

788/988 - 788/988 Plus Crawler Excavators 788/988 - 788/988 Plus Wheeled Excavators Table of Contents

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Section

1001

**SAFETY, GENERAL INFORMATION
AND TORQUE SPECIFICATIONS**

SAFETY



WARNING: This symbol means **WARNING ! BE VIGILANT ! YOUR SAFETY IS AT RISK**. The message that follows the symbol contains important safety information. Read it carefully. Be sure you understand the possible risks of injury or even death.

To avoid all risks, always follow the safety notes contained in this section and throughout this manual.

Put the warning tag shown below on the key for the keyswitch when servicing or repairing the machine. One warning tag is supplied with each machine. Additional tags, Part Number 321-4614, are available from your service parts supplier.



PDG0328



WARNING: Read the Operator's Manual carefully and make sure you understand how to operate the controls correctly.



WARNING: Never operate the machine and attachment controls unless you are seated in the operator's seat. If you are not in the operator's seat, you run the risk of serious injury.



WARNING: The machine is built to carry the operator only. Do not allow passengers to ride on the machine.



WARNING : Prior to starting up the engine read the safety messages contained in the operator's manual carefully. Read all safety stickers on the machine. Have people move back from the machine. Learn how to use the controls before starting up the machine. It is your responsibility to follow the manufacturer's instructions on how to operate and maintain the machine. It is your responsibility to follow applicable rules and regulations. Service and Operator's Manuals are available from your J.I. Case Dealer.



WARNING: If you wear loose clothing or if you omit to use safety equipment for your work, you risk injury. Always wear clothes that do not risk getting caught in the machine. Other safety equipment may be necessary, in particular : helmets, safety shoes, ear plugs, safety glasses, protection mask, thick gloves and reflecting clothes.



WARNING: When working close to the fan with the engine running, avoid wearing loose clothing and operate with extreme caution.



WARNING: When checking the hydraulic circuits, follow procedures to the letter. **DO NOT CHANGE** procedures.



WARNING: Prior to operating the hydraulic cylinders of this machine for setting or to bleed the circuit, have all people standing around the machine move away.



WARNING: Wear gloves or insulated mittens when working on hot parts.



WARNING: Lower all attachments to the ground or rest them on stands before carrying out maintenance jobs.



WARNING: Fine sprays of hydraulic oil under pressure can penetrate the skin and cause serious infection. If hydraulic oil under pressure penetrates the skin, see a doctor immediately. Maintain all hoses and pipes in good condition. Make sure that all connections are properly tightened. Change all hoses or pipes that have been damaged or that are suspect. **DO NOT CHECK** for leaks with bare hands. Use a piece of cardboard or wood.



WARNING: To remove a hardened pin such as a pivot pin, or a hardened shaft, use a soft head hammer (brass or bronze) or a brass or bronze strip and a steel head hammer.



WARNING: When using a hammer to remove or reassemble pivot pins, or when using compressed air, or when using a grinder make sure to wear safety glasses that protect the eyes from all sides.



WARNING: Use proper lifting/hoisting equipment to lift wheels or tracks and always work on safe ground. Prevent the machine from moving using correct safety chocks.



WARNING: When performing maintenance or repair operations on the machine, make sure that the work shop floor, the cab and the steps of the excavator are free from oil, water, grease, tools etc. Use oil absorbing material or rags as necessary. Always think safety.



WARNING: Certain components of this machine are very heavy. Use hoisting tools or additional assistance as recommended in this manual.



WARNING: Exhaust fumes can cause death. If it is necessary to start up the engine in a closed building, evacuate exhaust fumes using an exhaust pipe extension. Open the doors and let fresh air into the building.



WARNING: When battery liquid is frozen, the battery can explode if : (1) you try to charge the battery or (2) you try to start the engine by connecting an auxiliary power source. To prevent battery electrolyte from freezing keep the battery fully charged. If you do not follow these instructions, you or others nearby may be injured.



WARNING: Batteries contain acid and explosive gases. A spark, a flame or an improper cable connection may cause an explosion. For proper connection of cables to the battery of this machine see the Operator's Manual. If you do not follow these instructions, you risk severe injury.

TWIN WHEELS

Safety rules



WARNING: *In all cases, before removing twin wheels, always deflate both tyres completely.*



WARNING: *If a tyre bursts it can cause serious injury. Check tyres regularly to see that they are in good condition and always be sure to inflate them to the correct pressure.*



WARNING: *Never face a tyre when checking pressure or adding air. Always stand in front of the tread. Use an inflation cage if the wheel has been removed from the machine. Make sure all people standing in the area move well away.*



WARNING: *Never weld near a tyre. If this can not be avoided, it is mandatory to remove the tyre before performing any welding operations.*



WARNING: *Make sure that all decals on the machine are perfectly legible, clean them regularly and replace any decals which are damaged, missing or painted over, with new ones.*

Safety instructions

- Use appropriate, good quality tools to disassemble the various wheel components. Never use a hammer. Use a rubber, plastic or copper-faced mallet.

IMPORTANT: *Never remove the inner tyre valve extension, as this will be necessary afterwards for inflating and deflating the tyre.*

IMPORTANT: *If the valve or the valve extension are no longer accessible, take the necessary precautions and then, imperatively, puncture the tyre.*

- Use suitable grease to facilitate the installation and removal of the tyre.
- Never re-inflate a tyre on the machine which has been used at a pressure lower than 5.6 bar.
- Check the various components: tyre, rim, shoulder, retaining ring and replace any defective items.
- Never reuse a retaining ring which is distorted or rusty.

GENERAL INFORMATION

CLEANING

Clean all metal parts except bearings with white spirit or steam. Do not use caustic soda when steam cleaning. After cleaning, dry and lubricate all parts. Clean hydraulic lines with compressed air. Clean bearings with kerosene, then dry them and lubricate them.

INSPECTION

Check all parts when disassembled. Change all parts showing wear or damage. Scratches that are not too deep can be removed by honing or with a rag dipped into buffing compound. A full visual inspection to detect wear and pitting and subsequent changing of parts will prevent premature failure.

BEARINGS

Check that bearings rotate freely. If their adjustment is too loose or if they do not run regularly, change them. Wash bearings with a good solvent or kerosene and let them dry. **DO NOT DRY BEARINGS WITH COMPRESSED AIR.**

NEEDLE BEARINGS

Before inserting needle bearings into a bore, remove all metal particles from the edge of the bore. Prior to mounting bearings with a press, coat the inside and the outside of the bearing with vaseline.

GEARS

Check all the gears for wear or damage. Change worn or damaged gears.

SEAL RINGS, O-RINGS, GASKETS

Always use new seal rings. O-rings and gaskets. Coat sealing rings and O-rings with vaseline.

SHAFTS

Check all shafts showing signs of wear or damage. Check that the surface of a shaft running in a bearing is not damaged.

SPARE PARTS

Always use original CASE spare parts. To order spare parts, see the Spare Parts Catalogue to indicate the proper reference of original CASE spare parts. Failures caused by the use of parts that are not original CASE spare parts are not covered by the warranty.

LUBRICATION

Use only oils and lubricants specified in the Operator's and Service Manuals. Failures due to the use of oils and lubricants not specified are not covered by the warranty.

Section

2002

2002

ENGINE REMOVAL AND INSTALLATION

788/988 Excavators

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This symbol is used in this manual to indicate important safety messages. When ever you see this symbol, carefully read the message that follows, as there is a risk of serious injury.

SPECIFICATION

Weights :

Engine, (without hydraulic pump)

788 Model..... 350 kg

988 Model..... 443 kg

High pressure hydraulic pump

788 Model..... 100 kg

988 Model..... 130 kg

Upper hood :

788 Model..... 26 kg

988 Model..... 43 kg

Capacity :

Complete cooling system

788 Model..... 14.5 litres

988 Model..... 20 litres

Lubricants and coolant(see Section 1002)

SPECIAL TORQUES

Engine/hydraulic pump retaining screws..... 44 Nm

Fan retaining screws 44 Nm

Splined sleeve retaining screws 120 Nm

Shock absorber centering lug retaining screws..... 220 Nm

Engine support retaining screws 217 to 271 Nm

TOOLS REQUIRED

- 1 1 torque wrench (10 to 15 Nm)
- 2 1 torque wrench (40 to 200 Nm)
- 3 1 torque wrench (70 to 360 Nm)
- 4 1 sling (400 to 600 kg)
- 5 2 slings (150 to 200 kg)
- 6 1 receptacle (30 litres)
- 7 1 plugging spigot length 100 mm diameter 27 mm
- 8 1 Loctite 638

Before performing any service work on a machine, the following steps must be carried out in the order shown :

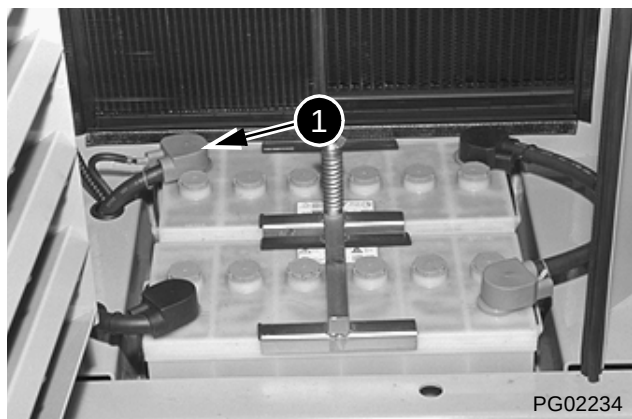
- Park the machine on hard, flat ground.
- Lower the attachment to the ground.
- Stop the engine and let it cool down.
- Turn the battery master switch to the "OFF" position and remove the key.



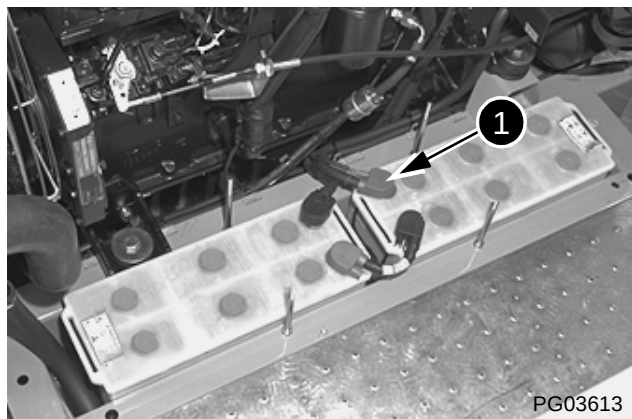
When the machine is running, the engine components and the hydraulic pump reach a high temperature. To avoid being burnt by hot metal or scalded by high temperature water or oil, let the machine cool down before beginning any service operation.

Removal and installation

STEP 1 788 Model



988 Model



Disconnect the negative cable (1) first and then the other cables.

STEP 2

Remove the access panels located under the engine.

STEP 3

Remove the exhaust silencer outlet tube.

NOTE : *When installing, make sure that the exhaust outlet is pointing towards the rear.*

STEP 4

Remove the upper hood using a suitable lifting device.

STEP 5

Remove the side panel on the walkway side.

STEP 6

Remove the exhaust silencer and its bracket.

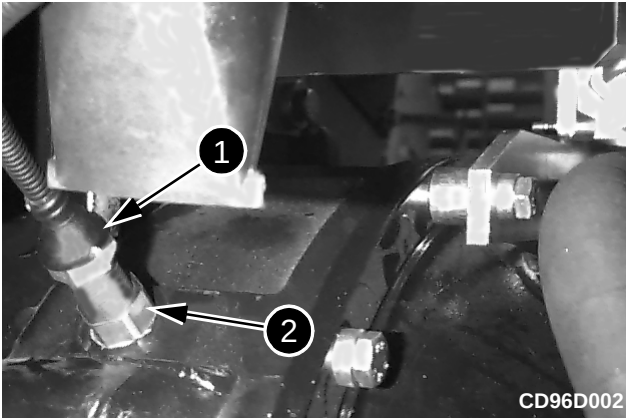
STEP 7

(788 Model)

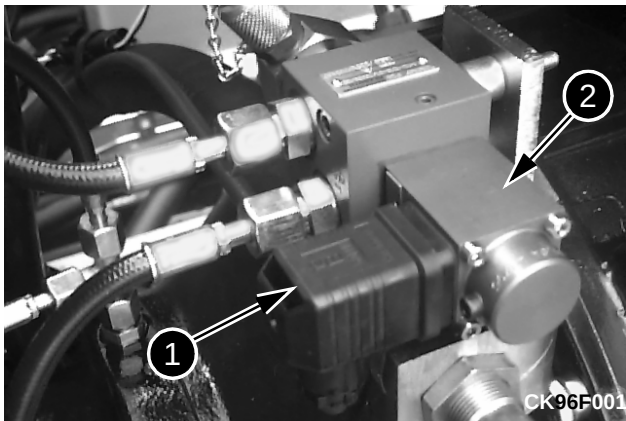
Remove the hose connecting the turbo charger to the air filter.

(988 Model)

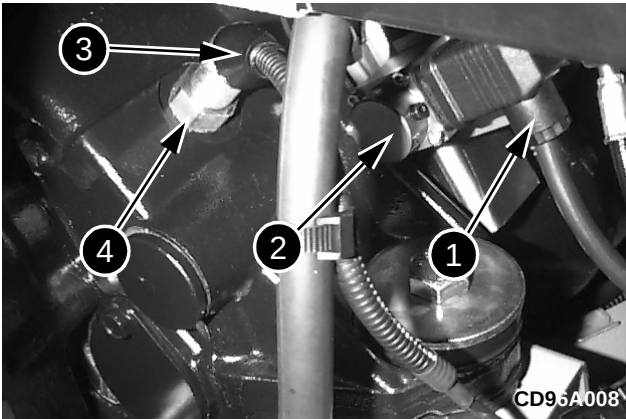
Remove the hose connecting the air filter to the turbo charger, disconnect the air filter restriction pressostat (see item (7) Step 11) and remove the air filter.

STEP 8 788 Model

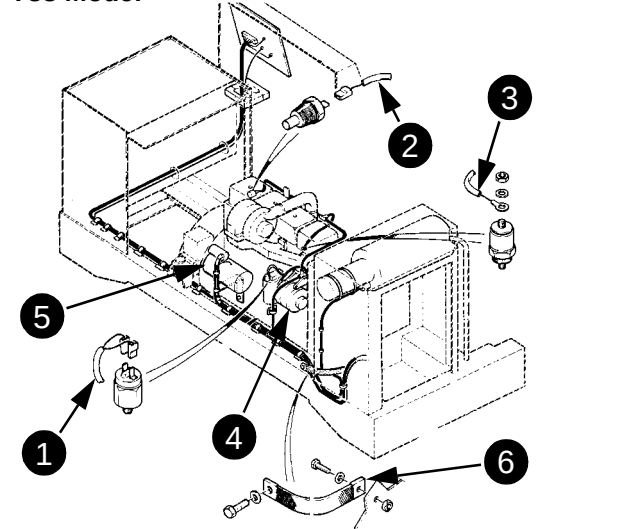
Disconnect the connector (1) from the speed detector (2).

STEP 9 788 Model

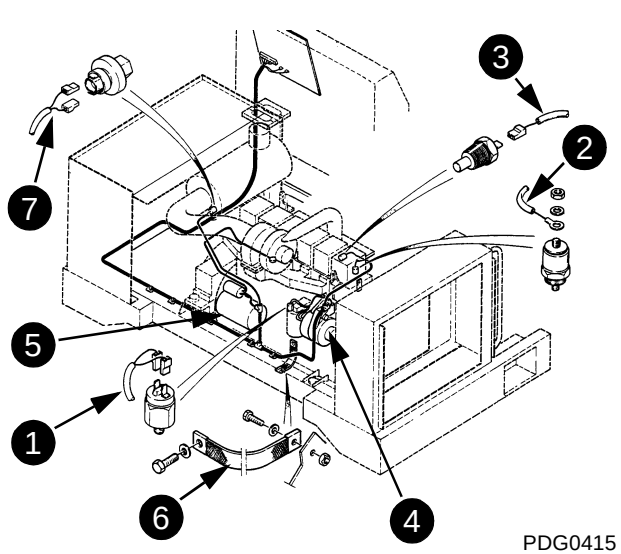
Disconnect the electrical supply (1) from the proportional pressure reducing valve DRE4 (2).

STEP 10 988 Model

Disconnect the electrical supply (1) from the proportional pressure reduction valve DRE4 (2) and the connector (3) from the speed detector (4).

STEP 11**788 Model**

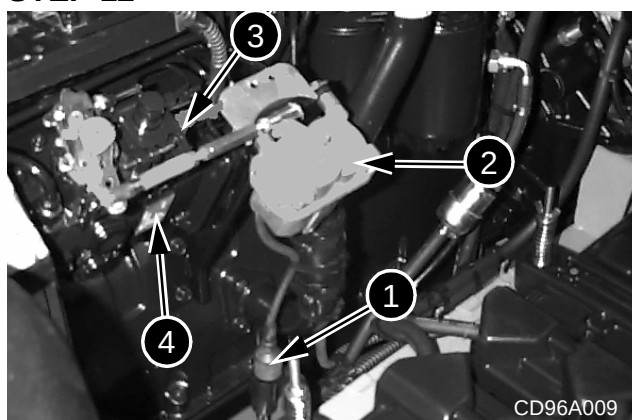
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988 Model

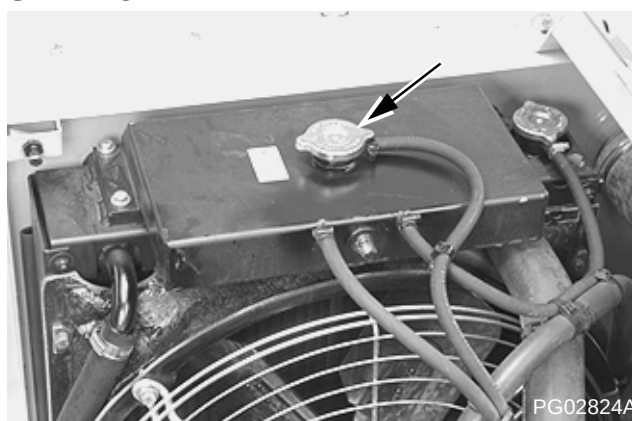
PDG0415

Disconnect the wires and electrical harnesses connected to the engine.

- 1 Engine oil pressure pressostat.
- 2 Engine coolant solution temperature sender.
- 3 Engine cut-out solenoid valve.
- 4 Alternator (see Section 4003), for wiring identification.
- 5 Starter motor (see Section 4004), for wiring identification.
- 6 Earthing strap.
- 7 Air filter restriction pressostat

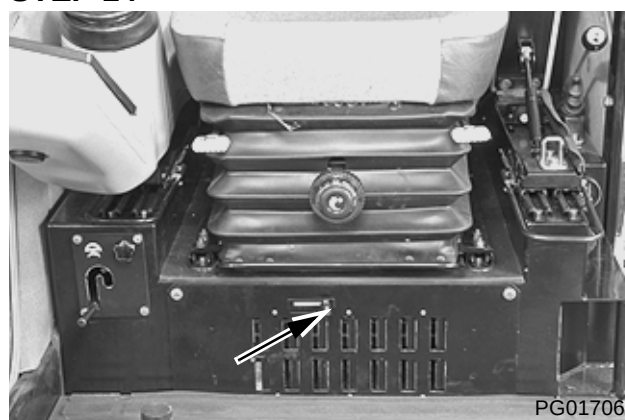
STEP 12

Disconnect the connector (1) from the servo-motor (2) and the connector (3) from the injection pump (4).

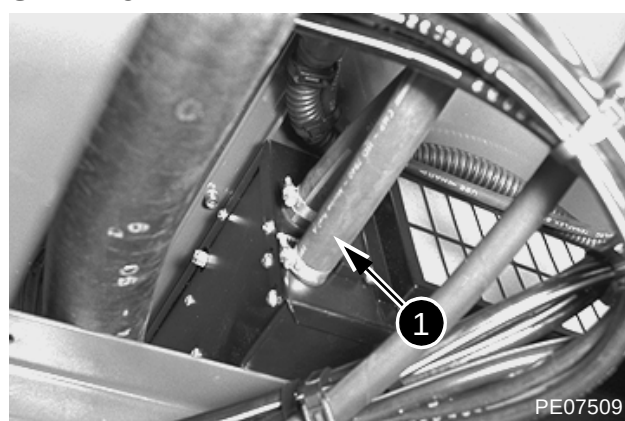
STEP 13

Remove the expansion reservoir cap.

NOTE : *Do not remove the cap when the engine is hot. The system is still under pressure and you risk being scalded.*

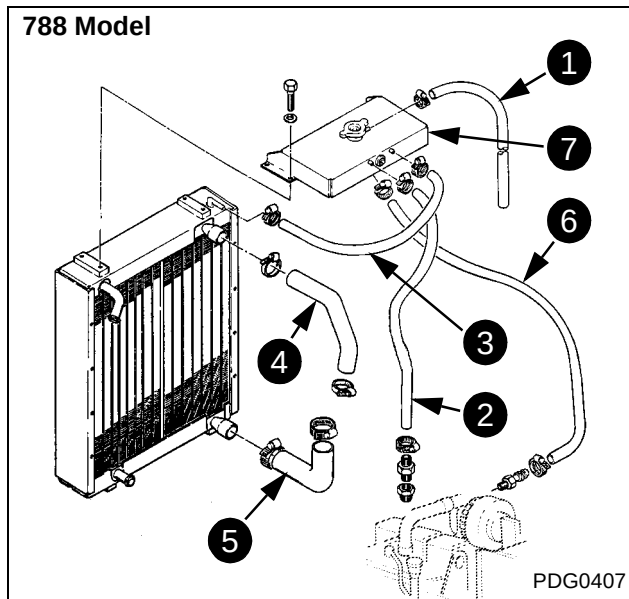
STEP 14

Move the heating lever to the left.

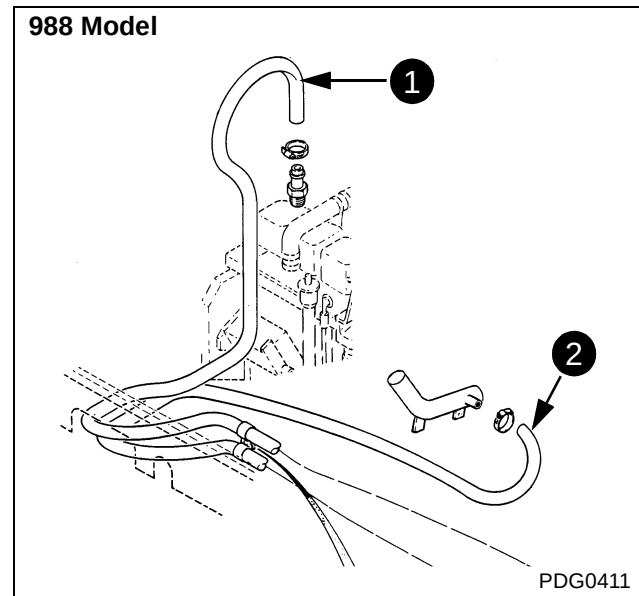
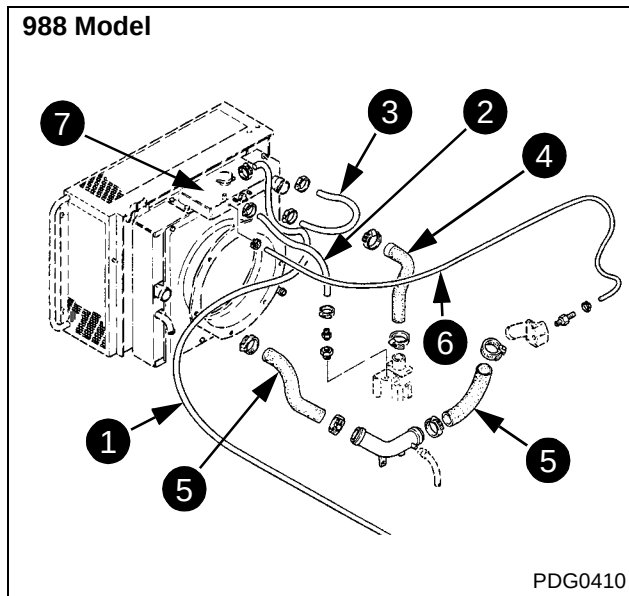
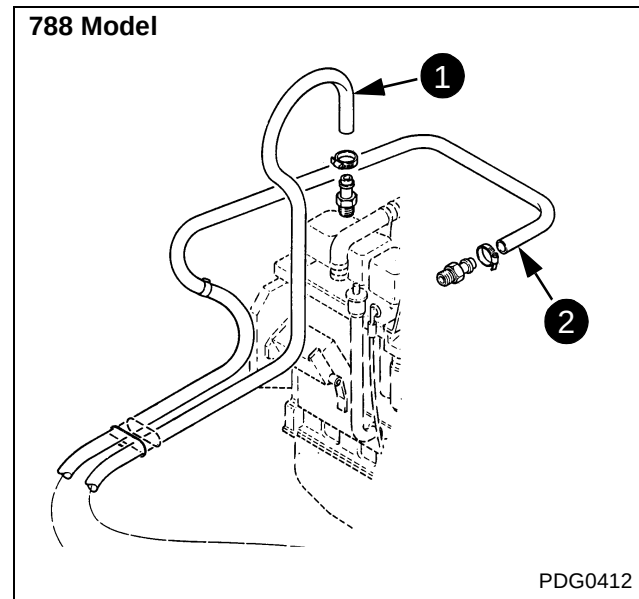
STEP 15

Remove the lower tray under the operator's compartment. Place a receptacle of about 30 litres underneath and then disconnect the hose (1) from the heating system and allow the coolant solution to flow out.

STEP 16



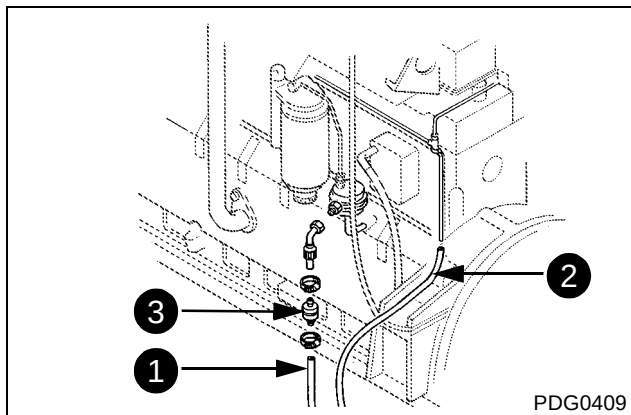
STEP 17



Disconnect, label and remove the cooling system hoses from the engine in numerical order.

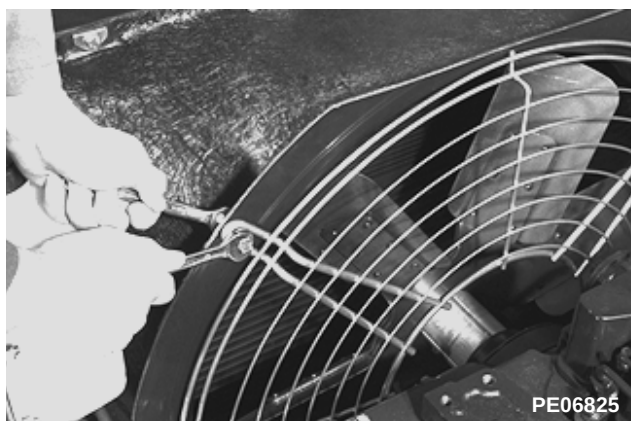
NOTE : When installing, make sure that the system hoses are clean.

- 1 Overflow hose
- 2 Engine gas evacuation hose
- 3 Radiator gas evacuation hose
- 4 Engine/radiator return hose
- 5 Pump/radiator inlet hose
- 6 Coolant solution supply hose
- 7 Expansion reservoir

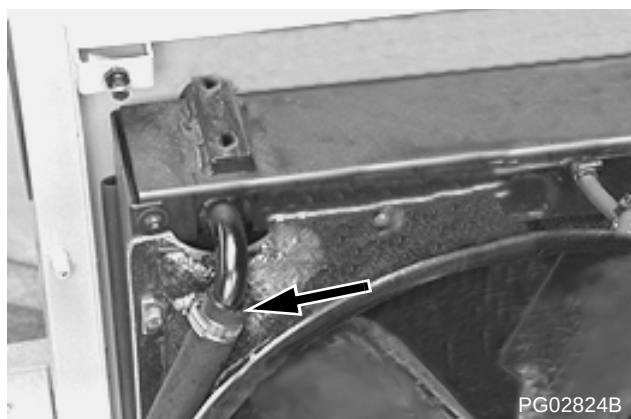
STEP 18

Disconnect the fuel supply pipe (1) and plug it. Disconnect the fuel return pipe (2) and plug it.

NOTE : When installing, change the filter (3).

STEP 19

Remove the fan guard fastening hardware and remove the guard.

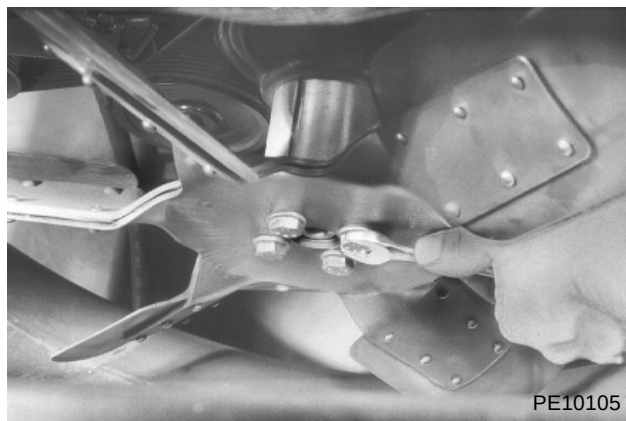
STEP 20 788 Model

Remove and plug the hydraulic fluid return hose to gain access to the shroud retainers.

NOTE : Refer to "Tools required" on page 2 for plugging the hydraulic fluid return hose.

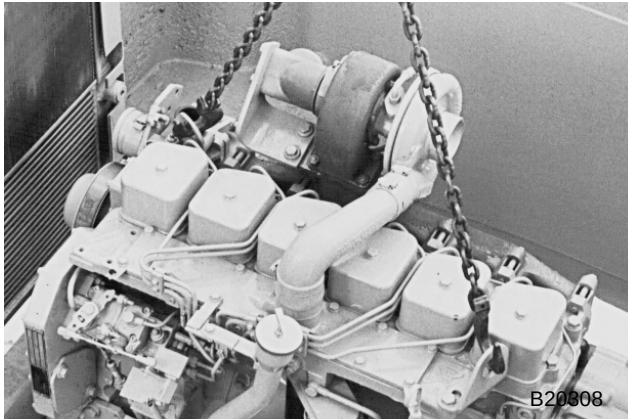
STEP 21

Remove the shroud fastening hardware and move the shroud towards the engine to gain access to the fan retaining screws.

STEP 22

Remove the four fan retaining screws and remove the fan and spacer. Remove the fan shroud.

NOTE : When installing, the fan shroud should be installed resting on the engine. Install spacer and the fan and then tighten the screws to a torque of 44 Nm.

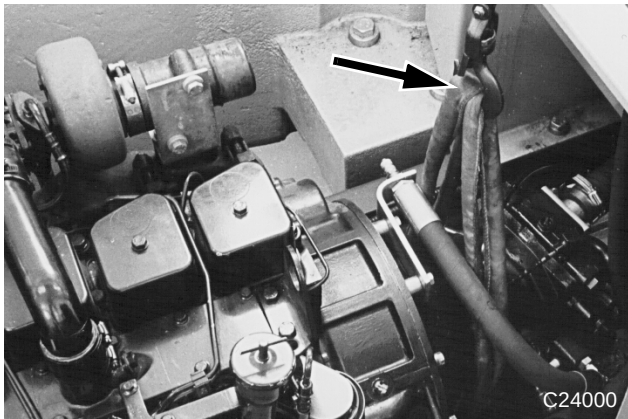
STEP 23

Attach a suitable lifting device to the engine lifting eyes.

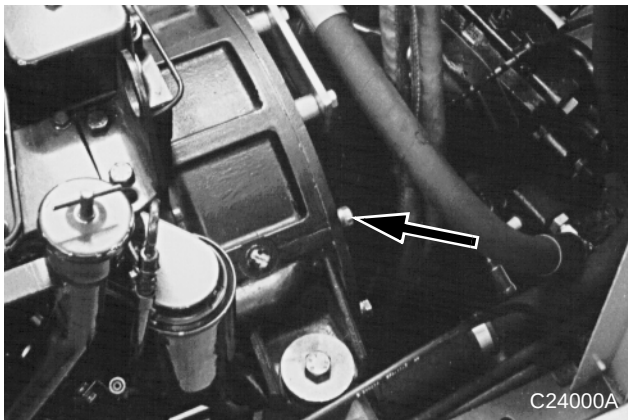
Weight of engine :

788 Model 350 kg

988 Model 443 kg

STEP 24

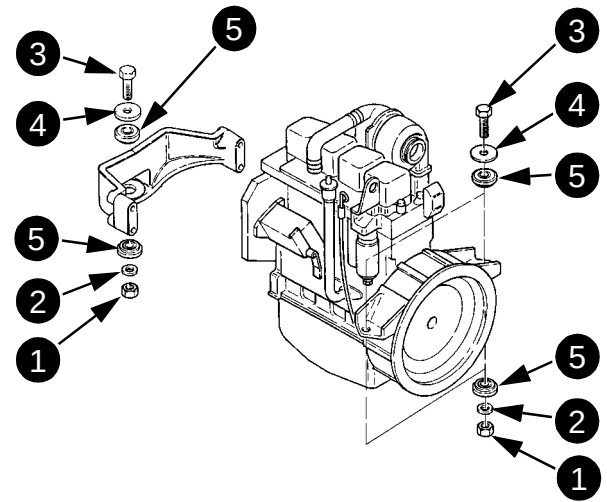
Using a suitable sling, support the hydraulic pump so as to keep it in place during the removal of the engine.

STEP 25

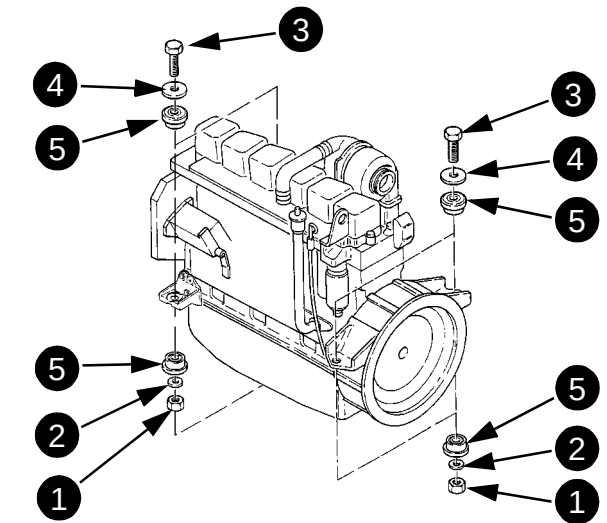
Remove the hydraulic pump fastening hardware.

NOTE : When installing, tighten the hydraulic pump retaining screws to a torque of 44 Nm.

NOTE : (788 Model), When installing, the pressure control hose and its bracket must be installed.

STEP 26**788 Model**

PDG0413

988 Model

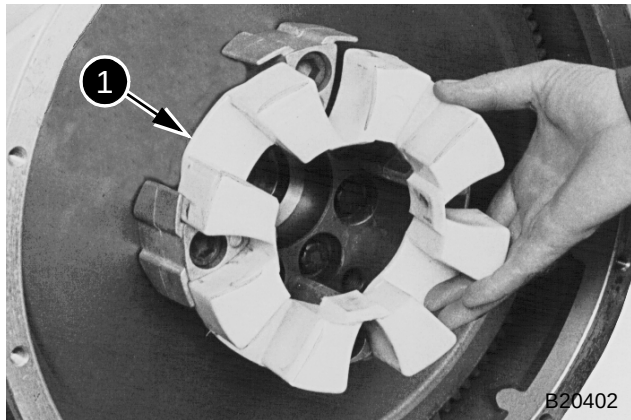
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Remove the nuts (1), the washers (2) and remove the screws (3) and the thrust washers (4).

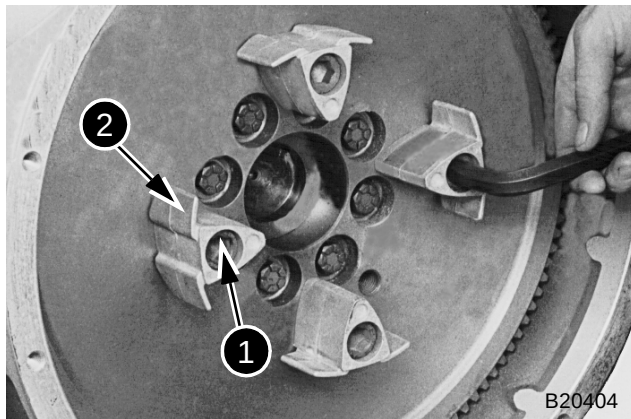
NOTE : When installing, make a visual check of the condition of the rubber spacers (5). Replace them with new spacers if necessary. Tighten the engine bearer retaining screws to a torque of 217 to 271 Nm.

STEP 27

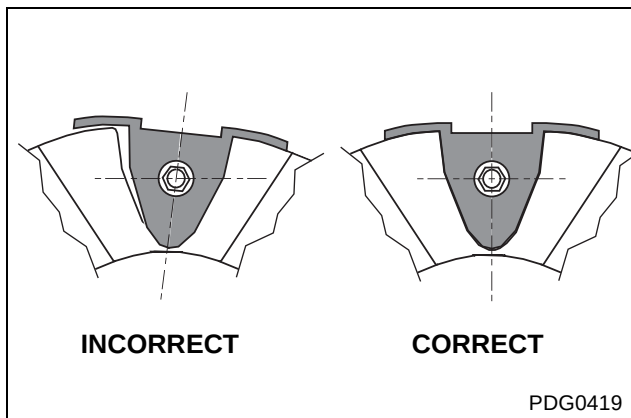
Carefully lift the engine. Move it towards the radiator until it is disengaged from the pump coupling. When there is nothing to prevent the removal of the engine, install it on a suitable repair bench.

STEP 28

Remove the flexible coupling (1). Check the wear and general condition of the coupling and replace it by a new coupling if necessary.

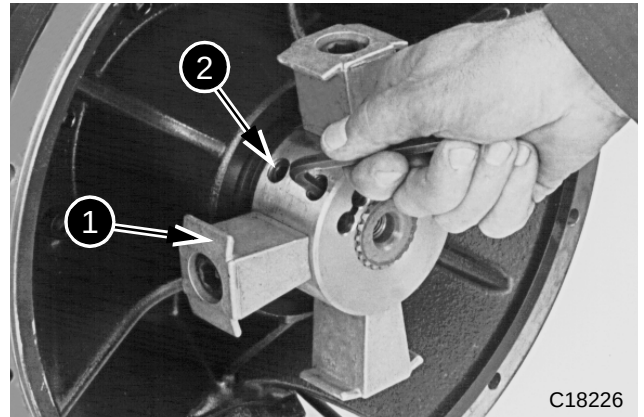
STEP 29

Remove the screws (1) and remove the centering lugs (2). Make a visual check of the wear and general condition of the centering lugs and replace them if necessary.

NOTE :

When installing, apply Loctite 638 on the screws, position the centering lugs correctly, and tighten the screws to a torque of 220 Nm.

NOTE : If it is necessary due to wear to replace the flexible coupling and the centering lugs, the splined sleeve should also be replaced.



Remove the splined sleeve (1) from the hydraulic pump. Replace it if necessary.

NOTE : When installing the splined sleeve (1), install the splined sleeve on the pump shaft. The splined sleeve should be pushed fully home against the pump shaft shoulder. Tighten the retaining screws (2) to a torque of 100 Nm.

NOTE : When installing the engine, proceed in the reverse order to that used for the removal.

Before using the machine, perform all the following operations :

- Fill the cooling system (see Operators Manual).
- Turn the battery master switch to the "ON" position.
- Bleed and prime the fuel circuit (see Operators Manual).
- Check that the engine oil pressure warning lamp goes out when the engine is running.
- Adjust the engine speed detector if it has been removed. See Section 4002.
- Calibrate the servo-motor if it has been removed. See Section 4002.
- Bleed the cooling system (see Operator's Manual).
- Check the hydraulic system, fuel system and cooling system for leaks.
- Stop the engine and check all levels. Top up if necessary.

Section

2002

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ENGINE REMOVAL AND INSTALLATION

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This symbol is used in this manual to indicate important safety messages. Whenever you see this symbol, carefully read the message that follows, as there is a risk of serious injury.

SPECIFICATIONS

Weights :

Engine (without hydraulic pump)	350 kg
High pressure hydraulic pump	100 kg
Upper hood	26 kg
Total cooling system capacity.....	14.5 litres
Lubricant and coolant solution.....	(see section 1002)

SPECIAL TORQUES

Engine/hydraulic pump retaining screws.....	44 Nm
Fan retaining screws	44 Nm
Splined sleeve retaining screws	120 Nm
Shock absorber centring stud retaining screws.....	220 Nm
Engine bracket retaining screws.....	217 to 271 Nm

TOOLS REQUIRED

- 1 1 torque wrench (10 to 50 Nm)
- 2 1 torque wrench (40 to 200 Nm)
- 3 1 torque wrench (70 to 360 Nm)
- 4 1 sling (400 to 600 kg)
- 5 2 slings (150 to 200 kg)
- 6 1 receptacle (30 litres)
- 7 1 Loctite 638

Before carrying out any servicing on the machine, perform the following operations in the order shown:

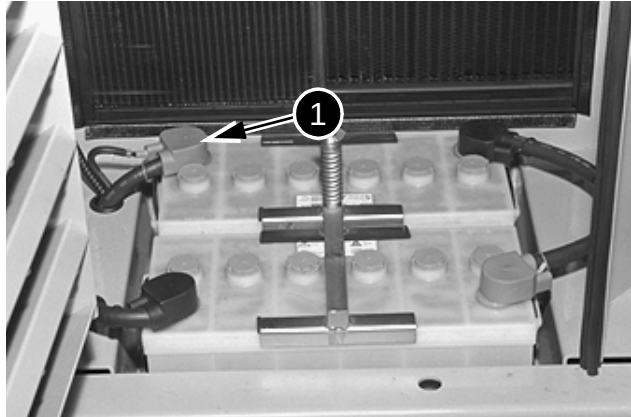
- Park the machine on flat, hard ground.
- Lower the attachment to the ground.
- Shut down the engine and allow it to cool down.
- Place the batter master switch in the "OFF" position and remove the key.



When the machine is operating, the engine and hydraulic pump reach high temperatures. To avoid being burnt by hot metal or scalded by high temperature oil or water, allow the machine to cool down before starting any servicing operation.

Removal and installation

STEP 1



PG02234

Remove the sound-proofing plate, disconnect the negative cable (1) first, then disconnect the other cables.

STEP 2

Remove the access panels located under the engine.

STEP 3

Remove the exhaust silencer outlet pipe.

NOTE: *When installing, make sure that the exhaust outlet is oriented rearwards.*

STEP 4

Remove the upper hood using suitable lifting equipment.

STEP 5

Remove the side hood, at the walkway end.

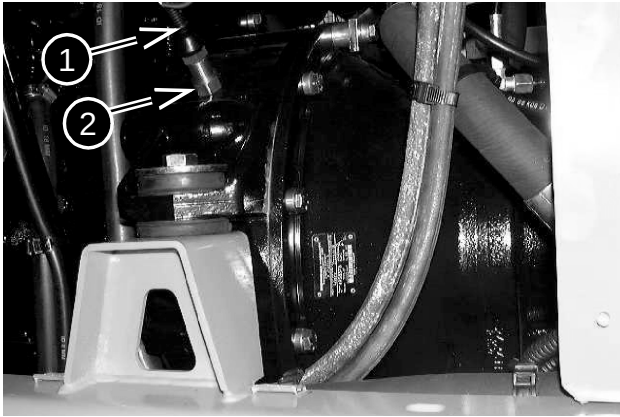
STEP 6

Remove the exhaust silencer and its bracket.

STEP 7

Remove the hose connecting the air filter to the turbo-charger, disconnect the air filter restriction pressure switch harness (see item (6) Step 9), then remove the air filter.

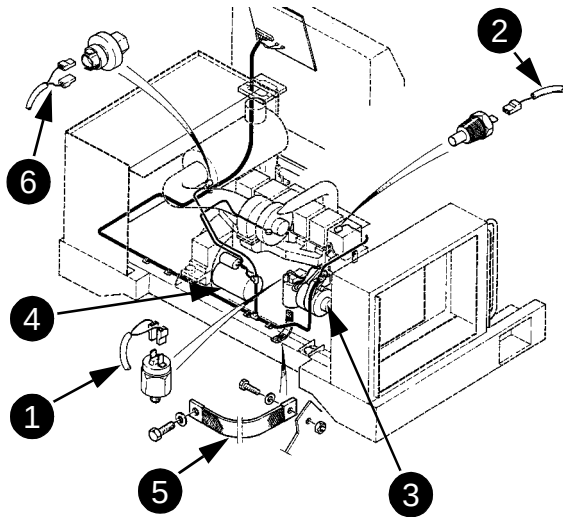
STEP 8



CD99H002

Disconnect the speed detector (2) connector (1).

STEP 9

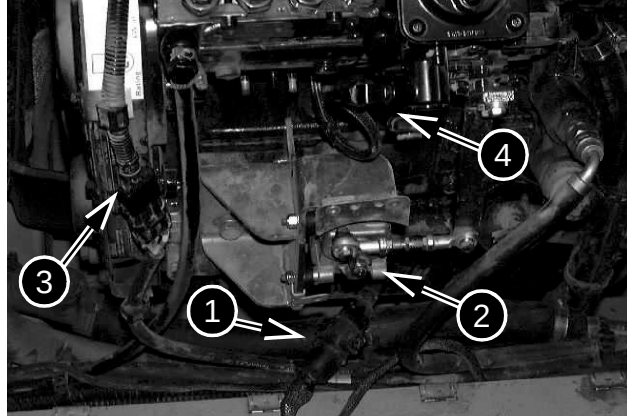


CI99H501

Disconnect the electrical wires and harnesses connected to the engine.

- 1 Engine oil pressure switch
- 2 Engine coolant solution temperature sender
- 3 Alternator, see section 4003 for wire identification
- 4 Starter motor, see section 4004 for wire identification
- 5 Earthing braid
- 6 Air filter restriction pressure switch

STEP 10



CD99H003

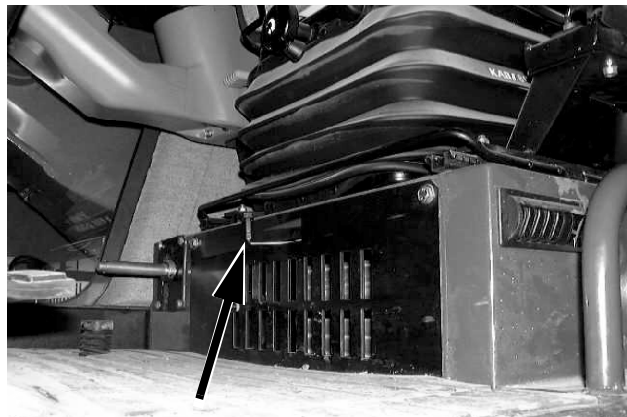
Disconnect the connector (1) from the servo-motor (2) and the connector (3) from the injection pump (4).

STEP 11

Remove the expansion reservoir cap.

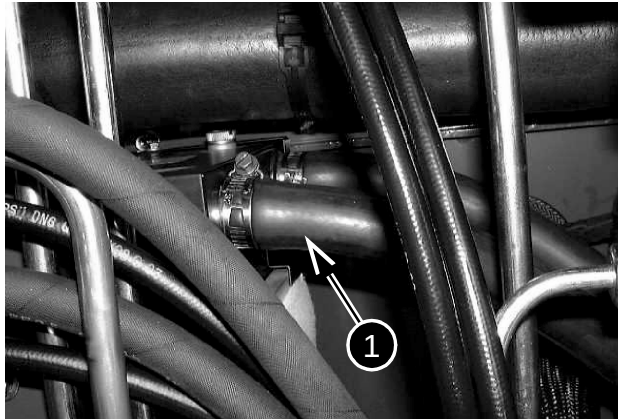
NOTE: Do not remove the cap when the engine is hot, since the system would still be under pressure and you could be scalded.

STEP 12



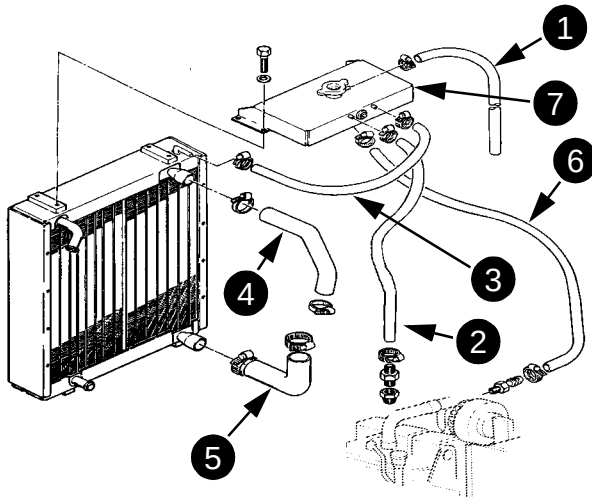
CD99H004

Turn the heater lever to the left.

STEP 13

CD99H005

Remove the lower tray under the operator's compartment. Position a receptacle of about 30 litres capacity, then disconnect the hose (1) from the heater unit and allow the coolant solution to drain out.

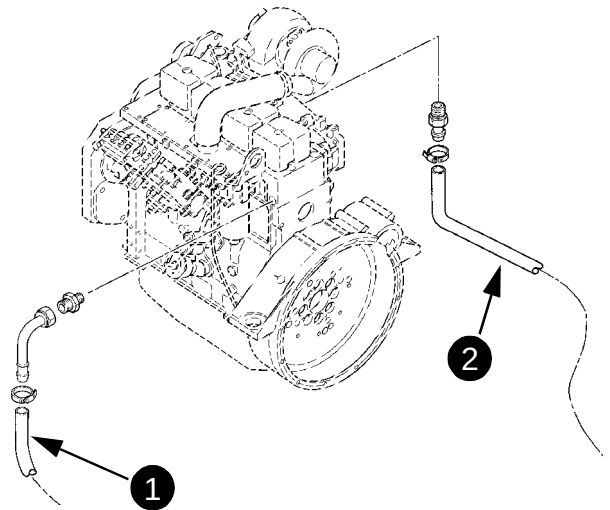
STEP 14

PDG0407

Disconnect, label, then remove the engine cooling system hoses in numerical order.

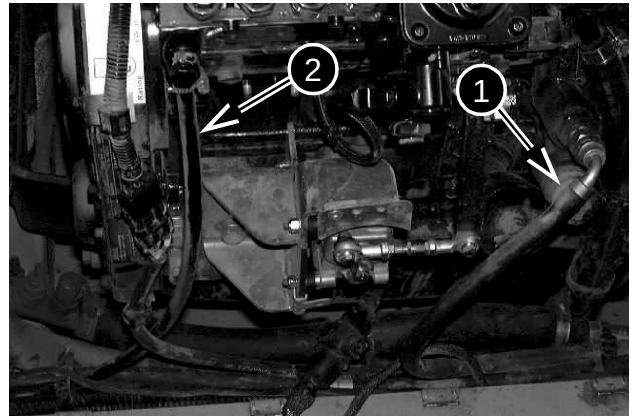
NOTE: When installing, make sure that the system hoses are clean.

- 1 Overflow hose
- 2 Engine gas relief hose
- 3 Radiator gas relief hose
- 4 Engine/radiator return hose
- 5 Pump/radiator inlet hose
- 6 Coolant solution supply hose
- 7 Expansion reservoir

STEP 15

CI99H502

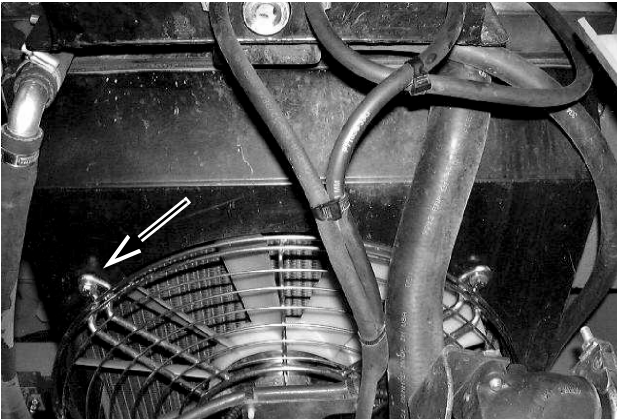
At the engine, disconnect the hoses (1) and (2) from the heater system.

STEP 16

CD99H003

Disconnect the fuel supply pipe (1) and plug it. Disconnect the fuel return pipe (2) and plug it.

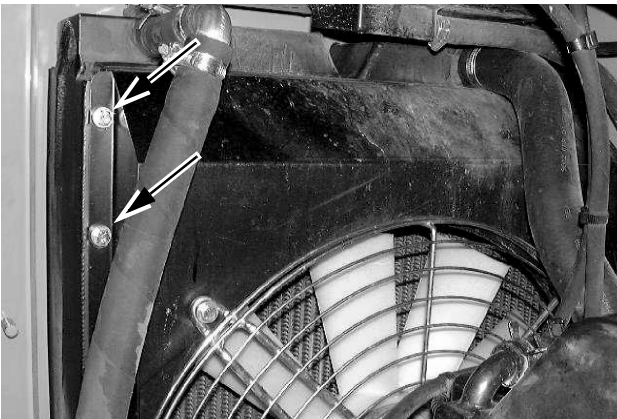
STEP 17



CD99H006

Remove the fan protective grille retaining hardware, then remove the grille.

STEP 18



CD99H007

Remove the fan shroud retaining hardware then move the shroud towards the engine to gain access to the fan retaining screws.

STEP 19

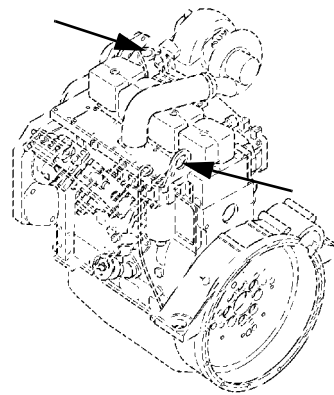


CD99H008

Remove the four fan retaining screws, then remove the fan and the spacer. Remove the fan shroud.

NOTE: When installing, assemble the fan shroud by resting it on the engine. Assemble the spacer and the fan then tighten the screw to a torque of 44 Nm.

STEP 20



C199H503

Install suitable lifting equipment on the engine lifting eyes.

Engine weight: 350 kg

STEP 21

Using a suitable sling, support the hydraulic pump to hold it in position when removing the engine.

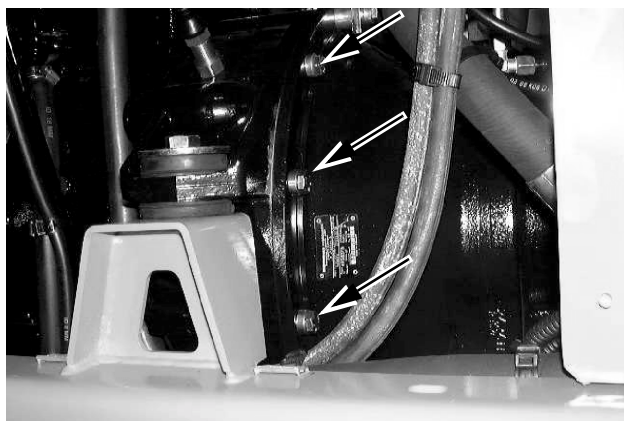


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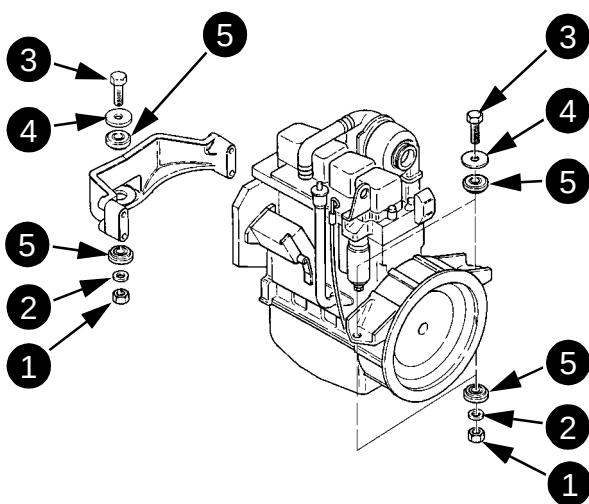
STEP 22

CD99H002

Remove the hydraulic pump retaining hardware.

NOTE: When installing, tighten the hydraulic pump retention screws to a torque of 44 Nm.

NOTE: When installing, install the bracket for the pressure control hose and the proportional pressure reducing valve DRE 4.

STEP 23

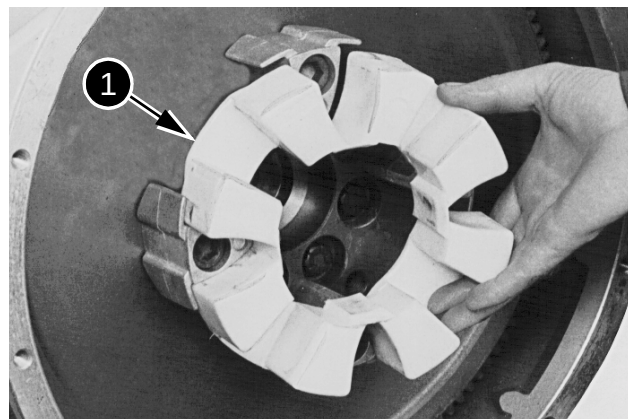
PDG0413

Remove the nuts (1), the washers (2) then remove the screws (3) and the thrust washers (4).

NOTE: When installing, make a visual check of the condition of the rubber spacers (5), replace them if necessary, tighten the engine bracket retaining screws to a torque of 217 to 271 Nm.

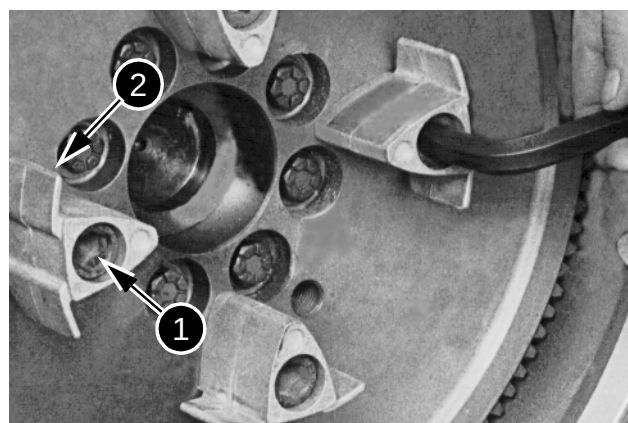
STEP 24

Carefully raise the engine and move it towards the radiator until it is clear of the pump coupling. When there is nothing to prevent the engine being removed, lift the engine and install it on a suitable repair bench.

STEP 25

B20402

Remove the flexible coupling (1), check it visually for wear and condition and replace it if necessary.

STEP 26

B20404

Remove the screws (1) then remove the centring studs (2). Check the centring studs for wear and condition and replace them if necessary.

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