CX130D
Crawler Excavator

SERVICE MANUAL

Part number 51436799
English
February 2018

CASE
CONSTRUCTION

Contents

INTRODUCTION

Engine..... 10

[10.001] Engine and crankcase 10.1

[10.102] Pan and covers 10.2

[10.106] Valve drive and gears 10.3

[10.101] Cylinder heads 10.4

[10.105] Connecting rods and pistons..... 10.5

[10.103] Crankshaft and flywheel..... 10.6

[10.216] Fuel tanks 10.7

[10.206] Fuel filters 10.8

[10.218] Fuel injection system..... 10.9

[10.202] Air cleaners and lines 10.10

[10.250] Turbocharger and lines..... 10.11

[10.254] Intake and exhaust manifolds and muffler 10.12

[10.500] Selective Catalytic Reduction (SCR) exhaust treatment..... 10.13

[10.501] Exhaust Gas Recirculation (EGR) exhaust treatment..... 10.14

[10.400] Engine cooling system 10.15

[10.414] Fan and drive 10.16

[10.310] Aftercooler..... 10.17

[10.304] Engine lubrication system..... 10.18

Hydraulic systems..... 35

[35.000] Hydraulic systems..... 35.1

[35.300] Reservoir, cooler, and filters..... 35.2

[35.106] Variable displacement pump 35.3

[35.102] Pump control valves..... 35.4

[35.359] Main control valve..... 35.5

[35.357] Pilot system 35.6

[35.355] Hydraulic hand control 35.7
[35.356] Hydraulic foot control 35.8
[35.352] Hydraulic swing system 35.9
[35.353] Hydraulic travel system 35.10
[35.354] Hydraulic central joint 35.11
[35.736] Boom hydraulic system 35.12
[35.737] Dipper hydraulic system 35.13
[35.741] Dozer blade cylinders 35.14
[35.738] Excavator and backhoe bucket hydraulic system 35.15
[35.360] Hammer and rotating bucket hydraulic system 35.16
Frames and ballasting 39
[39.140] Ballasts and supports 39.1
Tracks and track suspension 48
[48.130] Track frame and driving wheels 48.1
[48.100] Tracks 48.2
[48.134] Track tension units 48.3
[48.138] Track rollers 48.4
Cab climate control 50
[50.100] Heating 50.1
[50.200] Air conditioning 50.2
Electrical systems 55
[55.000] Electrical system 55.1
[55.100] Harnesses and connectors 55.2
[55.525] Cab engine controls 55.3
[55.015] Engine control system 55.4
[55.201] Engine starting system 55.5
[55.301] Alternator 55.6
[55.302] Battery 55.7

[55.202] Cold start aid 55.8
[55.011] Fuel tank system 55.9
[55.010] Fuel injection system 55.10
[55.014] Engine intake and exhaust system 55.11
[55.988] Selective Catalytic Reduction (SCR) electrical system 55.12
[55.989] Exhaust Gas Recirculation (EGR) electrical system 55.13
[55.012] Engine cooling system 55.14
[55.013] Engine oil system 55.15
[55.640] Electronic modules 55.16
[55.512] Cab controls 55.17
[55.036] Hydraulic system control 55.18
[55.051] Cab Heating, Ventilation, and Air-Conditioning (HVAC) controls 55.19
[55.050] Heating, Ventilation, and Air-Conditioning (HVAC) control system 55.20
[55.524] Cab controls (Lift arm, Boom, Dipper, Bucket) 55.21
[55.416] Swing control system 55.22
[55.417] Travel control system 55.23
[55.530] Camera 55.24
[55.518] Wiper and washer system 55.25
[55.404] External lighting 55.26
[55.514] Cab lighting 55.27
[55.408] Warning indicators, alarms, and instruments 55.28
[55.992] Anti-theft system 55.29
[55.DTC] FAULT CODES 55.30

Booms, dippers, and buckets 84

[84.910] Boom 84.1
[84.912] Dipper arm 84.2
[84.100] Bucket 84.3

Dozer blade and arm 86

[86.110] Dozer blade 86.1

Platform, cab, bodywork, and decals 90

[90.150] Cab 90.1

[90.154] Cab doors and hatches 90.2

[90.156] Cab windshield and windows 90.3

[90.118] Protections and footboards 90.4

[90.120] Mechanically-adjusted operator seat 90.5

[90.100] Engine hood and panels 90.6

INTRODUCTION

Foreword - Important notice regarding equipment servicing

All repair and maintenance work listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given, and using, whenever possible, the special tools.

Anyone who performs repair and maintenance operations without complying with the procedures provided herein shall be responsible for any subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages caused by parts and/or components not approved by the manufacturer, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages caused by parts and/or components not approved by the manufacturer.

The manufacturer reserves the right to make improvements in design and changes in specifications at any time without notice and without incurring any obligation to install them on units previously sold. Specifications, descriptions, and illustrative material herein are as accurate as known at time of publication but are subject to change without notice.

In case of questions, refer to your CASE CONSTRUCTION Sales and Service Networks.

Safety rules

Personal safety

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.

Machine safety

NOTICE: *Notice indicates a situation that, if not avoided, could result in machine or property damage.*

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

Information

NOTE: *Note indicates additional information that clarifies steps, procedures, or other information in this manual.*

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

Safety rules - General information

Cleaning

Clean the metal parts with cleaning solution that meets the standard and steam cleaning. (except for bearings)

After cleaning, dry well, and inject oil in all parts.

Also inject oil into the bearings after drying.

Inspection

When disassembling parts, check all the parts.

If there are any worn or damaged parts, replace them.

Inspect carefully to prevent initial breakdowns.

Bearing

Replace any loose bearings.

Air dry bearings before installing them.

Needle bearing

When inserting needle bearings, be very careful not to damage them.

Apply grease to the section where the needle bearing will be inserted.

Gear

Check that there is no wear and no damage.

Oil seal, O-ring, gasket

Always install new oil seals, O-rings, and gaskets.

Apply grease to sections where oil seals and O-rings will be inserted.

Shaft

Check that there is no wear and no damage.

Check the bearings and check for damaged oil seals on the shaft.

Service parts

Install CASE CONSTRUCTION genuine service parts.

When placing an order, check the parts catalog. It contains the CASE CONSTRUCTION genuine part numbers.

Any breakdowns arising from the installation of non-genuine parts are not covered by the warranty.

Lubricants (fuel, hydraulic oil)

Use the oil from the specified company or specified in the operator's manual or service Manual.

Any breakdowns arising from any fuel or hydraulic oil other than those specified are not covered by the warranty.

SERVICE MANUAL

Engine

Engine - General specification

Engine main specifications

Item		Engine model 4HK1
Type		Diesel/4-cycle/water-cooled, inline 4 cylinder DOHC
Shape of combustion chamber		Direct injection type
Cylinder liner type		Dry type
Cylinder bore x stroke		**95.4 mm** (**3.76 in**) x **104.9 mm** (**4.13 in**)
Displacement		**2.999 L** (**183 in³**)
Compression ratio		16.5
Compression pressure		**3 MPa** (**435 psi**) **200 RPM**
Idling speed		**800 RPM**
Valve clearance	Intake	**0.15 mm** (**0.006 in**) While cool
	Exhaust	**0.15 mm** (**0.006 in**) While cool
Ignition method		Compression ignition
Injection order		1, 3, 4, 2
Lubrication system		
Lubrication type		Pressure type
Oil pump type		Gear type
Lubrication oil amount		**13 – 17 L** (**3.4 – 4.5 US gal**)
Oil filter type		Full-flow filter (cartridge type)
Oil cooling type		Built-in type, water cooled
Cooling system		
Cooling type		Water cooling
Water pump type		Centrifugal, belt type
Thermostat type		Wax type unit
Open valve temperature of the thermostat valve		**82.0 °C** (**180 °F**)
Coolant container		**6.0 L** (**1.6 US gal**) Engine only
Fuel system		
Injection pump type		Electronic control common rail type
Governor type		Electronic type
Timer type		Electronic type
Injection nozzle type		Multi-hole type
		8 holes
Charging system		
Generator type		AC type
Output		**24 V** / **50 A**
Regulator type		IC
Starter system		
Starter type		Reduction type
Output		**24 V** / **4.0 kW**
Preheat system		
Preheat system type		Glow plug
Glow plug standard voltage/current		**23 V** / **3.8 A**

Cooling system main specifications

Item	Specifications
Water pump	Centrifugal impeller method
Pulley ratio	1.03
Thermostat	Wax pellet type
Open valve temperature	**82.0 °C** (**180 °F**)
Full-open temperature	**95.0 °C** (**203 °F**)
Valve lift amount when fully opened	**10 mm** (**0.394 in**)

Electrical system main specifications

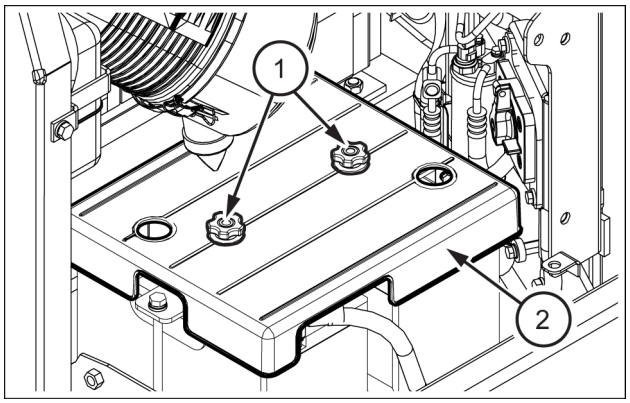
Generator	
Item	**Data**
Isuzu parts number	8980921122
Nominal output	**24 V**/ **50 A**
Rated rotation count	**5000 RPM**
Regulator type	IC type
Regulated voltage	**28 – 29 V**
Weight	**9.1 kg** (**20.1 lb**)

Starter		
Type (Manufacturer)		Hitachi
Rating	Voltage	**24 V**
	Output	**4 kW** (**5.4 Hp**)
	Time	**30 s**
Number of pinion teeth		11
Rotational direction (facing the pinion)		Clockwise
Weight (approx.)		**6.3 kg** (**13.9 lb**)
No-load characteristics	Current/voltage	Less than **120 A** / **23 V**
	Revolution speed	More than **3500 RPM**
Load characteristics	Current/voltage	Less than **250 A** / **18.6 V**
	Torque	More than **13.2 N·m** (**9.74 lb ft**)
	Revolution speed	More than **1590 RPM**
Locking characteristics	Current/voltage	Less than **1100 A** / **10 V**
	Torque	More than **47 N·m** (**34.67 lb ft**)

Glow plug	
Item	**Type**
Preheat device model	Glow plug
Glow plug rated voltage/current	**23 V** / **3.5 A**

Engine - Remove

1. Remove the 2 bolts **(1)** to remove the battery cover **(2)**.



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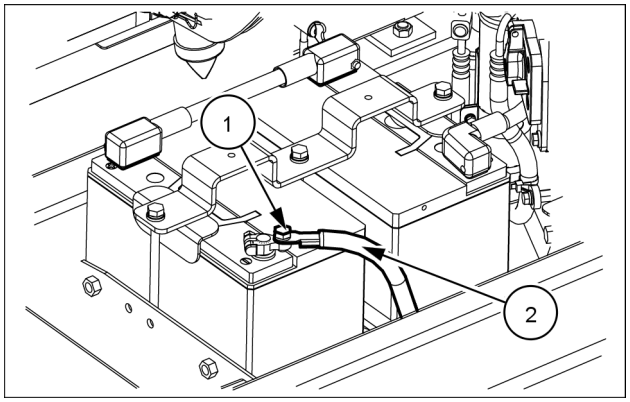
2. Remove the bolt **(1)** with a wrench [**17 mm**] to remove the negative battery cable **(2)**.

NOTICE: *While the indicator (LED) of the battery disconnect switch is lit, do not turn OFF the battery disconnect switch or disconnect its negative cable from the battery. (After key OFF, lit for a maximum duration of **3 min**)*

- Secure the terminal and harness in order to prevent them from touching the frame or other parts when they have been removed.
  Moreover, protect them with rubber caps etc. to prevent sparks.

  Tightening torque: **10.6 – 13.0 N·m** (**7.8 – 9.6 lb ft**) bolt **(1)**



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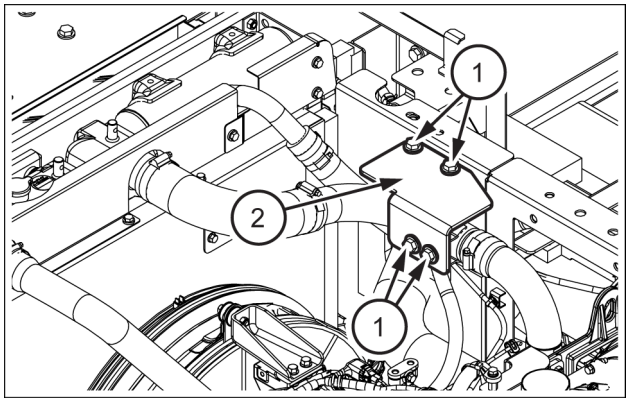
3. Remove the counterweight. (For details, See " **Counterweight - Remove (39.140)**" and " **Counterweight - Install (39.140)**").
4. Remove the SCR (For details, See " **Selective Catalytic Reduction (SCR) muffler and catalyst - Remove (10.500)**" and " **Selective Catalytic Reduction (SCR) muffler and catalyst - Install (10.500)**").
5. Remove the pump. (For details, See " **Pump - Remove (35.106)**" and " **Pump - Install (35.106)**").
6. Remove the 4 bolts **(1)** with a wrench [**19 mm**] to remove the bracket **(2)**.



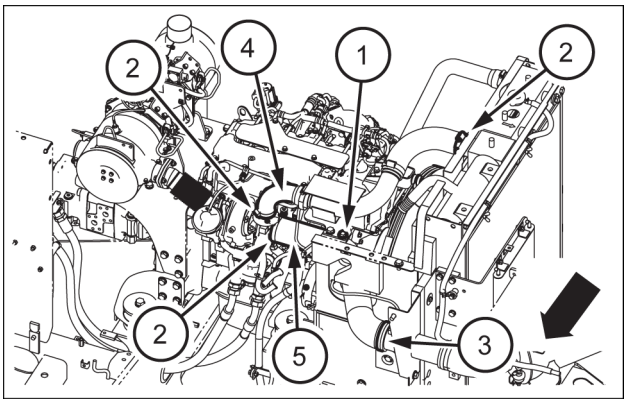
SMIL15CEX4460AB 3

7. Loosen the bolt **(1)** and the hose bands **(2)** and **(3)** with a wrench [**19 mm**] and a wrench [**7 mm**] respectively to disconnect the intercooler hose (on high temperature side) **(4)** and the hose from air cleaner **(5)**.

   Tightening torque: **8.8 – 9.8 N·m** (**6.5 – 7.2 lb ft**) band **(2)**

   Tightening torque: **6.3 – 7.3 N·m** (**4.6 – 5.4 lb ft**) band **(3)**

NOTE: *The arrow indicates the front side of the vehicle.*



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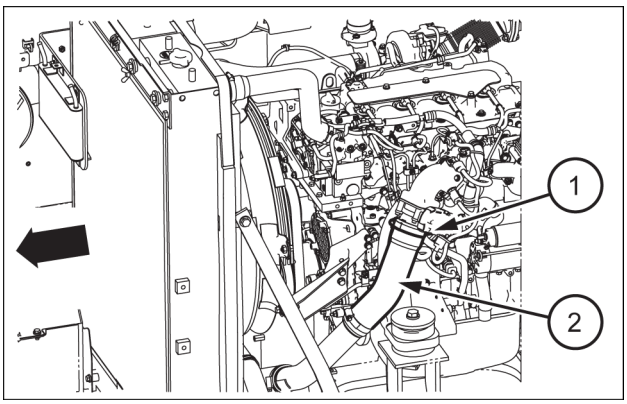
8. Loosen the hose band **(1)** to disconnect the intercooler hose (on low temperature side) **(2)**.

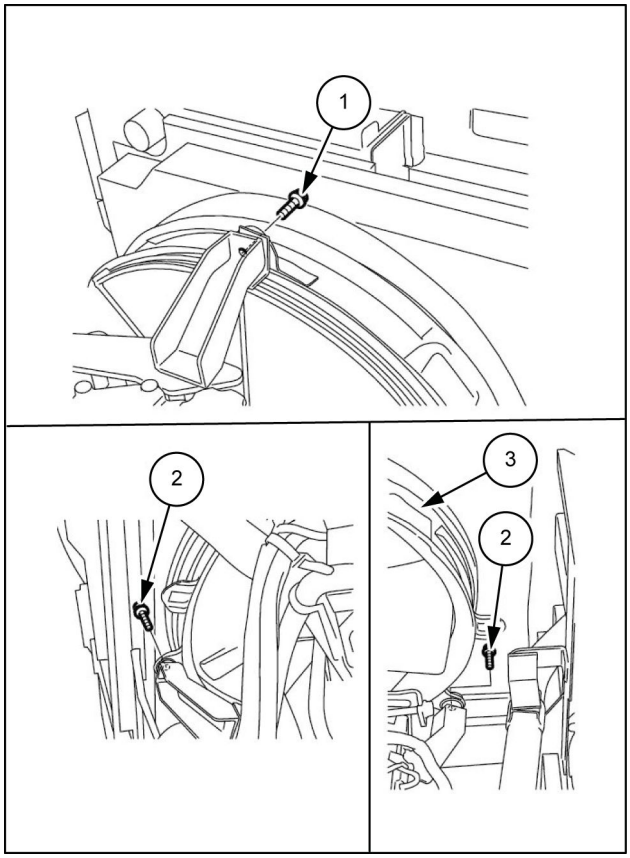
   Tightening torque: **8.8 – 9.8 N·m** (**6.5 – 7.2 lb ft**) hose band **(1)**

NOTE: *The arrow indicates the left side of the vehicle.*



SMIL15CEX4462AB 5

9. Remove the bolts **(1)** and **(2)** with a wrench to remove the fan shroud **(3)**.



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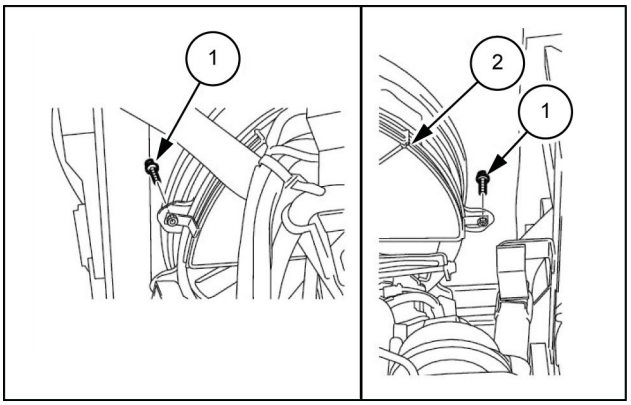
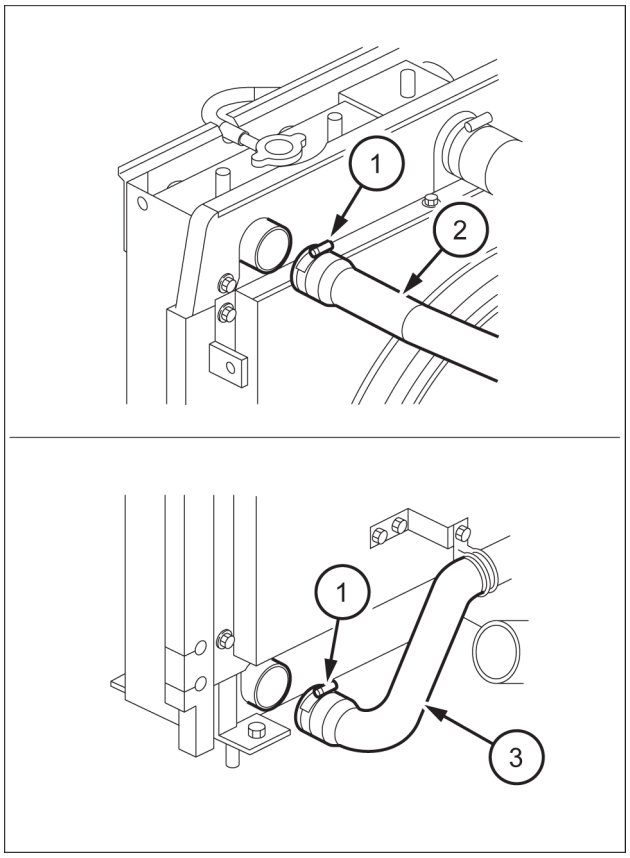
10. Remove the bolt **(1)** with a wrench to remove the fan guard **(2)**.



LPIL12CX00145AB 7

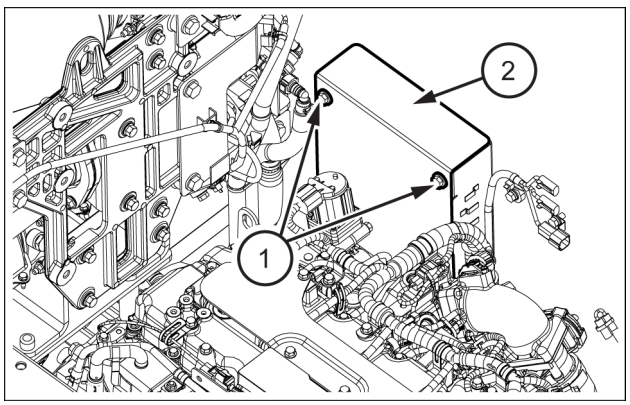
11. Loosen the 2 hose bands **(1)** of the radiator with a wrench [**7 mm**] to disconnect the upper hose **(2)** and the lower hose **(3)**.
    - Attach caps to each location of the radiator and hoses to prevent the entry of water, dust, and dirt.
    - Completely drain coolant before removing the radiator hose.

    Tightening torque: **4.9 – 5.9 N·m** (**3.6 – 4.4 lb ft**) band **(1)**



SMIL15CEX4463BB 8

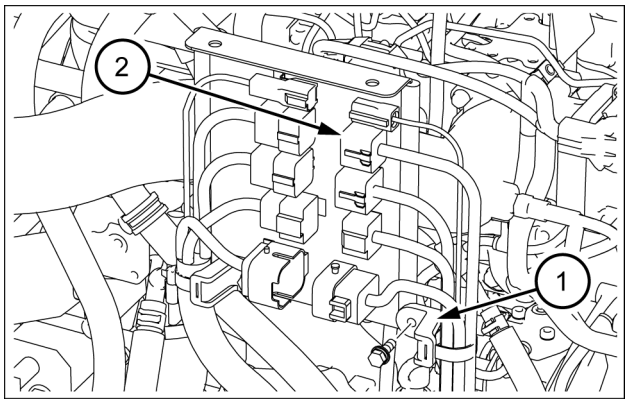
12. Remove the 2 bolts **(1)** with a wrench [**13 mm**] to remove the connector bracket **(2)**.



SMIL15CEX4464AB 9

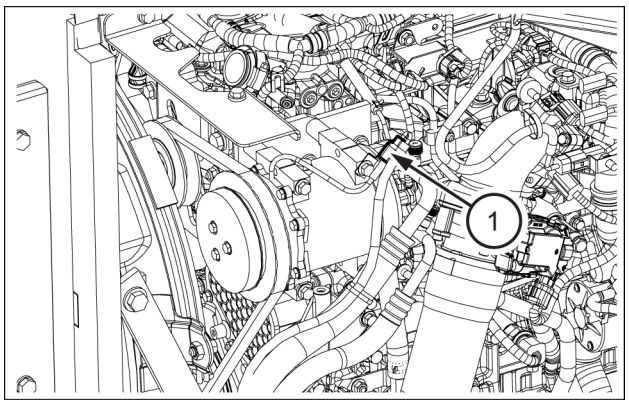
13. Remove the 2 bolts **(1)** with a wrench [**13 mm**] to remove the connector bracket **(2)**.
    - Wrap the disconnected connectors with a plastic sheet after bundling them.

    Tightening torque: **21.6 – 37.2 N·m** (**15.9 – 27.4 lb ft**) bolt **(1)**



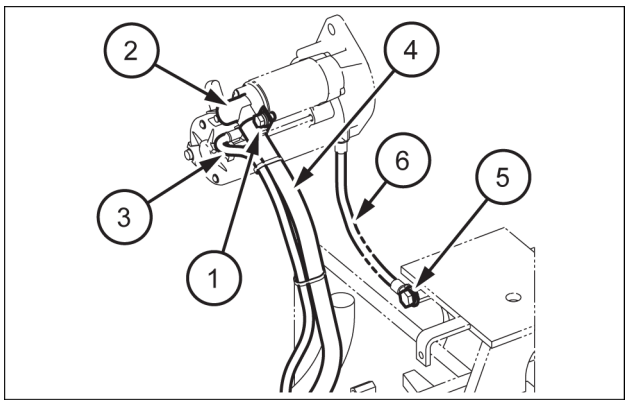
SMIL15CEX4465AB 10

14. Disconnect the connector **(1)** of the air conditioner compressor.



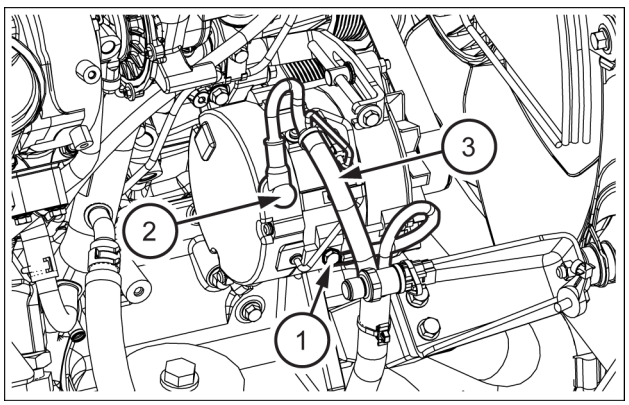
SMIL15CEX4466AB 11

15. Remove the bolt **(1)** with a wrench [**13 mm**] to remove the terminal cap **(2)**.
    Remove the wiring **(3)** and **(4)** from the starter with a wrench.
    Remove the bolt **(5)** with a wrench [**17 mm**] to remove the wiring **(6)** from the frame.



SMIL15CEX4467AB 12

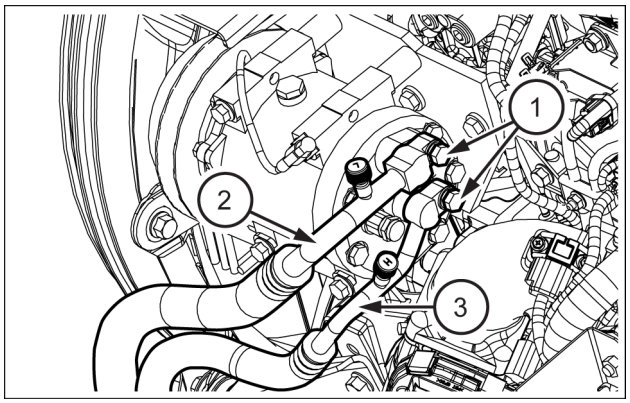
16. Remove the bolts **(1)** with a wrench [**10 mm**].
    Remove the connector **(2)** of the alternator.
    Remove the harness **(3)** from the alternator.



SMIL15CEX4468AB 13

17. Remove the 2 bolts **(1)** of lines with a wrench [**13 mm**] to disconnect the lines **(2)** and **(3)** of the compressor.
    - Make sure that the piping **(2)** on the lowpressure (suction) side is removed first.
    - Attach caps and plugs to each location of the compressor and piping to prevent the entry of water, dust, and dirt.

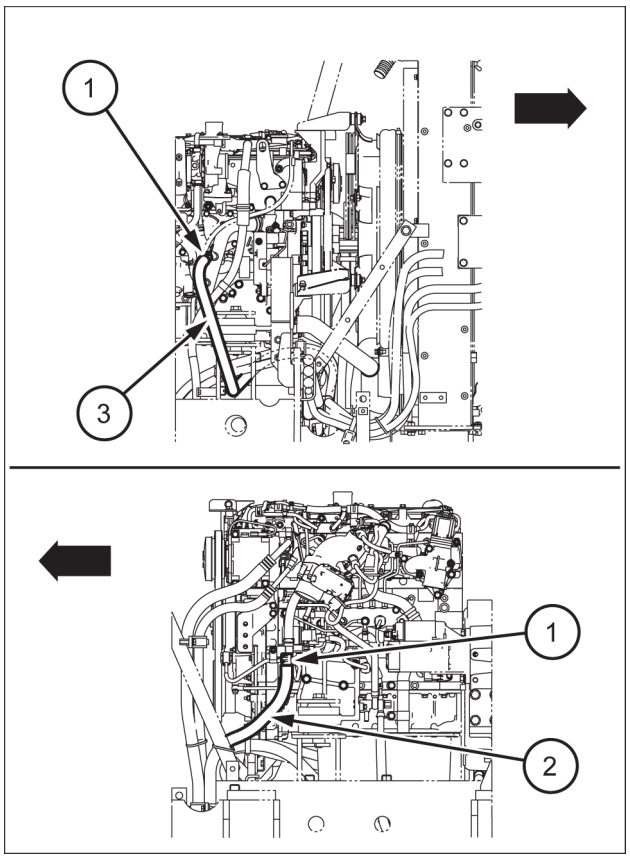
      Tightening torque: **20.0 – 25.0 N·m** (**14.8 – 18.4 lb ft**) bolt **(1)**



SMIL15CEX4469AB 14

18. Loosen the 2 hose bands **(1)** to disconnect the heater hoses **(2)** and **(3)**.
    - Attach caps and plugs to the engine and the hoses to prevent the entry of water, dust, and dirt.

NOTE: *The arrows indicate the left side of the vehicle.*

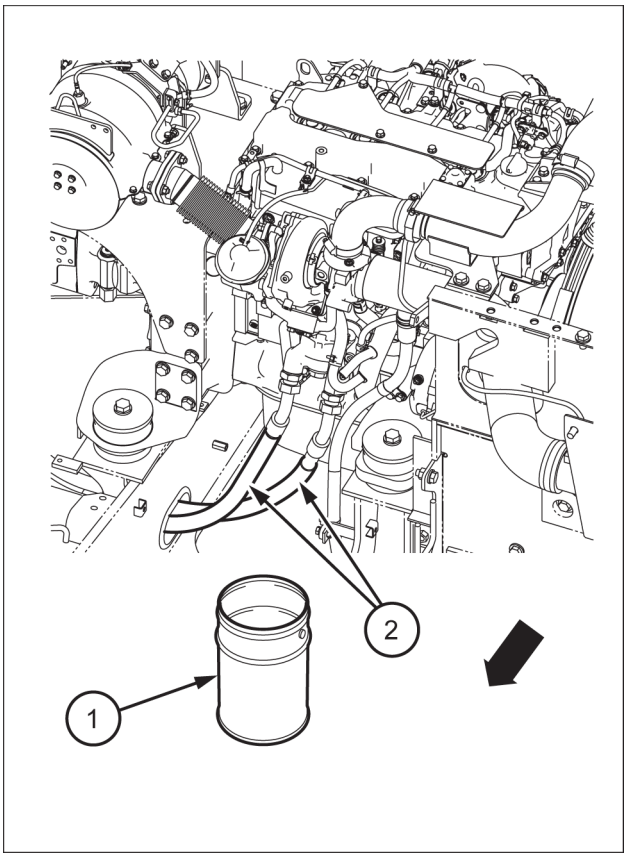


SMIL15CEX4470BB 15

19. Prepare a waste oil can **(1)**.
    - Drain engine oil in advance to remove the hose for engine oil.
    - Disconnect the 2 engine oil remote hoses **(1)** with a wrench [**36 mm**].
    - Apply marking to each location of the engine and hoses so as to match connections at assembling.
    - Attach caps and plugs to each location of the engine and hoses to prevent the entry of water, dust, and dirt.
    - Wash each location of the engine and hoses by blowing parts cleaner so as to prevent adhering dirt at connections and not to damage them.

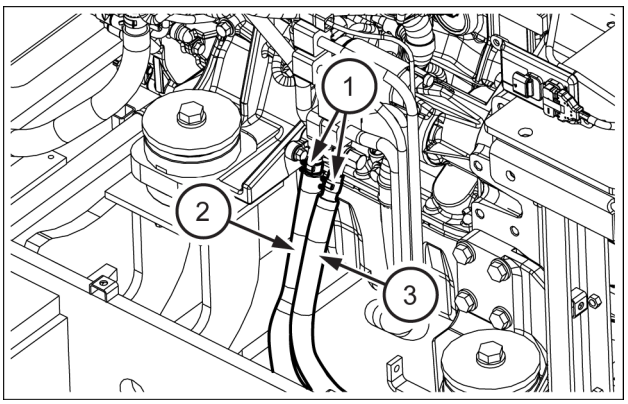
      Tightening torque: **54.1 – 63.9 N·m** (**39.9 – 47.1 lb ft**)

NOTE: *The arrow indicates the front side of the vehicle.*



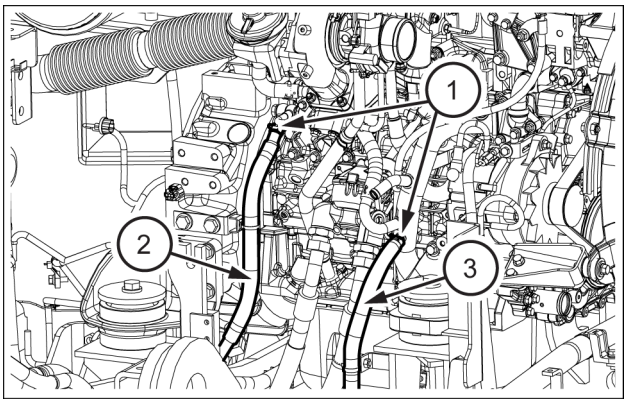
SMIL15CEX4471BB 16

20. Remove the hose bands **(1)** to disconnect the fuel hoses **(2)** and **(3)**.
    - Attach caps and plugs to the engine and the hoses to prevent the entry of water, dust, and dirt.



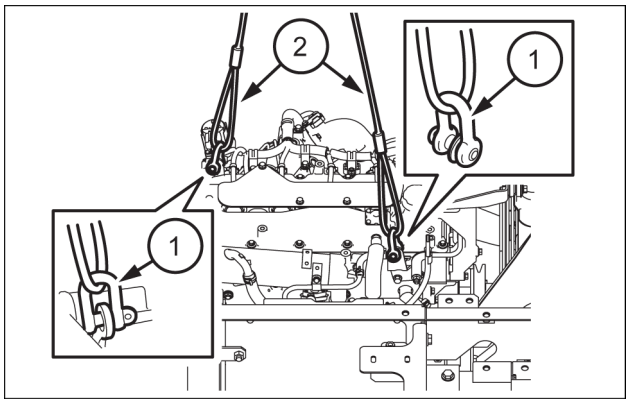
SMIL15CEX4472AB 17

21. Loosen the hose bands **(1)** to disconnect the cooling hoses **(2)** and **(3)**.



SMIL15CEX4473AB 18

22. Attach the 2 shackles **(1)**, and secure the engine main unit with wire ropes **(2)** and a liftcrane.

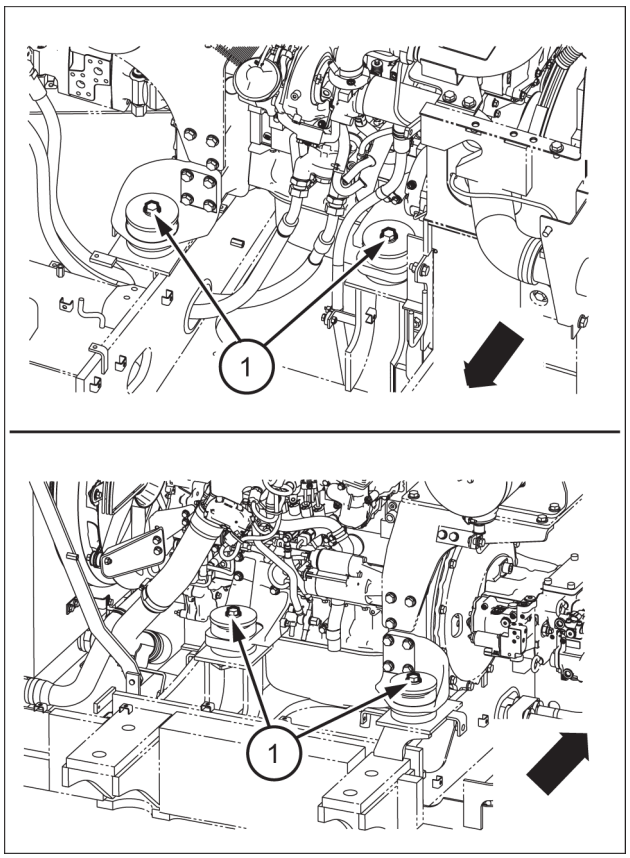


SMIL15CEX4474AB 19

23. Remove the 4 bolts **(1)** of the mount with a box wrench [**24 mm**].

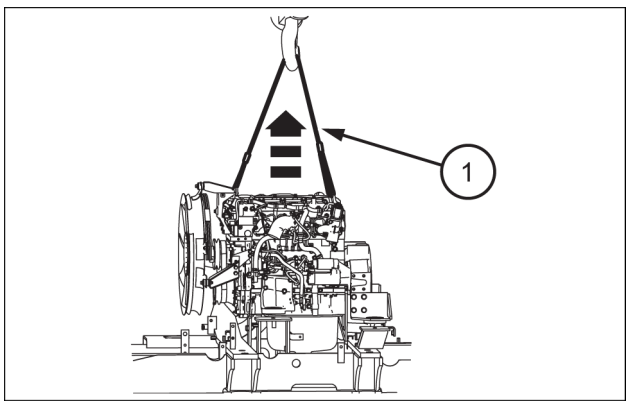
    Tghtening torque: **264.9 – 313.9 N·m** (**195.4 – 231.5 lb ft**) bolt **(1)**

NOTE: *The arrows indicate the front side of the vehicle.*



SMIL15CEX4475BB 20

24. Lift the engine main unit with wire ropes **(1)** and a liftcrane.
    - Before lifting, be sure to check that hoses and connectors are all disconnected.
    - Make sure that the area is safe, and then place the engine on wood planks.
    - Fully secure the engine so that it may not topple.



SMIL15CEX4476AB 21

Engine - Install

1. To install the engine, perform the reverse of the removal procedure.
   When installing each bolt, tighten them to the specified torque.
   For bolts for which the torque is not specified, see **Torque - Bolt and nut ()** .
   After installing the engine, resupply coolant and engine oil, perform fuel line air bleeding, and perform filling for the air-conditioner gas.
   For details, see the individual explanations for each procedure.
2. Run the engine at no-load idling and check for any water or oil leaks.
3. Attach the hydraulic pump, covers, and counterweight.
   For details, see the individual explanations for each procedure.

Engine - Check - Engine oil

⚠ WARNING

Burn hazard!
Do not handle any service fluid (engine coolant, engine oil, hydraulic oil, etc.) at temperatures that exceed 49 °C (120 °F). Allow fluids to cool before proceeding.
Failure to comply could result in death or serious injury.

W0330B

NOTICE: *The engine should be in a horizontal position.*

NOTICE: *Wait at least **5 min** before starting the engine and after stopping the engine.*

Engine oil inspection

1. Remove the oil level gauge from the oil level gauge guide tube.

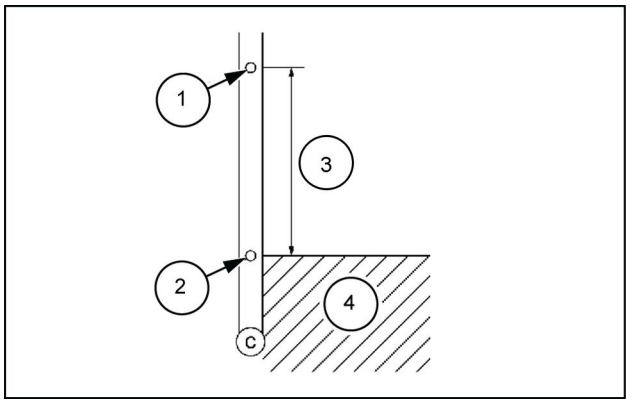
NOTE: *Wipe off the engine oil remaining on the oil level gauge.*

2. Install the oil level gauge to the oil level gauge guide tube.
3. Remove the oil level gauge from the oil level gauge guide tube.
4. Inspect the engine oil.

NOTE: *Check the engine oil remaining on the oil level gauge to inspect the engine oil level.*

1. MAX
2. MIN
3. Acceptable oil amount
4. Requires replenishment

NOTE: *If the oil level is under the lower limit, add engine oil. Replace the engine oil if engine oil is dirty.*



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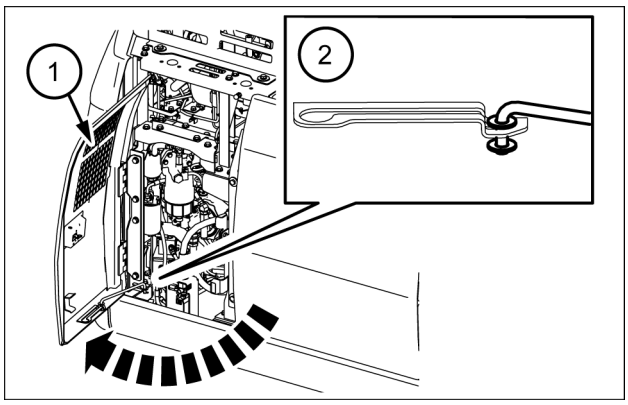
Engine - Test - Engine oil

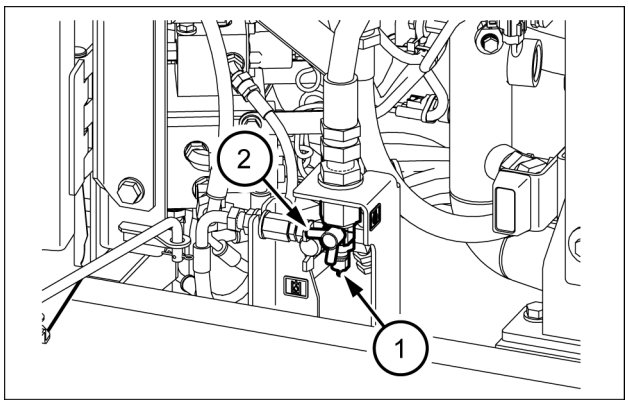
Sampling of engine oil

1. Open the side door **(1)**.
   At this time, make sure to apply the lock **(2)**.



SMIL15CEX4477AB 1

2. Place a sampling container under the sampling port **(1)**.
3. Open the valve **(2)** to drain a proper amount of oil.
4. Close the valve **(2)** to check that there is no leakage.
5. If necessary, add the same amount of oil as the drained oil.



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Engine - Compression test

1. Start the engine.

NOTE: *Warm-up the engine.*

2. Turn OFF the ignition switch.
3. Disconnect the battery ground cable from the battery.

NOTICE: *While the indicator (LED) of the battery disconnect switch is lit, do not turn OFF the battery disconnect switch or disconnect its negative cable from the battery. (After key OFF, lit for a maximum duration of **3 min**)*

4. Disconnect the harness connector from all injector.
5. Remove the glow plug from the cylinder head.

NOTE: *Remove all glow plugs.*

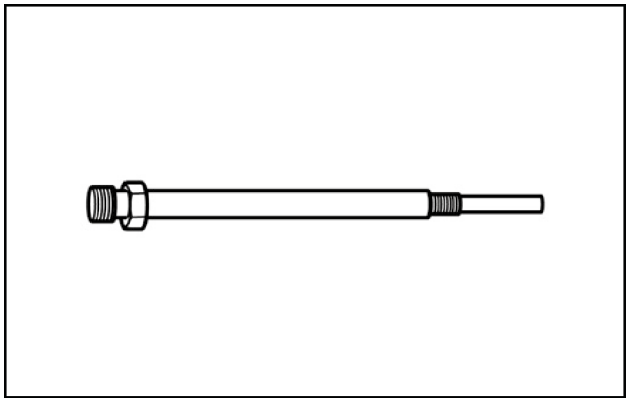
6. Connect the battery ground cable to the battery.
7. Rotate the starter.

NOTE: *Crank the engine to discharge foreign matter from inside the cylinders.*

8. Install the special tool to the cylinder head.

NOTE: *Insert the compression gauge adapter into the installation hole of the glow plug to install the compression gauge.*

Special tool: Compression gauge adapter (Refer to **Cylinder head - Special tools (10.101)**)



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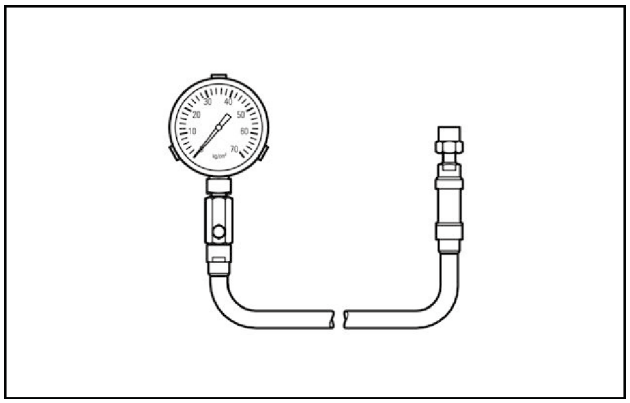
Special tool: Compression gauge (adapter) (Refer to **Cylinder head - Special tools (10.101)**)



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9. Measure the compression pressure.

NOTE: *Rotate the starter, and read the indication of the compression pressure when the compression gauge needle stabilizes.*

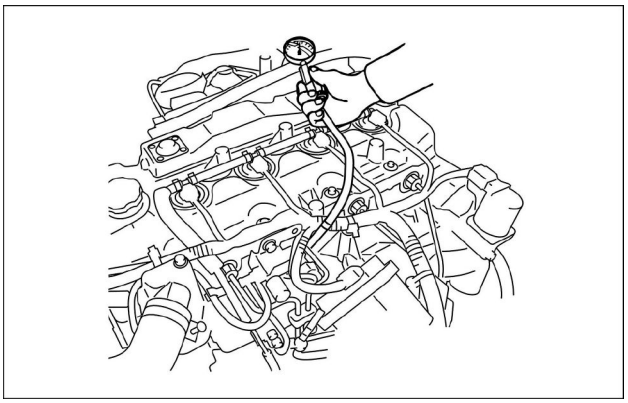
NOTE: *Measure the compression pressure of all cylinders.*

Engine speed: **200 RPM**

Standard value: **2840 – 3240 kPa** (**412 – 470 psi**)

Limit value: **1960 kPa** (**284 psi**)

Difference between each cylinder: **294 kPa** (**43 psi**)



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NOTICE: *Use a fully charged battery.*

NOTICE: *Note that air will burst out through the glow plug hole during rotation.*

NOTICE: *Be sure to clear the DTC after completing the inspection, because a DTC is stored if the ignition switch is turned ON while the injector harness connector is removed.*

10. Remove the special tool from the cylinder head.
11. Disconnect the battery ground cable from the battery.

NOTICE: *Do not disconnect the battery cable for 3 minutes after turning OFF the ignition switch.*

12. Install the glow plug to the cylinder head assembly.

NOTE: *Install the all glow plugs.*

Tightening torque: **18 N·m** (**13 lb ft**)

13. Connect the harness connector to the injector.
14. Connect the battery ground cable to the battery.

Crankcase - Remove

Battery ground cable disconnect

1. Disconnect the battery ground cable from the battery.

NOTICE: *While the indicator (LED) of the battery disconnect switch is lit, do not turn OFF the battery disconnect switch or disconnect its negative cable from the battery. (After key OFF, lit for a maximum duration of **3 min**)*

Coolant drain

⚠ CAUTION

Burn hazard!
Take care if removing the filler cap while the system is hot. Before removing the cap: completely cover the cap using a thick cloth, and slowly open the filler cap to allow the pressure to escape. Do not add cold water to a hot coolant reservoir.
Failure to comply could result in minor or moderate injury.

C0031A

1. Loosen the water drain plug on the rear right side of the engine, as well as the radiator drain plug.
2. Completely drain the coolant.
3. After completely draining the coolant, securely tighten the drain plug.

Engine oil drain

1. Drain the engine oil from the oil pan.
   - After draining the oil, tighten the drain plug to the specified torque.

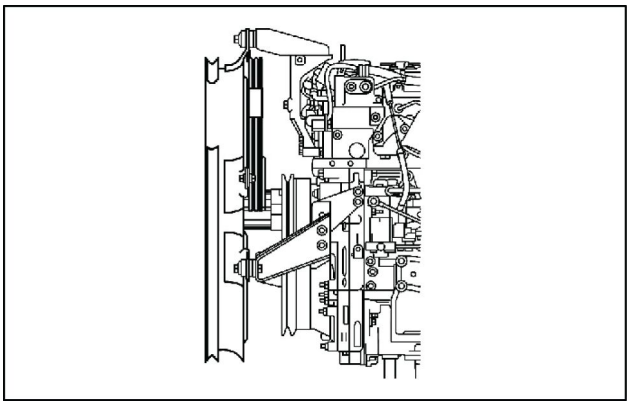
     Tightening torque : **78 N·m** (**57.53 lb ft**) drain plug

     Tightening torque : **70 N·m** (**51.63 lb ft**) drain cock

NOTICE: *Do not forget to tighten the drain plug or drain cock.*

Fan shroud removal

1. Remove the fan shroud from the bracket.
   - Remove the fan shroud and fan guard as a unit.



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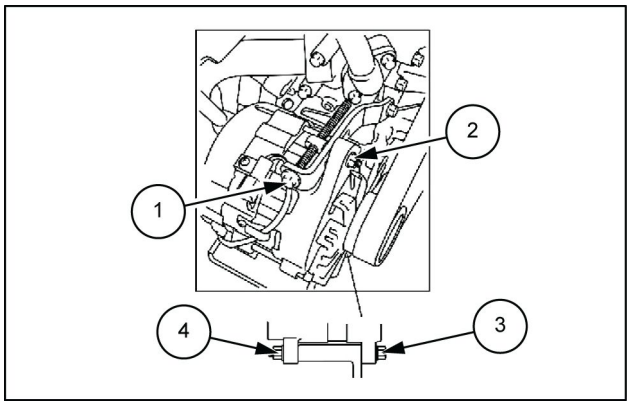
Cooling fan belt removal

1. Remove the cooling fan belt from the pulley.
   - Loosen the nuts **(4)** fastening the bolts **(3)**.
   - Loosen the generator adjust bolt **(1)** to remove the belt.

     2. Lock nut



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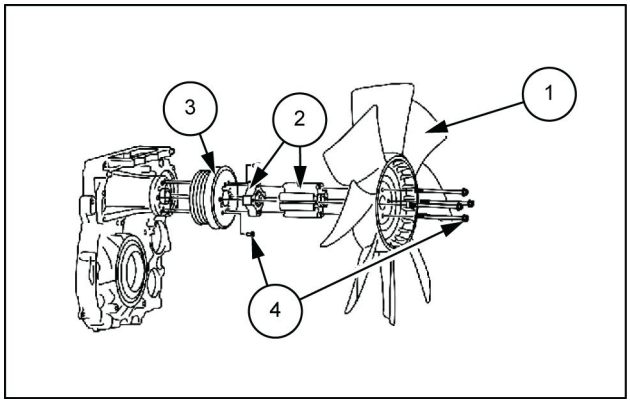
Cooling fan removal

1. Remove the cooling fan **(1)** from the fan pulley **(3)**.
   - Remove the spacer **(2)** at the same time.
2. Remove the fan pulley **(3)** from the water pump assembly.

     4. Bolt



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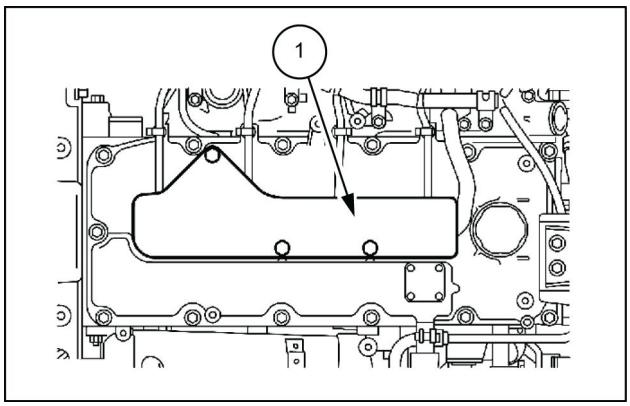
Fuel hose removal

1. Remove the cover **(1)** from the cylinder head cover.



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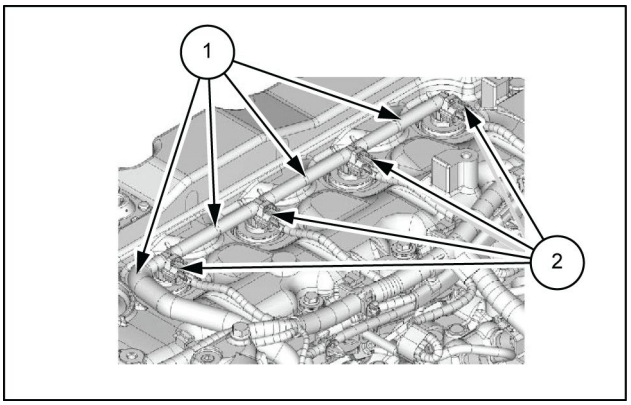
2. Remove the harness connector **(2)** from the injector.
3. Remove the nozzle leak off pipe **(1)** from the injector.



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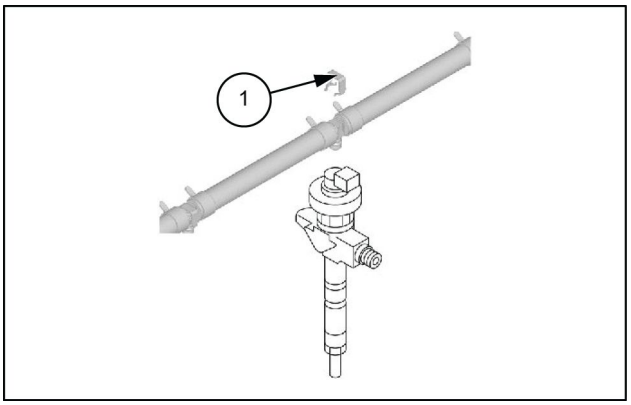
NOTICE: *Do not reuse the leak-off pipe clip **(1)**.*



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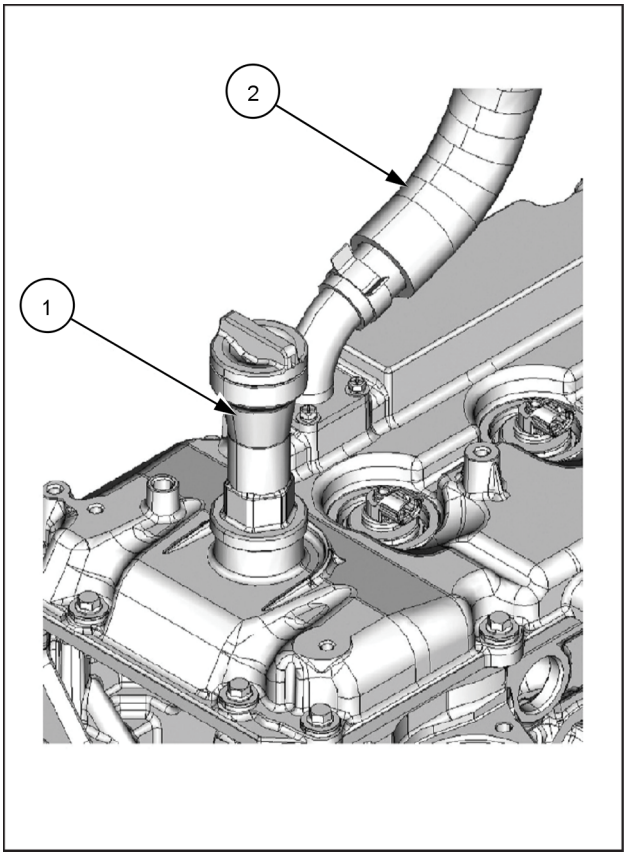
Cylinder head cover removal

1. Disconnect the PCV hose or the oil separator hose **(2)** from the cylinder head cover.
2. Disconnect the oil separator hose **(2)** from the cylinder head cover.
    1. Oil filler pipe



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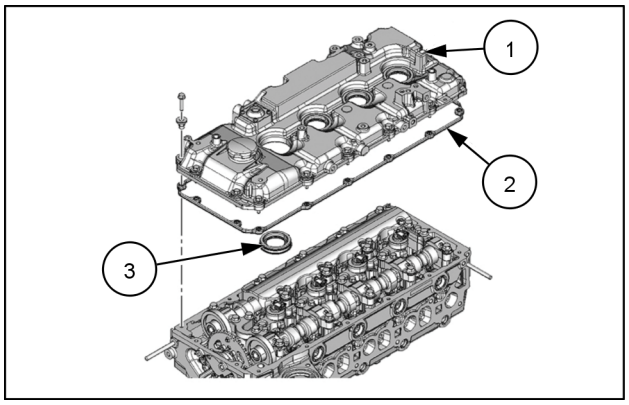
3. Remove the cylinder head cover **(1)** from the cylinder head.

    2. Cylinder head cover gasket

NOTICE: *Take care not to damage the lip section of the oil seal* ***(3)*** *with the injector connector.*



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PCV hose removal

1. Remove the PCV hose from the engine assembly.
    - Remove the clamp.

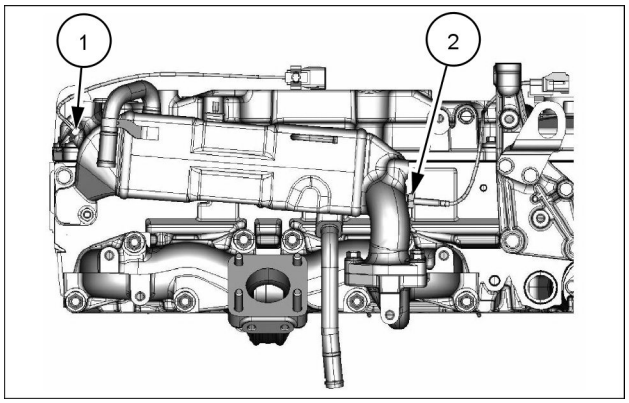
Generator removal

1. Disconnect the harness from the generator.
    - Disconnect the harness connector and B-terminal cable.
2. Remove the generator from the generator bracket.
    - Remove the nuts at 2 locations, pull out the bolts, and remove the generator.

EGR gas temperature sensor 1 removal

1. Disconnect the harness connector from EGR gas temperature sensor 1 **(2)**.
2. Remove EGR gas temperature sensor 1 **(2)** from the EGR cooler.

    1. EGR gas temperature sensor 2



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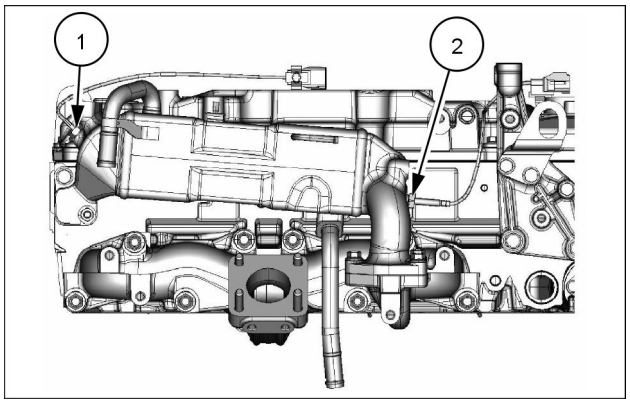
EGR gas temperature sensor 2 removal

1. Disconnect the harness connector from EGR gas temperature sensor 2 **(1)**.
2. Remove EGR gas temperature sensor 2 **(1)** from the EGR cooler.

2. EGR gas temperature sensor 1



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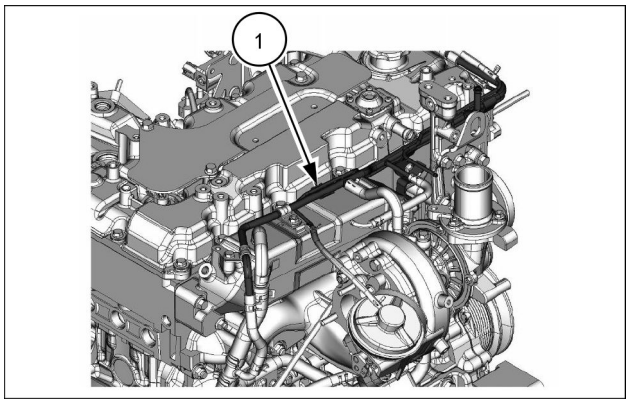
Water pipe removal

1. Remove the water pipe **(1)** from the engine assembly.
   - Because the plastic pipe is easily damaged during hose removal, do not remove from the side of the plastic pipe if possible.



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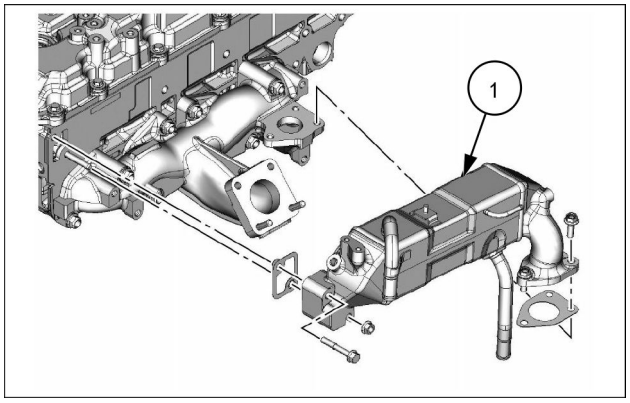
EGR cooler removal

1. Remove the EGR cooler **(1)** from the exhaust manifold and cylinder head assembly.
   - Remove the IN side and OUT side of the rubber hose for the water pipe and remove the EGR cooler **(1)** and gasket.

NOTICE: *Do not hold the water pipe section when removing the EGR cooler.*

NOTICE: *Because the plastic pipe is easily damaged during hose removal, do not remove from the side of the plastic pipe if possible.*



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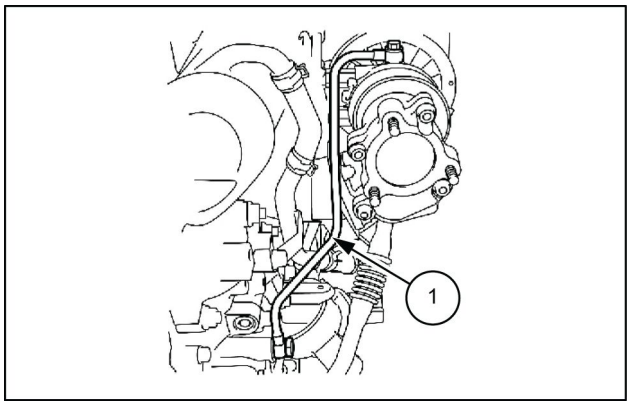
first, and then click the above link

to download the complete manual.

Thank you so much for reading

Turbocharger assembly removal

1. Remove the water feed pipe from the oil cooler assembly.
2. Disconnect the oil feed pipe **(1)** from the turbocharger assembly.
3. Remove the oil feed pipe **(1)** from the oil cooler assembly.



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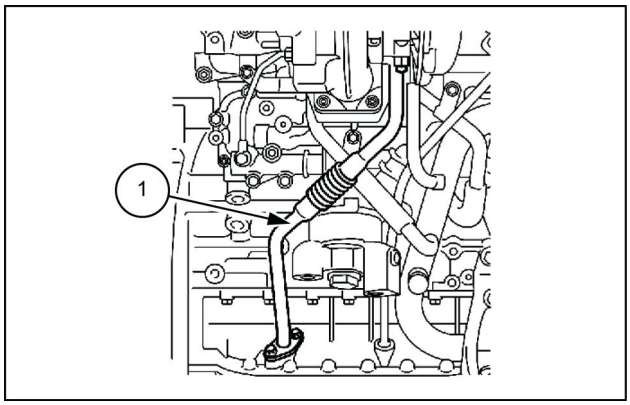
4. Disconnect the oil return pipe **(1)** from the turbocharger assembly.
5. Remove the oil return pipe **(1)** from the crankcase.



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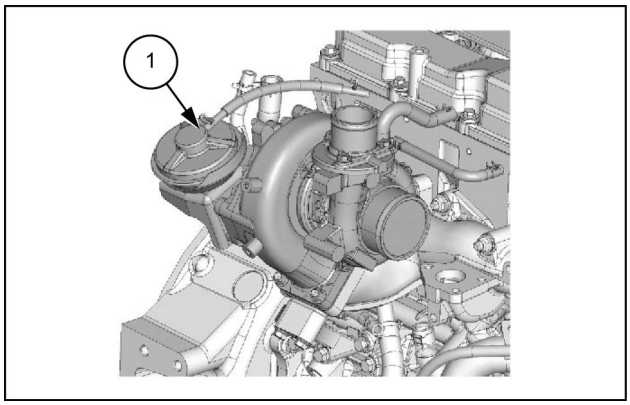
6. Remove the turbocharger assembly **(1)** from the exhaust manifold.
   - Remove the water feed hose and water return hose together.

NOTE: *Do do not hold the actuator rod.*

NOTICE: *Do not reuse the gasket.*



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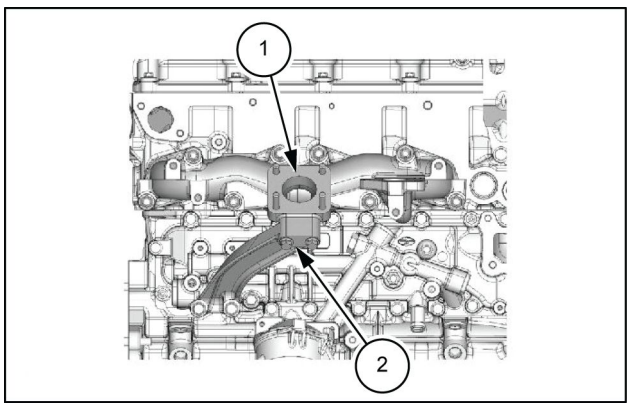
Exhaust manifold removal

1. Remove the exhaust manifold bracket **(2)** from the exhaust manifold **(1)** and the oil cooler assembly.
2. Remove the exhaust manifold from the cylinder head.
   - Do not reuse the gasket.



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