

**I650M**  
**Tier 2**  
**Crawler Dozer**  
*PIN NGC107000 and above*

**SERVICE MANUAL**

**Part number 48048568**  
1<sup>st</sup> edition English  
April 2017





## **SERVICE MANUAL**

- 1650M Bulldozer (BD) Blade, Extra Long Track (XLT) - Tier 2 [NGC107000 - ]**
- 1650M Power Angle Tilt (PAT) Blade, Extra Long Track (XLT) - Tier 2  
[NGC107000 - ]**
- 1650M Power Angle Tilt (PAT) Blade, Low Ground Pressure (LGP) - Tier 2  
[NGC107000 - ]**

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## **INTRODUCTION**

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## Foreword - Important notice regarding equipment servicing

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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.

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## Safety rules

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### 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.

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## Safety rules - Personal safety

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### **General maintenance safety**

Keep area used for servicing the machine clean and dry. Clean up spilled fluids.

Service machine on a firm level surface.

Install guards and shields after servicing the machine.

Close all access doors and install all panels after servicing the machine.

Do not attempt to clean, lubricate, clear obstructions or make adjustments to the machine while it is in motion or while the engine is running.

Always make sure working area is clear of tools, parts, other persons and pets before you start operating the machine.

Unsupported hydraulic cylinders can lose pressure and drop the equipment causing a crushing hazard. Do not leave equipment in a raised position while parked or during service, unless securely supported.

Jack or lift the machine only at jack or lift points indicated in this manual.

Incorrect towing procedures can cause accidents. When towing a disabled machine follow the procedure in this manual. Use only rigid tow bars.

Stop the engine, remove key and relieve pressure before disconnecting or connecting fluid lines.

Stop the engine and remove key before disconnecting or connecting electrical connections.

Scalding can result from incorrect removal of coolant caps. Cooling system operates under pressure. Hot coolant can spray out if a cap is removed while the system is hot. Allow system to cool before removing cap. When removing a cap turn it slowly to allow pressure to escape before completely removing the cap.

Replace damaged or worn tubes, hoses, electrical wiring, etc.

Engine, transmission, exhaust components, and hydraulic lines may become hot during operation. Take care when servicing such components. Allow surfaces to cool before handling or disconnecting hot components. Wear protective equipment when appropriate.

When welding, follow the instructions in the manual. Always disconnect the battery before welding on the machine. Always wash your hands after handling battery components.

### **General battery safety**

Always wear eye protection when working with batteries.

Do not create sparks or have open flame near battery.

Ventilate when charging or using in an enclosed area.

Disconnect negative (-) first and reconnect negative (-) last.

When welding on the machine, disconnect both terminals of the battery.

Do not weld, grind, or smoke near a battery.

When using auxiliary batteries or connecting jumper cables to start the engine, use the procedure shown in the operator's manual. Do not short across terminals.

Follow manufacturer's instructions when storing and handling batteries.

Battery post, terminals, and related accessories contain lead and lead compounds. Wash hands after handling. This is a California Proposition 65 warning.

Battery acid causes burns. Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. Antidote (external): Flush with water. Antidote (eyes): flush with water for 15 minutes and seek medical attention immediately. Antidote (internal): Drink large quantities of water or milk. Do not induce vomiting. Seek medical attention immediately.

Keep out of reach of children and other unauthorized persons.

** Air-conditioning system **

The air-conditioning system is under high pressure. Do not disconnect any lines. The release of high pressure can cause serious injury.

The air-conditioning system contains gases that are harmful to the environment when released into the atmosphere. Do not attempt to service or repair the system.

Service, repair, or recharging must be performed only by a trained service technician.

** Personal Protective Equipment (PPE) **

Wear Personal Protective Equipment (PPE) such as hard hat, eye protection, heavy gloves, hearing protection, protective clothing, etc.

** Do Not Operate tag **

Before you start servicing the machine, attach a 'Do Not Operate' warning tag to the machine in an area that will be visible.

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## Safety rules - Ecology and the environment

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Soil, air, and water quality is important for all industries and life in general. When legislation does not yet rule the treatment of some of the substances that advanced technology requires, sound judgment should govern the use and disposal of products of a chemical and petrochemical nature.

Familiarize yourself with the relative legislation applicable to your country, and make sure that you understand this legislation. Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, anti-freeze, cleaning agents, etc., with regard to the effect of these substances on man and nature and how to safely store, use, and dispose of these substances.

### Helpful hints

- Avoid the use of cans or other inappropriate pressurized fuel delivery systems to fill tanks. Such delivery systems may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of these products contain substances that may be harmful to your health.
- Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
- Avoid spillage when you drain fluids such as used engine coolant mixtures, engine oil, hydraulic fluid, brake fluid, etc. Do not mix drained brake fluids or fuels with lubricants. Store all drained fluids safely until you can dispose of the fluids in a proper way that complies with all local legislation and available resources.
- Do not allow coolant mixtures to get into the soil. Collect and dispose of coolant mixtures properly.
- The air-conditioning system contains gases that should not be released into the atmosphere. Consult an air-conditioning specialist or use a special extractor to recharge the system properly.
- Repair any leaks or defects in the engine cooling system or hydraulic system immediately.
- Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
- Protect hoses during welding. Penetrating weld splatter may burn a hole or weaken hoses, allowing the loss of oils, coolant, etc.

### Battery recycling

Batteries and electric accumulators contain several substances that can have a harmful effect on the environment if the batteries are not properly recycled after use. Improper disposal of batteries can contaminate the soil, groundwater, and waterways. CASE CONSTRUCTION strongly recommends that you return all used batteries to a CASE CONSTRUCTION dealer, who will dispose of the used batteries or recycle the used batteries properly. In some countries, this is a legal requirement.



### Mandatory battery recycling

**NOTE:** *The following requirements are mandatory in Brazil.*

Batteries are made of lead plates and a sulfuric acid solution. Because batteries contain heavy metals such as lead, CONAMA Resolution 401/2008 requires you to return all used batteries to the battery dealer when you replace any batteries. Do not dispose of batteries in your household garbage.

Points of sale are obliged to:

- Accept the return of your used batteries
- Store the returned batteries in a suitable location
- Send the returned batteries to the battery manufacturer for recycling



## **SERVICE MANUAL**

### **Engine**

**1650M Bulldozer (BD) Blade, Extra Long Track (XLT) - Tier 2 [NGC107000 - ]**

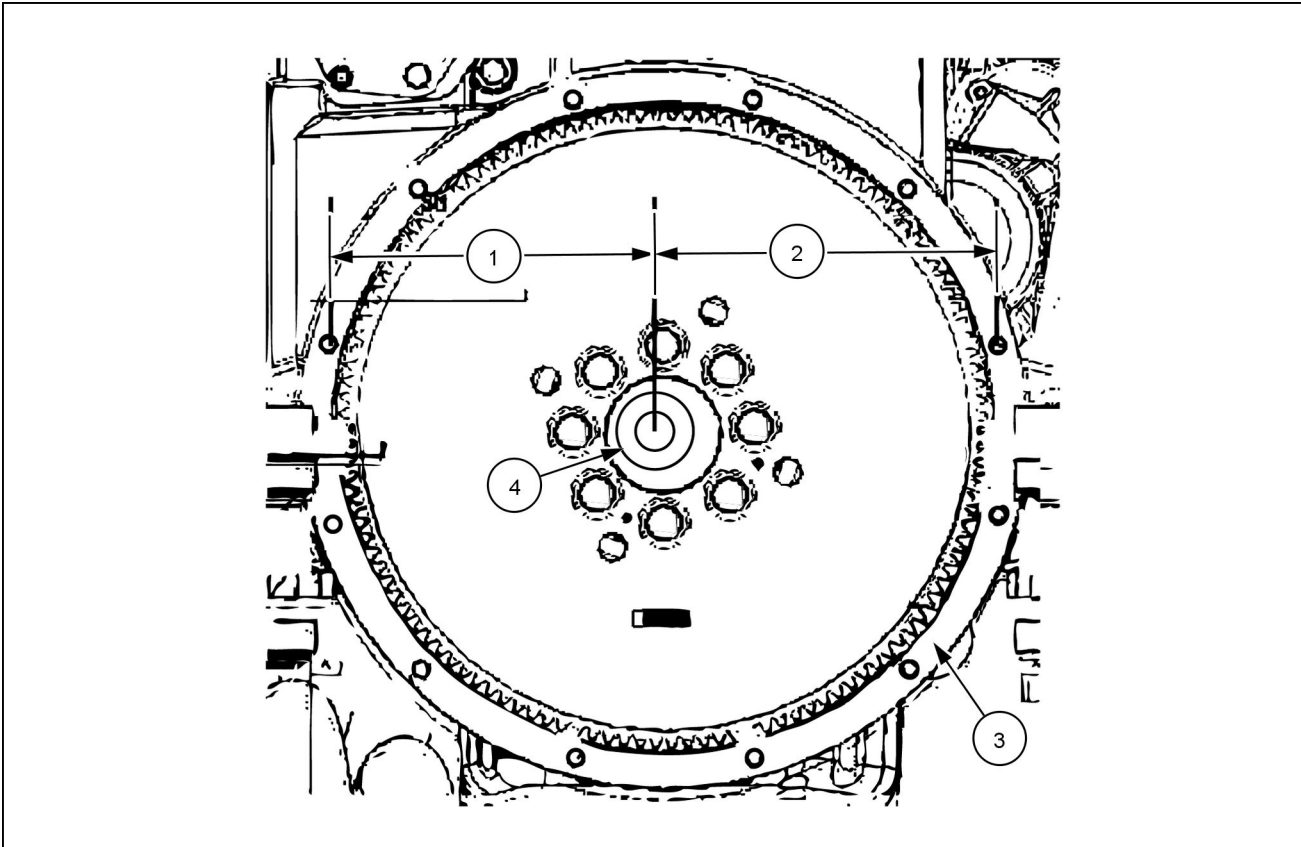
**1650M Power Angle Tilt (PAT) Blade, Extra Long Track (XLT) - Tier 2  
[NGC107000 - ]**

**1650M Power Angle Tilt (PAT) Blade, Low Ground Pressure (LGP) - Tier 2  
[NGC107000 - ]**

## Engine - Assemble - Driveshaft alignment, engine and tandem pumps

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Item	Description
1	Shaft center to center 9:30 hole
2	Shaft center to center 2:30 hole
3	Flywheel housing
4	Pump shaft

**NOTE:** All instructions specified are from the perspective of someone sitting in the operator's seat, facing the blade.

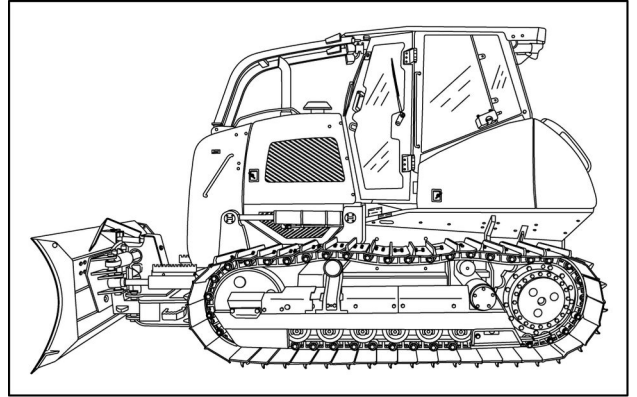
1. Angle of the driveshaft is **4.85°**.
2. Coming off the pump shaft centerline, the driveshaft is angled up **4.07°** and to the left **2.63°**.
3. The distance from the flywheel housing to the pump mounting bracket is **176.00 mm (6.93 in)**

## Air cleaner - Remove

1650M

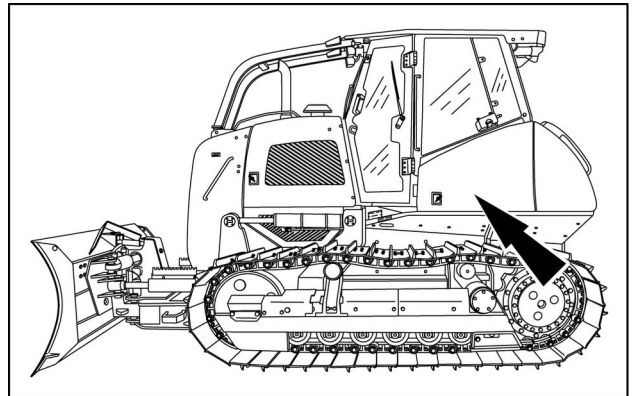
ANZ --- APAC --- LA --- MEA

1. Park the machine on a firm level surface.



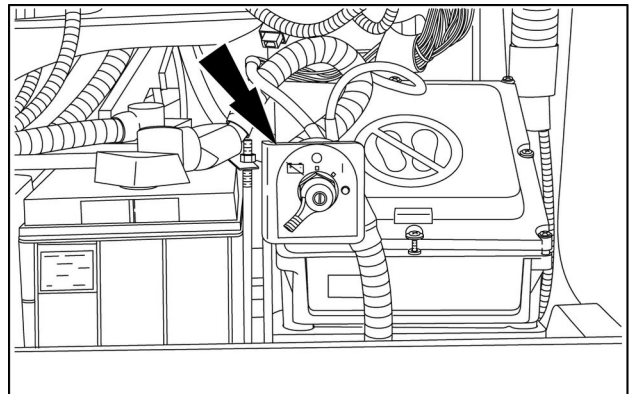
RAIL12DOZ0403AA 1

2. Lower the blade and the ripper tool (if so equipped).
3. Engage the parking brake and turn the ignition key to the OFF position.
4. Locate the battery master disconnect switch behind the panel on the left side of the cab.



RAIL12DOZ0403AA 2

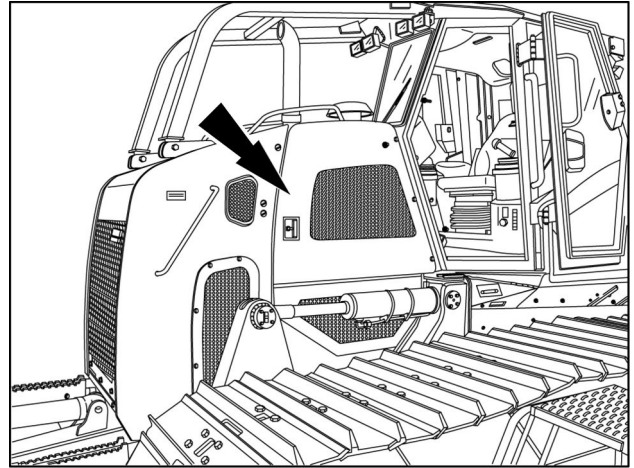
5. Switch the master battery disconnect switch to the OFF position.



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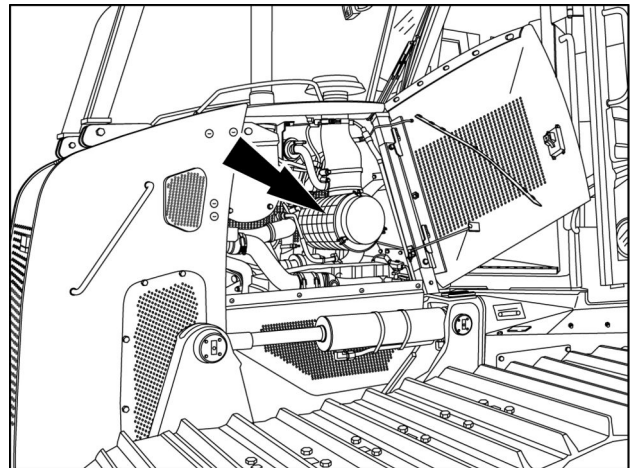
**NOTE:** Wait 90 seconds after engine shutdown before turning off battery disconnect. After engine shutdown, the Selective Catalytic Reduction (SCR) system does a purge cycle and the supply module continues to run.

6. Open the left hand side engine compartment access door.



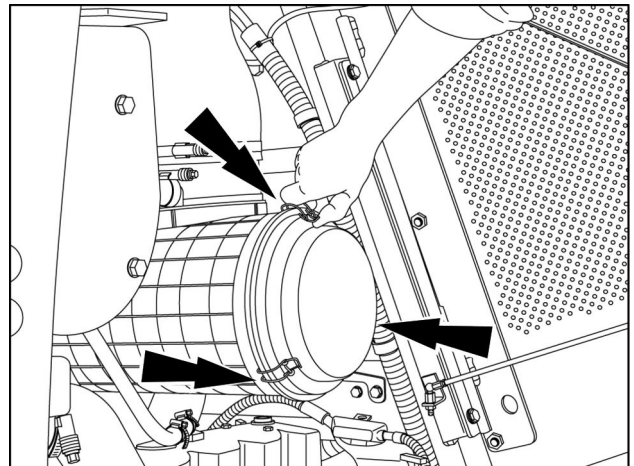
RAIL12DOZ0832BA 4

7. Locate the engine air intake filter housing.



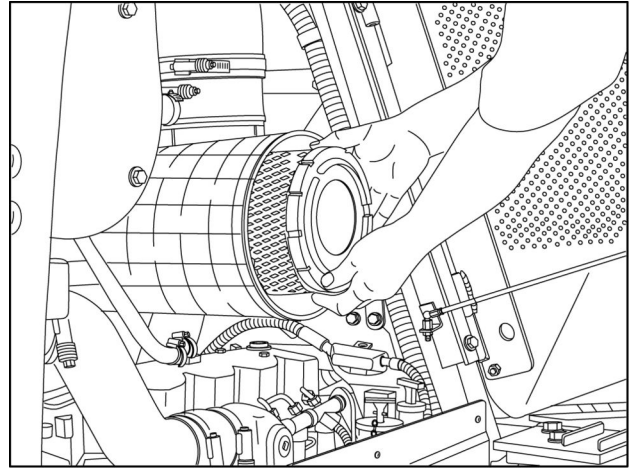
RAIL12DOZ0833BA 5

8. Release the retaining clips and remove the engine air intake filter housing cover.



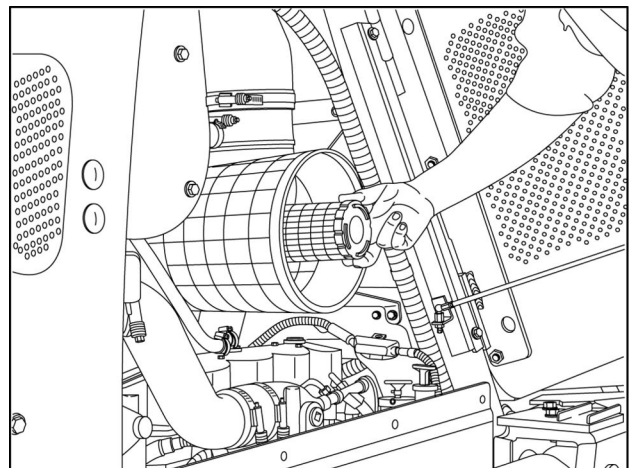
RAIL12DOZ0834BA 6

9. Remove the primary air filter element.



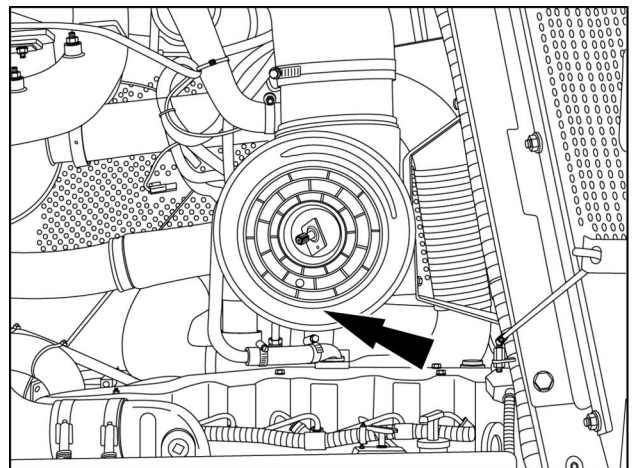
RAIL12DOZ0835BA 7

10. Remove the secondary air filter element.



RAIL12DOZ0837BA 8

11. Remove any additional debris from inside the engine air intake filter housing before installing the air filter elements.



RAIL12DOZ0839BA 9

**Next operation:**  
**Air cleaner - Install (10.202)**

## Air cleaner - Install

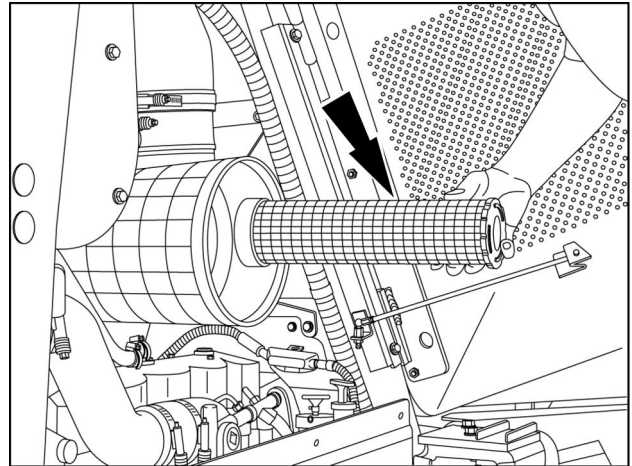
1650M

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### Prior operation:

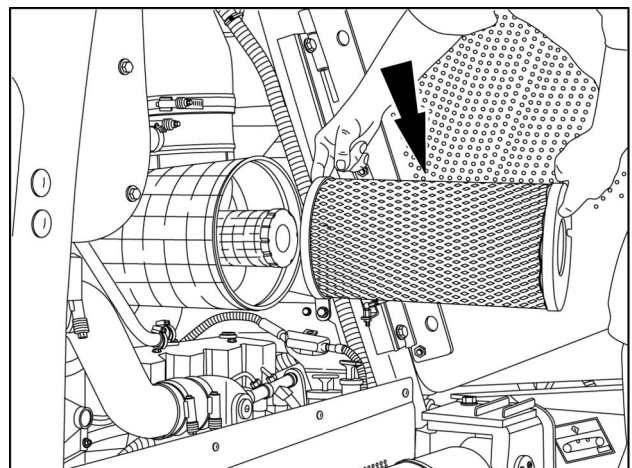
### Air cleaner - Remove (10.202)

1. Install the secondary air filter element into the air filter housing.



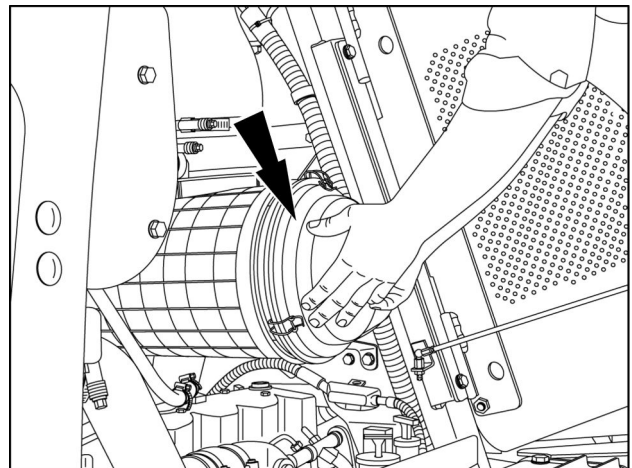
RAIL12DOZ0838BA 1

2. Install the primary air filter element into the air filter housing.



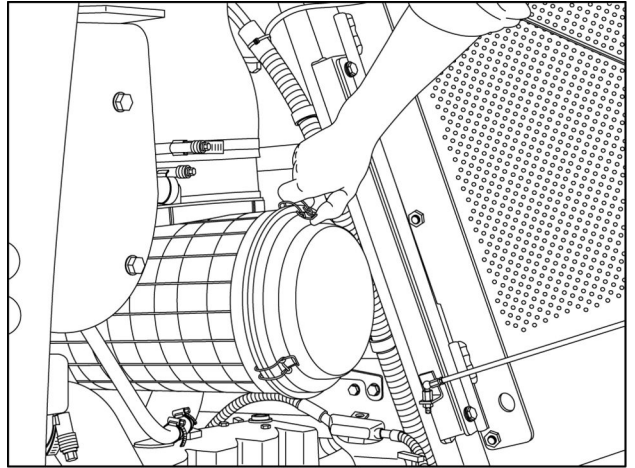
RAIL12DOZ0836BA 2

3. Attach the engine air intake filter housing cover.



RAIL12DOZ0840BA 3

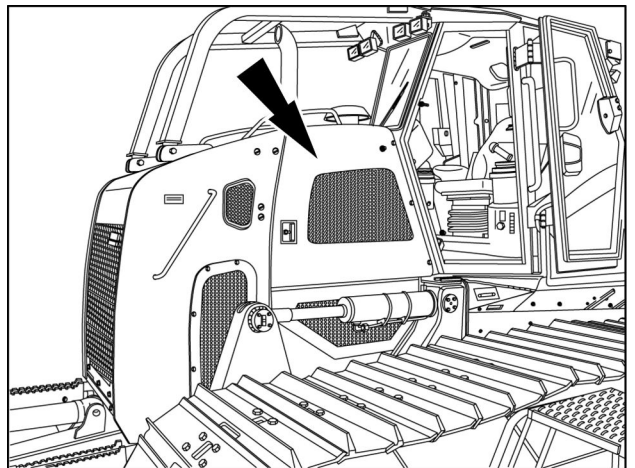
- Secure the retaining clips which hold the engine air intake filter housing cover in place.



RAIL12DOZ0834BA 4

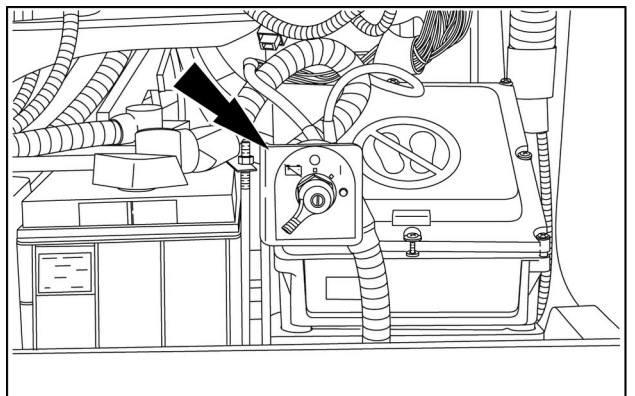
**NOTE:** Make sure that the engine air intake filter housing and forms a tight seal with the cover.

- Close the left side engine compartment panel and secure it with the latch.



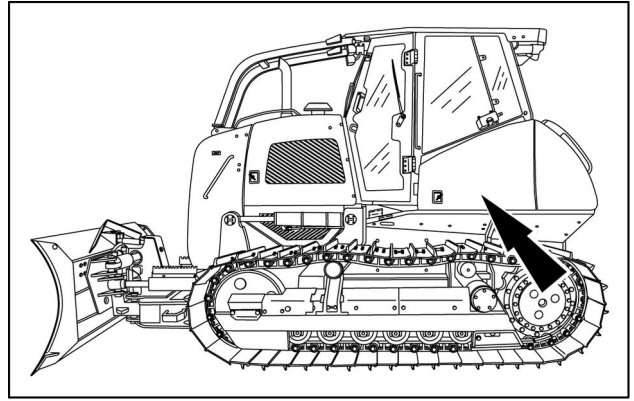
RAIL12DOZ0832BA 5

- Switch the master battery disconnect switch to the ON position.



RAPH12DOZ0044AA 6

7. Close the panel on the left side of the machine below the cab and secure the latch.



RAIL12DOZ0403AA 7

8. Start the engine and confirm normal operations. Remove any fault codes from the system.

## Fuel filters - Replace

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### **▲ WARNING**

**Fire hazard!**

**When handling diesel fuel, observe the following precautions:**

- 1. Do not smoke.**
- 2. Never fill the tank when the engine is running.**
- 3. Wipe up spilled fuel immediately.**

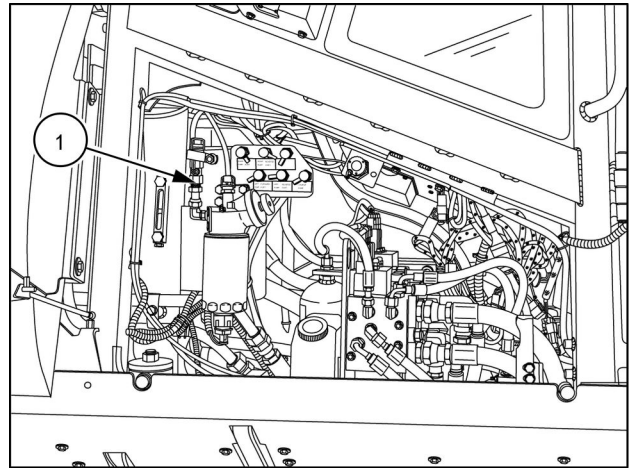
**Failure to comply could result in death or serious injury.**

W0099A

### **Prior operation:**

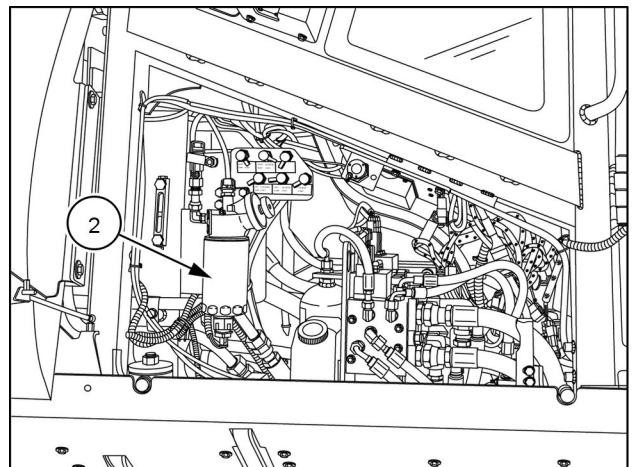
Keep all unauthorized personnel clear of the area. Park the machine on level ground, in neutral with the parking brake applied, and the attachment lowered to the ground, turn off the engine, remove the key, and verify that engine components have cooled or avoid contact. Make sure that all residual pressure is relieved from circuits before beginning maintenance.

1. Locate the fuel filter in the right rear access compartment. Close the fuel shut off valve **(1)** to prevent fuel leakage.
2. Clean the fuel filter head, the outside of the fuel filter, and remove any dirt and debris around the area that might contaminate the system.



RAIL13DOZ1594AA 1

3. Turn the fuel filter **(2)** counterclockwise and remove. Capture any fuel remaining in the lines or the fuel filter, and discard properly.
4. Apply a thin layer of clean oil to the gasket on the new fuel filter.
5. Install the filter. Use your hands to tighten the fuel filter 1/2 to 3/4 turn after the fuel filter makes contact with the filter head.
6. Open the fuel shut off valve. Check for leaks.



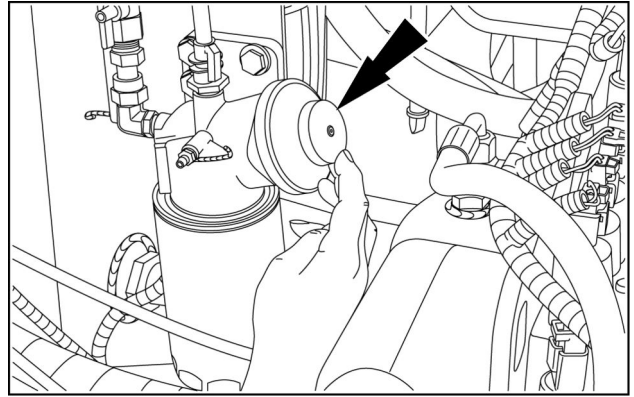
RAIL13DOZ1594AA 2

**NOTICE:** Never use a filter wrench to tighten a new fuel filter on install.

---

## Removing air from the fuel system

1. Remove air from the fuel system after changing the fuel filter. Removing air from the fuel system may also be necessary if the machine runs out of fuel, if the fuel system has been serviced, or if the machine has been in storage.
2. Make certain that the fuel tank shutoff is in the ON position.
3. Loosen the air bleed screw one or two turns.
4. Operate the hand primer until no air bubbles flow from around the air bleed screw.
5. Tighten the air bleed screw.
6. Start the engine, and check for leaks.



RAPH12DOZ0056AA 3

## Engine oil filter - Replace

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### Prior operation:

Keep all unauthorized personnel clear of the area. Park the machine on level ground, in neutral with the parking brake applied, and the attachment lowered to the ground, turn off the engine, remove the key, and verify that engine components have cooled or avoid contact. Make sure that all residual pressure is relieved from circuits before beginning maintenance.

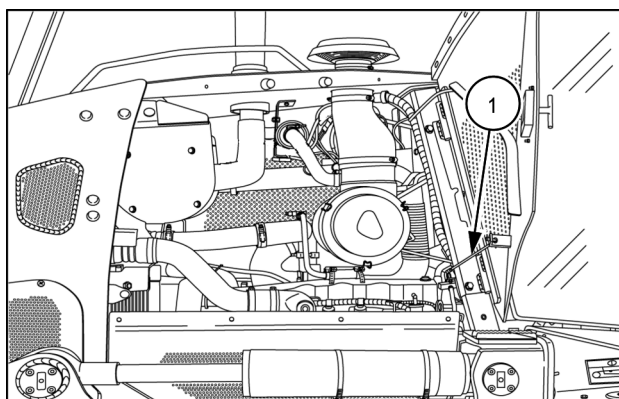
Service specifications	
Type of oil	CASE AKCELA UNITEK NO. 1™ SBL CJ-4 SAE 10W-40
Capacity (with filter change)	16.4 l (17.3 US qt)
Capacity (without filter change)	15.6 l (16.5 US qt)

1. Open the left-hand front and right-hand front access doors. Secure the access doors with the door struts (1).

2. Remove the oil dipstick and the oil fill cap.

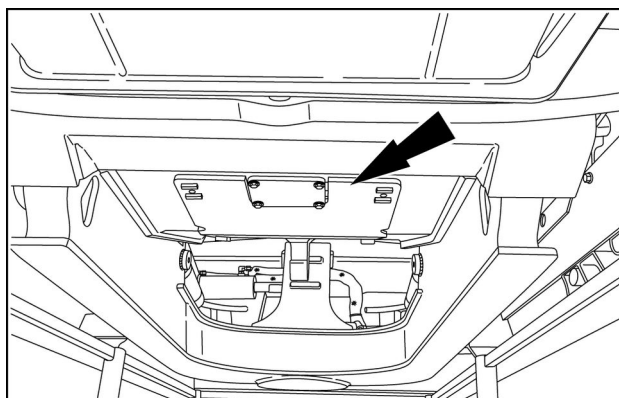
**NOTE:** Oil drains faster when the oil is warm (but not hot) and the oil dipstick and oil fill cap is removed.

3. Use a suitable container to collect the drained oil.



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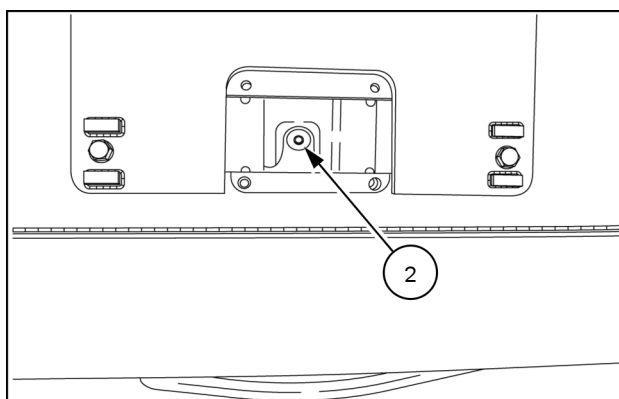
4. Remove the bolts and the engine oil access plate under the engine. Locate the oil drain plug.



RAPH12DOZ0095AA 2

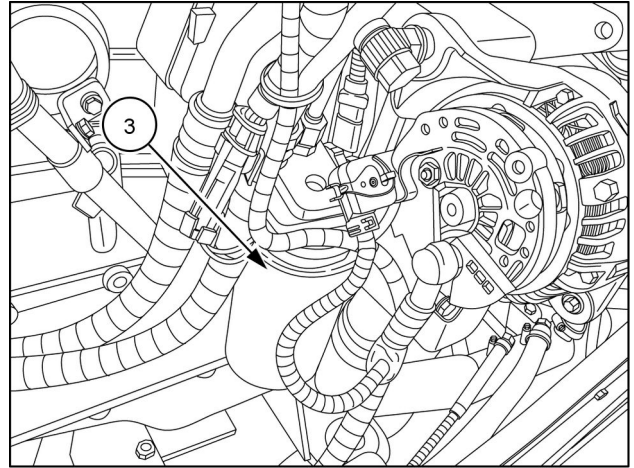
**NOTE:** If the machine is so equipped, and the special draining equipment is available, use the engine oil environmental drain located in the left side engine access door.

5. Remove the engine oil drain plug (2), and allow the oil to drain.



RAPH12DOZ0096AA 3

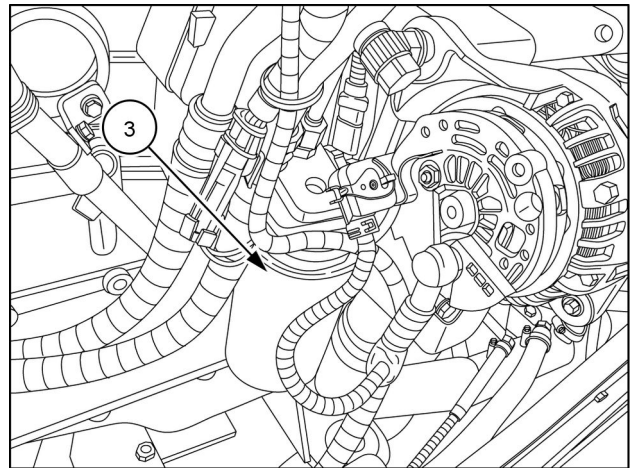
6. Locate the oil filter **(3)** in the right front engine compartment. Clean the area around the filter of dirt and debris.



RAIL12DOZ0192AA 4

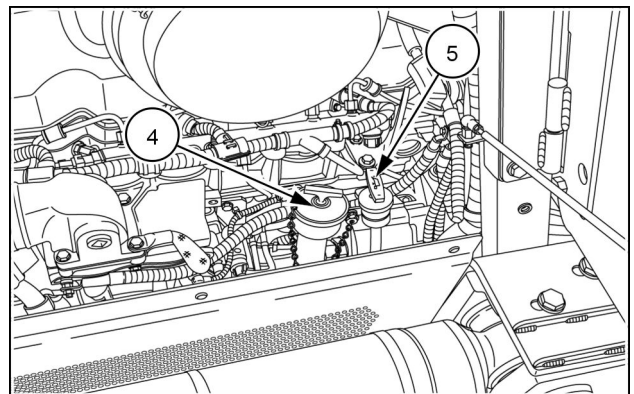
### Replace oil filter

7. Turn the oil filter **(3)** housing counterclockwise to remove. Remove and discard the filter following local environmental and waste regulations.
8. Apply a thin layer of clean oil to the new filter gasket.
9. Turn the new oil filter onto the base until the gasket makes contact with the base, and then turn by hand an additional 3/4 turn. Never use a filter wrench to install a new filter.



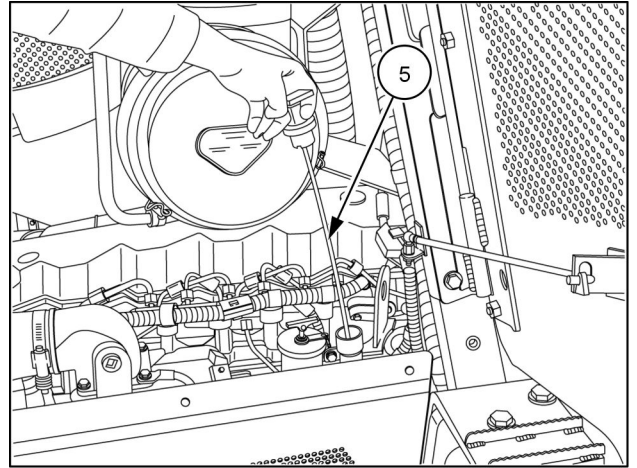
RAIL12DOZ0192AA 5

10. Close the oil drain.
11. Fill the engine with the proper amount of oil through the fill port **(4)**.
12. Start the engine and run at idle speed. Check the engine oil filter and remote drain for leaks.
13. After **2 min** stop the engine.
14. Wait for the engine oil to drain down for an accurate reading on the dipstick **(5)**.



RAPH12DOZ0069AA 6

15. Check the dipstick **(5)**, and add additional oil, if necessary.
16. Check for leaks around the filter and drain.
17. Secure the lower engine access plate.



RAIL12DOZ0171AA 7

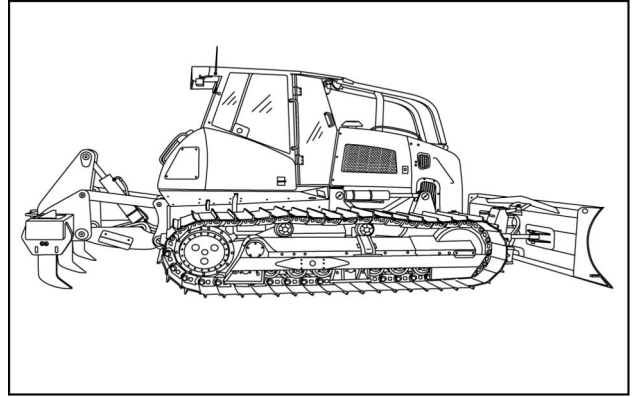
**NOTE:** The oil flow rate can be improved if the oil is slightly warm and the oil fill cap or dipstick is removed from the engine while draining.

## Crankcase ventilation system - Remove

1650M

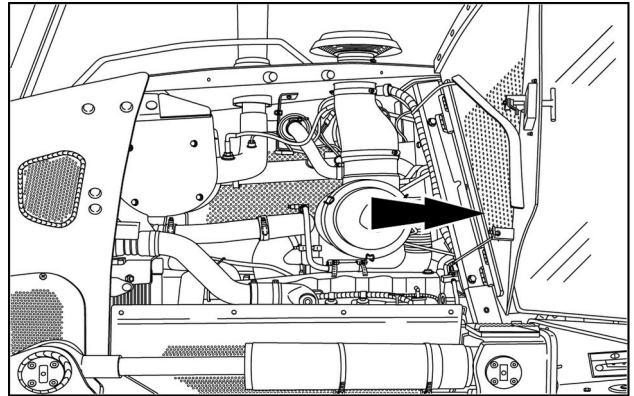
ANZ --- APAC --- LA --- MEA

1. Park the Dozer on level ground. Lower the blade to the ground and turn OFF the engine.



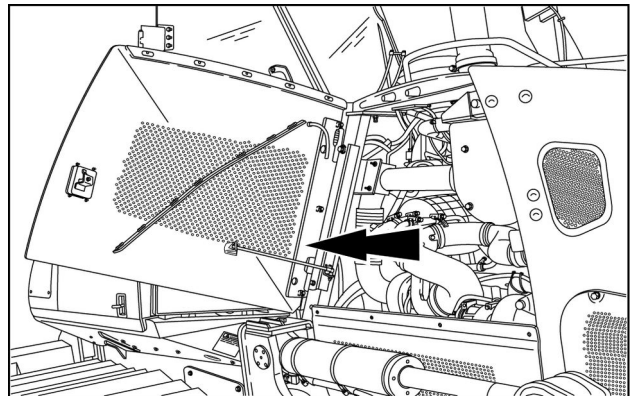
RAPH12DOZ0102AA 1

2. Turn the electrical power to OFF.
3. Remove the left side cover plate.



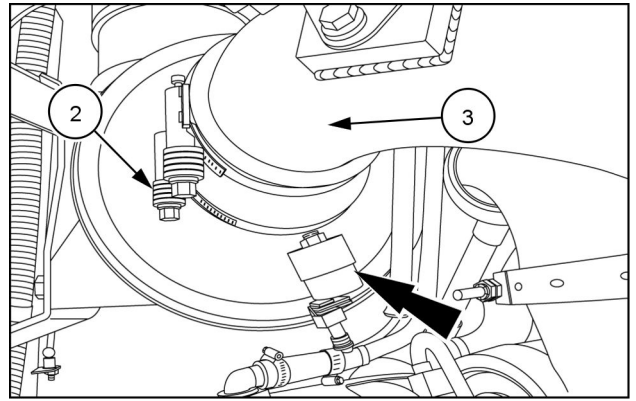
RAPH12DOZ0068AA 2

4. Remove the right side cover plate.



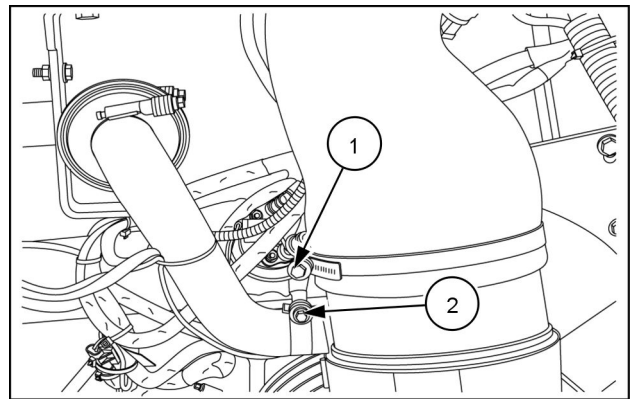
RAPH12DOZ0066AA 3

5. Disconnect the electrical plug (1) at the filter restriction valve.
6. Loosen the inner hose clamp (2) and slide the hose (3) off the air cleaner.



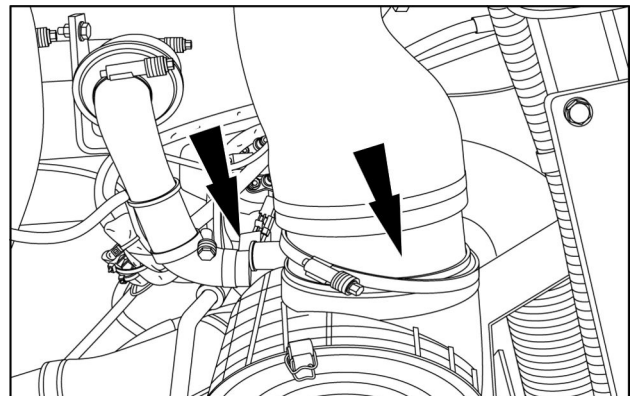
RAPH12DOZ0248AA 4

7. On left side of machine, loosen the intake clamp (1) and the aspiration tube clamp (2).



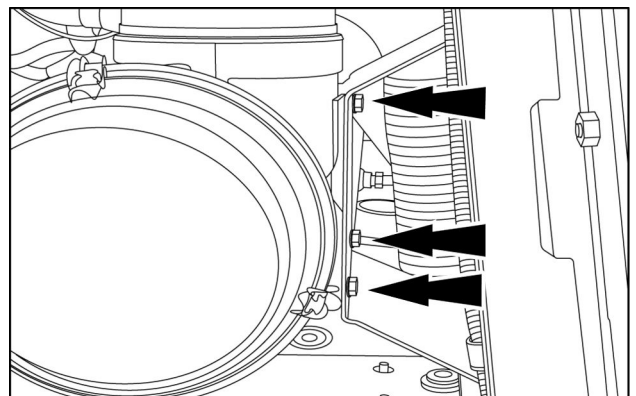
RAPH12DOZ0251AA 5

8. Disconnect the hoses from the air cleaner.



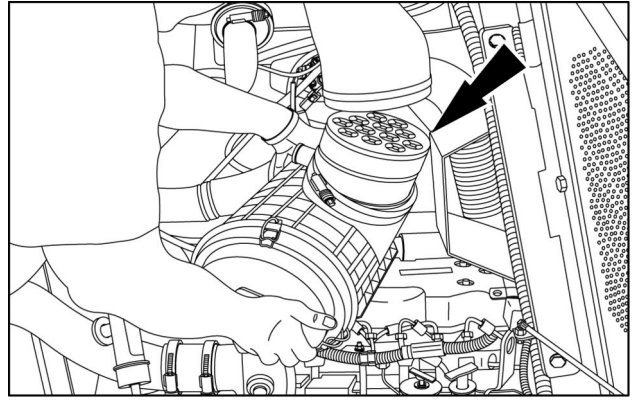
RAPH12DOZ0254AA 6

9. Remove the three bolts from the bracket holding the air cleaner in place.



RAPH12DOZ0252AA 7

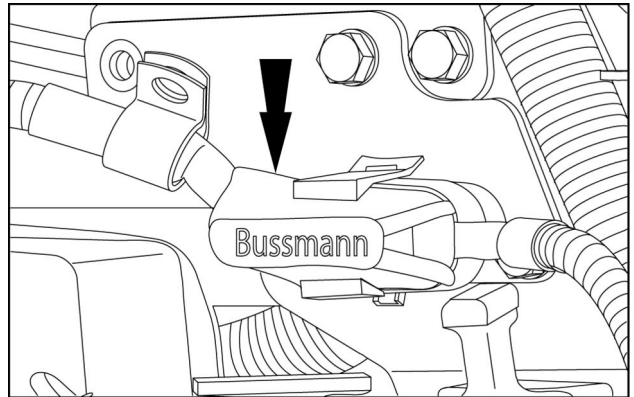
10. Remove the air cleaner from the machine.



RAPH12DOZ0255AA 8

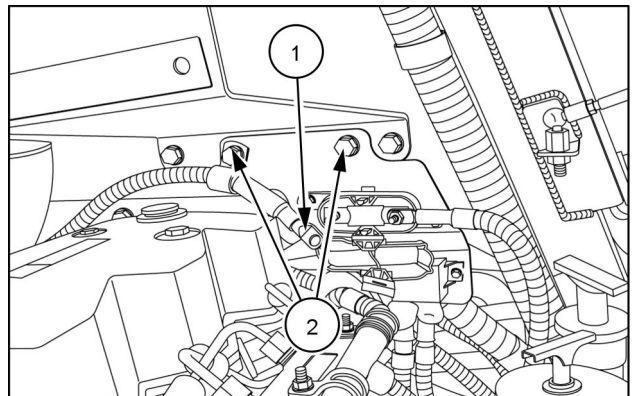
11. Open the junction block fuse cover (1).

**ATTENTION:** Power **MUST** be off before accessing the junction block fuses.



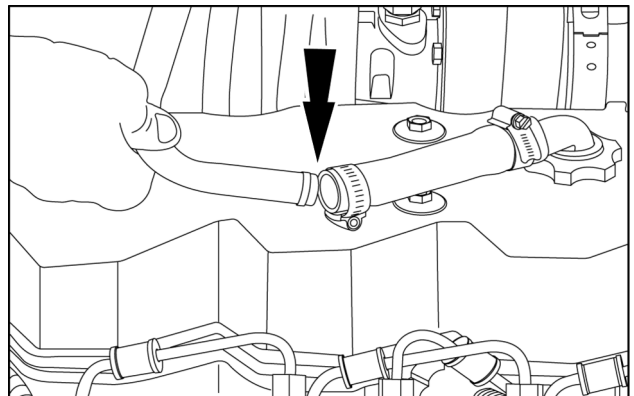
RAPH12DOZ0260AA 9

12. Disconnect the inside cable (1). Remove the two bolts holding the bracket (2) to the cross member frame. Pull bracket away from the frame.



RAPH12DOZ0308AA 10

13. Loosen the clamp and remove the vent tube from the valve cover.



RAPH12DOZ0257AA 11



**Suggest:**

**If the above button click is invalid.**

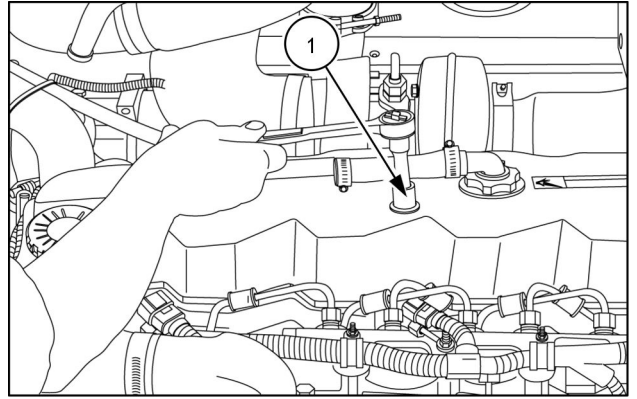
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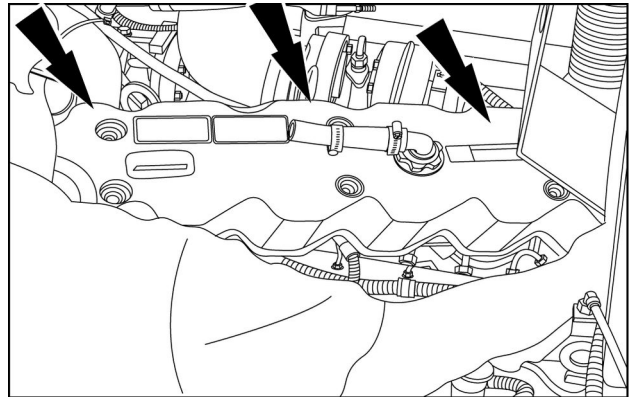
**Thank you so much for reading**

14. Remove the six nut and washer assemblies (1) from the valve cover.



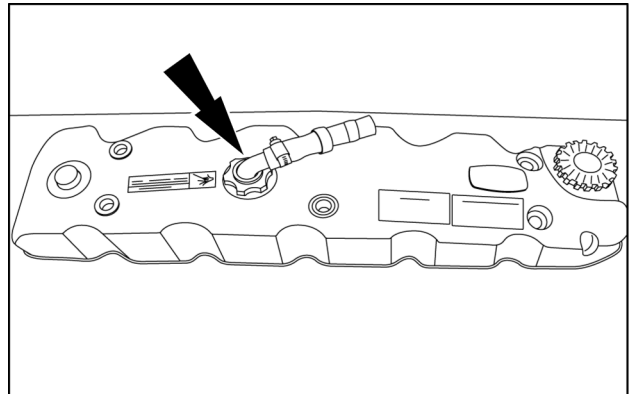
RAPH12DOZ0258AA 12

15. Remove the valve cover.



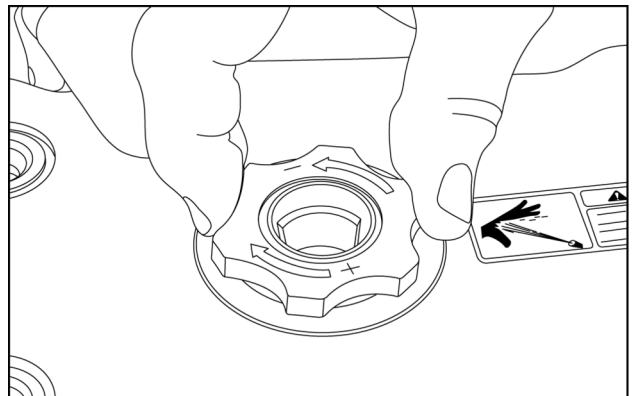
RAPH12DOZ0261AA 13

16. Remove the vent hose from the valve cover.



RAPH12DOZ0263AA 14

17. Remove the thumb nut and spring washer from the valve cover.



RAPH12DOZ0288AA 15

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