

CX180C
Tier III
Crawler Excavator

SERVICE MANUAL

Part number 48044245

English

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CASE
CONSTRUCTION



SERVICE MANUAL

CX180C Crawler excavator LC version (TIER 3)

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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

CX180C Crawler excavator LC version (TIER 3)

Engine - General specification

Engine main specifications

Item		Engine model 4JJ1
Type		Diesel/4-cycle/Water cooled, Inline 4-cylinder DOHC
Shape of combustion chamber		Direct injection type
Cylinder liner type		No liner
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		17.5
Compression pressure		3 MPa (435 psi) 200 RPM
Idling rotation 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
Lubricant system		
Lubricating type		Pressure type
Oil pump type		Gear type
Lubrication oil amount		15 l (4 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		76.5 °C (169.70 °F) without jiggle valve
		82 °C (179.6 °F) with jiggle valve
Coolant container		6 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
		6 holes
Charging system		
Generator type		AC type
Output		24 V / 50 A
Regulator type		IC
Starting system		
Starter type		Reduction type
Output		24 V / 4.0 kW (5.4 Hp)
Preheat system		
Preheat system type		Glow plug
Glow plug standard voltage/current		23 V / 3.8 A

Cleaning system main specifications

Item	Specifications
Water pump	Centrifugal impeller method
Pulley ratio	1.03
Thermostat	Wax type unit
Open valve temperature	76.5 °C (169.7 °F) without jiggle valve
	82 °C (179.6 °F) with jiggle valve
Full-open temperature	90 °C (194.0 °F) without jiggle valve
	95 °C (203.0 °F) with jiggle valve

Electrical system main specifications

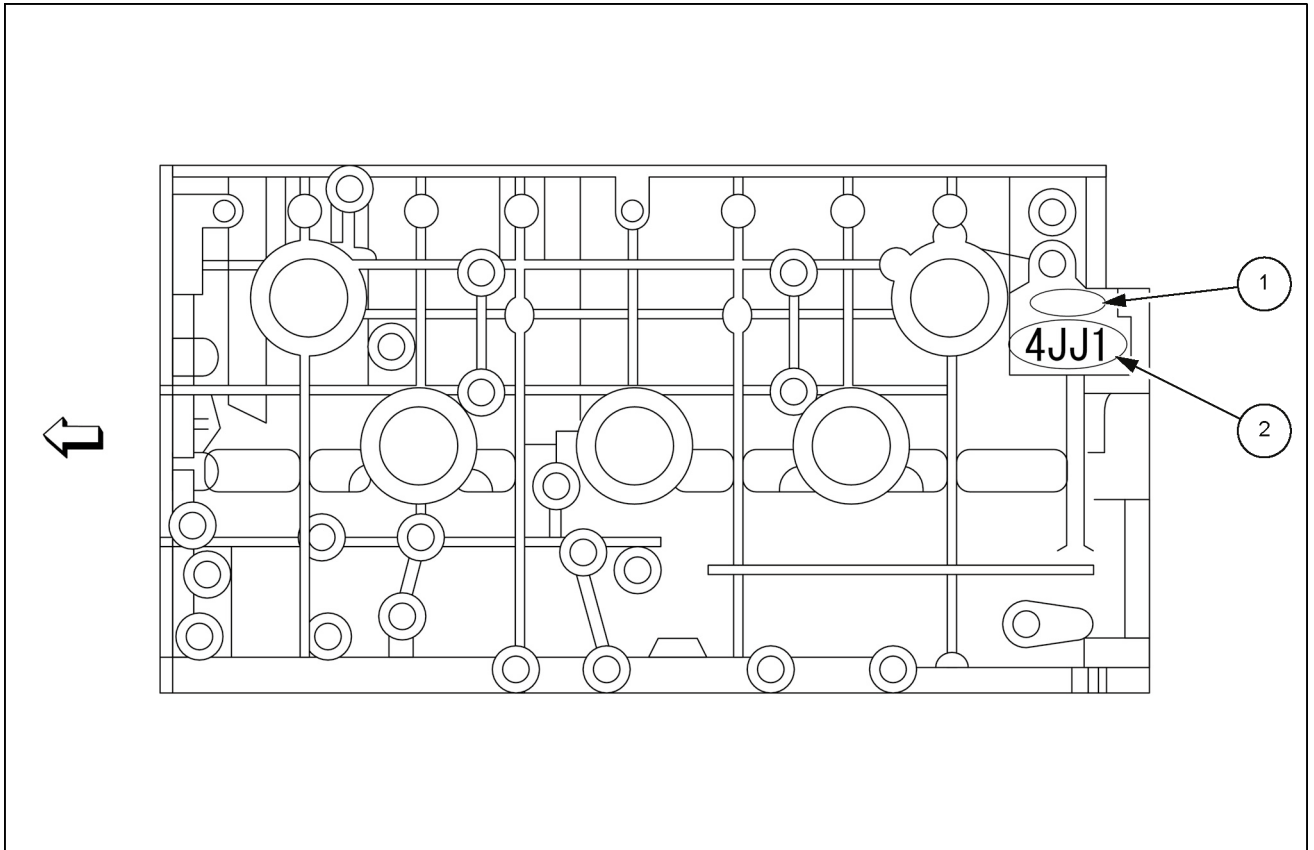
Generator	
Item	Specifications
Isuzu parts number	8980921122
Nominal output	24 V / 50 A
Rated rotation count	5000 RPM
Regulator type	IC type
Regulated voltage	28 - 29 V
Weight	9.1 kg (20.1 lb)

Starter		
Type (Manufacturer)	Hitachi	
Rating	Voltage	24 V
	Output	4 kW
	Time	30 s
Number of pinion teeth	11	
Rotational direction (facing the pinion)	Right	
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 (9.7 lb ft)
	Revolution speed	More than 1590 RPM
Locking characteristics	Current/voltage	Less than 1100 A / 10 V
	Torque	More than 47 N·m (34.7 lb ft)

Glow plug	
Item	Type
Preheat device model	Glow plug
Glow plug rated voltage/current	23 V / 3.8 A

Engine - Identification

Engine number



SMIL14CEX4762FB 1

1. Engine number stamping
2. Engine model stamping

Engine - Static description

Engine electronic control

The control provided by the control unit applies to the range from injection to air intake and exhaust including fuel injection amount, injection timing, air intake restriction, EGR and idling speed.

Cylinder block

The cylinder block is made of cast iron, and it has the equal center distance for each bore and a high rigidity, and the center of the crankshaft matches the center of the block.

Piston

The piston is a strut cast thermal flow piston made of aluminum alloy, and the combustion chamber is the round reentrant type.

Cylinder head

The cylinder head is made of cast iron, and has four valves per each cylinder.

The angle tightening method has been adopted to the cylinder head bolt to further improve its reliability and durability.

Crankshaft

The crankshaft is not to be polished for reuse, as it has TUFFTRIDE treatment applied. If a problem is found, replace with a new one.

EGR system

The EGR system is controlled by the engine control module (ECM) according to various data including the water temperature, engine RPM, and engine load to recirculate the exhaust gas for purification.

The primary components are the EGR valve, EGR cooler, and various sensors.

Connecting rod cap bolt

The angle tightening method has been adopted to the connecting rod cap bolt to further improve its reliability and durability.

Common rail type electronic control injection system

The common rail type electronic control injection system consists of the supply pump that sets the target pressure of high-pressure fuel to supply the fuel, the common rail that measures the high-pressure fuel and the fuel injector that injects the fuel in the form of a fine mist. Each of these are controlled by the ECM based on various signals to control the injection timing and injection amount in accordance with the driving condition.

Fuel injector

The fuel injector has adopted the 8-hole nozzle, and adjusts the fuel injection amount and injection timing by opening or closing the electromagnetic valve on the injector head portion.

The ECM corrects variation in the fuel injection amount from fuel injector to fuel injector in accordance with the ID code data in the memory. When adjusting the fuel injector, the ID code data must be recorded in the ECM.

Fuel filter with sedimenter

The fuel filter with sedimenter removes the water by using the difference in the relative density between diesel oil and water, and notifies the operator through the indicator when it becomes full of water.

Preheat system

The preheat system consists of the ECM, glow relay, glow plug and glow indicator light. The preheat system is activated when the engine coolant temperature is low to help engine start.

Lubricating system

It uses an oil filter with a full-flow bypass, and cools down the pistons using the water-cooled oil cooler and the oil jet.

Engine - Prepare

⚠ WARNING

Escaping fluid!

Hydraulic fluid or diesel fuel leaking under pressure can penetrate the skin and cause infection or other injury. To prevent personal injury: Relieve all pressure before disconnecting fluid lines or performing work on the hydraulic system. Before applying pressure, make sure all connections are tight and all components are in good condition. Never use your hand to check for suspected leaks under pressure. Use a piece of cardboard or wood for this purpose. If injured by leaking fluid, see your doctor immediately.

Failure to comply could result in death or serious injury.

W0178A

⚠ WARNING

Avoid injury!

Shut off the engine, remove the key, and make sure all motion is stopped before servicing the machine.

Failure to comply could result in death or serious injury.

W1128A

⚠ WARNING

Crushing hazard!

The lifting systems must be operated by qualified personnel who are aware of the correct procedures to follow. Make sure all lifting equipment is in good condition, and all hooks are equipped with safety latches.

Failure to comply could result in death or serious injury.

W0256A

⚠ WARNING

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders.

Failure to comply could result in death or serious injury.

W0398A

⚠ WARNING

Explosion hazard!

Batteries emit explosive gases. Always ventilate when using in an enclosed area or when charging. Keep the battery away from sparks, open flames, and other ignition sources.

Failure to comply could result in death or serious injury.

W0369A

NOTICE: *Keep away from flames.*

NOTICE: *The air conditioner circuit is filled with high pressure gas, gas may spray out dangerously when loosening lines.*

Items to prepare:

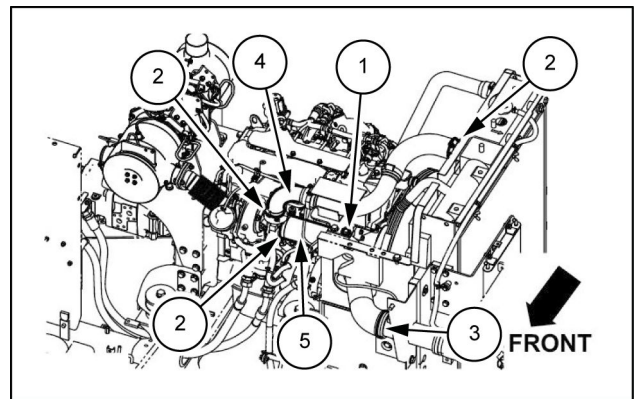
- Wrenches [**7 mm, 10 mm, 13 mm, 17 mm, 19 mm, 36 mm**]
- Box wrench [**24 mm**]
- Shackle (with the required lifting capacity) x 2
- Wire rope (with the required breaking load)
- Lifting equipment (with the required lifting capacity)
- Pliers
- Marking pen
- Cap
- Plug
- Waste oil can
- Rag
- Cleaning fluid
- Wood planks, etc.

Engine - Remove

1. Turn the battery disconnect switch to the "OFF" position or disconnect the negative terminal of the battery.
 - After removing the terminal and harness, fasten them so that they do not interfere with the frame and other parts.
Also, cover with a rubber cap to protect against sparks.
2. Remove the counterweight.
For details, see **Counterweight - Remove (39.140)**.
3. Remove the muffler.
For details, see **Exhaust muffler - Remove (10.254)**.
4. Remove the pump.
For details, see **Pump - Remove (35.106)**.
5. Use a wrench [**19 mm**] to remove the bolt (1), use a wrench [**7 mm**] to loosen the hose bands (2) and (3), and then disconnect the intercooler hose (high-temperature side) (4) and hose (5) from the air cleaner.

Tightening torque for band (2) installation: **8.8 - 9.8 N·m (6.49 - 7.23 lb ft)**

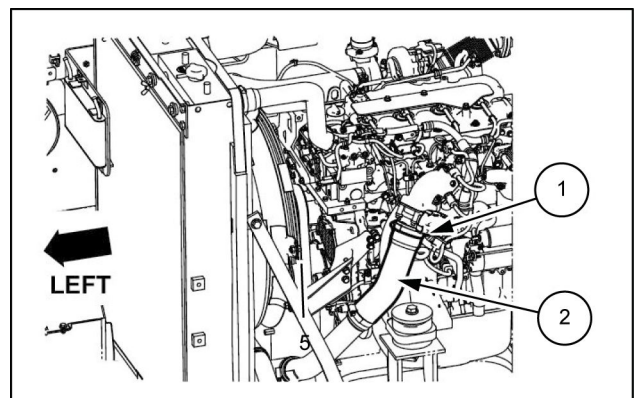
Tightening torque for band (3) installation: **6.3 - 7.3 N·m (4.65 - 5.38 lb ft)**



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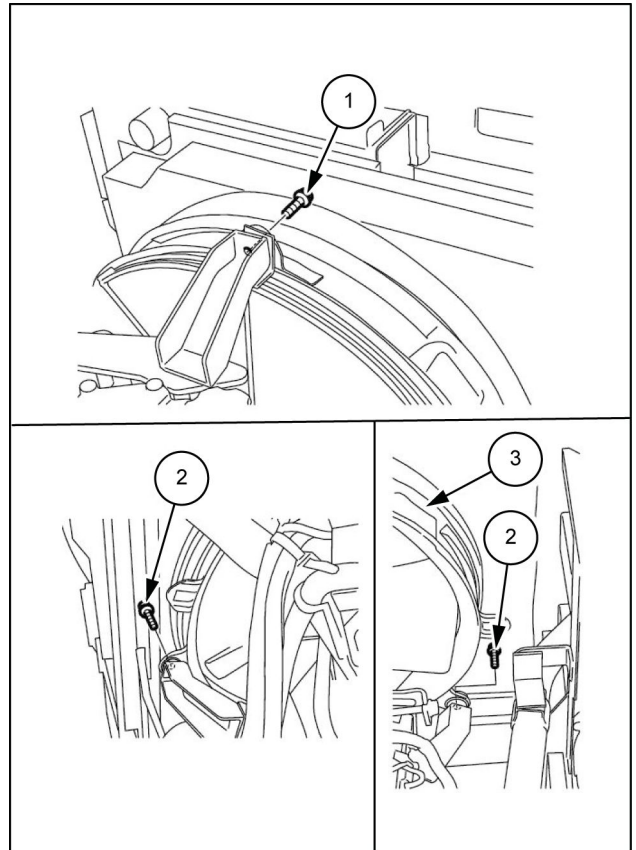
6. Loosen the hose bands (1), and then remove the intercooler hose (low-pressure side) (2).

Tightening torque for hose band (2) installation: **8.8 - 9.8 N·m (6.49 - 7.23 lb ft)**



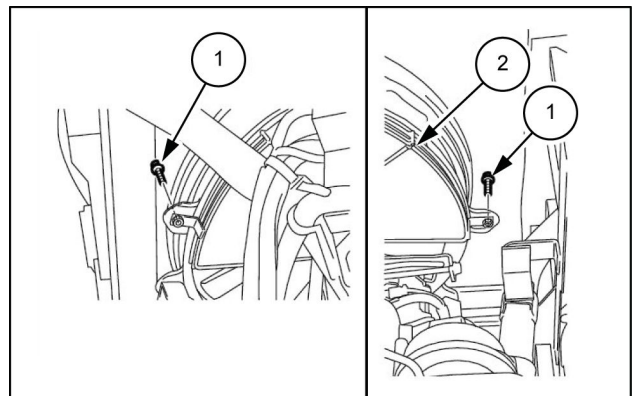
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7. Use a wrench to remove the bolts (1), (2), and then remove the fan shroud (3).



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8. Use a wrench to remove the bolts (1), and then remove the fan guard (2).

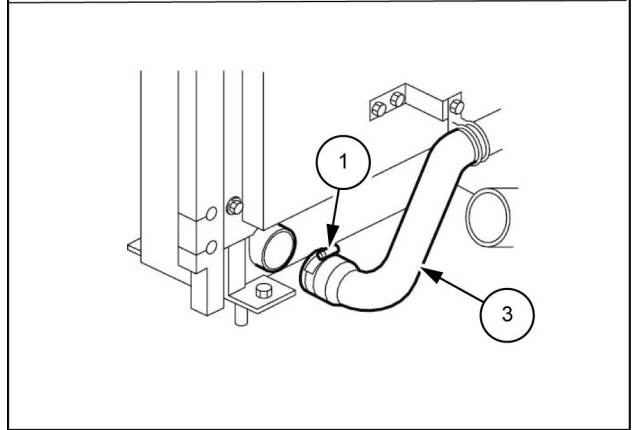
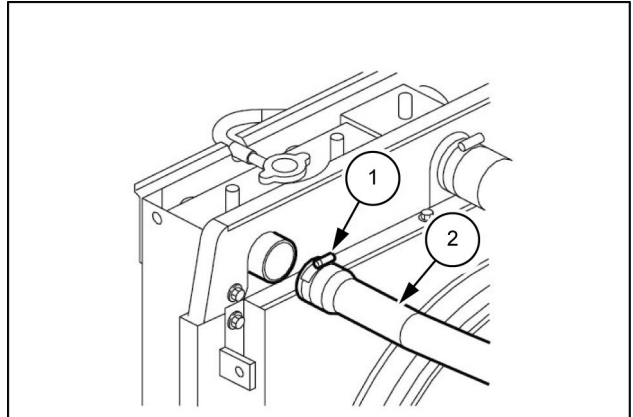


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9. Use a wrench [**7 mm**] to loosen the radiator hose bands (1) in 2 locations, and then remove the upper hose (2) and lower hose (3).

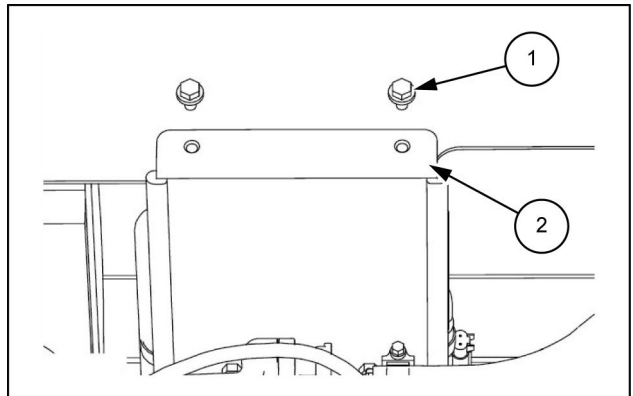
- Use caps to cover the radiator and hoses to prevent any entry of water, dust or dirt.
- Before removing the radiator hose, completely drain the coolant.

Tightening torque for band (1) installation: **4.9 - 5.9 N·m (3.61 - 4.35 lb ft)**



LPIL12CX00146BB 5

10. Use a wrench [**13 mm**] to remove the 2 bolts (1), and then remove the connector brackets (2).

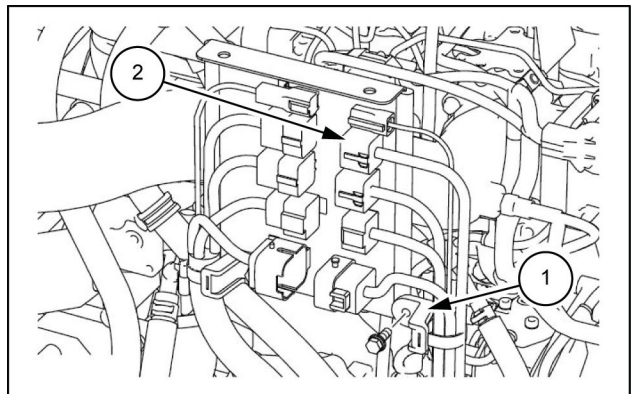


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11. Use a wrench [**13 mm**] to remove the hose bands (1) in 2 locations from the bracket, and then remove the 5 connectors (2).

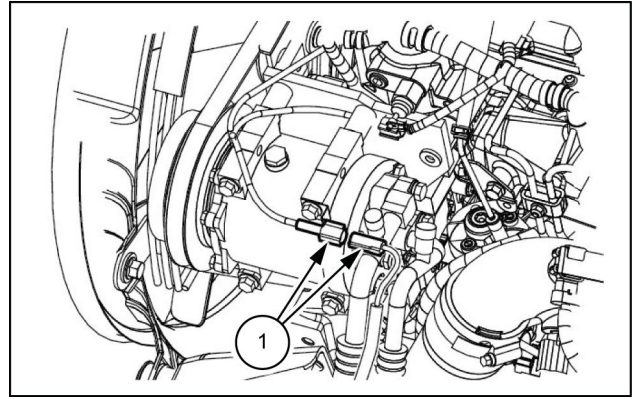
- Wrap the removed connectors in plastic after tying them together.

Tightening torque for bolt installation: **21.6 - 37.2 N·m (15.93 - 27.44 lb ft)**



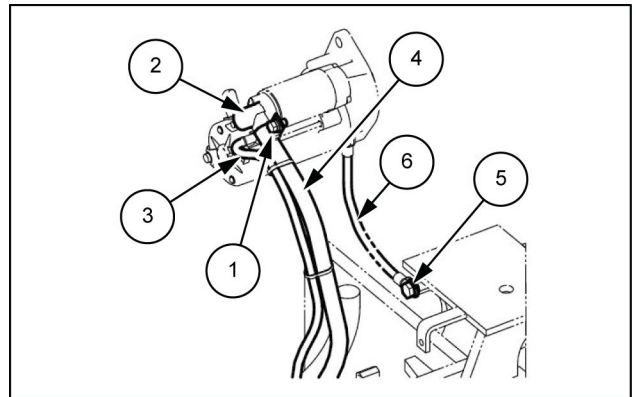
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12. Disconnect the connectors (1) from the air-conditioner compressor.



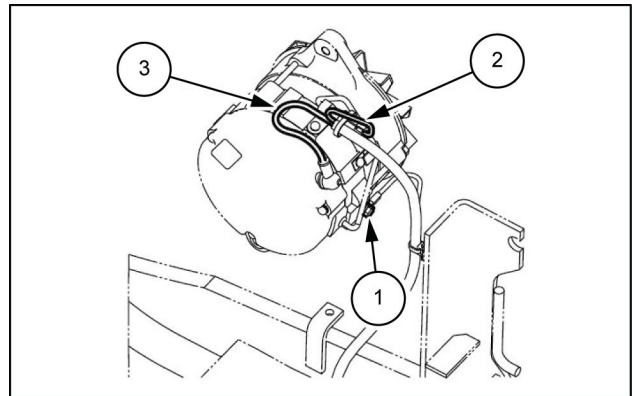
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13. Use a wrench [**13 mm**] to remove the bolt (1), and then remove the terminal cap (2).
Use a wrench to remove the wirings (3) and (4) from the starter.
Use a wrench [**17 mm**] to remove the bolt (5), and then remove the wiring (6) from the frame.



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14. Use a wrench [**10 mm**] to remove the bolt (1).
Disconnect the connector (2) from the alternator.
Use a wrench to remove the wiring (3) from the alternator.

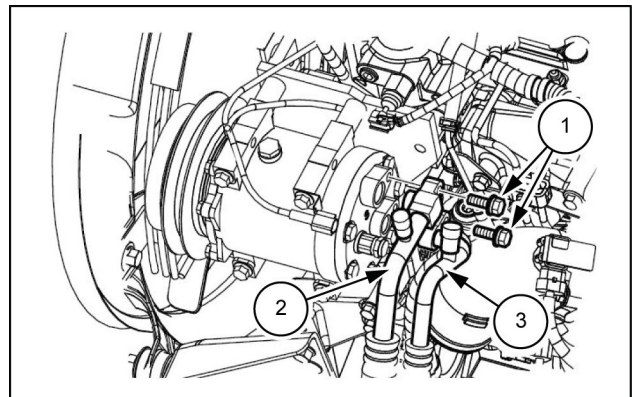


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15. Use a wrench [**13 mm**] to loosen the 2 line bolts (1) on the lines, and then remove the lines (2) and (3) from the compressor.

- Always remove the low-pressure (suction side) line (2) first.
- Install caps or plugs to the compressor and lines to prevent any entry of water, dust or dirt.

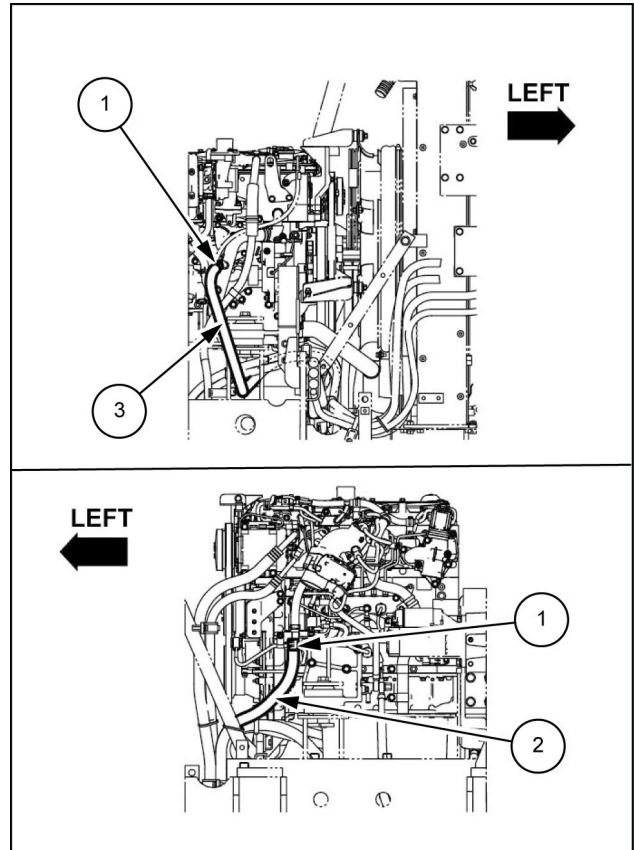
Tightening torque for bolt (1) installation: **20 - 25 N·m (14.75 - 18.44 lb ft)**.



LPIL12CX00152AB 11

16. Loosen the 2 hose bands (1), and then remove the heater hoses (2), (3).

- Install caps or plugs to the engine and hoses to prevent any entry of water, dust or dirt.

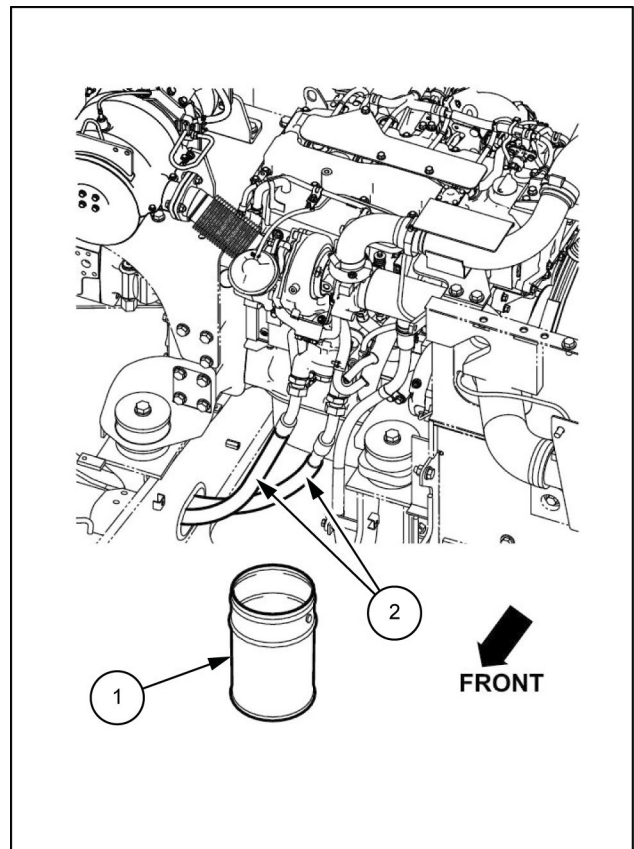


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17. Prepare the waste oil can (1).

- Drain the engine oil before removing the engine oil hose.
Use a wrench [**36 mm**] to disconnect the 2 engine oil remote hoses (1).
- Mark the engine and hoses so that the connectors match at the time of assembly.
- Install caps or plugs to the engine and hoses to prevent any entry of water, dust or dirt.
- Clean the engine and hoses by spraying them with a parts cleaner to prevent scratches and prevent dirt from accumulating on the connectors.

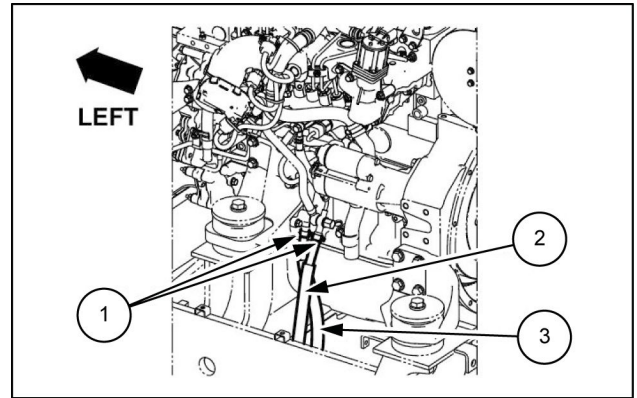
Tightening torque for installation: **54.1 - 63.9 N·m**
(**39.90 - 47.13 lb ft**)



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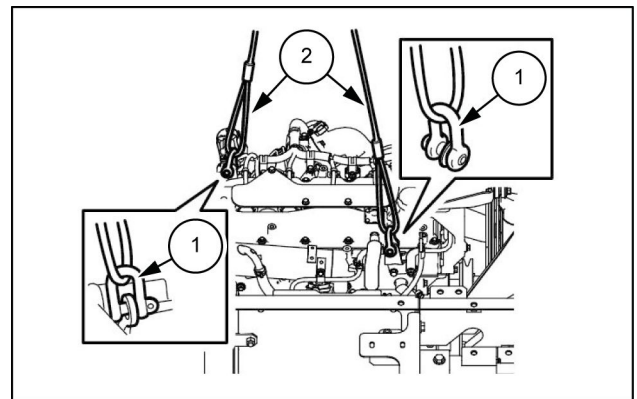
18. Remove the hose bands (1), and then disconnect the fuel hoses (2).

- Install caps or plugs to the engine and hoses to prevent any entry of water, dust or dirt.



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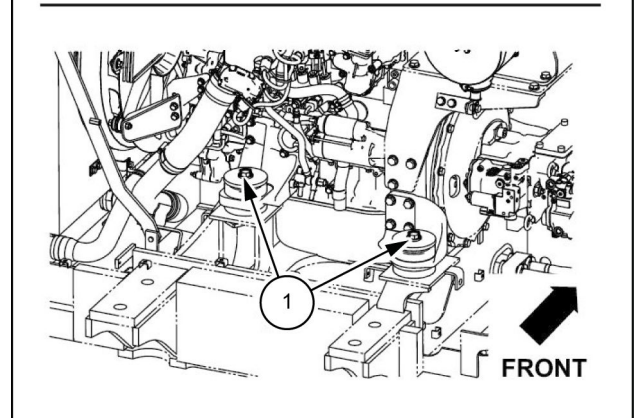
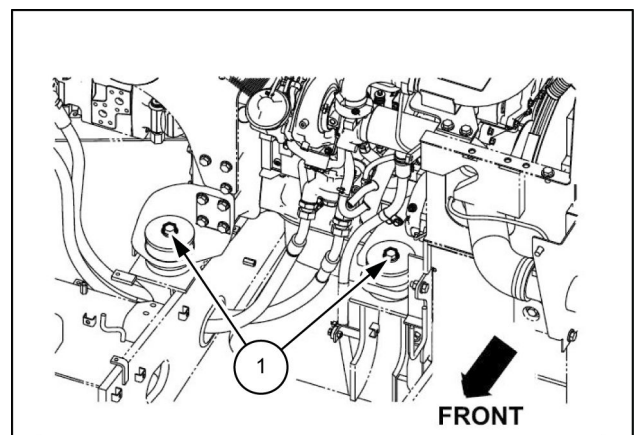
19. Install the 2 shackles (1), and then use the wire ropes (2) and liftcrane to fasten the engine main unit.



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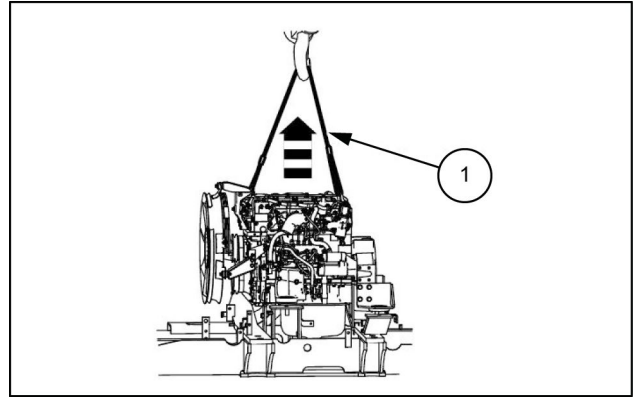
20. Use a box wrench [24 mm] to remove the 4 bolts (1) from the mount.

Tightening torque for bolt installation: **264.9 - 313.9 N·m (195.38 - 231.52 lb ft)**



LPIL12CX00157BB 16

21. Use the wire ropes **(1)** and lifting equipment to lift the engine main unit.
- Always check if the hoses and connectors are all disconnected before lifting the engine. Thoroughly check that the location is safe before lowering the engine on wood planks.
 - Thoroughly fasten the engine so that it does not fall over.



LPIL12CX00158AB 17

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, cleaning, 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

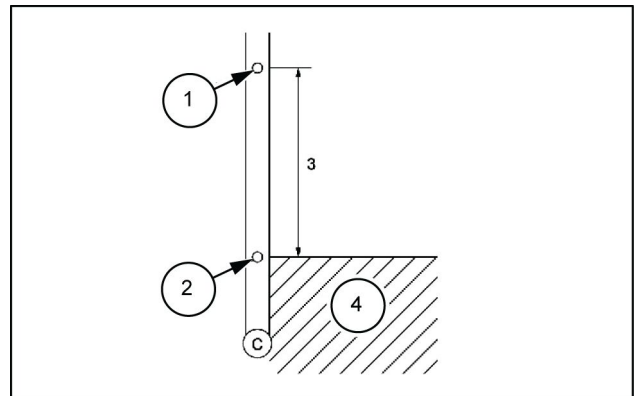
1. Remove the oil level gauge from the oil level gauge guide tube.

NOTE: Wipe off the engine oil adhered to 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 for the engine oil adhered to the oil level gauge and inspect the engine oil level.

1. MAX
2. MIN
3. Acceptable oil amount
4. Refilling required

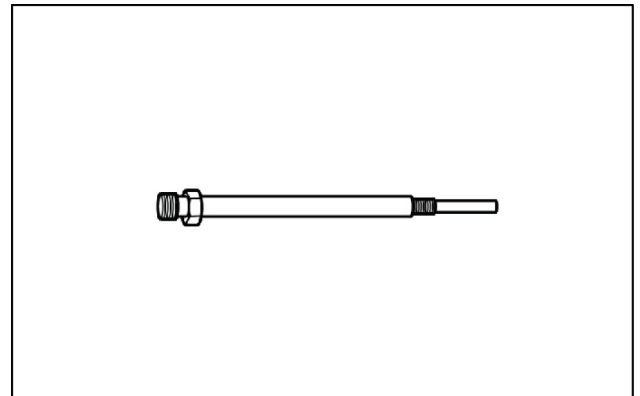


LPIL12CX009 1

Engine - Compression test

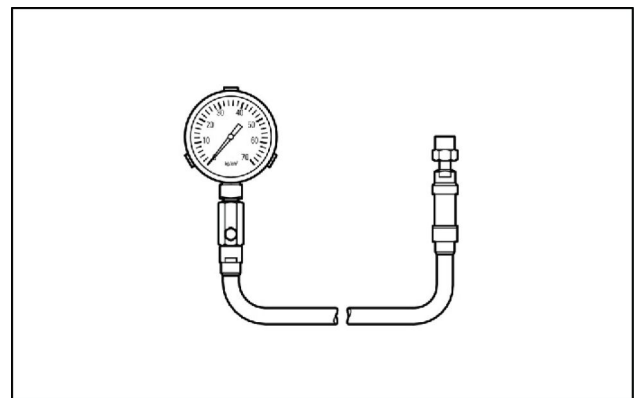
1. Start the engine.
 - Warm-up the engine.
2. Turn "OFF" the starter switch.
3. Disconnect the battery ground cable from the battery.
 - Do not disconnect the battery cable at least for **1 min** after turning the starter switch "OFF".
4. Remove the glow plug from the cylinder head.
 - Remove all glow plugs.
5. Connect the battery ground cable to the battery.
6. Rotate the starter.
 - Crank the engine to discharge foreign matter from inside the cylinders.
7. Install the special tool to the cylinder head.
 - 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)**)



LPIL12CX00522AA 1

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



LPIL12CX00523AA 2



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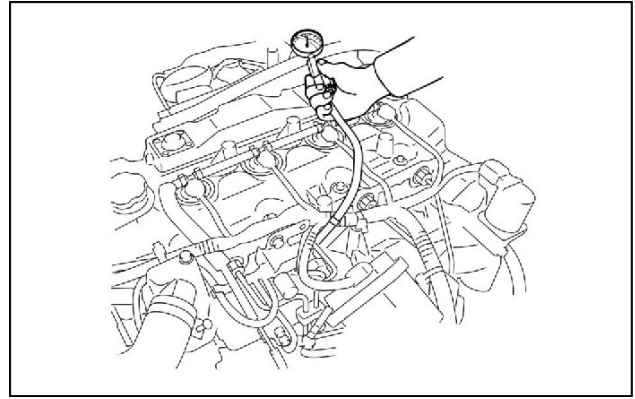
8. Measure the compression pressure.

- Rotate the starter, and read the indication of the compression pressure when the compression gauge needle stabilizes.
- Measure the compression pressure of all cylinders.

Values: **2840 - 3240 kPa (412 - 470 psi)** Engine speed: **200 RPM**

Limit: **1960 kPa (284 psi)** Engine speed: **200 RPM**

Difference between each cylinder: **294 kPa (43 psi)** Engine speed: **200 RPM**



LPIL12CX00524AA 3

NOTICE: Use a fully charged battery.

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

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

9. Remove the special tool from the cylinder head.

10. Disconnect the battery ground cable from the battery.

- Do not disconnect the battery cable at least for **1 min** after turning the starter switch "OFF".

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

- Install the all glow plugs.

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

12. Connect the harness connector to the injector.

13. Connect the battery ground cable to the battery.

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