clamp bands										❍

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[5] ENGINE CONTROL SYSTEM



(1) Key Switch ON Signal
(2) Starter Switch Signal
(3) Emergency Stop Switch
(4) Oil Pressure Switch
(5) CAN Communication for OEM Machine (Accelerator Position Signal*, Neutral Switch*, Machine Travel Speed Signal*)
(6) CAN Communication for Service
(7) Engine Warning Light Signal
(8) Stop Lamp Signal
(9) Oil Pressure Warning Lamp Signal
(10) Overheat Lamp Signal
(11) Glow (Air Heater) Lamp Signal
(12) Starter Relay
(13) Fuel Temperature Sensor
(14) Glow (Air Heater) Relay
(15) Supply Pump
(16) SCV (Suction Control Valve)
(17) Rail Pressure Sensor
(18) Rail
(19) Pressure Limiter
(20) Injector
(21) Inter cooler
(22) EGR DC Motor
(23) EGR Lift Sensor
(24) Intake Throttle Valve
(25) Intake Air Heater
(26) Intake Air Pressure Sensor
(27) Intake Air Temperature Sensor
(28) Coolant Temperature Sensor
(29) Crankshaft Position Sensor
(30) Diesel Particulate Filter (Hereinafter Referred To As The "DPF") Muffler
(31) Camshaft Position Sensor
(32) Temperature Sensor (DPF Outlet Exhaust Temperature) (T_2)
(33) Differential Pressure Sensor (DPF Differential Pressure) (ΔP)
(34) Temperature Sensor (DPF Inlet Exhaust Temperature) (T_1)
(35) Temperature Sensor (DOC Inlet Exhaust Temperature) (T_0)
(36) Air Flow Sensor

(A) CAN2 Connector (For OEM Machine)
(B) CAN1 Connector (For Service)
(C) Engine ECU
(a) To Fuel Tank

■ **NOTE**
- **The signals marked with * are CAN communication.**

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