

688C Excavator

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Section 2000

ENGINE REMOVAL AND INSTALLATION

For 688 Crawler Excavators

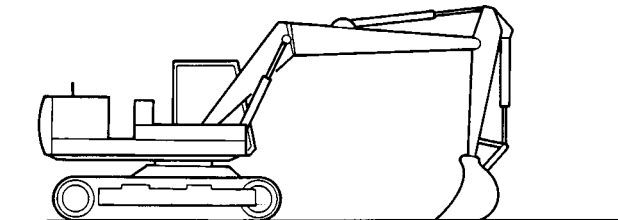
2000

Removal



WARNING: When the machine is operating, the engine systems and the hydraulic pump systems heat up to a high temperature. To avoid the possibility of being burnt by hot metal or scalded by hot oil or water, allow the machine to cool before starting any maintenance work.

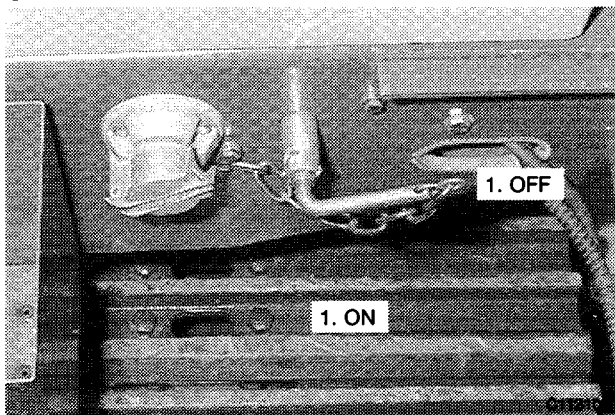
STEP 1



EA2836

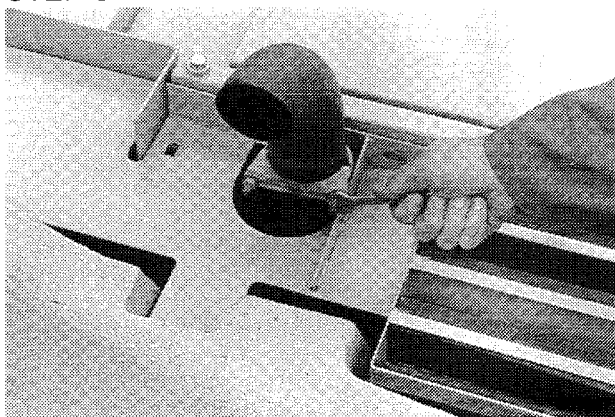
Put the machine on level ground. Lower the attachment to the ground. Stop the engine and allow the systems to cool.

STEP 2



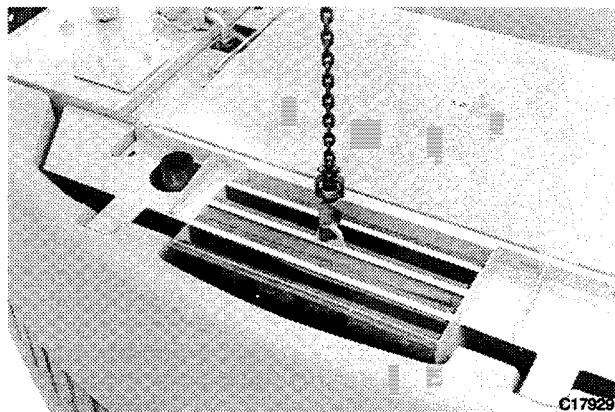
Turn the master disconnect switch, located under the right-hand side of the walkway, to the OFF position and remove the key.

STEP 3



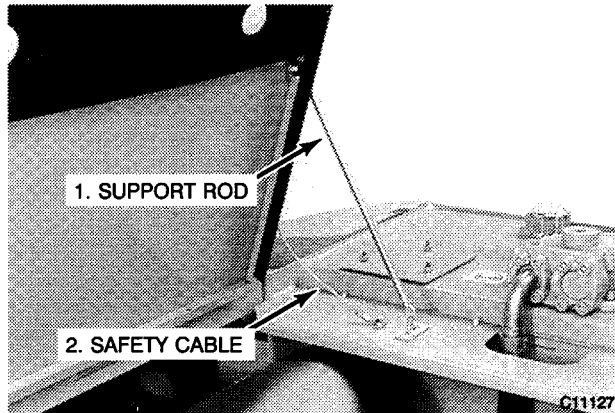
Loosen the nuts on the exhaust muffer extension tube. Remove the exhaust muffer extension tube.

STEP 4



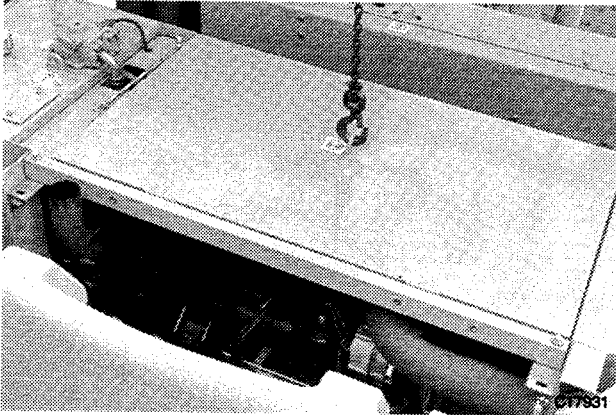
Install suitable lifting equipment onto the engine insulator. Remove the engine insulator mounting bolts and spacers and remove the engine insulator.

STEP 5



Raise the engine upper access cover and install the support rod. Remove the engine front cover. Remove the safety cable retaining bolt, spacers and nut. Lower the engine upper access cover.

STEP 6

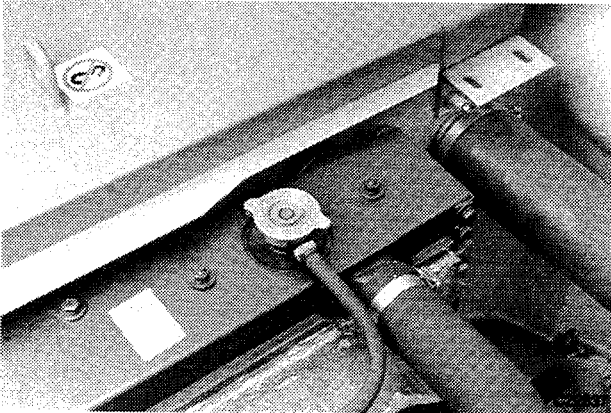


Install suitable lifting equipment on the engine upper access cover. Remove the retaining bolts, spacers and nuts and remove the engine upper access cover.



WARNING: Hot engine coolant can spray out of the radiator when the radiator cap is removed. To remove the radiator cap, allow the engine cooling system to cool. Turn the radiator cap to the first notch and wait until the pressure is released. Then remove the radiator cap.

STEP 7

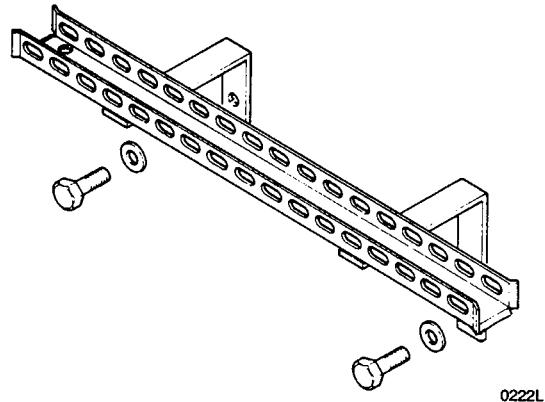


Remove the radiator cap.

STEP 8

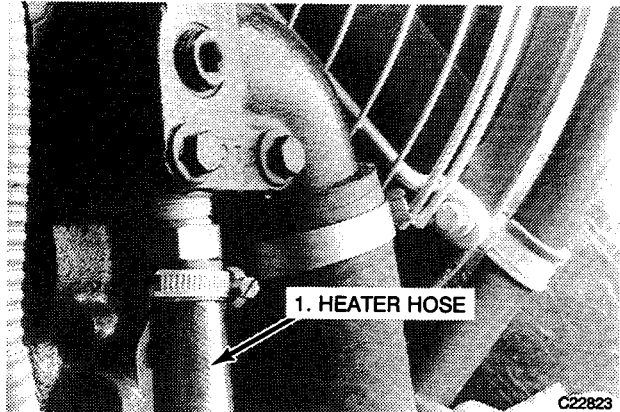
Remove the access panels under the engine and under the hydraulic oil tank.

STEP 9



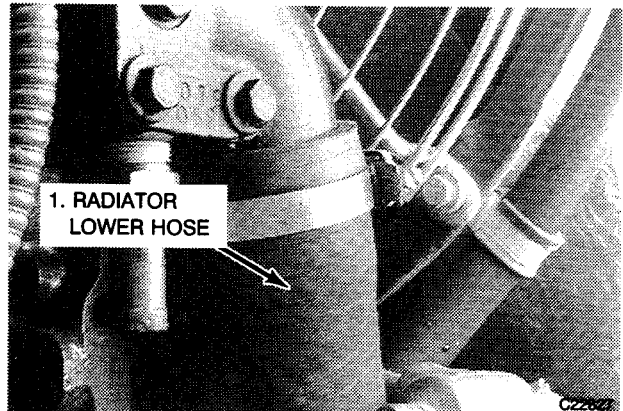
Remove the mounting bolts and spacers and remove the wiring harness carrier from the rear of the engine.

STEP 10



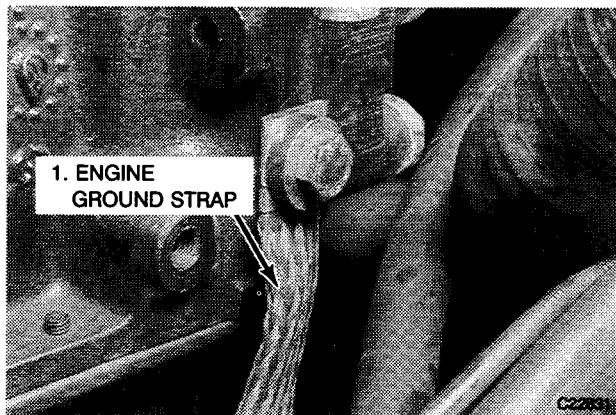
Put a clean container of at least 14 litres (3.7 US gallons) under the engine. Remove the heater hose from the engine and drain engine coolant into the container.

STEP 11



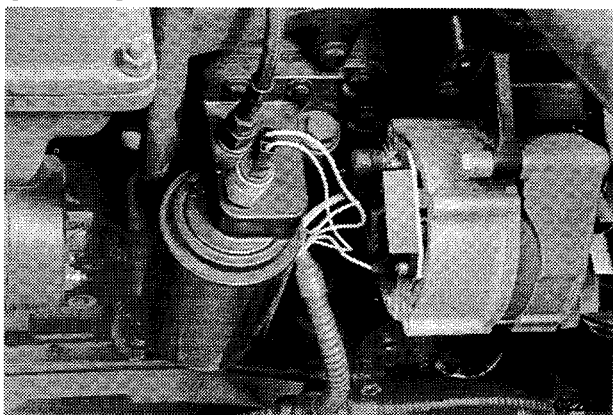
Remove the radiator lower hose and drain the remaining engine coolant into the container.

STEP 12



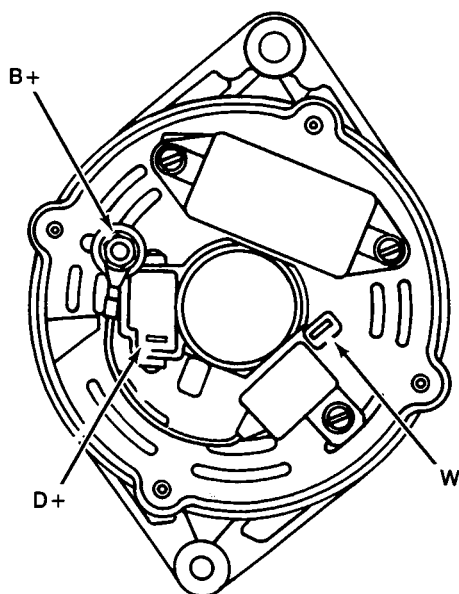
Remove the retaining bolt and spacer and remove the engine ground strap.

STEP 13



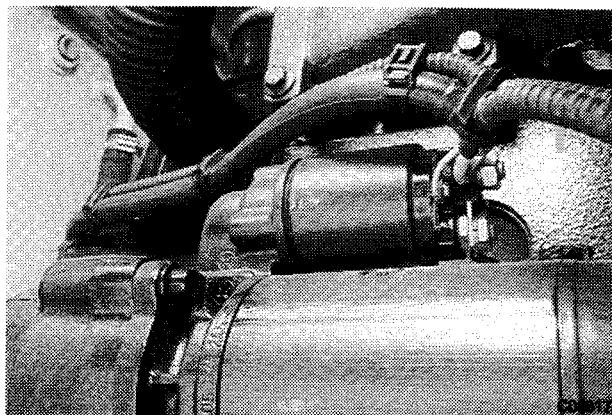
Disconnect the wires from the oil filter.

STEP 14



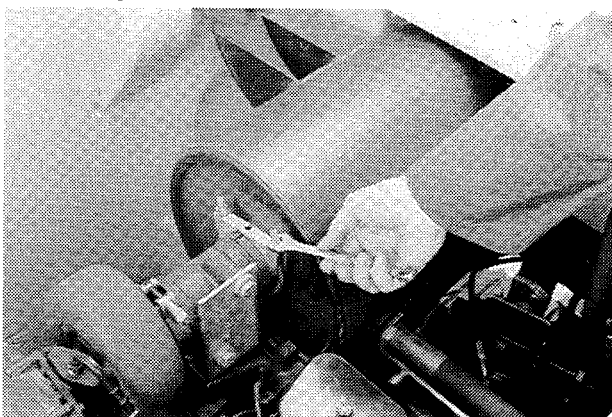
Disconnect the wires from the alternator.

STEP 15



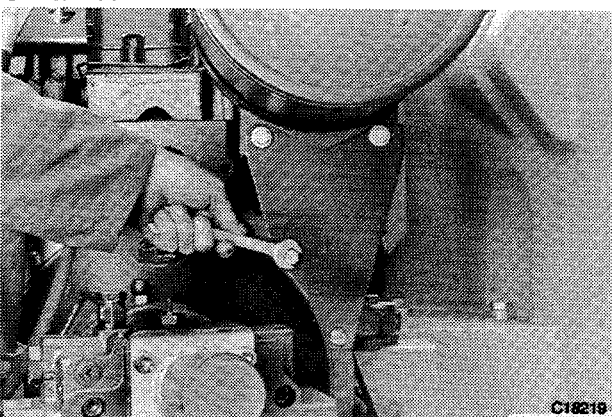
Disconnect the wires from the starter motor.

STEP 16



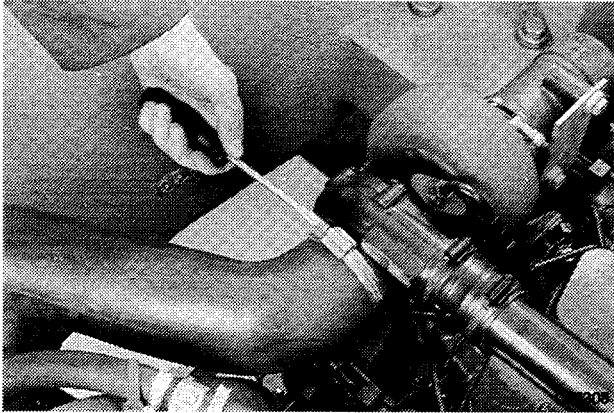
Loosen the nuts on the exhaust muffler clamp.

STEP 17



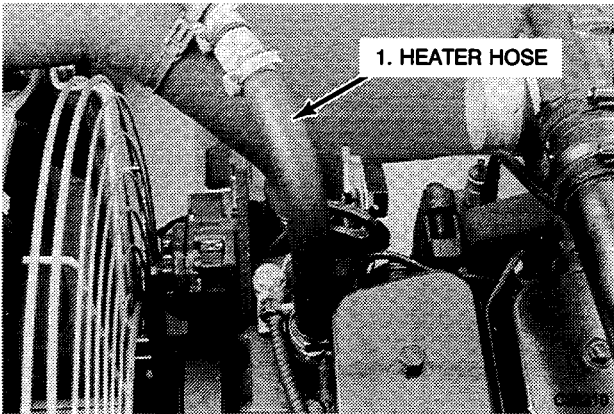
Remove the mounting bolts and spacers. Remove the exhaust muffler and bracket.

STEP 18



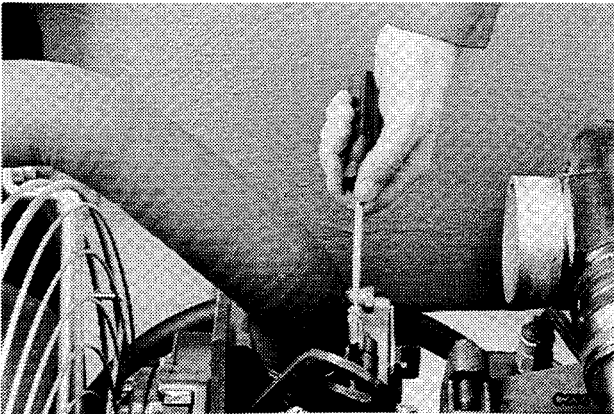
Disconnect the air inlet hose from the engine and from the air filter assembly.

STEP 19



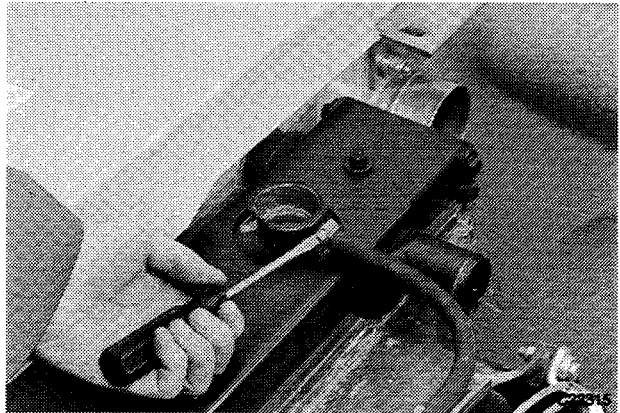
Disconnect the heater hose from the engine.

STEP 20



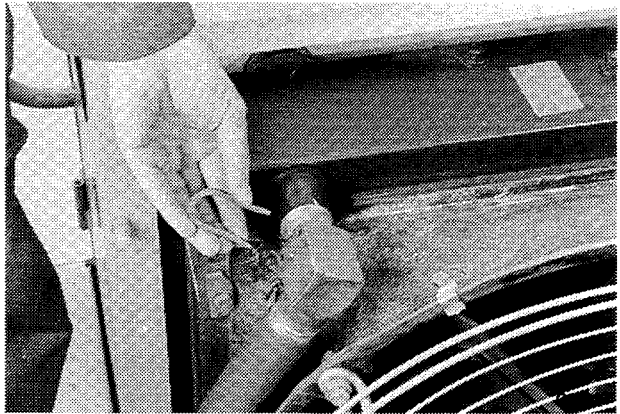
Disconnect the radiator upper hose from the engine and from the radiator.

STEP 21



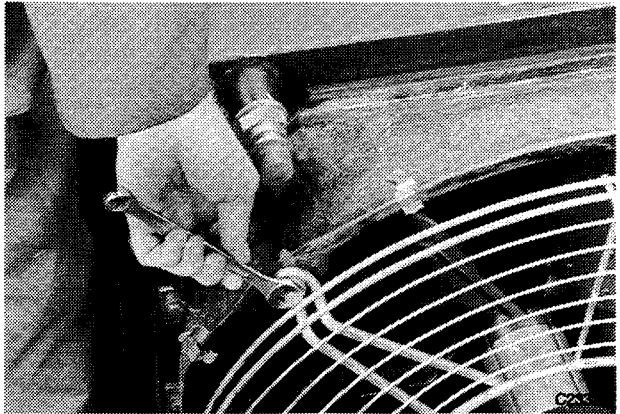
Disconnect the radiator overflow hose.

STEP 22

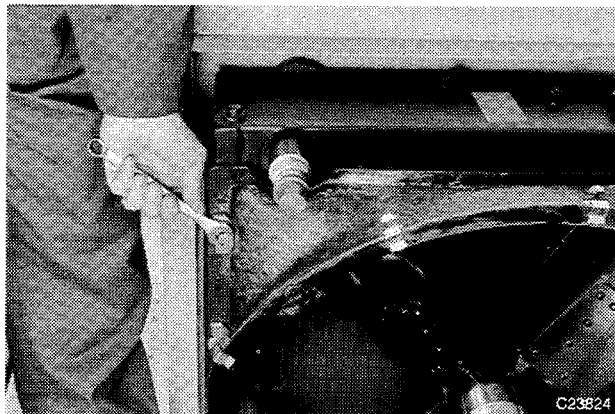


Remove the clip and disconnect the oil cooler upper hose from the oil cooler. Cap the oil cooler and the hose.

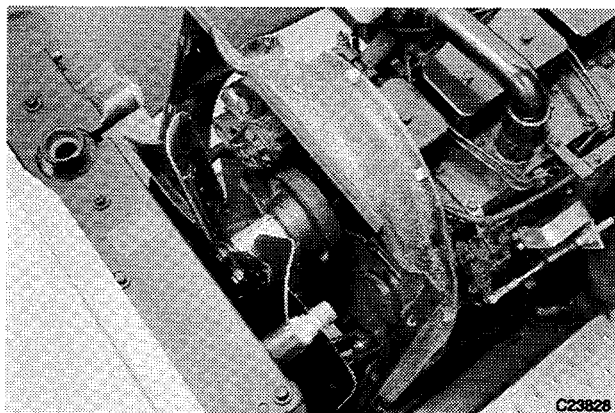
STEP 23



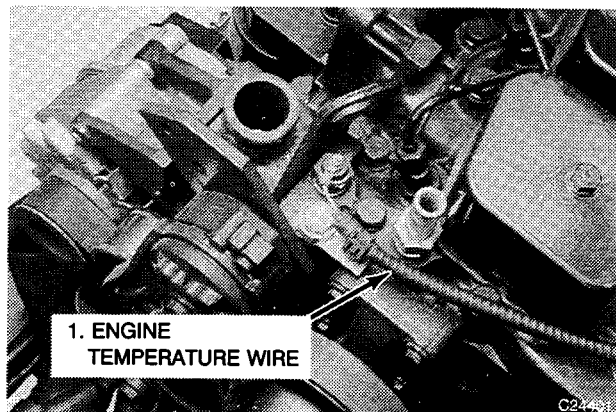
Remove the mounting bolts, spacers and nuts and remove the fan guard.

STEP 24

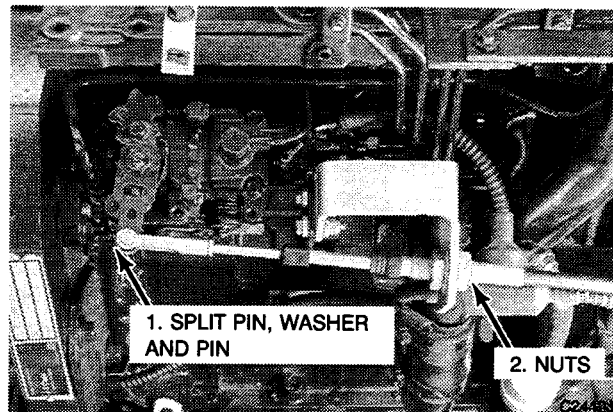
Remove the mounting bolts and spacers and move the fan shroud towards the engine.

STEP 25

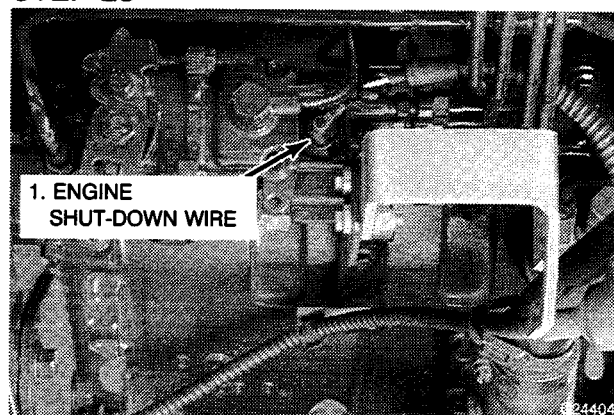
Remove the fan mounting bolts and washers. Remove the fan, the fan spacer and the fan shroud.

STEP 26

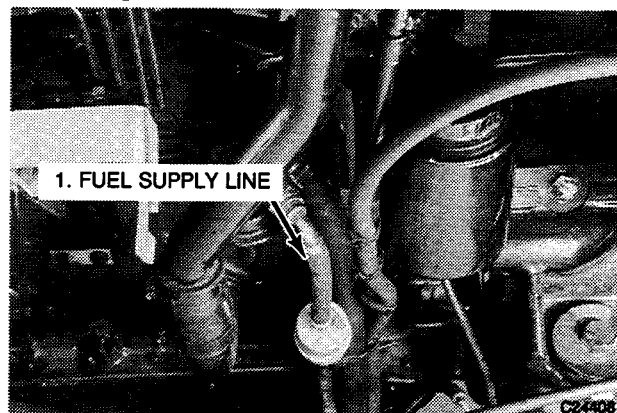
Disconnect the engine temperature wire.

STEP 27

Remove the split pin, washer and pin that hold the throttle cable onto the fuel injection pump lever. Loosen the nuts that hold the throttle cable in the bracket and remove the throttle cable from the engine.

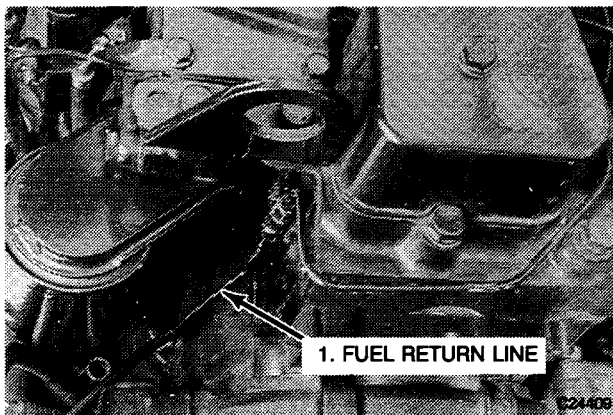
STEP 28

Disconnect the engine shut-down wire.

STEP 29

Disconnect and cap the fuel supply line.

STEP 30

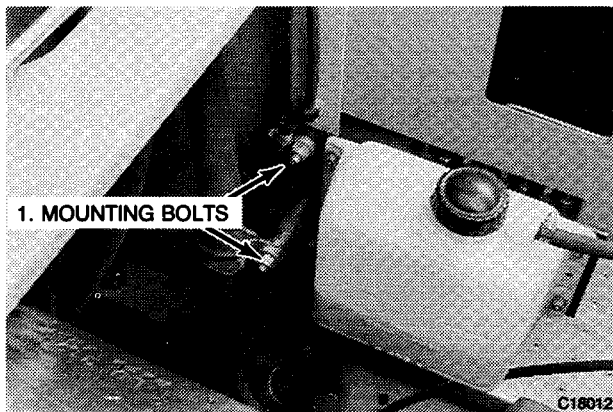


Disconnect and cap the fuel return line from the tee assembly and from the engine.

STEP 31

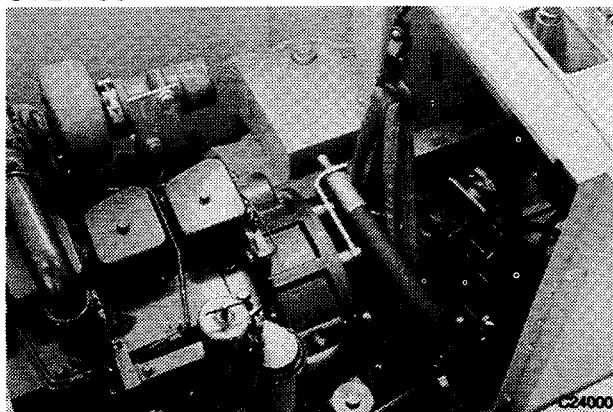
Disconnect the crankcase breather hose.

STEP 32



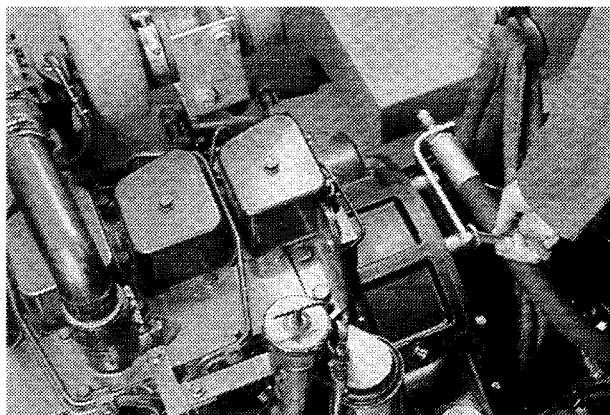
Disconnect the hoses from the top and the bottom of the coolant recovery reservoir. Remove the mounting bolts, spacers and nuts and remove the coolant recovery reservoir.

STEP 33



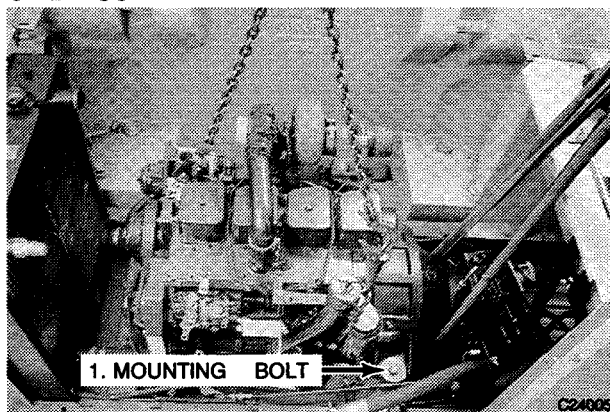
Install suitable lifting equipment to support the hydraulic pump when the engine is removed.

STEP 34



Remove the hydraulic pump mounting bolts and spacers and remove the pressure check hose and bracket. Remove the remaining hydraulic pump mounting bolts and spacers.

STEP 35



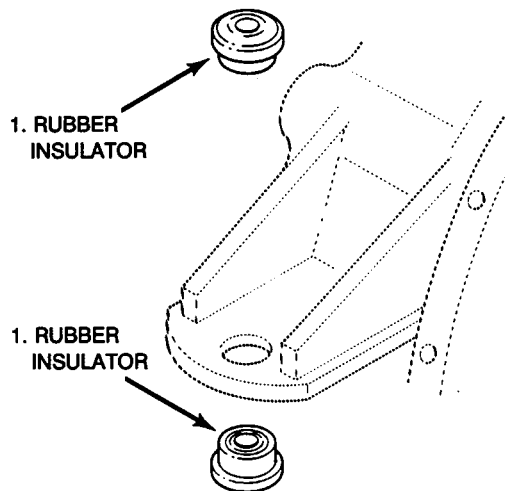
Install suitable lifting equipment onto the engine lifting eyes. Remove the engine mounting bolts, washers, spacers and nuts.

NOTE: *The engine weighs approximately 450 kg (990 lb).*

STEP 36

Lift the engine free of the mountings and move towards the radiator until it is free from the hydraulic pump coupling. Carefully remove the engine from the machine.

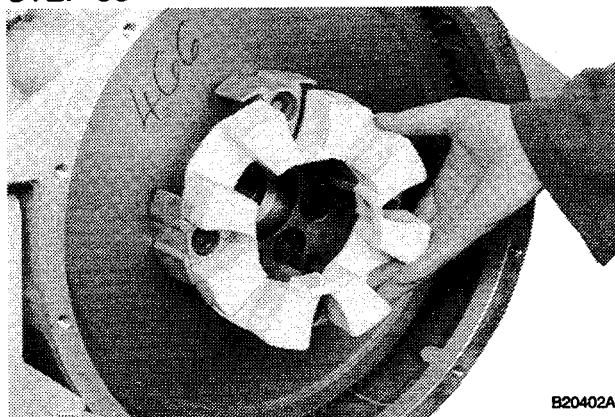
STEP 37



02165

Inspect the rubber insulators for wear or damage and replace if necessary.

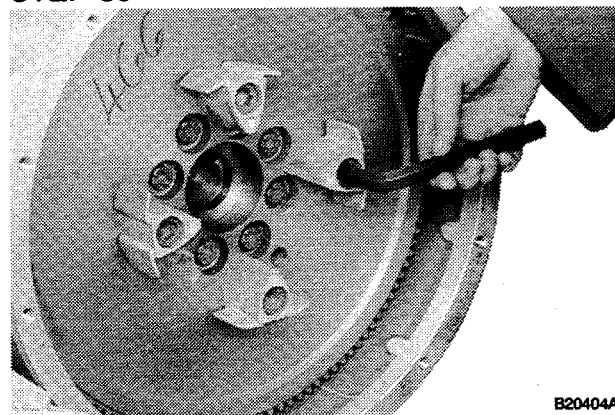
STEP 38



B20402A

Inspect the hydraulic pump shock-absorber for wear or damage and replace if necessary.

STEP 39

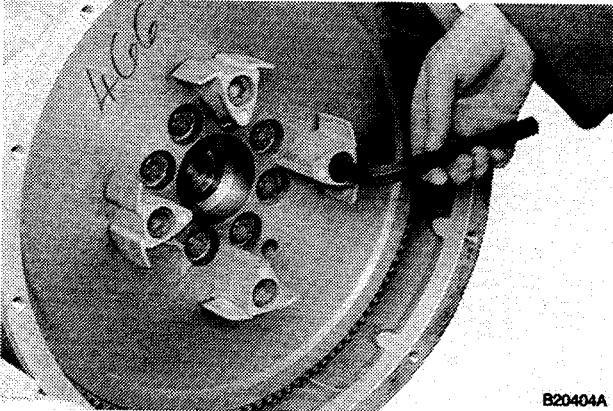


B20404A

Remove the shock-absorber centering-mount bolts, and remove the shock-absorber centering-mounts. Inspect the shock-absorber centering-mounts for wear or damage and replace if necessary.

Installation

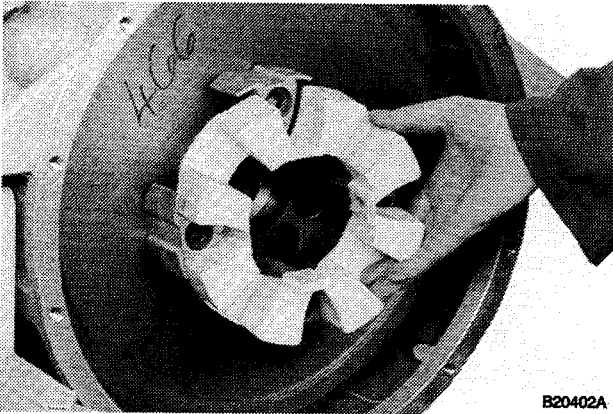
STEP 40



B20404A

Clean the shock-absorber centering mount bolts and bolt holes. Apply Loctite 638 to the shock-absorber centering-mount bolts. Install the shock-absorber centering-mounts and bolts. Do not fully tighten the bolts.

STEP 41

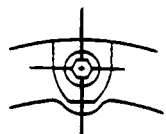


B20402A

1. INCORRECT



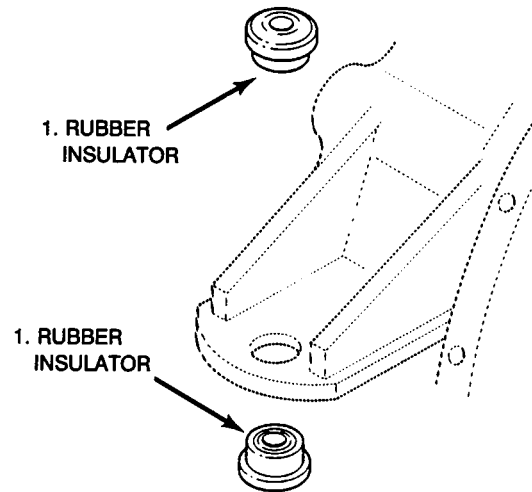
2. CORRECT



0216R

Install the shock-absorber. Make sure that the shock-absorber centering-mounts are centered in the shock-absorber and tighten the bolts to a torque of 220 Nm (162 lb ft).

STEP 42



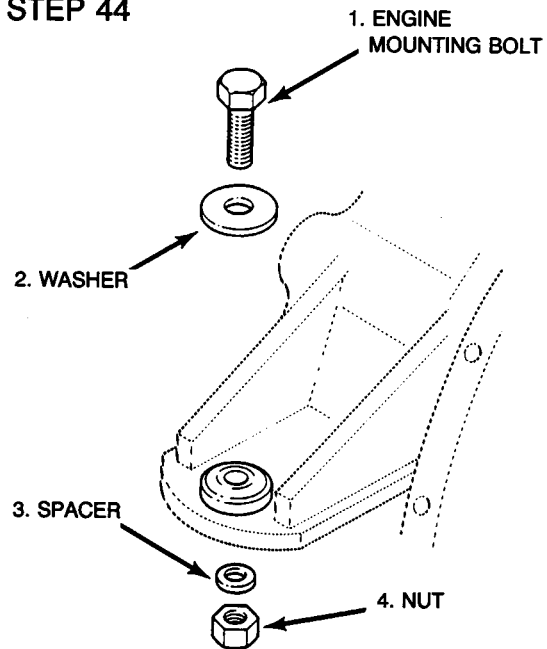
0216S

Install the upper and lower rubber insulators. The insulators are a tight fit in the engine supports.

STEP 43

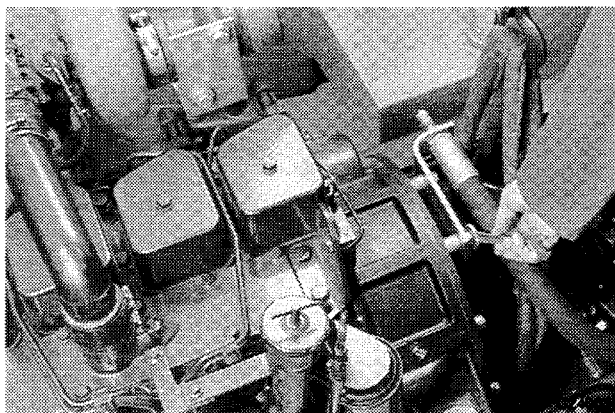
Lift the engine into the engine compartment and connect the engine to the hydraulic pump, making sure that the hydraulic pump drive coupling engages correctly.

STEP 44

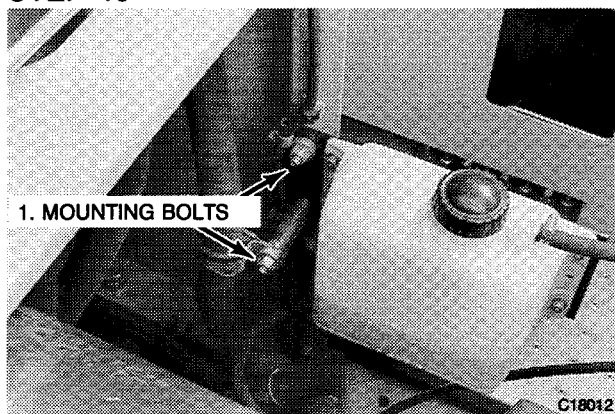


0216T

Install the engine mounting bolts, washers, spacers and nuts. Tighten the engine mounting bolts to a torque of 217 to 271 Nm (160 to 200 lb ft). Remove the lifting equipment from the engine.

STEP 45

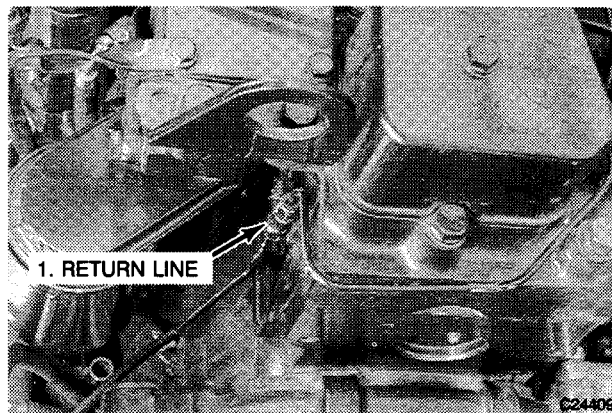
Install the pressure check hose and bracket. Install the hydraulic pump mounting bolts and spacers and tighten to a torque of 44 Nm (32.5 lb ft). Remove the lifting equipment from the hydraulic pump.

STEP 46

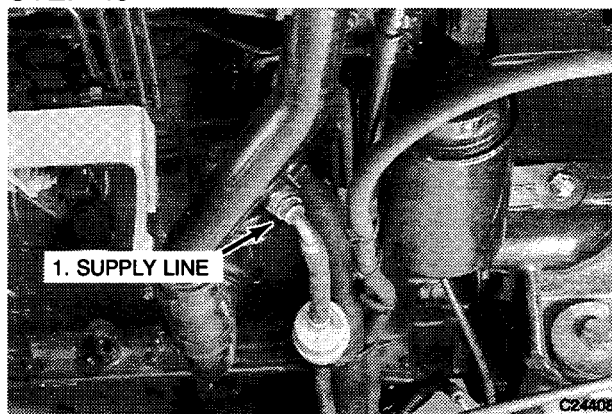
Install the coolant recovery reservoir and install and tighten the mounting bolts, spacers and nuts. Connect the hoses to the top and the bottom of the coolant recovery reservoir and tighten the clamps.

STEP 47

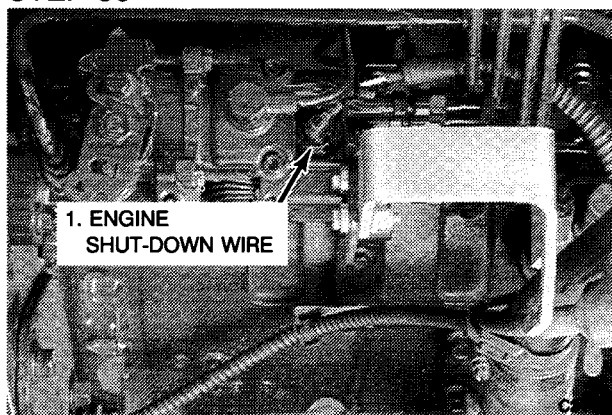
Connect the crankcase breather hose.

STEP 48

Connect the fuel return line to the tee assembly. Install and tighten the retaining bolt and washers.

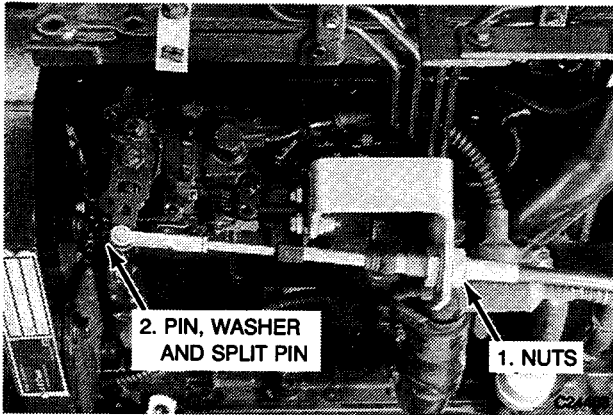
STEP 49

Connect the fuel supply line.

STEP 50

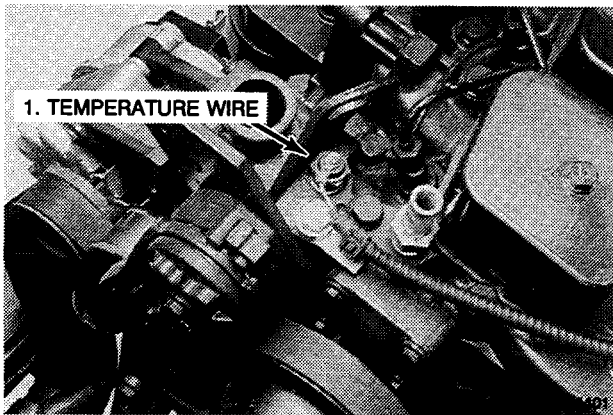
Connect the engine shut-down wire.

STEP 51



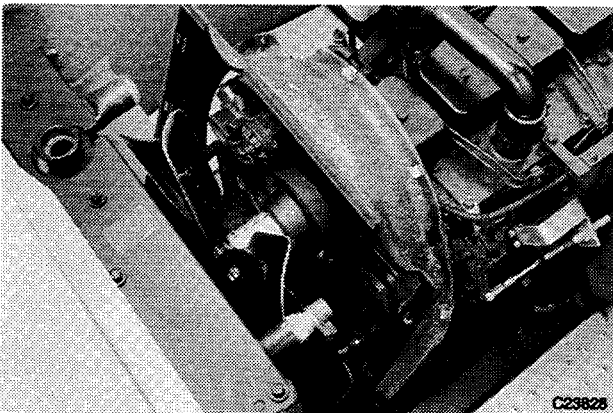
Install the throttle cable in the bracket and tighten the nuts. Install the throttle cable in the fuel injection pump lever and install the pin, washer and split pin.

STEP 52



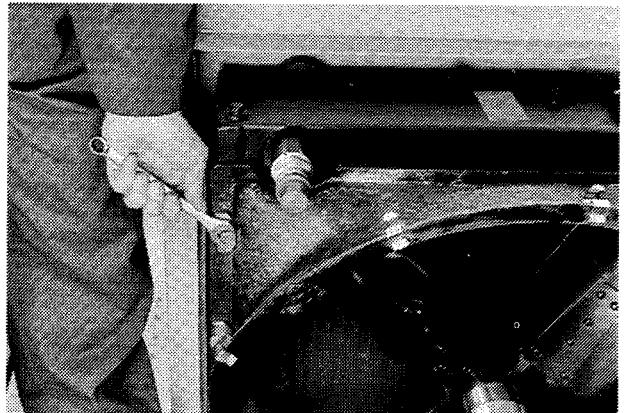
Connect the engine temperature wire.

STEP 53



Install the fan shroud, but do not install the mounting bolts and spacers. Install the fan spacer and the fan. Install and tighten the fan mounting bolts and washers to a torque of 43 Nm (32 lb ft).

STEP 54



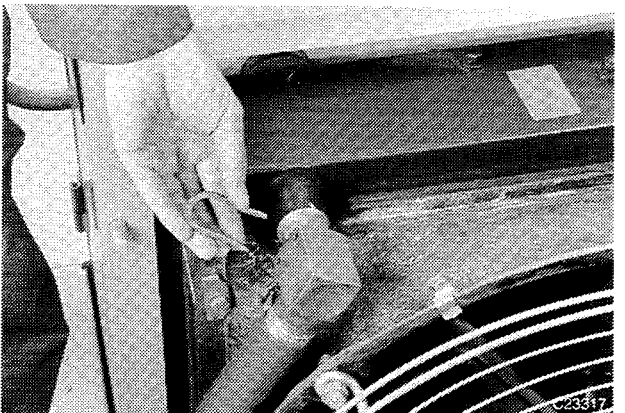
Install and tighten the fan shroud mounting bolts and spacers.

STEP 55



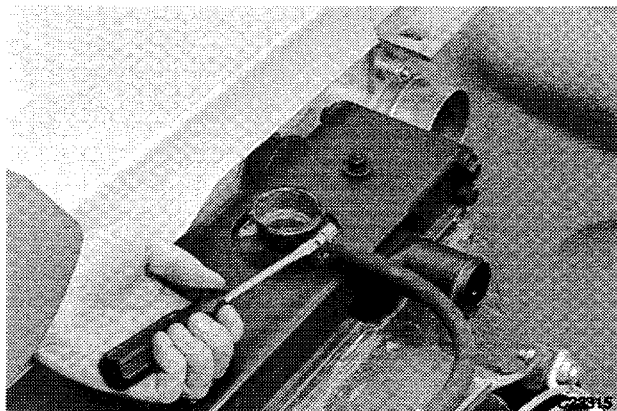
Install the fan guard. Install and tighten the mounting bolts, spacers and nuts.

STEP 56



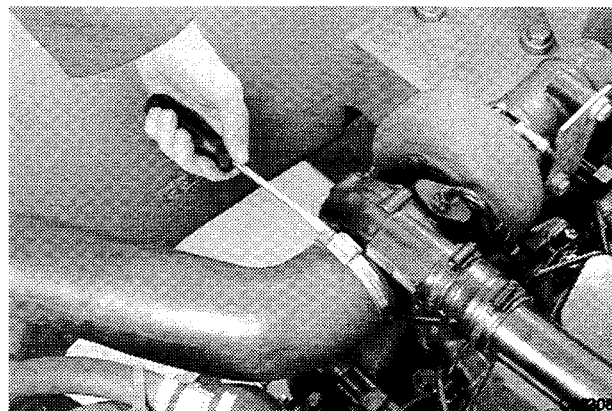
Install the oil cooler upper hose and install the clip.

STEP 57



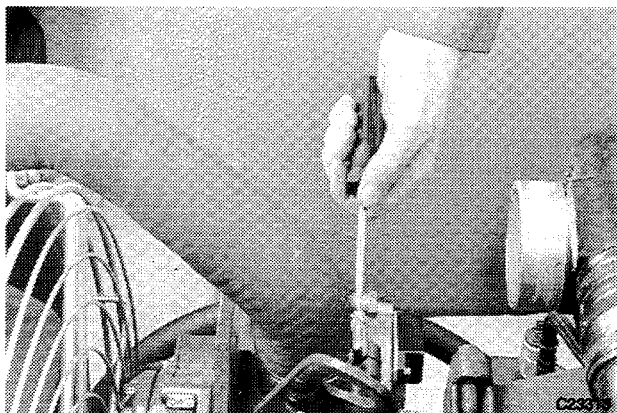
Install the radiator overflow hose and tighten the clamp.

STEP 60



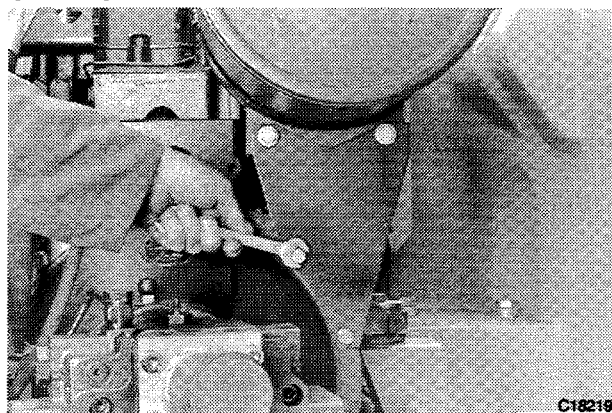
Install the air inlet hose and tighten the clamps.

STEP 58



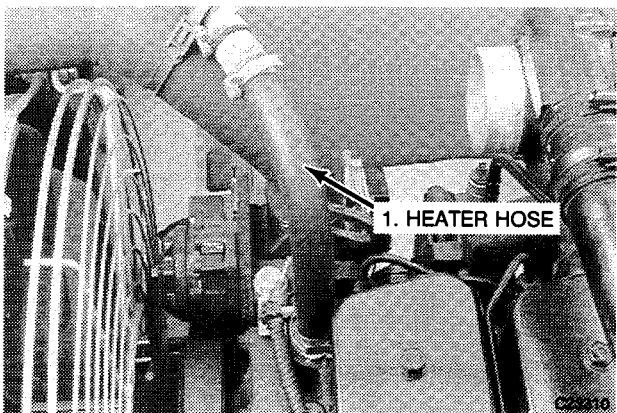
Install the radiator upper hose and tighten the clamps.

STEP 61



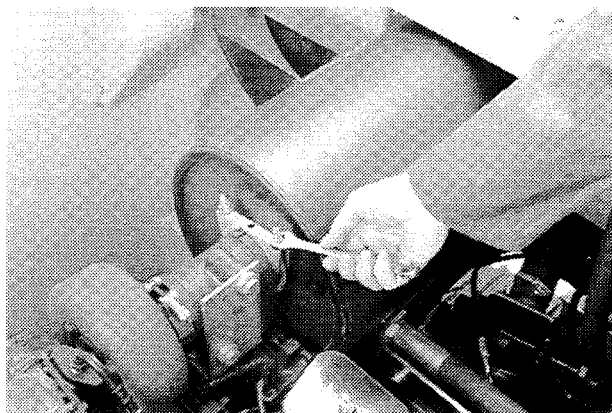
Install the exhaust muffler and bracket. Install the mounting bolts and spacers and tighten to a torque of 44 Nm (32.5 lb ft).

STEP 59



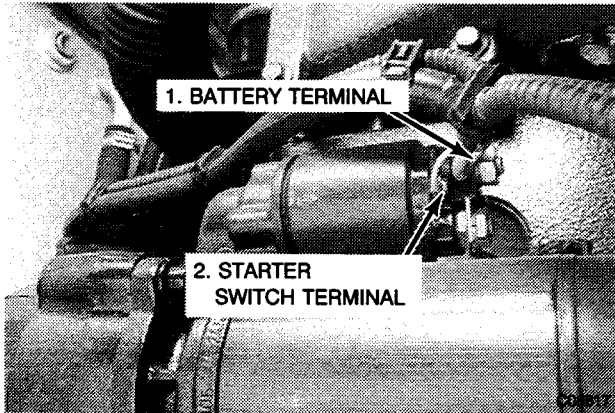
Install the heater hose and tighten the clamp.

STEP 62



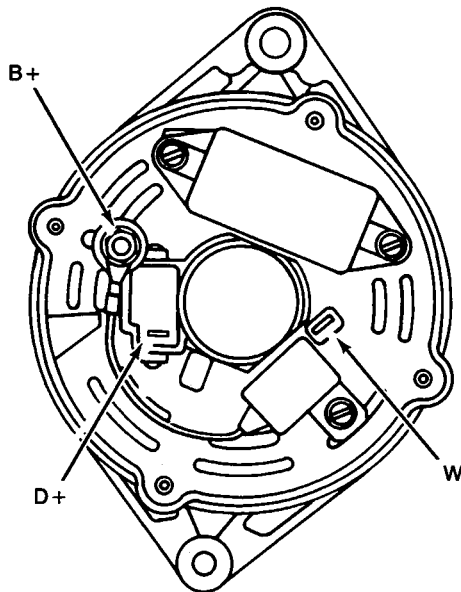
Install the exhaust muffler clamp and tighten the nuts.

STEP 63



Install the battery cable and wire number 2 on the battery terminal. Install and tighten the washer and nut. Install wire number 4 on the starter switch terminal. Install and tighten the washer and screw.

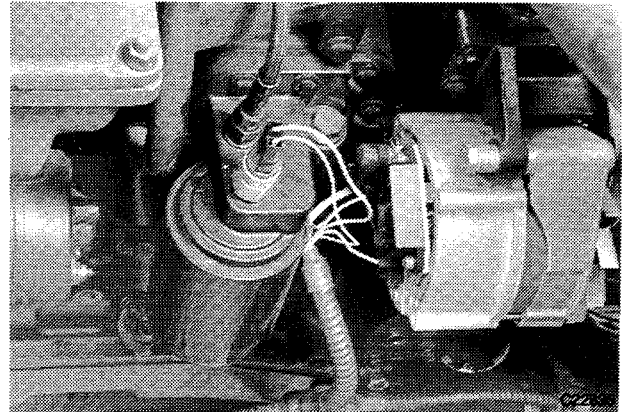
STEP 64



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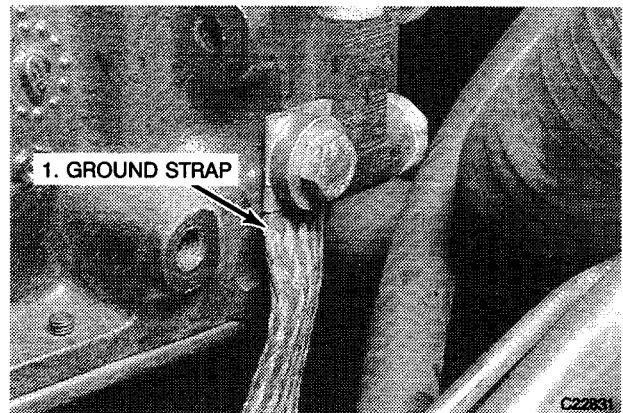
Make sure the capacitor wire is installed on the B+ terminal. Install wire number 2 on the B+ terminal and install and tighten the nut. Connect wire number 13 to the D+ terminal. Connect wire 14 to W terminal.

STEP 65



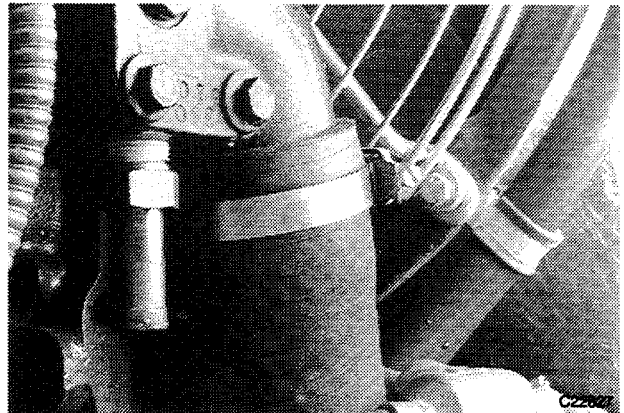
Connect wires number 23 and 0 to the oil filter.

STEP 66

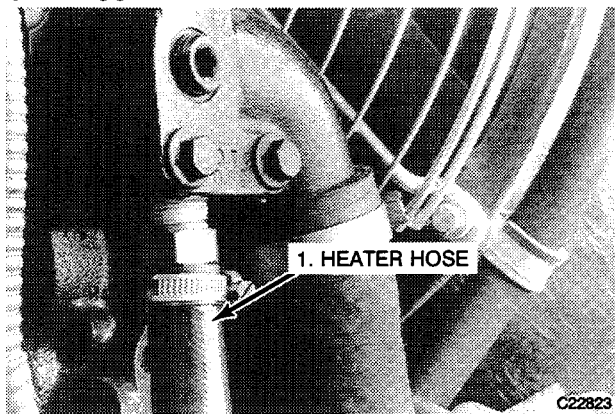


Install the engine ground strap and install and tighten the retaining bolt and spacer.

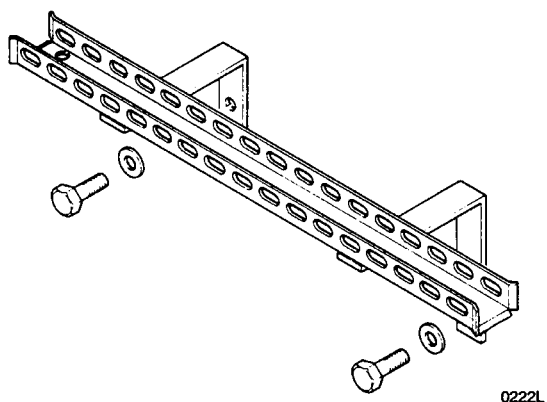
STEP 67



Install the radiator lower hose and tighten the clamps.

STEP 68

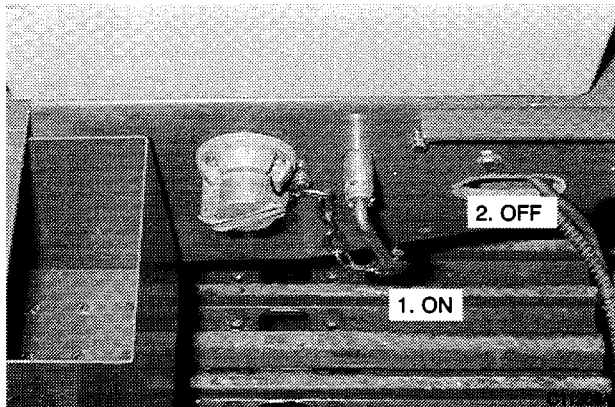
Install the heater hose and tighten the clamp.

STEP 69

Install the wiring harness carrier and install and tighten the mounting bolts and spacers.

STEP 70

Fill the radiator with specified engine coolant. Install and tighten the radiator cap. Fill the coolant recovery reservoir with specified engine coolant up to the upper mark. Install and tighten the cap. Fill the engine with specified engine oil up to the FULL mark on the engine oil dipstick.

STEP 71

Install the key and turn the master disconnect switch to the ON position.

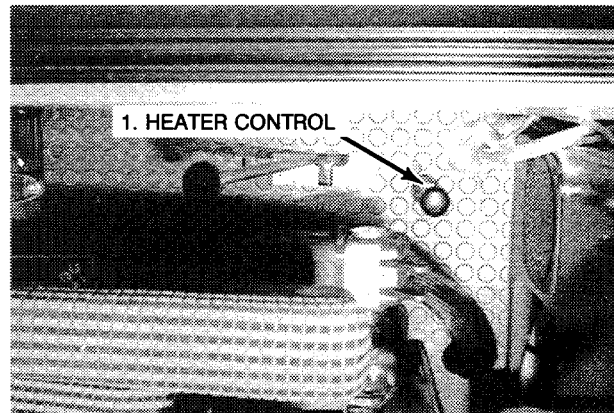
Don 8-89000

STEP 72

Remove air from the fuel system. Refer to Section 3410.



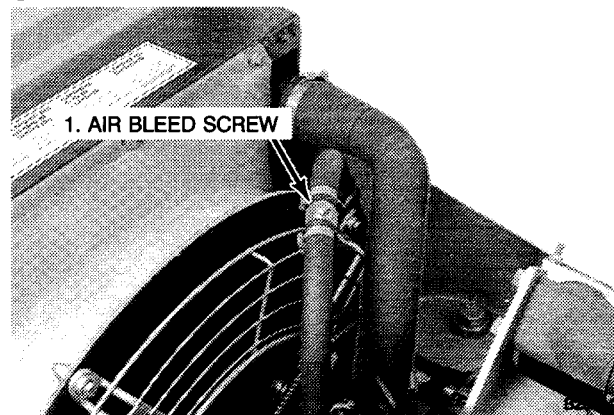
WARNING: *Never operate the engine in a closed building. Proper ventilation is required under all circumstances.*

STEP 73

Push down the heater control in the cab to allow circulation of engine coolant and to allow trapped air to collect at the air bleed screw. Start and run the engine for five minutes. Stop the engine.



WARNING: *Hot engine coolant will spray out of air bleed screw. To avoid injury, care must be taken when removing air from the cooling system.*

STEP 74

Open the air bleed screw. When there is a flow of engine coolant without air bubbles, tighten the air bleed screw.



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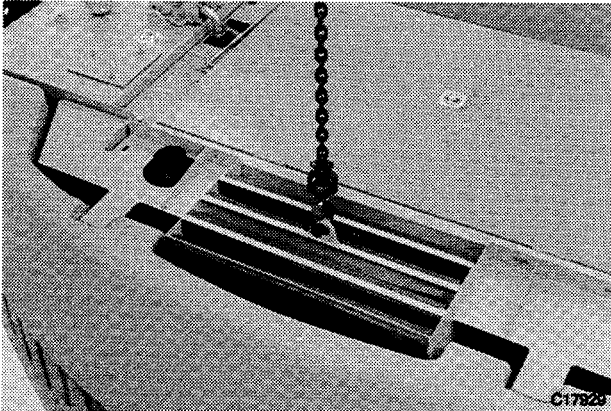
STEP 75

Check for and repair any fuel, engine coolant and engine oil leaks. Check the level of engine oil on the dipstick and the level of engine coolant in the engine coolant recovery reservoir. Top up the levels if necessary.

STEP 76

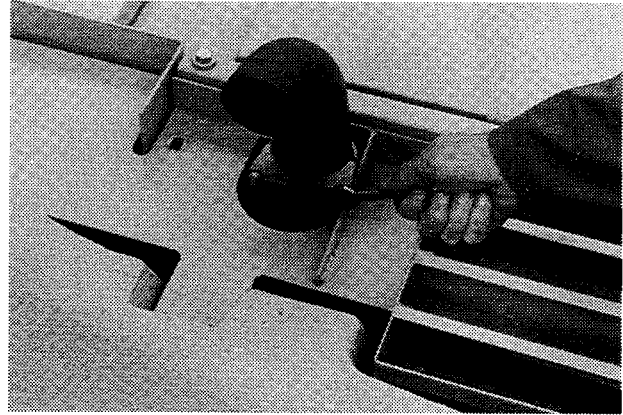
Install the engine upper access cover. Install and tighten the retaining bolts, spacers and nuts. Install and tighten the safety cable retaining bolt, spacer and nut. Install the engine front cover.

STEP 77



Install the engine insulator. Install and tighten the mounting bolts and spacers.

STEP 78



Install the exhaust muffler extension tube. Tighten the nuts on the clamp.

STEP 79

Install the access panels under the engine and under the hydraulic oil tank.

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