



## **SERVICE MANUAL**

**Magnum™ 250 CVT TIER 4B [ZHRF04001 - ], Magnum™ 280 CVT TIER 4B [ZHRF04001 - ], Magnum™ 310 CVT TIER 4B [ZHRF04001 - ], Magnum™ 310 Rowtrac™ CVT TIER 4B [ZHRF04001 - ], Magnum™ 340 CVT TIER 4B [ZHRF04001 - ], Magnum™ 340 Rowtrac™ CVT TIER 4B [ZHRF04001 - ], Magnum™ 380 CVT TIER 4B [ZHRF04001 - ], Magnum™ 380 Rowtrac™ CVT TIER 4B [ZHRF04001 - ]**

## Link Product / Engine

<b>Product</b>	<b>Market Product</b>	<b>Engine</b>
Magnum™ 250 CVT TIER 4B [ZHRF04001 - ]	North America	F2CFE613G*B002
Magnum™ 280 CVT TIER 4B [ZHRF04001 - ]	North America	F2CFE613G*B002
Magnum™ 310 CVT TIER 4B [ZHRF04001 - ]	North America	F2CFE613G*B002
Magnum™ 340 CVT TIER 4B [ZHRF04001 - ]	North America	F2CFE614C*B002
Magnum™ 380 CVT TIER 4B [ZHRF04001 - ]	North America	F2CFE614C*B002
Magnum™ 310 Rowtrac™ CVT TIER 4B [ZHRF04001 - ]	North America	F2CFE614D*B002
Magnum™ 340 Rowtrac™ CVT TIER 4B [ZHRF04001 - ]	North America	F2CFE614C*B002
Magnum™ 380 Rowtrac™ CVT TIER 4B [ZHRF04001 - ]	North America	F2CFE614A*B002

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# INTRODUCTION

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## **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 IH 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 maintenance safety

### General maintenance safety

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

Service the machine on a firm, level surface.

Install guards and shields after you service 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 that 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 the equipment is securely supported.

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

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

Stop the engine, remove the key, and relieve pressure before you connect or disconnect fluid lines.

Stop the engine and remove the key before you connect or disconnect electrical connections.

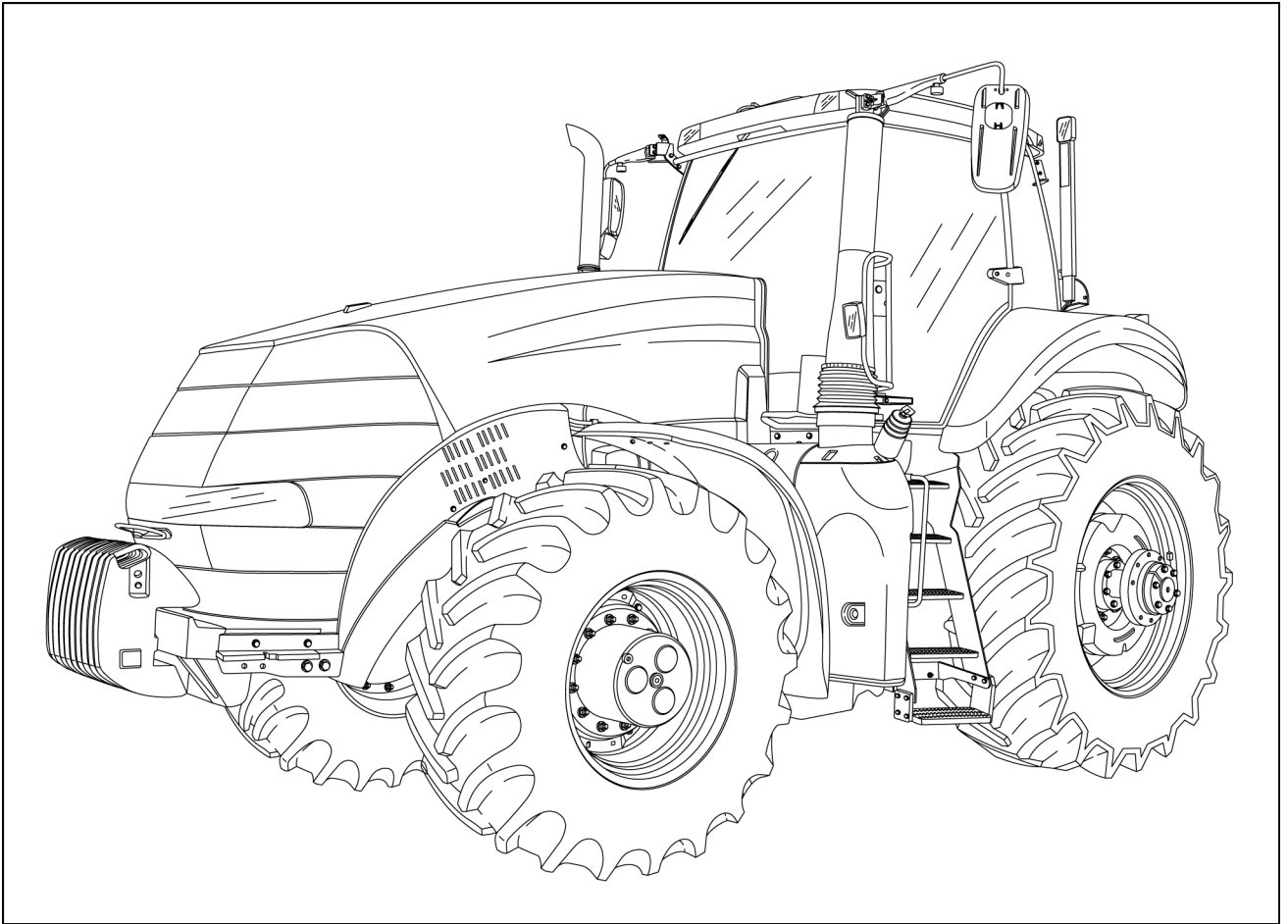
Scalding can result from incorrect removal of coolant caps. Cooling systems operate under pressure. Hot coolant can spray out if you remove a cap while the system is hot. Allow the system to cool before you remove the cap. When you remove the cap, turn it slowly to allow pressure to escape before you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

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

The engine, transmission, exhaust components, and hydraulic lines may become hot during operation. Take care when you service such components. Allow surfaces to cool before you handle or disconnect hot components. Wear protective equipment when appropriate.

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

## Product identification - Machine orientation



RAIL14TR02053GA 1

The right hand and left hand side of the tractor used in this manual are the same as your right hand and left hand when sitting in the tractor seat looking forward.



## **SERVICE MANUAL**

### **Engine**

**Magnum™ 250 CVT TIER 4B [ZHRF04001 - ], Magnum™ 280 CVT TIER 4B [ZHRF04001 - ], Magnum™ 310 CVT TIER 4B [ZHRF04001 - ], Magnum™ 310 Rowtrac™ CVT TIER 4B [ZHRF04001 - ], Magnum™ 340 CVT TIER 4B [ZHRF04001 - ], Magnum™ 340 Rowtrac™ CVT TIER 4B [ZHRF04001 - ], Magnum™ 380 CVT TIER 4B [ZHRF04001 - ], Magnum™ 380 Rowtrac™ CVT TIER 4B [ZHRF04001 - ]**

## Engine - Remove

Prior operation:

Battery - Disconnect (55.302)

Prior operation:

Hood - Remove (90.100)

Prior operation:

Side shield - Remove (90.102)

Prior operation:

Air conditioning - Recover (50.200)

Prior operation:

Engine cooling system - Emptying (10.400)

Prior operation:

Engine cooling system - Remove (10.400)

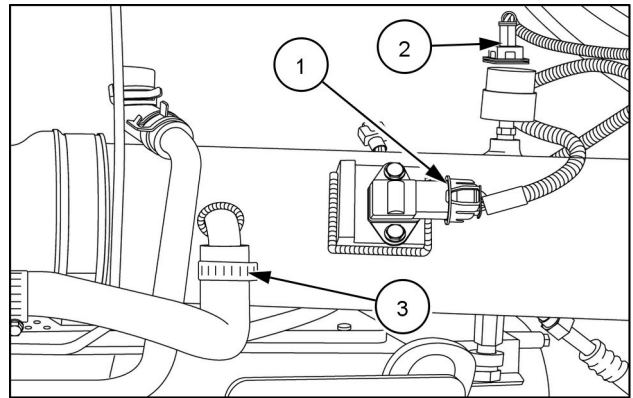
Prior operation:

Diesel Oxidation Catalyst (DOC) - Remove (10.500)

**NOTE:** Clean all fittings before disconnecting.

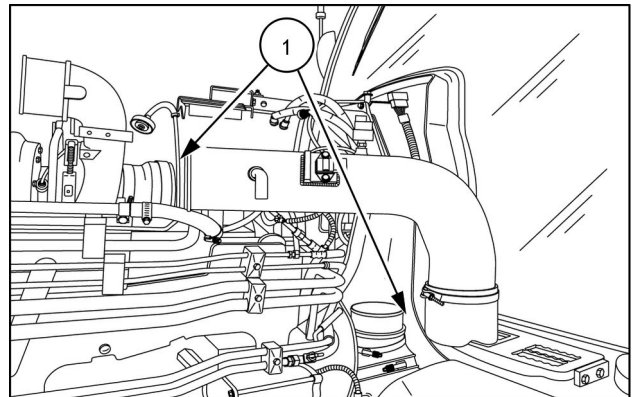
**NOTE:** Cap or plug all lines and ports when disconnecting hydraulic components.

1. Disconnect the humidity sensor (1) and the air restriction sensor (2). Disengage the hose clamp (3) and disconnect the hose from the air intake tube.



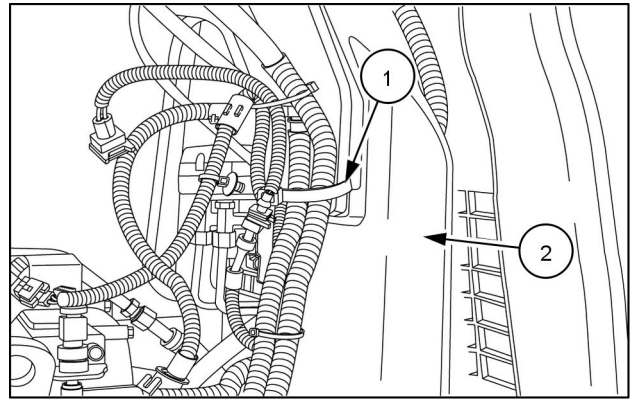
RAIL13TR04202AA 1

2. Disconnect the clamps (1) from each end of the air intake tube and remove the tube.



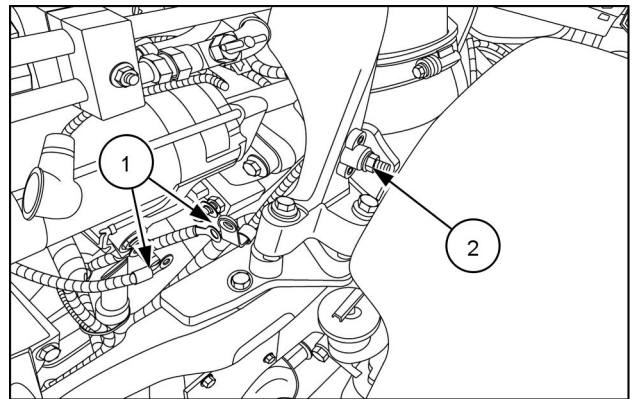
RAIL13TR04211AA 2

3. Cut the wire tie (1) securing the harness to the hood support (2).



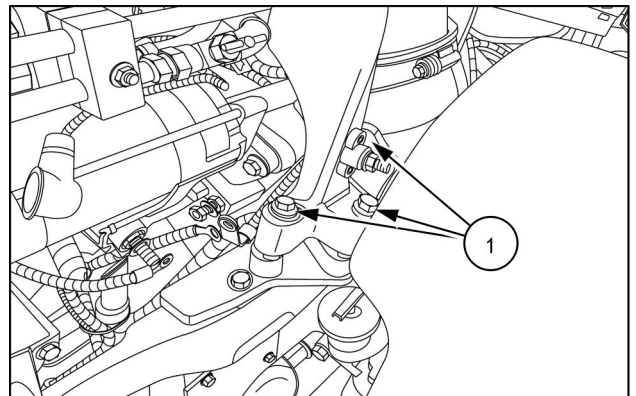
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4. Disconnect the starter cables (1) and the auxiliary wire (2).



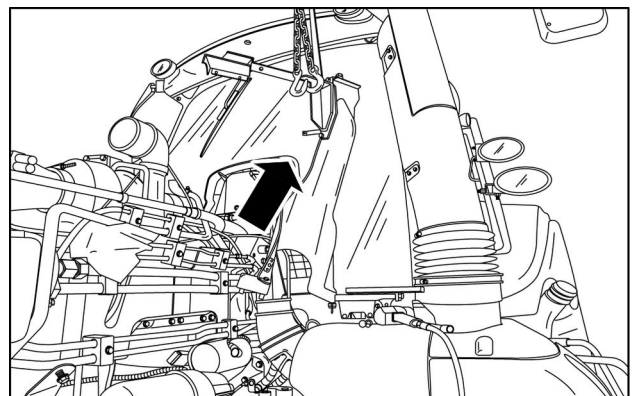
RAIL13TR04209AA 4

5. Remove the three bolts (1) securing the hood support to the frame.



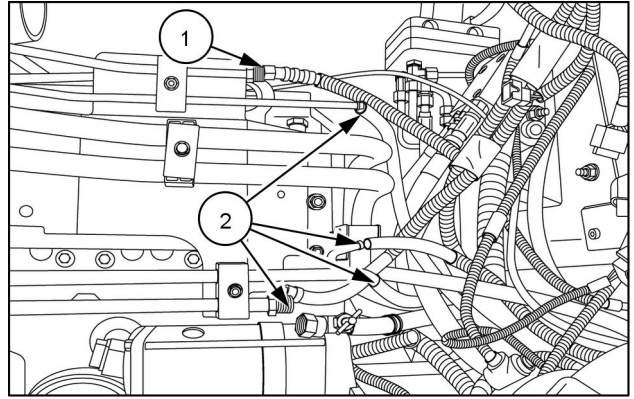
RAIL13TR04209AA 5

6. Remove the hood support.



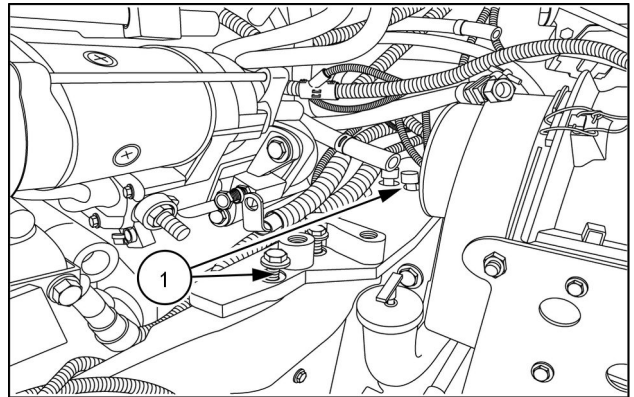
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7. Disconnect the high pressure A/C hose (1) and the coolant lines (2). Cap or plug all fittings and lines.



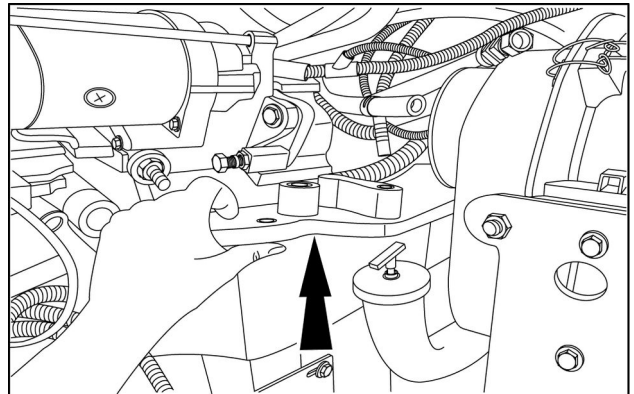
RAIL13TR04230AA 7

8. Remove the two bolts (1) from the rear engine mount plate.



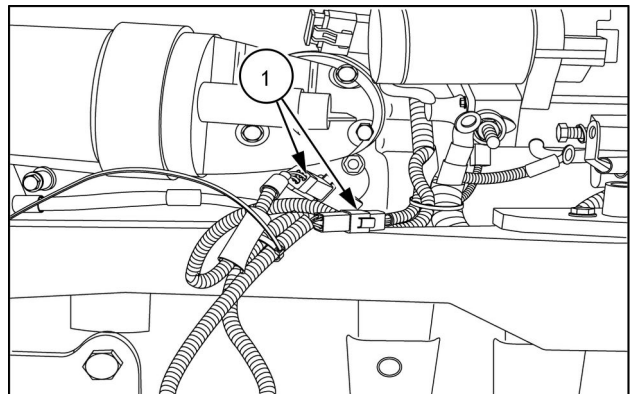
RAIL13TR04243AA 8

9. Remove the engine mount cover plate.



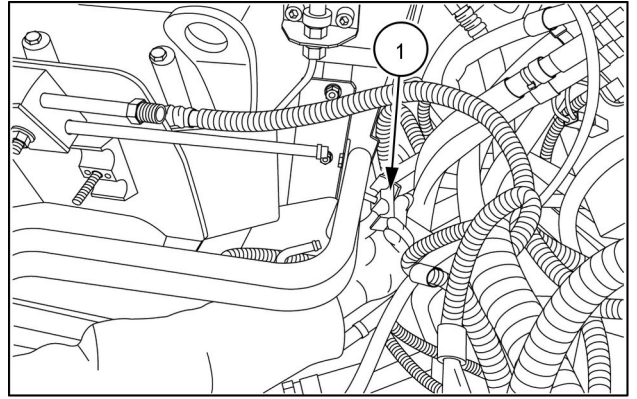
RAIL13TR04244AA 9

10. Disconnect the front suspended axle electrical connectors (1) if equipped.



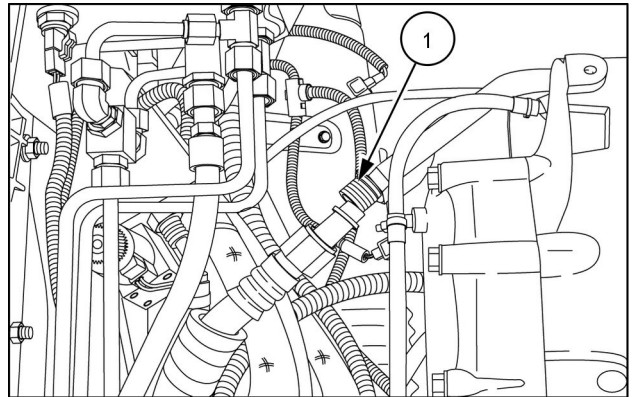
RAIL13TR04237AA 10

11. On the rear of the engine, remove the oil cooler tube clamp (1). Move the oil cooler lines to the side.



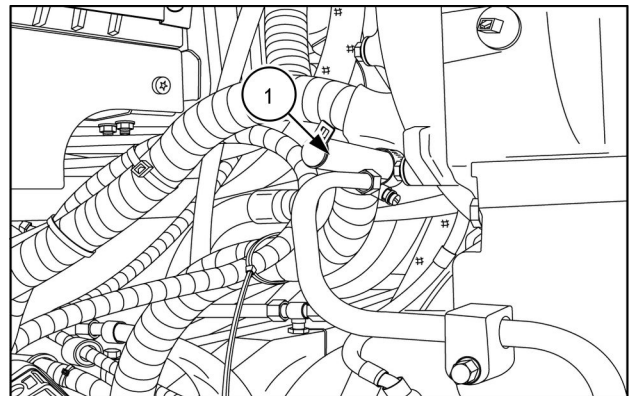
RAIL13TR04236AA 11

12. Disconnect the low pressure A/C line (1). Cap or plug all fittings and hoses.



RAIL13TR04228AA 12

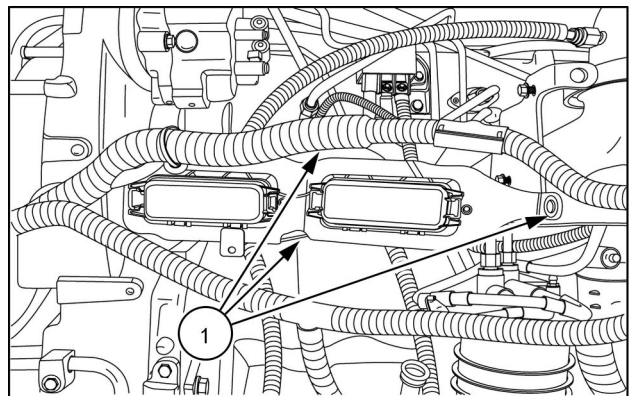
13. Disengage the hose clamp and disconnect the engine controller oil line (1).



RAIL13TR04227AA 13

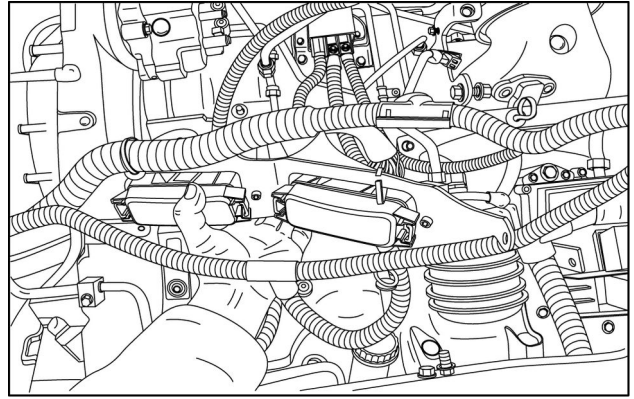
14. Remove the three mounting bolts (1) securing the fuse panel bracket.

**NOTE:** Cut any wire ties securing the harness.



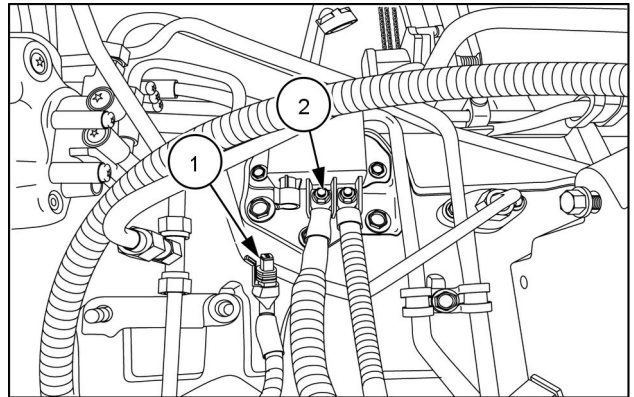
RAIL13TR04216AA 14

15. Remove the fuse panel.



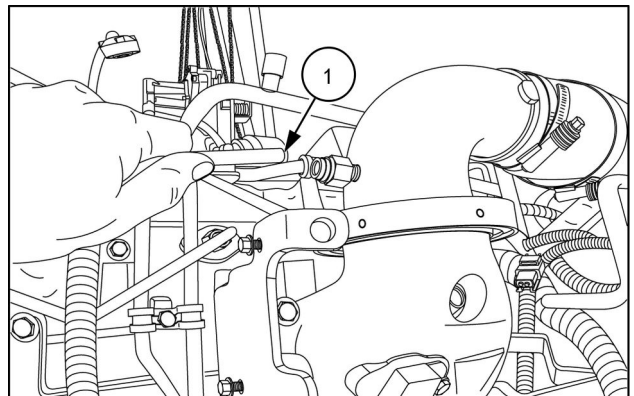
RAIL13TR04214AA 15

16. Disconnect the harness connector (1) for the engine grid heater and the power supply cable (2).



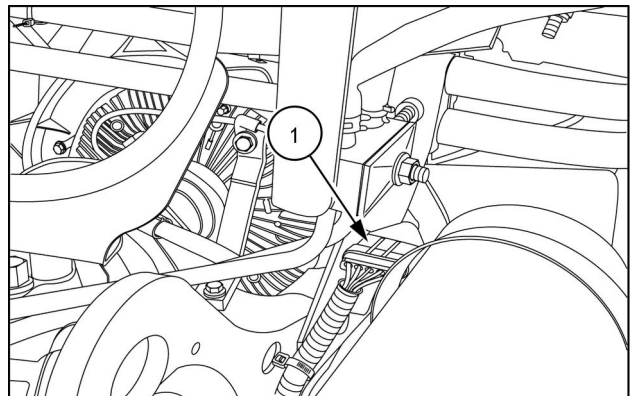
RAIL13TR04219AA 16

17. Disconnect the vent hose (1) from the intake manifold.



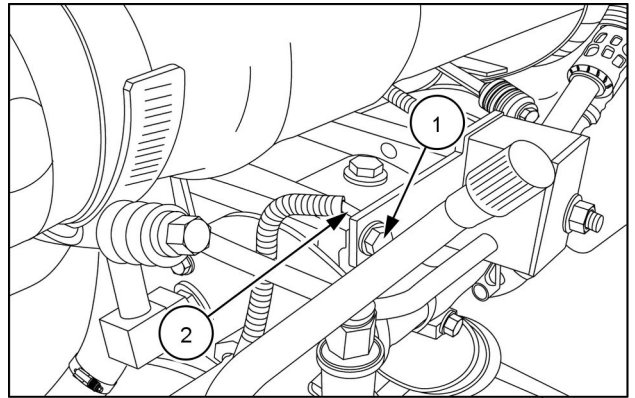
RAIL13TR04218AA 17

18. Disconnect the harness connector (1) for the fan drive.



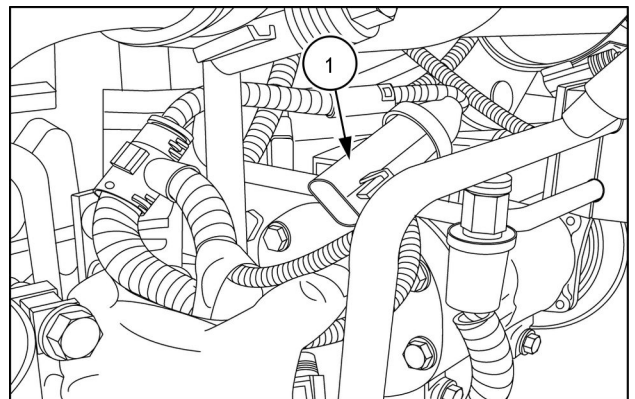
RAIL13TR04220AA 18

19. Remove the A/C compressor mounting bolt (1) and disconnect the ground wire (2).



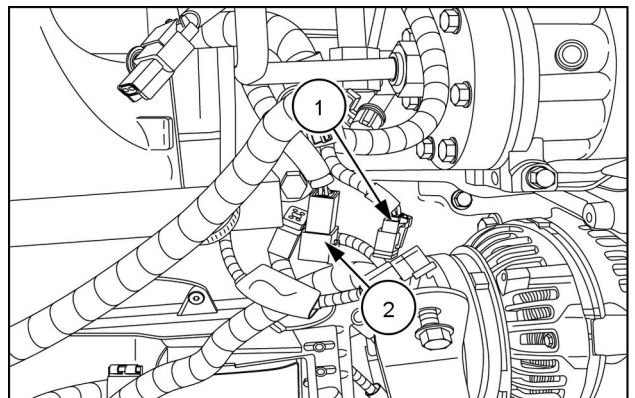
RAIL13TR04224AA 19

20. Disconnect the harness connector (1) to the A/C pressure switch.



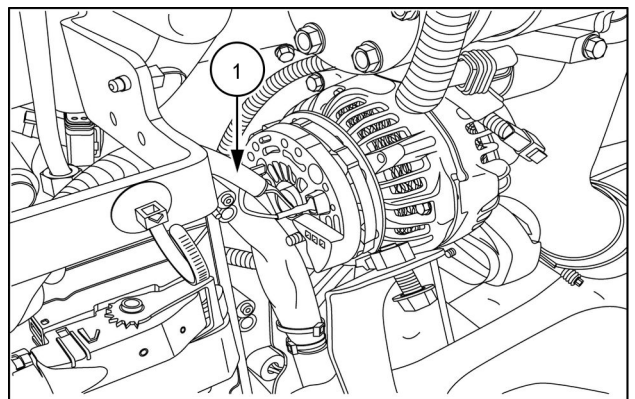
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21. Disconnect the alternator excite wire connector (1) and the CAN bus connector (2).



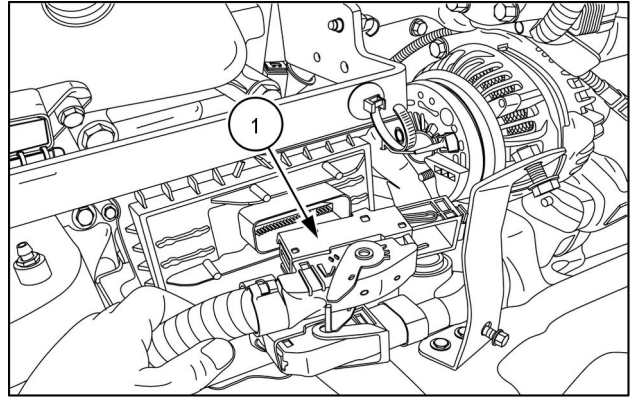
RAIL13TR04221AA 21

22. Remove the nut and disengage the alternator output cable (2).



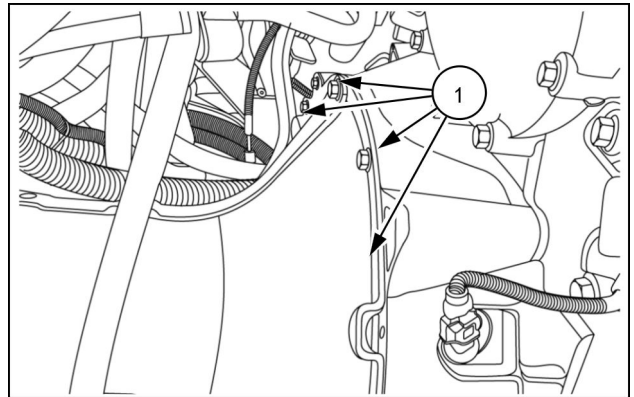
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23. Disconnect the engine controller connector (1).



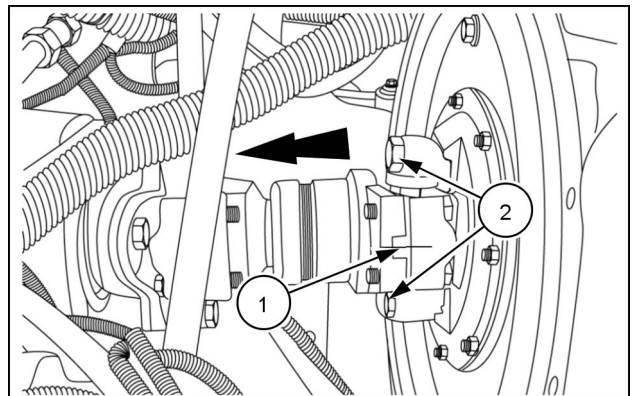
RAIL13TR04226AA 23

24. Remove the bolts (1) and cover for the drop box drive shaft. Set the cover aside.



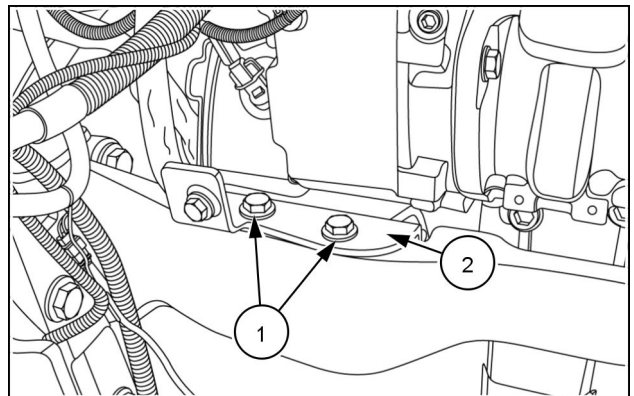
RCPH10CCH813AAB 24

25. Mark the drive shaft (1). Remove the four bolts and disengage the drive shaft from the flywheel.



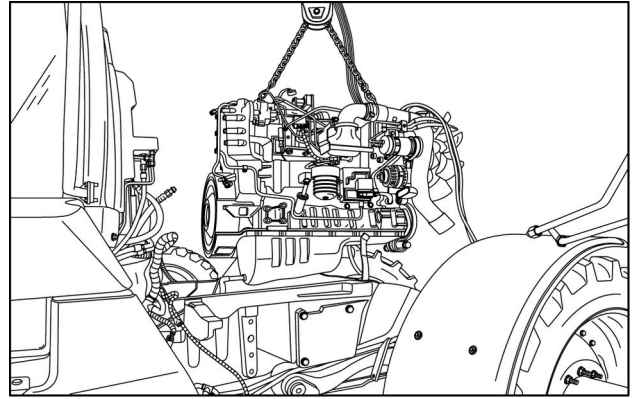
RCPH10CCH817AAB 25

26. Remove the bolts (1) from the plate (2) for the right hand rear engine mount.



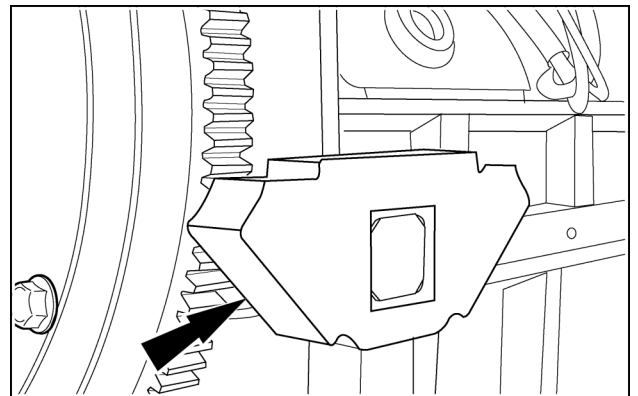
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27. Attach appropriately rated lifting equipment to the lifting brackets on the engine. Carefully remove the engine while making certain all harnesses, lines and hoses have been disconnected.



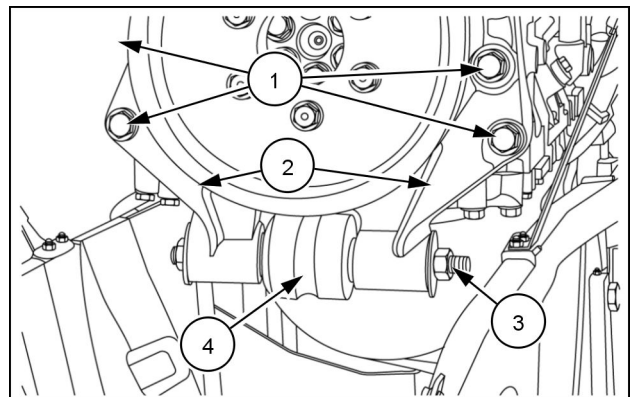
RAIL13TR04247AA 27

28. Remove the right hand rear engine mount. Inspect for wear and/or damage. Replace as required. Repeat for the left hand side.



RCPH07CCH166AAB 28

29. Remove the four bolts (1) securing the brackets (2) for the front engine mount.
30. Remove the bolt (3) securing the front engine mount (4).
31. Inspect the mount for wear and/or damage. Replace as required.



RCPH10CCH833AAB 29

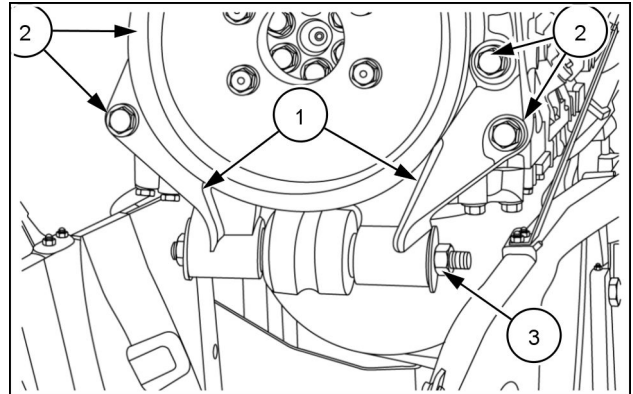
**Next operation:**  
**Engine - Install (10.001)**

## Engine - Install

### Prior operation:

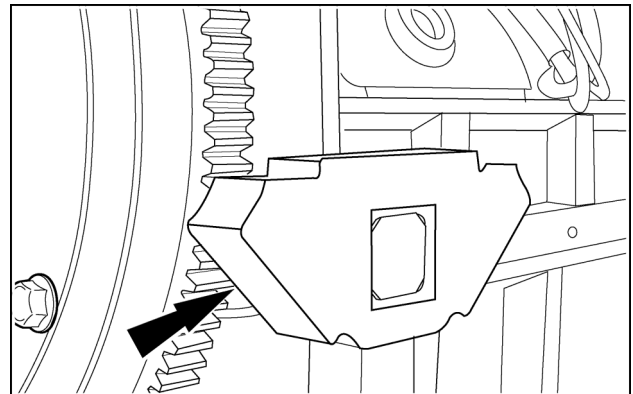
#### Engine - Remove (10.001)

1. If removed, install the front engine mounting brackets (1).
2. Torque the four mounting bolts (2) to **101 – 113 N·m (75 – 83 lb ft)**.
3. Torque the ISO mount support bolt nut (3) to **160 – 220 N·m (118 – 162 lb ft)**.
4. After proper torque is achieved, back the nut (3) off one half to one full turn.



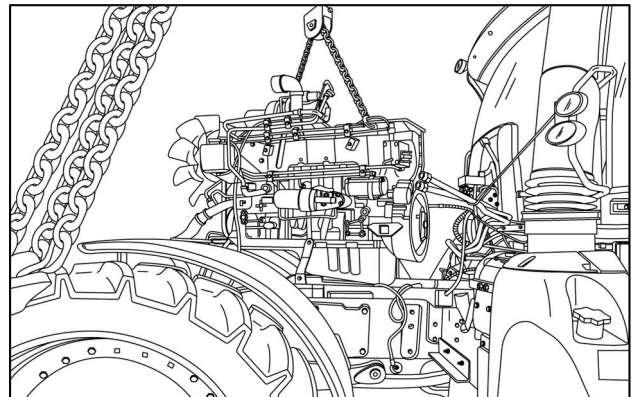
RCPH10CCH833AAB 1

5. Install the right (shown) and left rear engine ISO mounts.



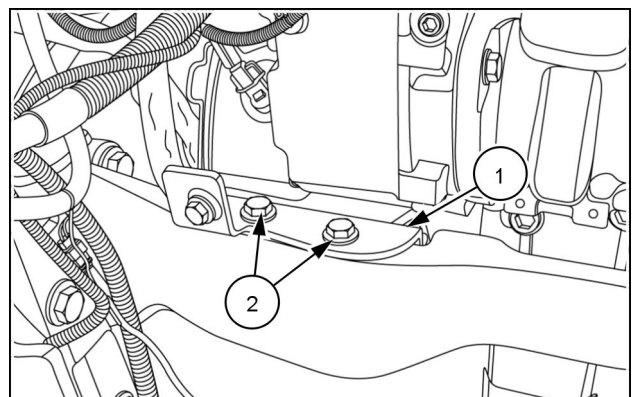
RCPH07CCH166AAB 2

6. Properly support the engine. Raise and move the engine into the front support frame.



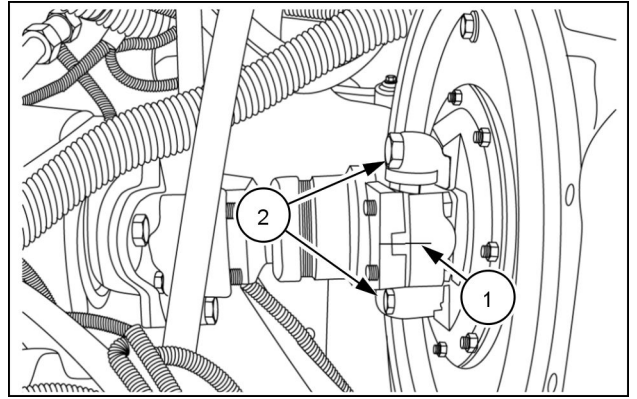
RAIL13TR04248AA 3

7. Install the holding plate (1) for the right rear engine mount with the bolts (2) removed earlier.
8. Torque the bolts to **125 – 150 N·m (92.2 – 110.6 lb ft)**.
9. Install the bolts (3) removed earlier, and torque to **125 – 150 N·m (92 – 111 lb ft)**.
10. Install the hood support bolt and washer (4) and torque to **125 – 150 N·m (92 – 111 lb ft)**.



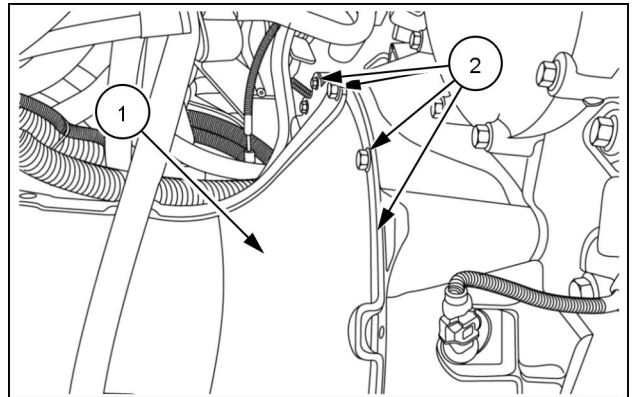
RCPH10CCH925AAB 4

11. Making sure the marks **(1)** are aligned, attach the engine output drive shaft to the engine flywheel.
12. Using the four bolts **(2)** removed earlier to secure the drive shaft to the flywheel.
13. Torque the bolts to **101 – 113 N·m (75 – 83 lb ft)**.



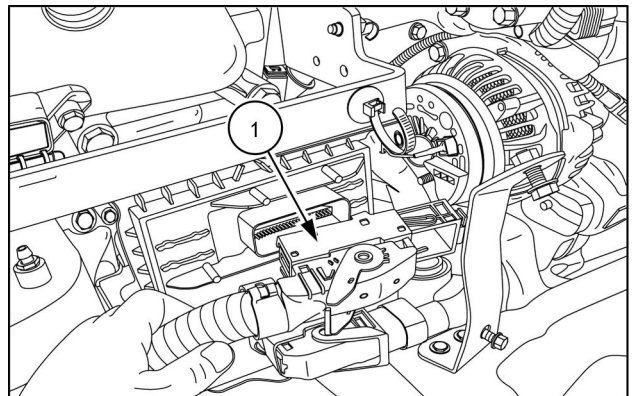
RCPH10CCH817AAB 5

14. Install the engine output drive shaft cover **(1)**. Use the bolts **(2)** removed earlier to secure the cover to the flywheel housing.



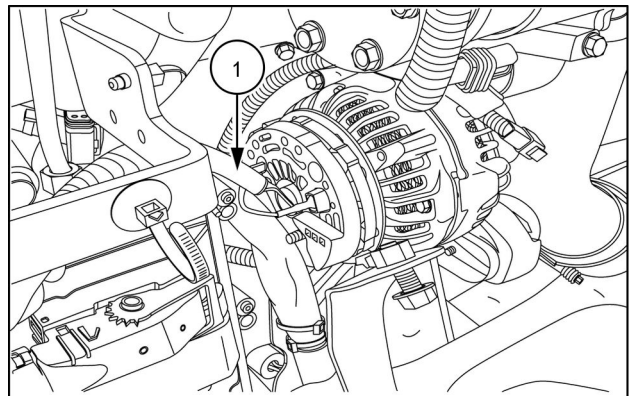
RCPH10CCH813AAB 6

15. Connect the harness connector **(1)** to the engine controller.



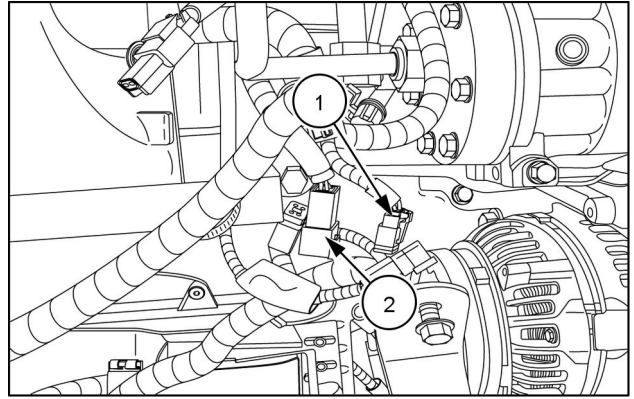
RAIL13TR04226AA 7

16. Connect the alternator output cable **(1)** and secure with the nut removed previously.



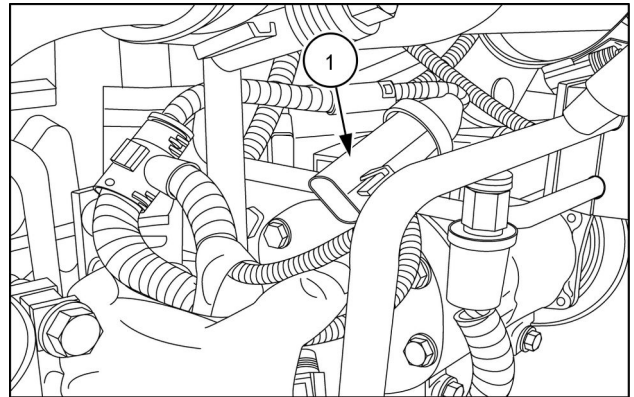
RAIL13TR04231AA 8

17. Connect the alternator excite wire connector (1) and the CAN bus connector (2).



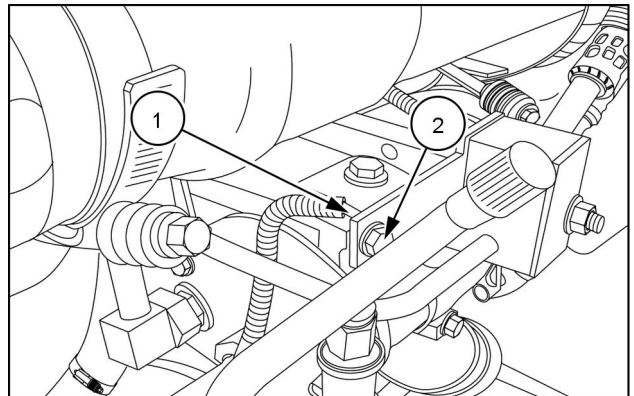
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18. Connect the harness connector (1) to the A/C pressure switch.



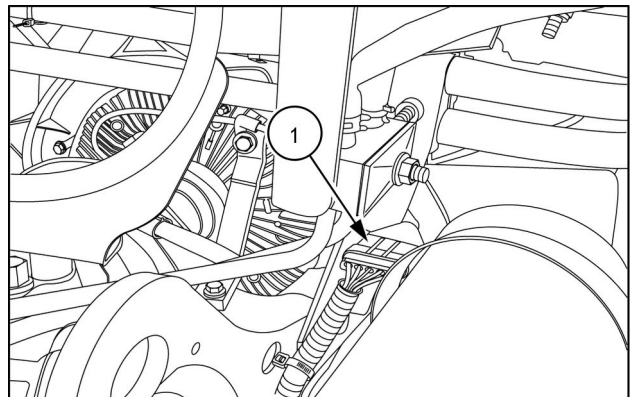
RAIL13TR04223AA 10

19. Connect the ground wire (1) and secure the wire with the A/C compressor mounting bolt (2).



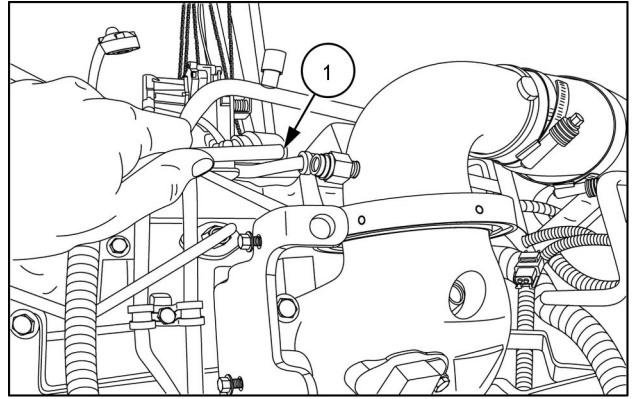
RAIL13TR04224AA 11

20. Connect the harness connector (1) for the fan drive.



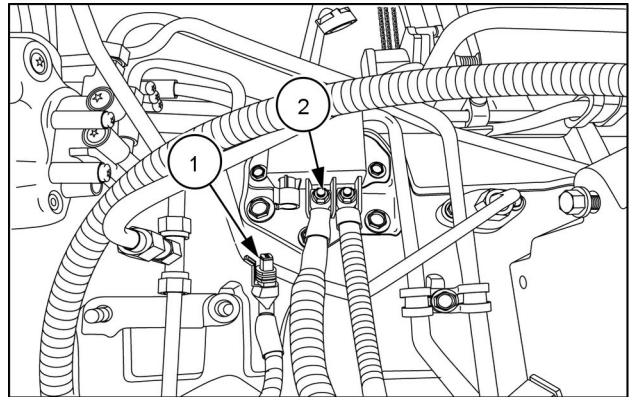
RAIL13TR04220AA 12

21. Connect the vent hose (1) to the intake manifold.



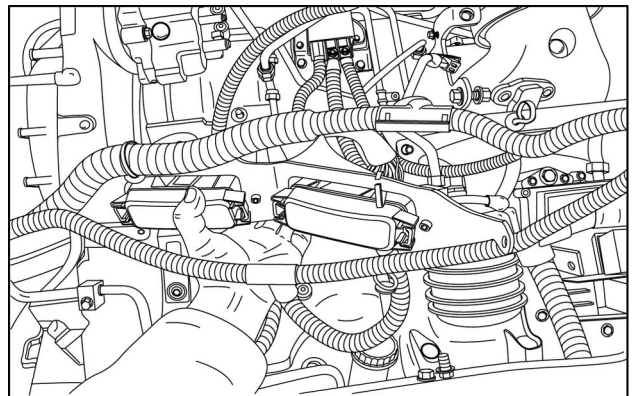
RAIL13TR04218AA 13

22. Connect the harness connector (1) for the engine grid heater and the power supply cable (2).



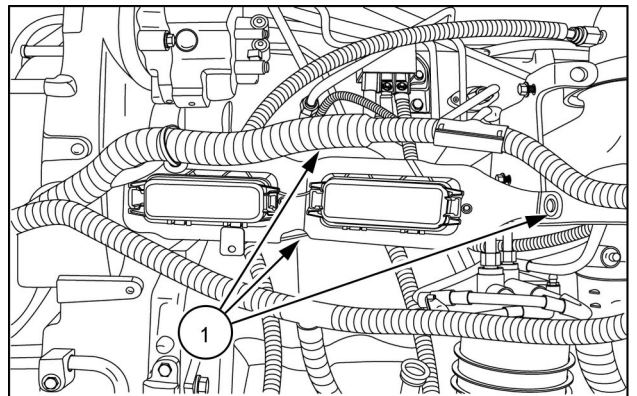
RAIL13TR04219AA 14

23. Install the fuse panel.



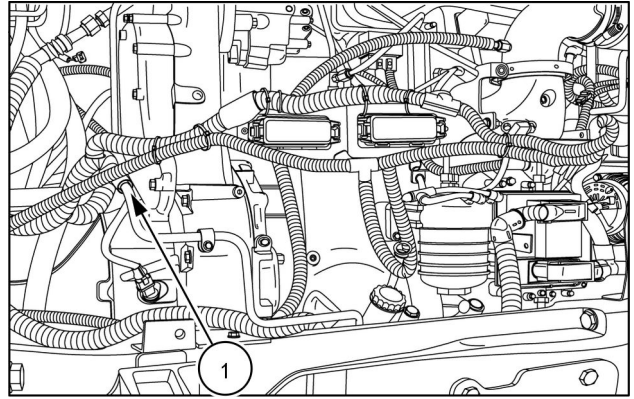
RAIL13TR04214AA 15

24. Secure the fuse panel bracket with the three mounting bolts (1) removed previously. Secure the harness with wire ties.



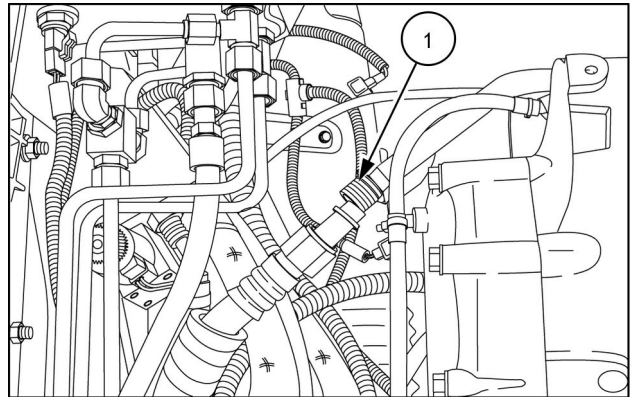
RAIL13TR04216AA 16

25. Connect the oil line (1) and secure with the hose clamp removed previously.



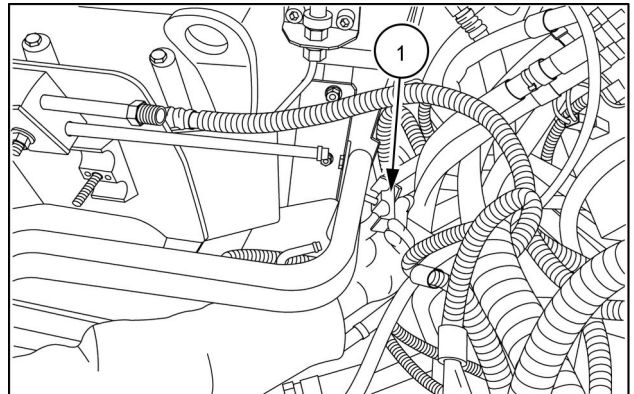
RAIL13TR04213AA 17

26. Lubricate a new O-ring with PAG or mineral oil and install the O-ring. Connect the low pressure A/C line (1).



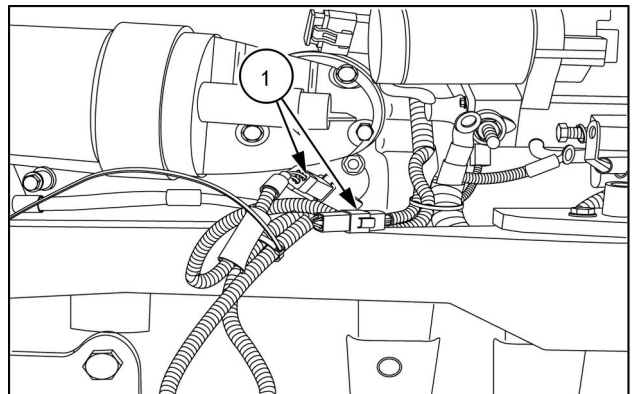
RAIL13TR04228AA 18

27. On the rear of the engine, secure the oil cooler tubes with the tube clamp (1) previously removed.



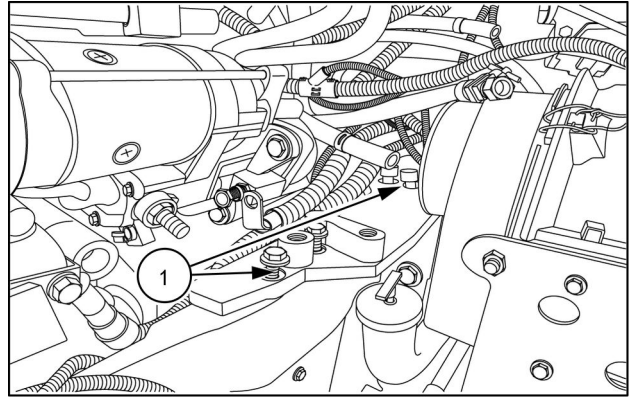
RAIL13TR04236AA 19

28. Connect the front suspended axle electrical connectors (1) if equipped.



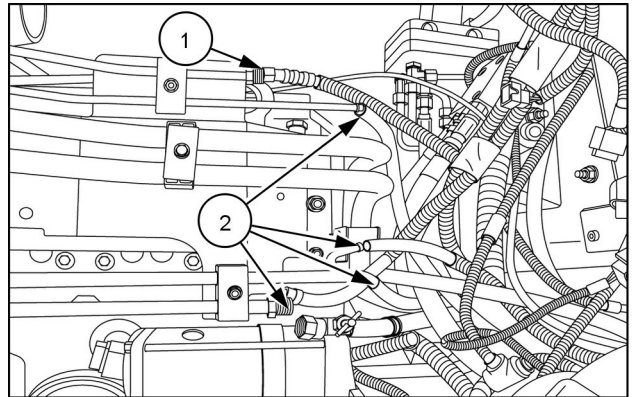
RAIL13TR04237AA 20

29. Install the cover plate for the left hand rear engine mount. Torque the bolts (1) to **125 – 150 N·m (92.2 – 110.6 lb ft)**.



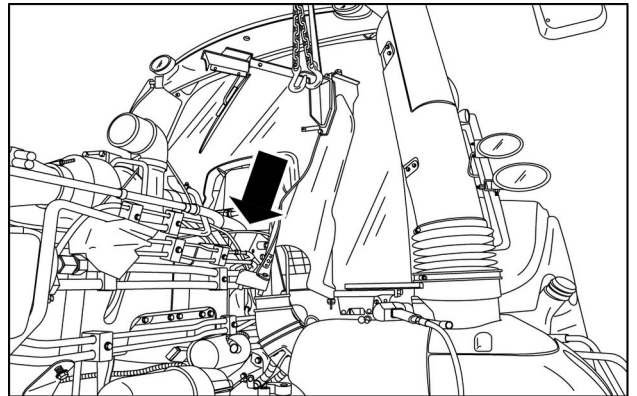
RAIL13TR04243AA 21

30. Lubricate a new O-ring with PAG or mineral oil and install the O-ring; reconnect the high pressure A/C hose (1).
31. Reconnect the coolant lines (2).



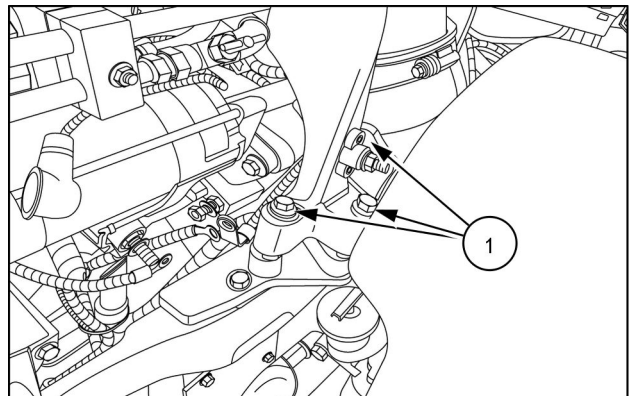
RAIL13TR04230AA 22

32. Install the hood support.



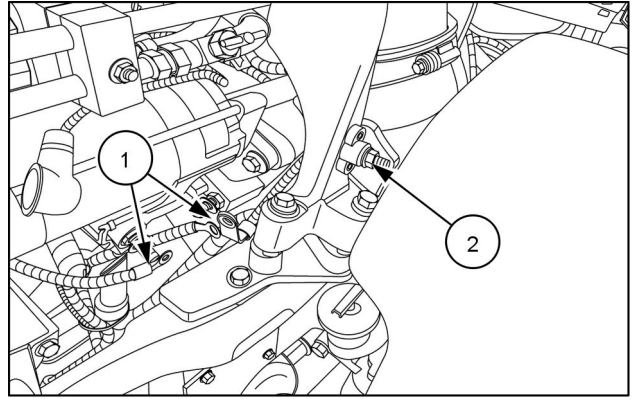
RAIL13TR04212AA 23

33. Torque the bolts (1) to **125 – 150 N·m (92.2 – 110.6 lb ft)**.



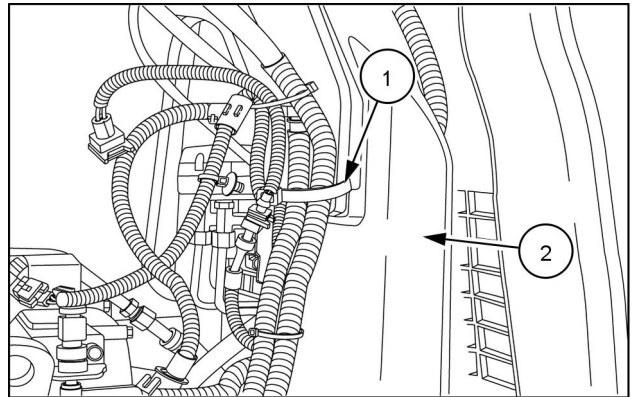
RAIL13TR04209AA 24

34. Connect the starter cables (1) and the auxiliary wire (2).



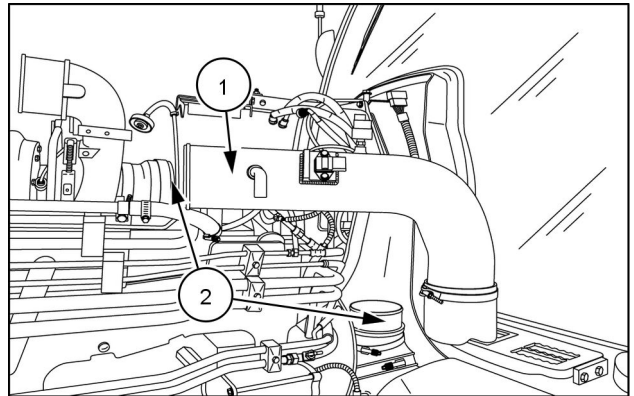
RAIL13TR04209AA 25

35. Install a wire tie (1) to secure the harness to the hood support (2).



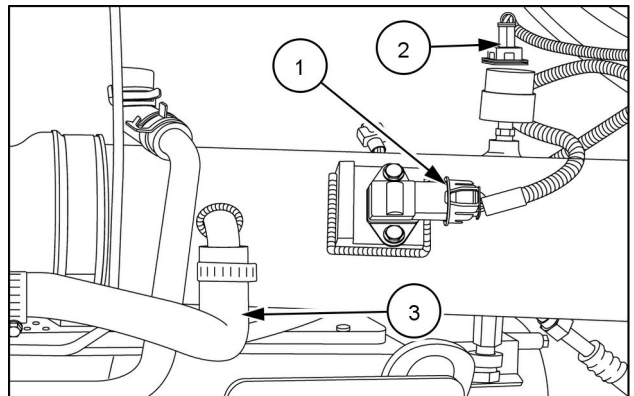
RAIL13TR04204AA 26

36. Install the air intake tube (1) and secure with the hose clamps (2) previously removed.



RAIL13TR04211AA 27

37. Connect the harness connectors for the humidity sensor (1) and the air restriction sensor (2). Connect the hose (3) to the air intake tube. Secure the hose with the hose clamp previously removed.



RAIL13TR04202AA 28

**Next operation:**  
**Air conditioning - Evacuate (50.200)**  
**Next operation:**

**Air conditioning - Charging (50.200)**

**Next operation:**

**Next operation:**

**Engine cooling system - Filling (10.400)**

**Next operation:**

**Engine cooling system - Install (10.400)**

**Next operation:**

**Hood - Install (90.100)**

**Next operation:**

**Side shield - Install (90.102)**

**Next operation:**

**Battery - Connect (55.302)**

## Engine - Dynamometer test

**NOTE:** For dynamometer test guidelines and general information, see: **Engine - General information - Dynamometer testing guidelines (10.001)**

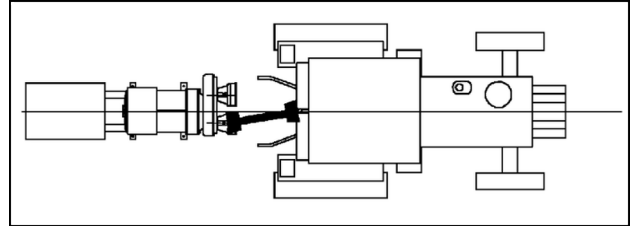
### Pre-test procedure

1. Correctly align the tractor to the dynamometer.

**NOTE:** Connect the driveline with a slight offset to properly load the drive shaft universal joints.

2. Confirm that Mechanical Front Drive (MFD) and the Power Take-Off (PTO) are disengaged.
3. Move the transmission control lever to the Park position and chock the wheels.
4. Stop the engine and connect the PTO shaft to the dynamometer.
5. Ensure that all safety guards are in place and that the dynamometer controls are set to the unloaded position.
6. Start the engine and check for fuel, oil, and coolant leaks. Correct as required.
7. Check the engine high idle RPM with the PTO disengaged. Check that the electronic engine throttle position is achieving **100%**. Throttle calibration is the only method for adjusting engine idle RPM on electronic engines. Shut off constant speed control when dynamometer testing.
8. Gradually, over the period of approximately one hour, apply load to the tractor until the engine RPM reduces to the rated engine RPM for the model being tested. Refer to the Operator Manual for the correct RPM.
9. Run the tractor at the rated RPM for **15 min** to thoroughly warm and stabilize the engine.
10. Ensure the tractor transmission oil temperature is a minimum of **60 °C (140 °F)**.
11. Slowly remove load from the tractor.
12. When the load has been fully removed, disengage the PTO.

The tractor is now ready for performance testing, which should be performed immediately before the engine and transmission cool down.



RAIL16TR00327AA 1



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## Performance measurement

**NOTE:** The steps that follow describe a general procedure for power/orque measurement. Some dynamometers may require a different procedure than the procedure stated below. In ALL cases, the dynamometer manufacturer's instruction manual should be consulted.

1. With the engine RPM at low idle engage the PTO and raise the engine RPM to the maximum no load RPM.
2. Gradually apply load to the dynamometer until rated speed full power has been reached.
3. Maintain rated RPM power for approximately **5 min**, check for any leaks or abnormal noises. If any fault is found, stop the test and correct the fault before restarting the test. If the engine has stopped for more than **10 min**, return to the pre-test procedure above to warm the engine.
4. Record all test data at varying engine RPM. See worksheet: **Engine - General information - Dyno test worksheet (10.001)**.
5. To measure maximum torque, continue applying load past the point of full power at rated RPM until maximum torque has been reached. Aaccomplish this in **100 RPM** increments until the maximum torque is achieved.

## Converting torque to a power figure

Some dynamometers may measure torque only. Use the following formula to convert the torque figures obtained to a power figure:

Power (kW) = (torque (Nm) x PTO (RPM) / K (constant)

**NOTE:** For K (constant), consult your dynamometer instruction manual.

6. The following formulas may be useful:
  - To convert kW (Kilowatts) into HP (Horsepower), multiply kW by 1.34.
  - To convert HP (Horsepower) into kW (Kilowatts), multiply HP by 0.746.
  - To convert lb ft (pounds feet) into Nm (Newton meters), multiply lb ft by 1.3558.
  - To convert (Nm) into (lb ft), multiply (Nm) by 0.7376.
  - Torque reserve or torque rise (as a percentage) equals:
    - ((Max torque - torque at rated RPM) / torque at rated RPM) x 100 = % torque rise

$$\frac{(\text{Max torque} - \text{torque at rated RPM})}{\text{Torque at rated RPM}} \times 100 = \% \text{ of torque rise}$$

RAIL17TR00629AA 2

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