

621F
721F
Tier 2

Wheel Loader

from PIN NBF213588 and above

SERVICE MANUAL

Part number 47388956

1st edition English

June 2012

Replaces part number 84487573

CASE
CONSTRUCTION

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INTRODUCTION

Torque – 621F Torque Specifications

621F INT

Axle

Wheel mounting nuts	640 - 720 N·m (472 - 531 lb ft)
Front axle mounting bolts	651 - 678 N·m (480 - 500 lb ft)
Rear axle trunnion pin bolts	325 - 353 N·m (240 - 260 lb ft)

Chassis

Cab mounts	773 - 854 N·m (570 - 630 lb ft)
Exhaust stack to hood	36 - 44 N·m (27 - 32 lb ft)
Counterweight mounting bolts	955 - 1075 N·m (704 - 793 lb ft)
Articulation pivot pin bolts	224 - 278 N·m (165 - 205 lb ft)
Articulation mount pin retainer bolts	69 N·m (51 lb ft)
Seat mounting bolts	73 - 87 N·m (54 - 64 lb ft)
Steering wheel retaining nut	50 N·m (37 lb ft)
Hydraulic oil filter mounting bolts	23 - 27 N·m (17 - 20 lb ft)
Steering cylinder base end pin retaining bolt	290 - 375 N·m (214 - 277 lb ft)
Steering cylinder rod end pin retaining bolt	Bolts must turn freely
Horn mounting bolt	53 - 62 N·m (39 - 46 lb ft)
Hood - rear grill bolts	9 - 11 N·m (7 - 8 lb ft)
Hood hinge bolts	65 - 79 N·m (48 - 58 lb ft)
Steps - lower entry strap bolts	27 - 31 N·m (20 - 23 lb ft)

Cooling

Fan to fan hub	40 - 48 N·m (30 - 35 lb ft)
Fan hub to motor shaft (no impact tools)	67 - 74 N·m (49 - 55 lb ft)
Radiator hose clamps	10.1 - 11.3 N·m (7.4 - 8.3 lb ft)
Hydraulic tank cover nuts	14 - 18 N·m (10 - 13 lb ft)
Hydraulic tank sight gauge	2.7 - 5.5 N·m (2.0 - 4.1 lb ft)

Driveshafts

Coupling to flywheel	53 - 62 N·m (39 - 46 lb ft)
Driveshaft to coupling	53 - 62 N·m (39 - 46 lb ft)
Front driveshaft yoke nut	339 - 373 N·m (250 - 275 lb ft)
Carrier bearing mounting bolts	99 - 128 N·m (73 - 94 lb ft)
550R U-joints	75 - 81 N·m (55 - 60 lb ft)
410R U-joints	61 - 81 N·m (45 - 60 lb ft)
Dust cover mounting bolts	20 - 27 N·m (15 - 20 lb ft)

INTRODUCTION

Engine

Engine mounting brackets	118 - 133 N·m (87 - 98 lb ft)
Engine rubber isolator mounts (Qty 4)	244 - 298 N·m (180 - 220 lb ft)
Brake pump to engine mounting	57 - 65 N·m (42 - 48 lb ft)
Brake pump gear nut (no impact tools)	70 - 79 N·m (52 - 58 lb ft)
Turbo to turbo exhaust elbow clamp	5 N·m (4 lb ft)
Muffler to turbo elbow exhaust clamp	20 - 25 N·m (15 - 18 lb ft)
Front muffler bracket to engine block	118 - 133 N·m (87 - 98 lb ft)
Muffler brackets to muffler	114 - 128 N·m (84 - 94 lb ft)
Charge Air Cooler (CAC) hose clamps (Qty 8)	10.1 - 11.3 N·m (7.4 - 8.3 lb ft)
Air cleaner to turbo hose clamp	10.1 - 11.3 N·m (7.4 - 8.3 lb ft)
Alternator pulley (no impact tools)	60 - 70 N·m (44 - 52 lb ft)
Starter mounting nuts	40 - 50 N·m (30 - 37 lb ft)

Loader

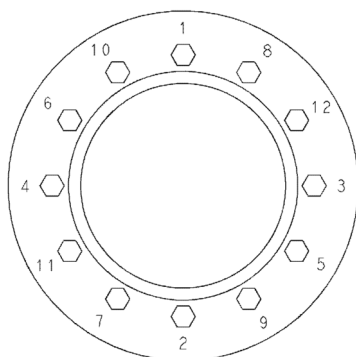
XT loader linkage bolts	650 - 732 N·m (479 - 540 lb ft)
XT guide link nuts	240 - 305 N·m (177 - 225 lb ft)
Loader link pin keeper	325 - 373 N·m (240 - 275 lb ft)

Transmission

Transmission rubber isolator mounts (Qty 3)	890 - 1000 N·m (656 - 738 lb ft)
Transmission upper mounting bracket bolts	251 - 319 N·m (185 - 235 lb ft)
Transmission lower mounting bracket bolts (Qty 2)	481 - 590 N·m (355 - 435 lb ft)
Hydraulic pump to transmission mounting	335 - 375 N·m (247 - 277 lb ft)
Cooler clamps	10.1 - 11.3 N·m (7.4 - 8.3 lb ft)
Hydraulic pump suction hose clamp flange	73 - 90 N·m (54 - 66 lb ft)
Steering priority manifold to pump	37 - 48 N·m (27 - 35 lb ft)
Transmission fill tube bolts	17 - 33 N·m (13 - 24 lb ft)
Transmission sight gauge bolts	2.7 - 5.5 N·m (2 - 4 lb ft)

Wheels

Wheel nuts	Initial torque: 298 N·m (220 lb ft) Final torque: 640 - 720 N·m (472 - 531 lb ft)
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RCPH10WHL320AAH 1

Do the following initial and final torque procedures:

1. Tighten wheel nuts to an initial torque of **298 N·m (220 lb ft)** in sequence shown in figure
2. Tighten wheel nuts to a final torque of **640 - 720 N·m (472 - 531 lb ft)** in sequence shown in figure

Torque – 721F Torque Specifications

721F INT

Axle

Wheel mounting bolts	640 - 720 N·m (472 - 531 lb ft)
Front axle mounting bolts	765 - 855 N·m (564 - 631 lb ft)
Rear axle trunnion pin bolts	651 - 678 N·m (480 - 500 lb ft)

Chassis

Cab mounts	773 - 854 N·m (570 - 630 lb ft)
Exhaust stack to hood	36 - 44 N·m (27 - 32 lb ft)
Counterweight mounting bolts	955 - 1075 N·m (704 - 793 lb ft)
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Seat mounting bolts	73 - 87 N·m (54 - 64 lb ft)
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Fan to fan hub	40 - 48 N·m (30 - 35 lb ft)
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Hydraulic tank sight gauge	2.7 - 5.5 N·m (2.0 - 4.1 lb ft)

Driveshafts

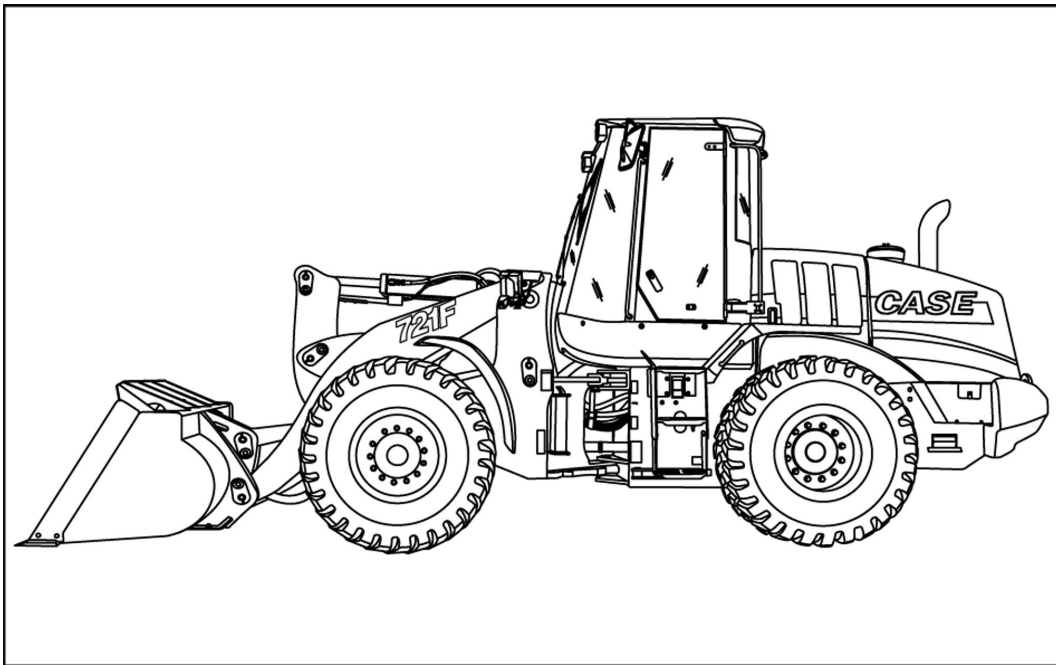
Coupling to flywheel	53 - 62 N·m (39 - 46 lb ft)
Driveshaft to coupling	53 - 62 N·m (39 - 46 lb ft)
Front driveshaft yoke nut	339 - 373 N·m (250 - 275 lb ft)
Carrier bearing mounting bolts	99 - 128 N·m (73 - 94 lb ft)
550R U-joints	75 - 81 N·m (55 - 60 lb ft)
Dust cover mounting bolts	20 - 27 N·m (15 - 20 lb ft)
Flex plate to flywheel bolts	33 - 41 N·m (24 - 30 lb ft)
Carrier bearing bolt	150 - 164 N·m (111 - 121 lb ft)
Drive line mounting bolts	136 - 149 N·m (100 - 110 lb ft)

CASE

CONSTRUCTION

SERVICE MANUAL

Engine



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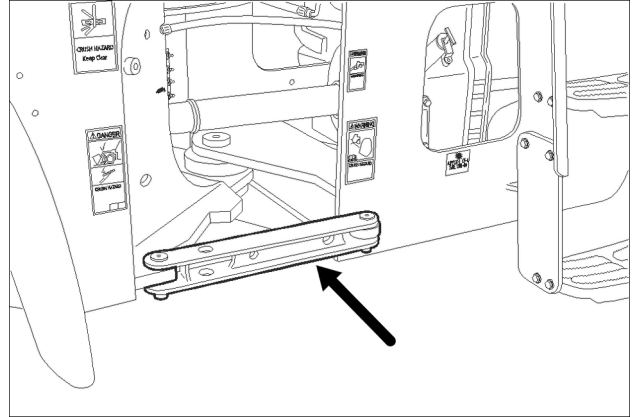
CONSUMABLES INDEX

Consumable	IU	PAGE
CASE Akcela Engine oil 15W-40	Engine - Install	10.001 / 45

Engine - Remove

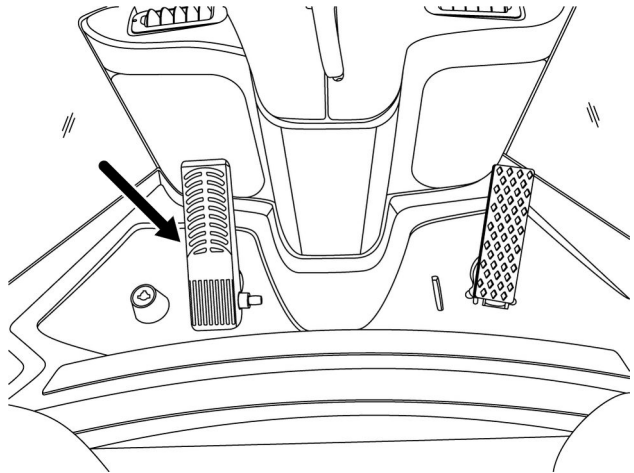
621F INT, 721F INT

1. Park machine on a level surface and lower the bucket to the ground. Put articulation lock in LOCKED position and stop the engine.



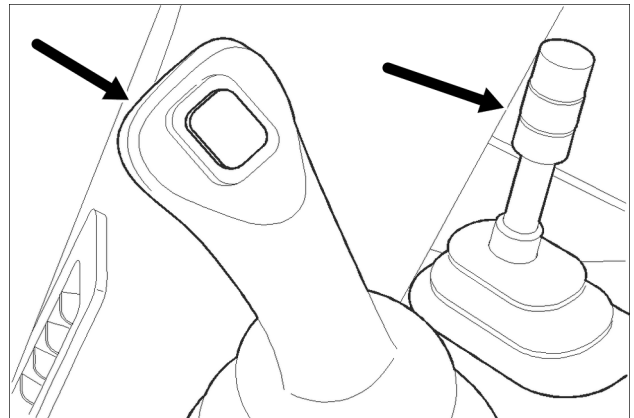
RCPH10WHL063BAL 1

2. Actuate the brake pedal several times to discharge brake accumulators.



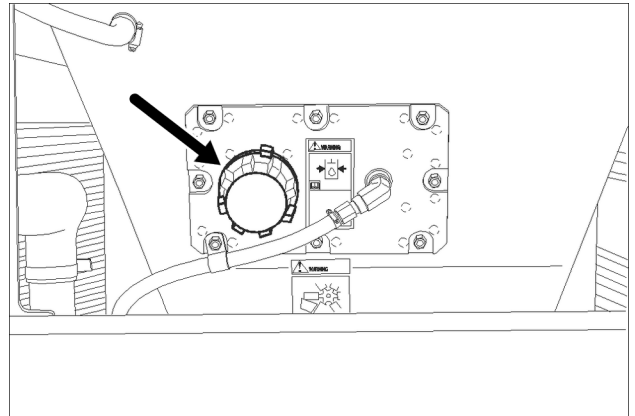
RCPH10WHL435AAH 2

3. Put key switch in ON position. Pilot control switch must be in the ON position and then move loader control lever(s) back and forth at least 30 times to release any pressure from hydraulic circuit. Put key switch in OFF position.



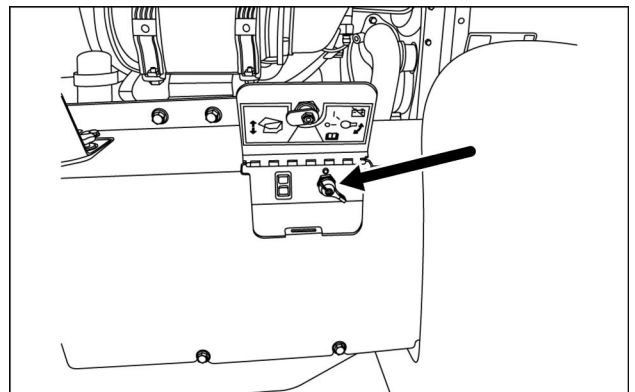
RCPH10WHL119BAL 3

4. Raise grill located above the cooler box just behind the cab. Then slowly loosen the hydraulic reservoir filler cap to release pressure in the reservoir.



RCPH10WHL099BAL 4

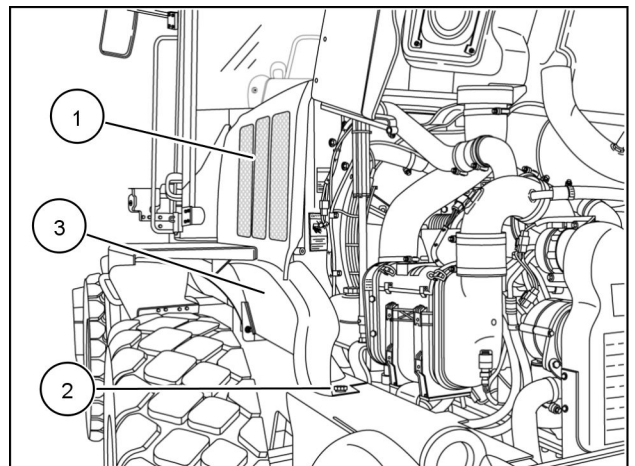
5. Locate the master and hood raise switch by the battery box. Then raise the hood and put the master disconnect switch in the OFF position.



RCPH10WHL106AAH 5

6. Raise both side panels (1). Then remove the thumb screws (2) and inner fender panels (3).

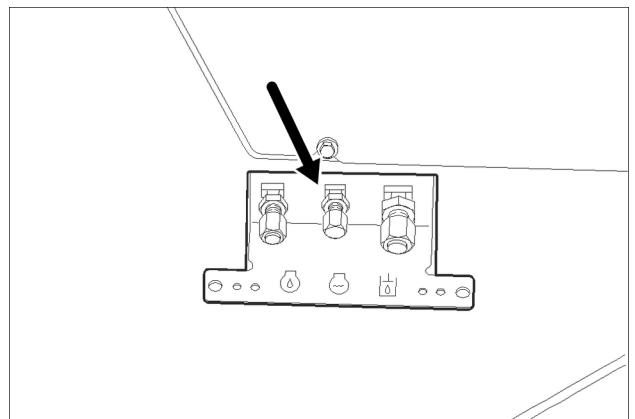
NOTE: Left side of the machine is shown. The operation is similar for the right side.



RAPH12WEL0597AA 6

7. Place a suitable container below radiator drain, remove radiator cap and coolant drain plug (arrow) to drain engine coolant. Then reinstall drain plug and radiator cap after coolant has drained.

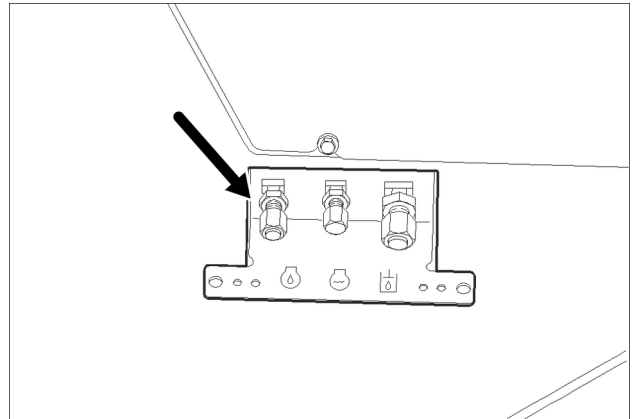
NOTE: See machine specifications for cooling system volume.



RCPH10WHL054BAL 7

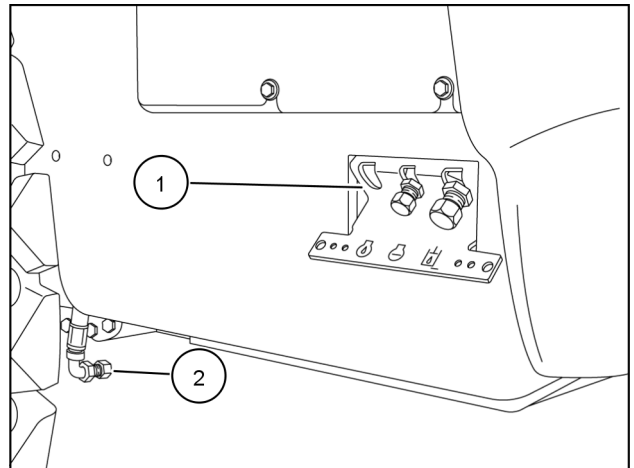
- Place a suitable container below engine oil drain. Remove drain plug and drain oil into container. Then reinstall drain plug.

NOTE: See machine specifications for engine oil sump volume.



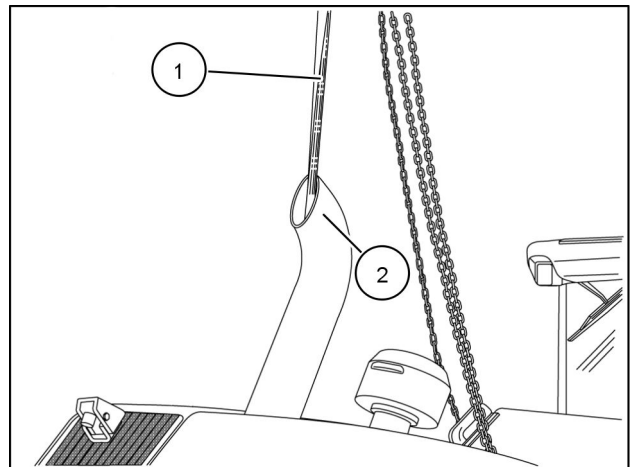
RCPH10WHL054BAL 8

- After oil drains, disconnect drain hose from frame by removing jam nut (1). Then pull hose from frame in preparation for engine removal. (2)



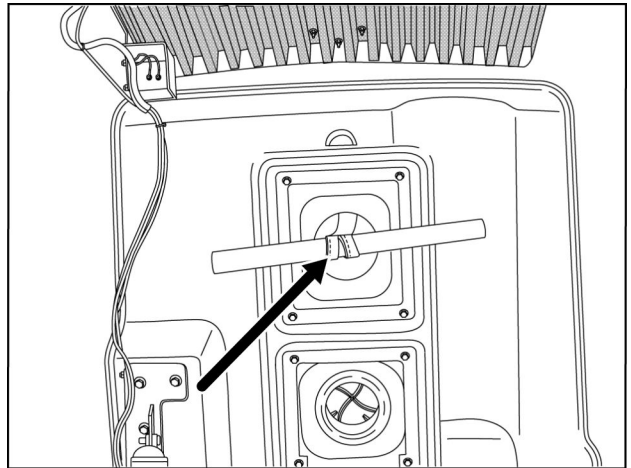
RAPH12WEL0598AA 9

- Double up a nylon lifting strap (1) and slide through the exhaust stack (2) on the hood.



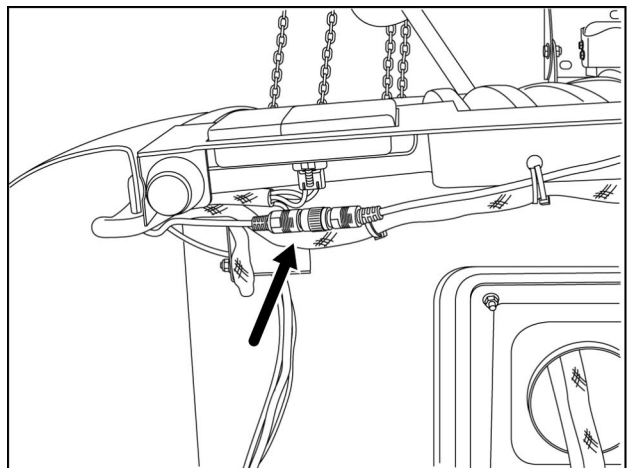
RAPH12WEL0599AA 10

11. Place a bar or pipe through the strap loop inside the hood and attach the strap to a suitable lifting device. Then raise the hood with the strap to release tension on the lifting motor.



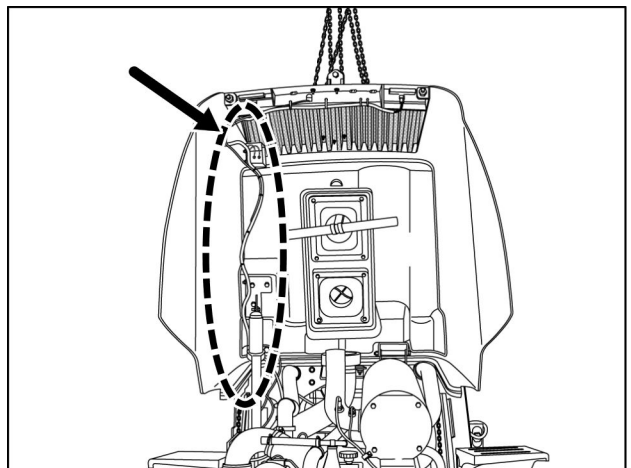
RAPH12WEL0600AA 11

12. Tag and disconnect the camera wire harness (if machine is equipped with a camera.)



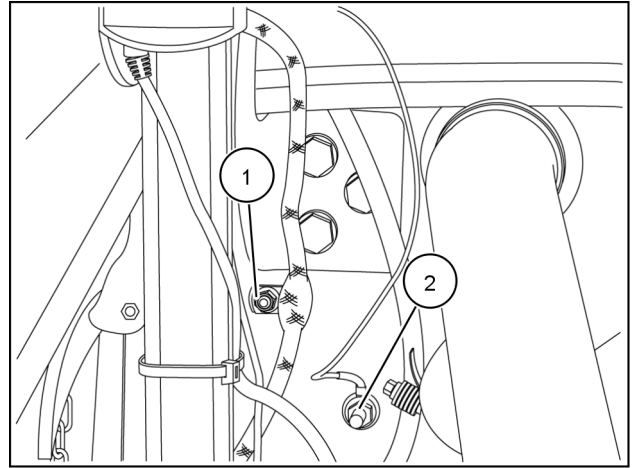
RAPH12WEL0601AA 12

13. Cut wire ties and remove camera wire harness from hood. Then place it off to the side in a safe location. (If machine is equipped with a camera.)



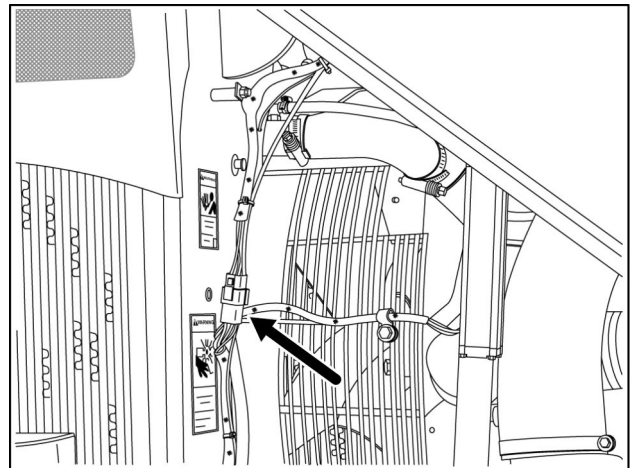
RAPH12WEL0602AA 13

14. Remove mount bolt (1) and backup alarm wiring harness clamp from cooler housing. Then tag and remove hood ground wire (2) from cooler housing.



RAPH12WEL0603AA 14

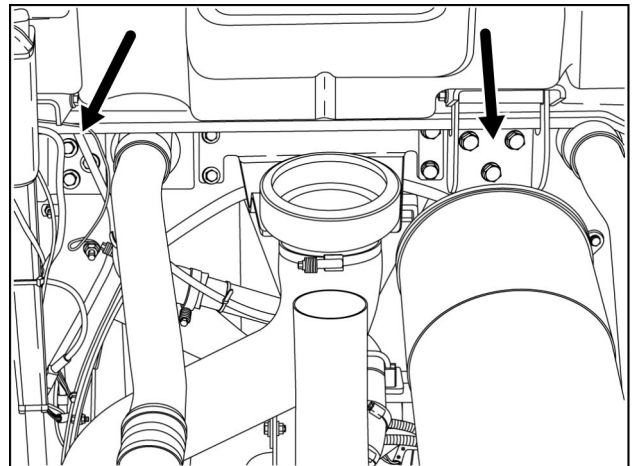
15. Tag and disconnect hood wiring harness connector from rear chassis wiring harness connector.



RAPH12WEL0604AA 15

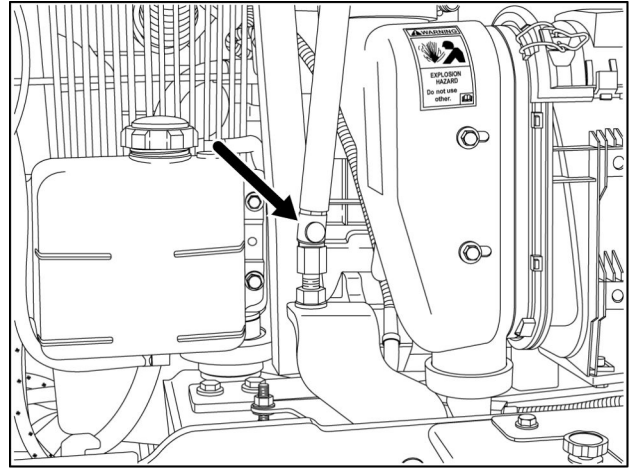
16. Have another person balance the hood and LOOSEN the hood hinge mounting bolts (arrows) from the cooler frame.

NOTE: Do not remove the hood hinge mounting bolts at this time.



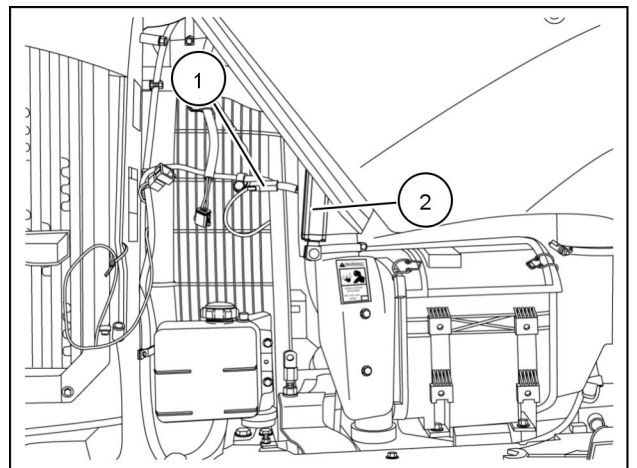
RAPH12WEL0605AA 16

17. Remove the pin from the bottom of the lifting motor cylinder where it attaches to the loader frame.



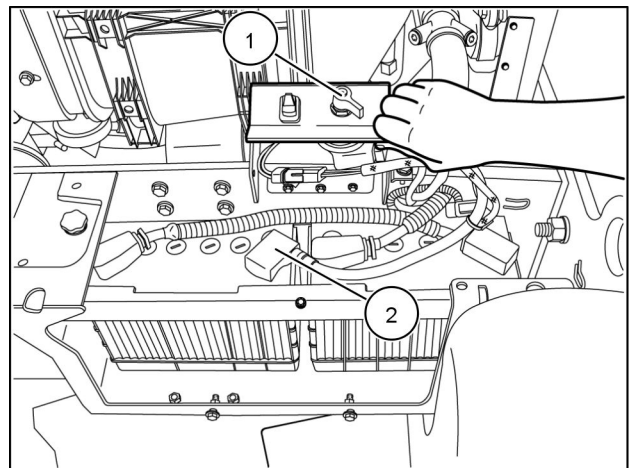
RAPH12WEL0606AA 17

18. Put the master disconnect switch in the ON position. Then, retract the lifting motor cylinder (2), replace pin and disconnect wiring harness (1).



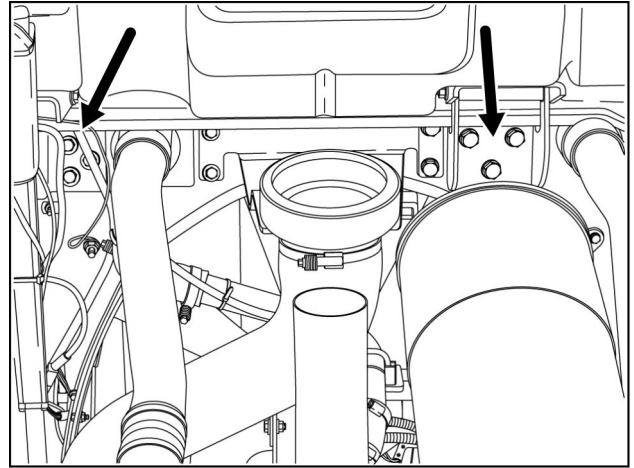
RAPH12WEL06062AA 18

19. Put master disconnect switch (1) in OFF position. Remove the battery cover and disconnect ground lead from the batteries (2). You may replace battery cover if desired to give you a place to stand.



RAPH12WEL0608AA 19

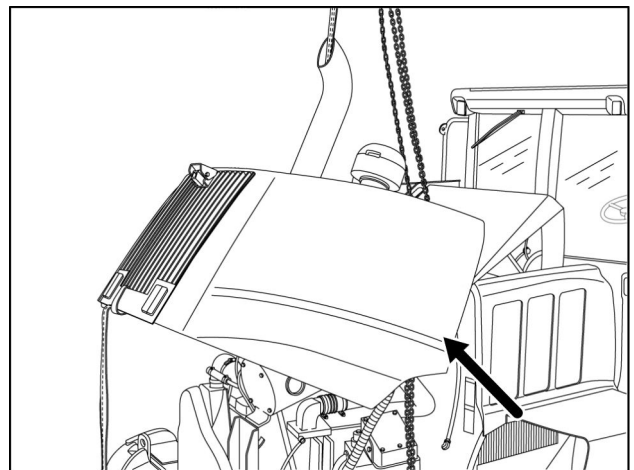
20. Have another person balance the hood and remove the hood hinge mounting bolts (arrows) from the cooler frame.



RAPH12WEL0605AA 20

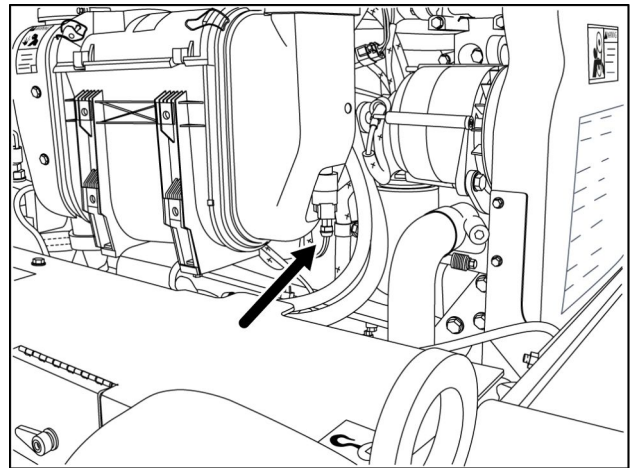
21. Carefully raise and remove hood from loader. Lower hood onto suitable platform and disconnect lifting equipment.

NOTE: Radiator overflow hose may interfere with left hand hood hinge movement and hood removal.



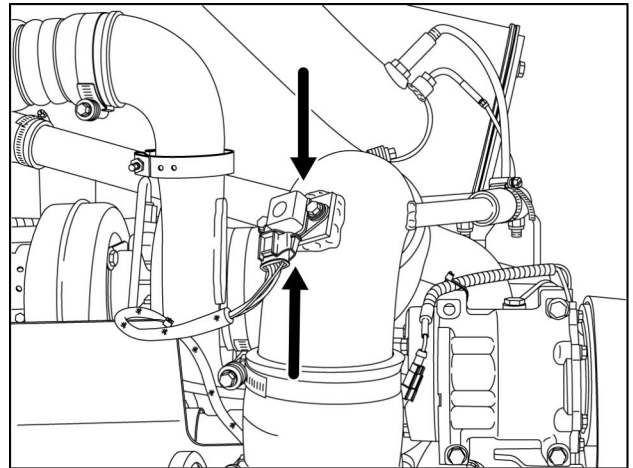
RAPH12WEL0609AA 21

22. Tag and disconnect engine wiring harness connector from air filter restriction switch.



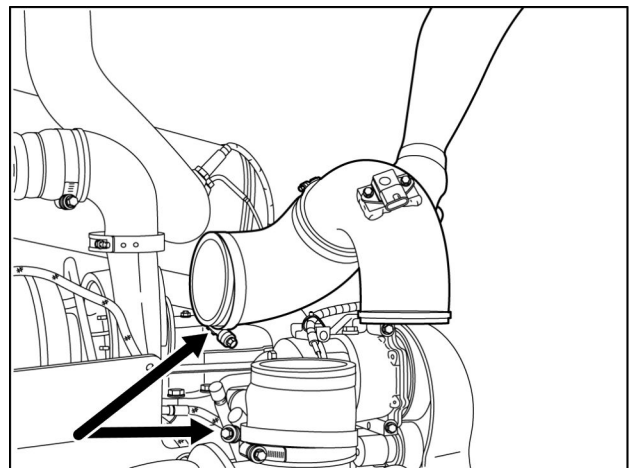
RAPH12WEL0610AA 22

23. Tag and disconnect engine wiring harness connector from air inlet humidity sensor.



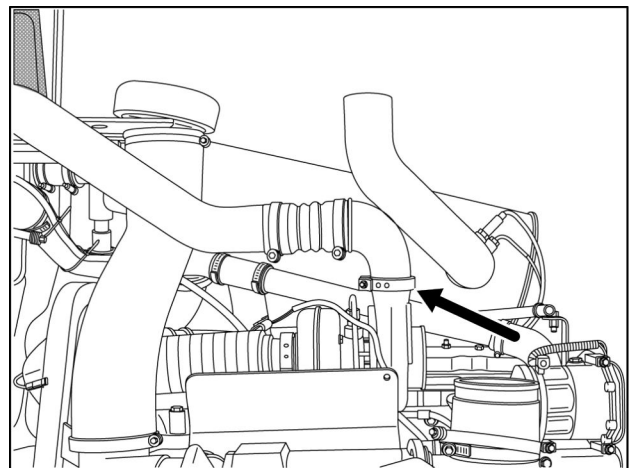
RAPH12WEL0611AA 23

24. Loosen clamps on turbocharger and air filter housing. Then remove the intake air hose. Cover turbocharger inlet to prevent debris entry.



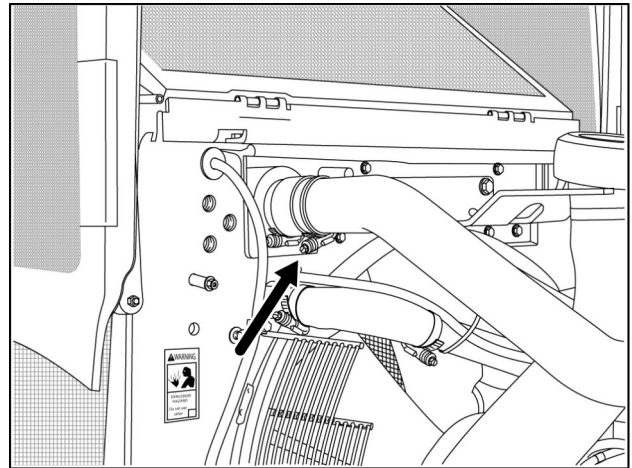
RAPH12WEL0613AA 24

25. Loosen the clamp on the turbocharger for the after cooler inlet elbow.



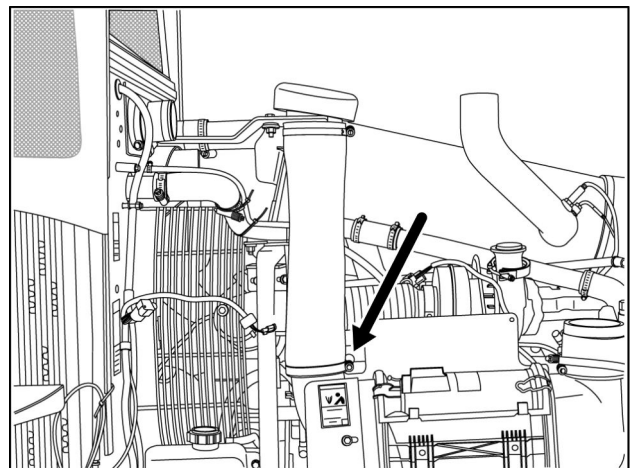
RAPH12WEL0614AA 25

26. Loosen the clamp on the hose at the after cooler inlet and remove the tube.



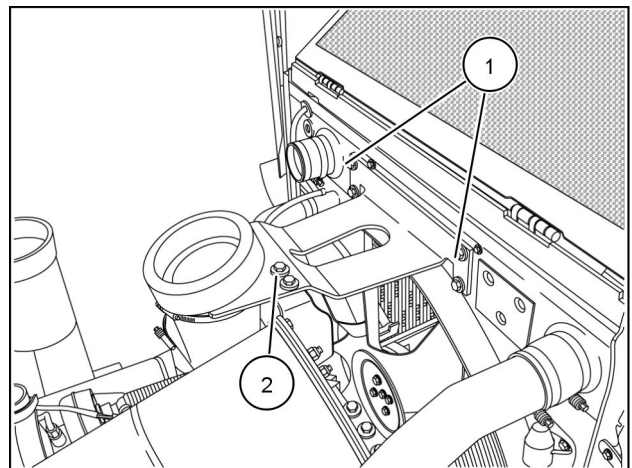
RAPH12WEL0615AA 26

27. Loosen clamp on the air inlet hose at the air filter housing.



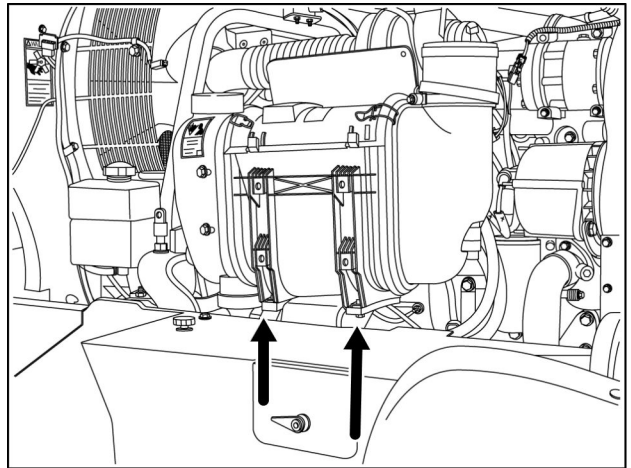
RAPH12WEL0616AA 27

28. Remove bolts from the cooler box (1) and the center support bracket (2) securing the air inlet hose and bracket. Then remove air inlet hose and bracket.



RAPH12WEL0617AA 28

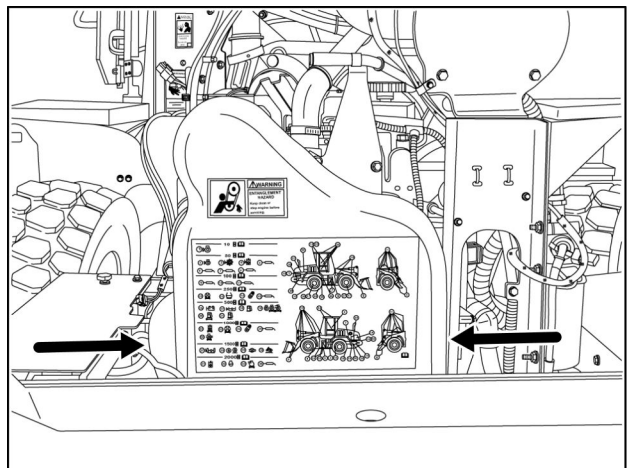
29. Remove four the bolts securing the air filter housing to the mounting support bracket. Then remove air filter housing.



RAPH12WEL0618AA 29

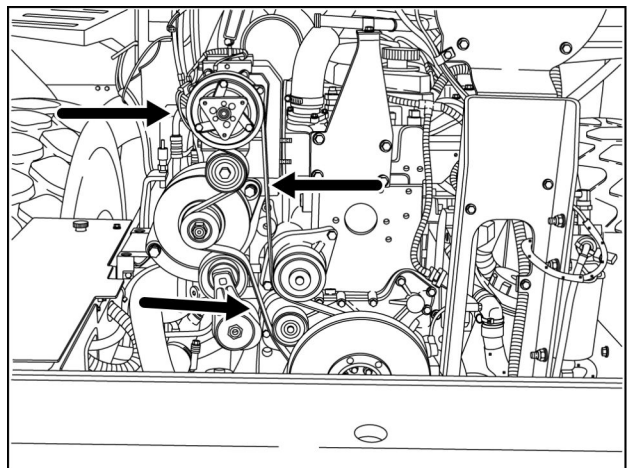
30. Remove the four mounting bolts from the belt cover. Then remove the cover.

NOTE: After removing the belt cover, remove the cover mounting bracket from the left rear side of machine frame.



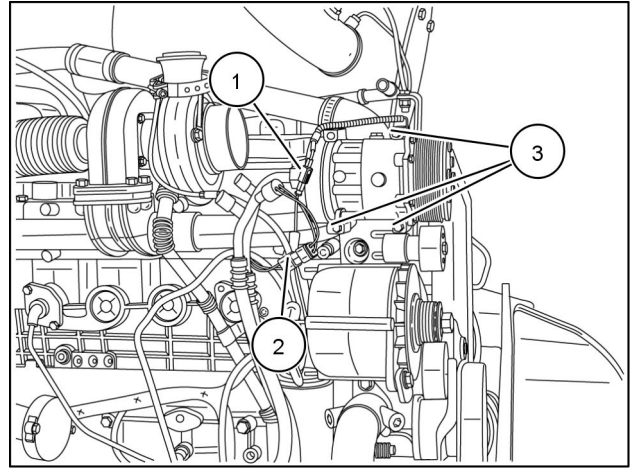
RAPH12WEL0619AA 30

31. Remove the drive belt from the engine.



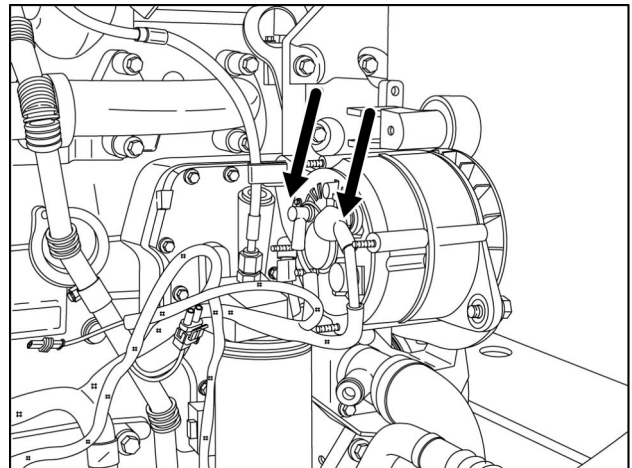
RAPH12WEL0620AA 31

32. If loader is equipped with air conditioning, identify, tag, and disconnect the engine wiring harness connectors from air compressor clutch connector (1) and high pressure switch (2). Then remove the three mounting bolts (3) for the compressor and carefully set it on the left battery cover.



RAPH12WEL0621AA 32

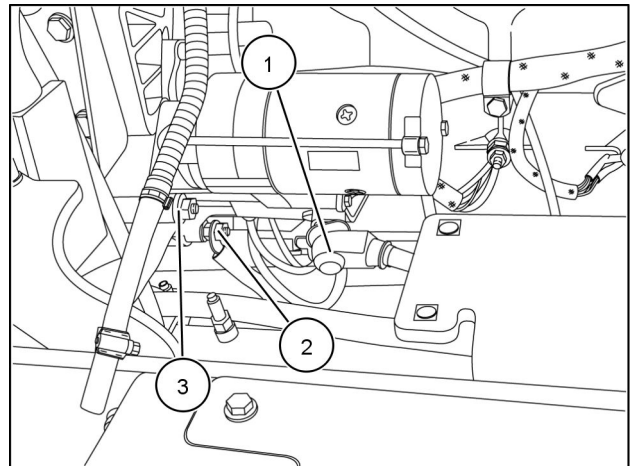
33. Tag and disconnect the wiring from the alternator.



RAPH12WEL0622AA 33

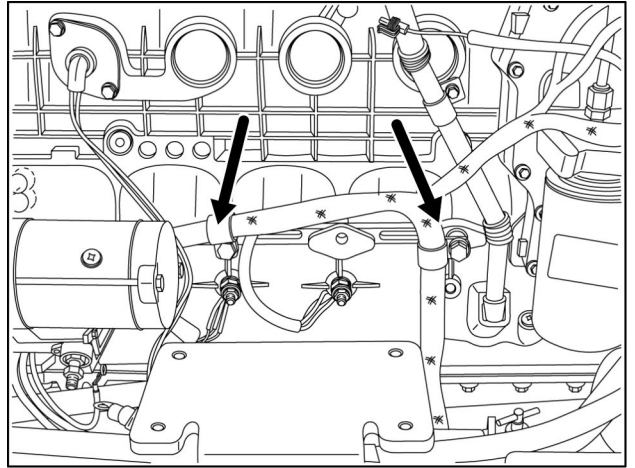
34. Tag and remove the wires from the starter solenoid (1), the ground cable (2), and ground strap (3) from the starter.

NOTE: Move the starter cables away from the engine.



RAPH12WEL0624AA 34

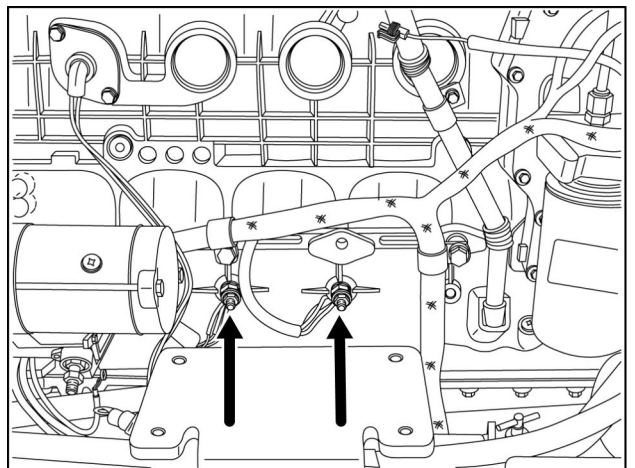
35. Remove bolts securing wiring harness clamps to engine.



RAPH12WEL0625AA 35

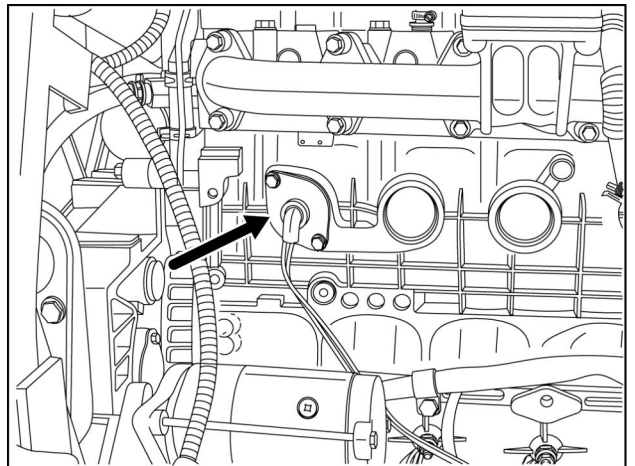
36. Remove ground wires from the engine.

NOTE: Move the wiring harness away from the engine.



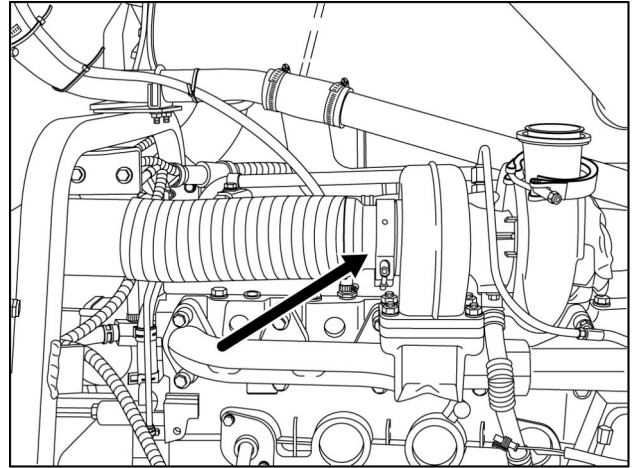
RAPH12WEL0625AA 36

37. If the machine is so equipped, unplug the engine block heater and set it aside.



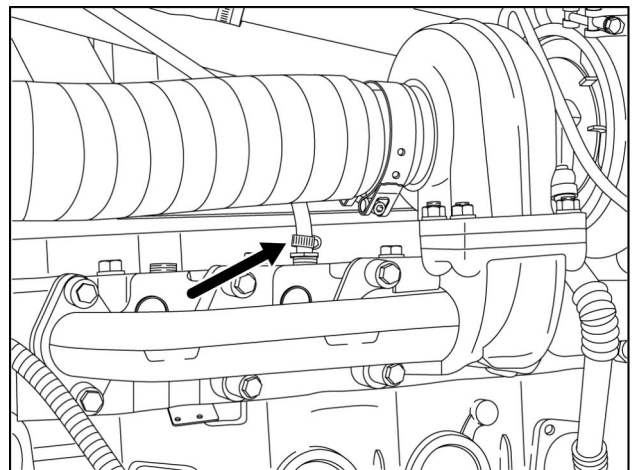
RAPH12WEL0626AA 37

38. Loosen the exhaust clamp from the turbocharger.



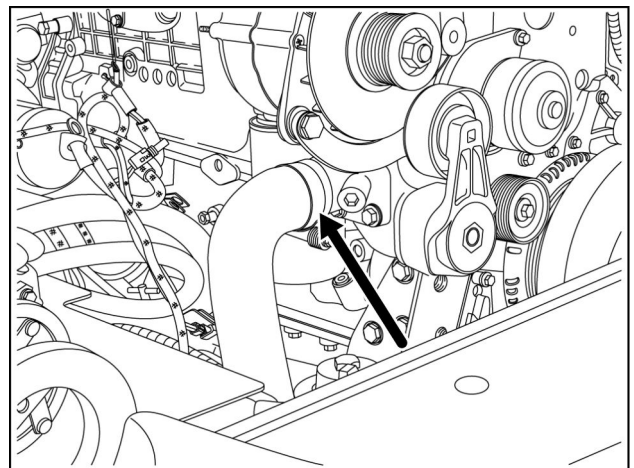
RAPH12WEL0627AA 38

39. Disconnect the engine coolant vent hose from the engine.



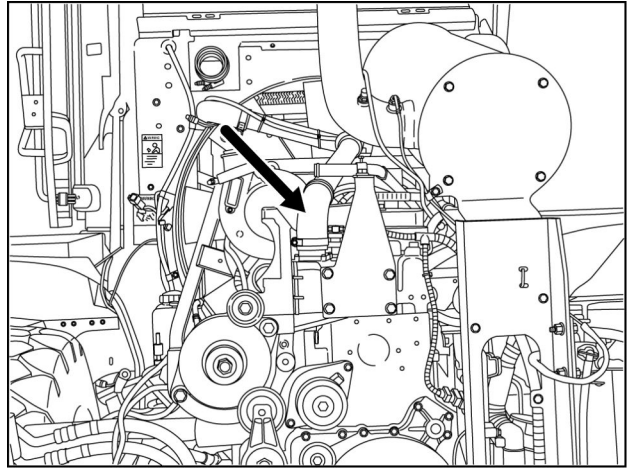
RAPH12WEL0628AA 39

40. Loosen clamps and remove lower coolant hose from the engine.



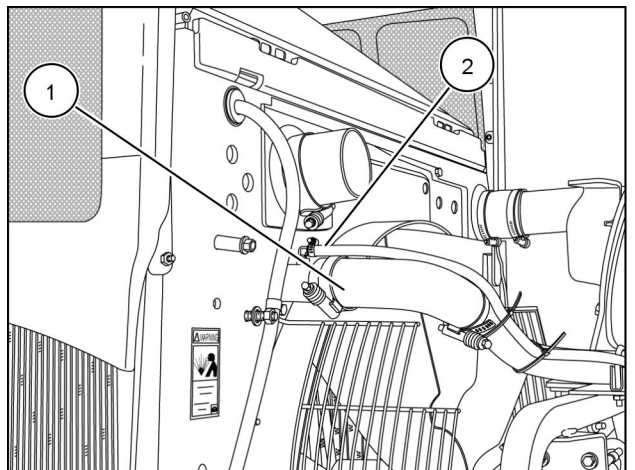
RAPH12WEL0629AA 40

41. Remove the radiator hose from the engine.



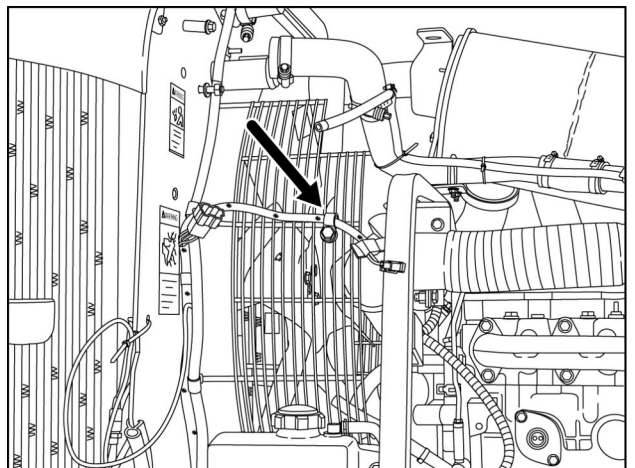
RAPH12WEL0630AA 41

42. Remove the return radiator hose (1) and the engine coolant vent hose (2) from the top of the radiator.



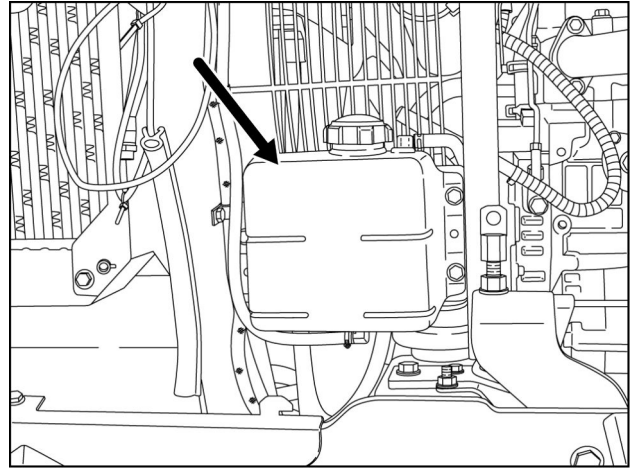
RAPH12WEL0631AA 42

43. Remove hood wire harness clamp from the fan shroud.



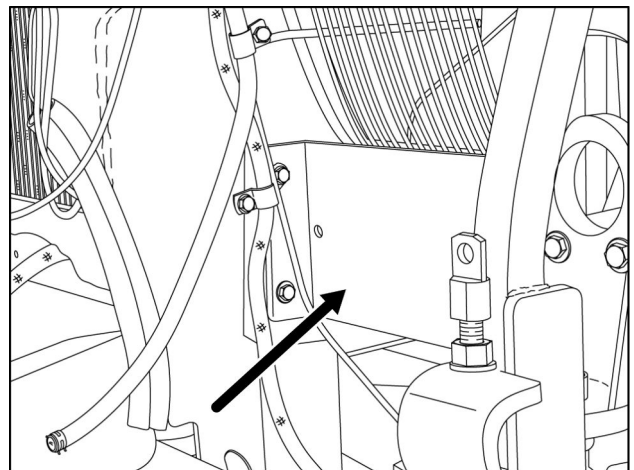
RAPH12WEL0632AA 43

44. Remove engine coolant overflow bottle.



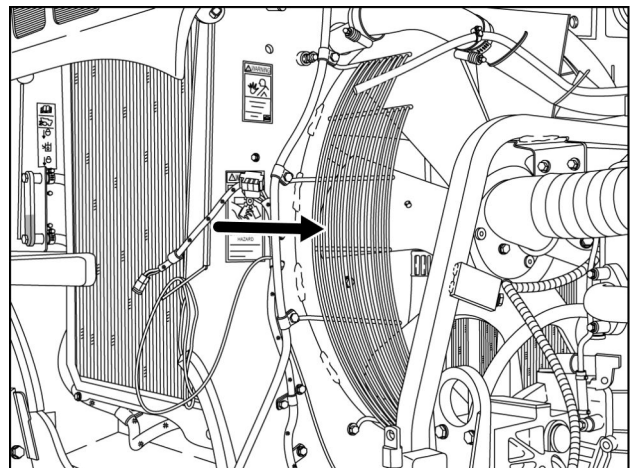
RAPH12WEL0633AA 44

45. Remove engine coolant overflow bottle support bracket.



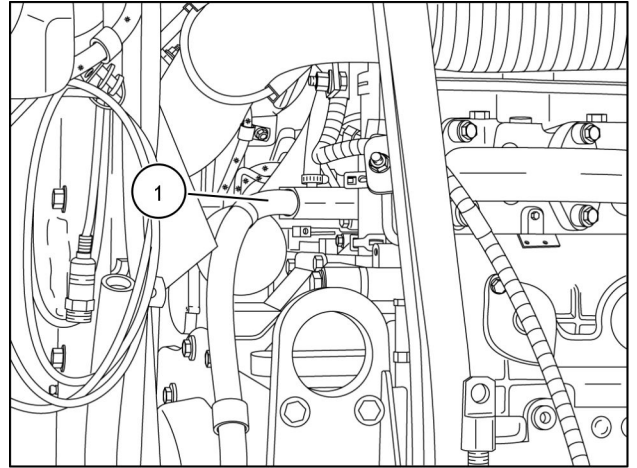
RAPH12WEL0634AA 45

46. Remove cooling fan screen.



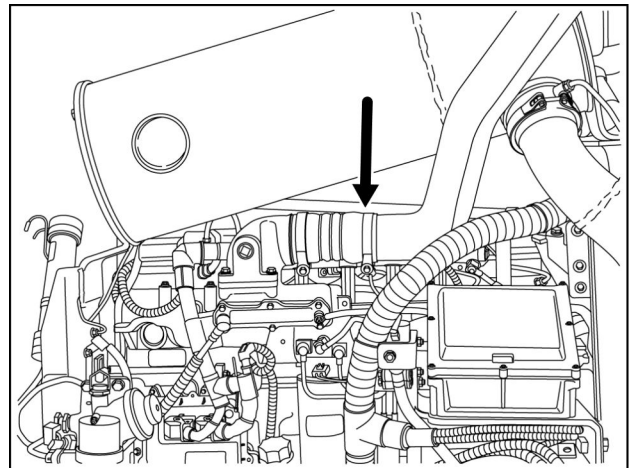
RAPH12WEL0635AA 46

47. Remove the heater hose (1) from the engine.



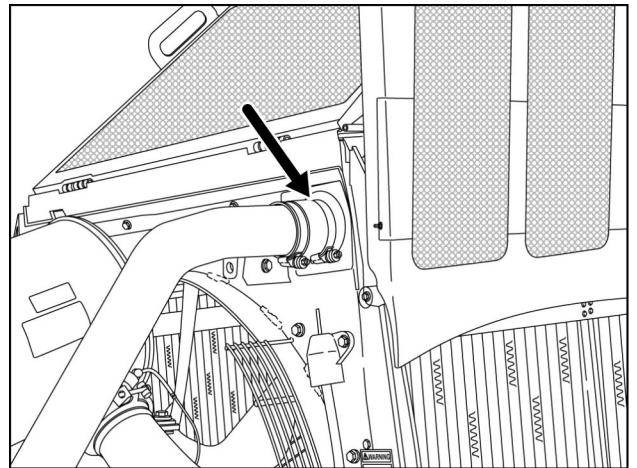
RAPH12WEL0636AA 47

48. Loosen the clamp on the intake manifold for the after cooler output hose.



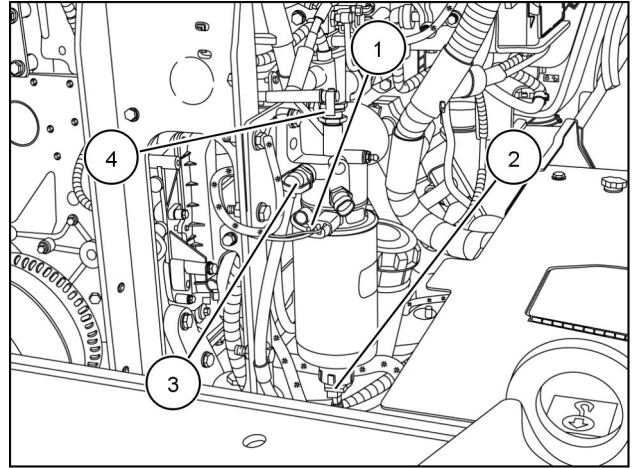
RAPH12WEL0637AA 48

49. Loosen the clamp on the after cooler, and remove the after cooler outlet tube from the machine.



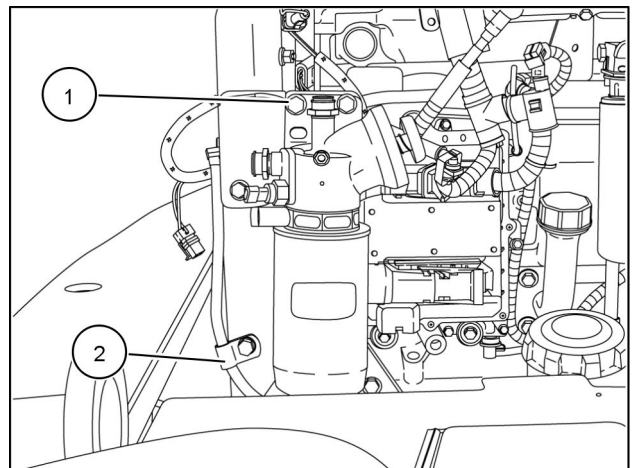
RAPH12WEL0638AA 49

50. Tag and disconnect the fuel filter heater wire (1) and water sensor (2). Then drain fuel filter and disconnect inlet (3) and outlet (4) fuel lines from the fuel filter head. Plug the lines and cap the fittings.



RAPH12WEL0639AA 50

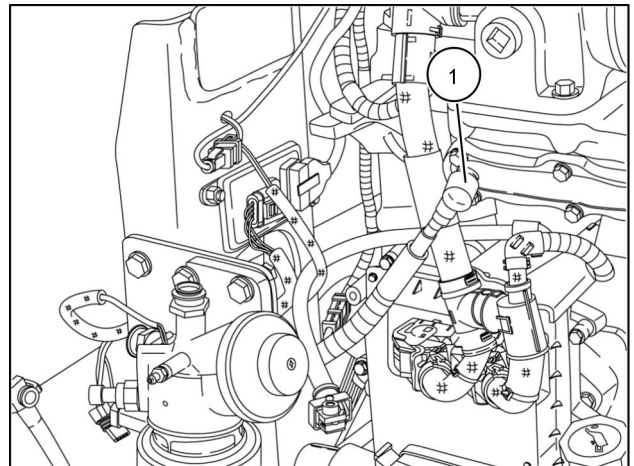
51. Remove ground wire and fuel filter head attachment bolt (1). Then remove fuel line support clamp (2).



RAPH12WEL0640AA 51

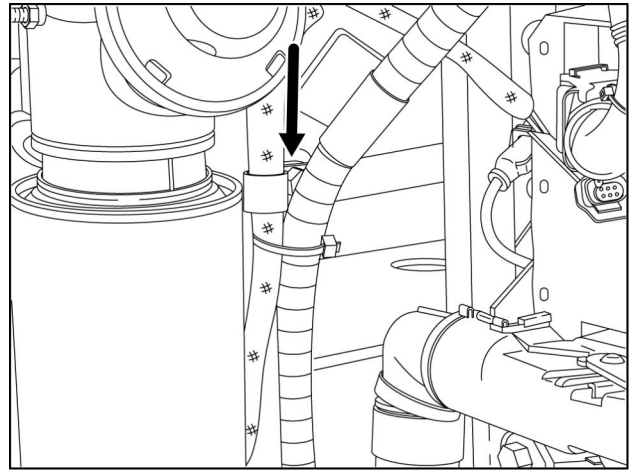
52. Tag and remove the grid heater cable (1).

NOTE: Hold the rear nut with a second wrench to prevent grid heater damage.



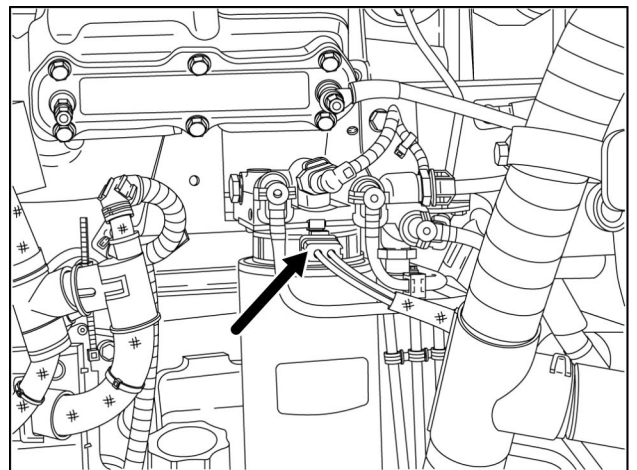
RAPH12WEL0063AA 52

53. Remove wire harness support clamp.



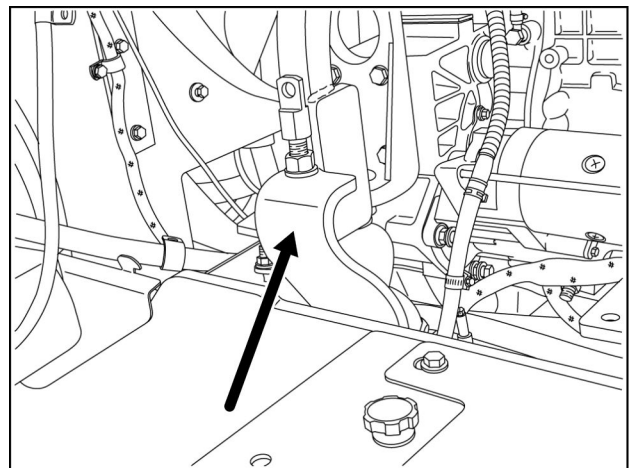
RAPH12WEL0064AA 53

54. Tag and disconnect wire harness from primary fuel filter.



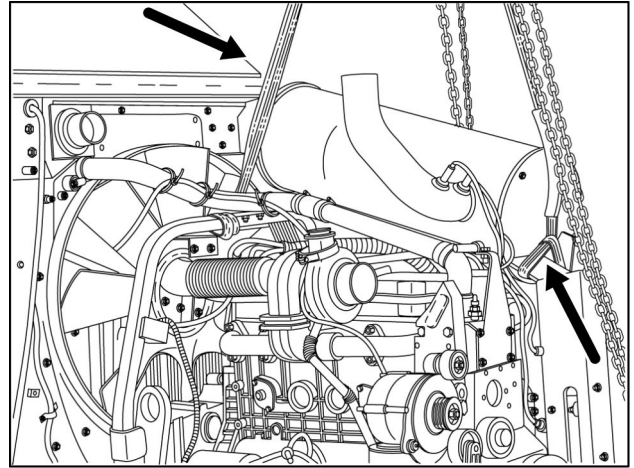
RAPH12WEL0068AA 54

55. Remove hood lift cylinder support bracket.



RAPH12WEL0071AA 55

56. Attach suitable lifting straps to the muffler support structure.



RAPH12WEL0072AA 56

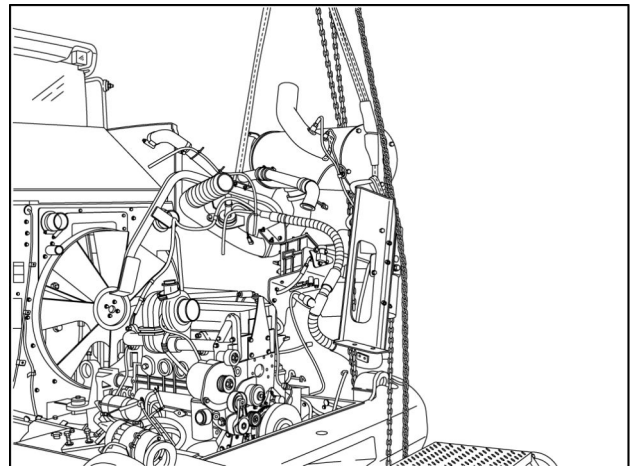
57. Remove bolts securing the muffler support structure at the front and rear of the structure. The mounting points are positioned on the left and right side in the front of the engine compartment, and in the center at the rear of the engine compartment.

NOTE: The right front mount is shown.



RAPH12WEL0073AA 57

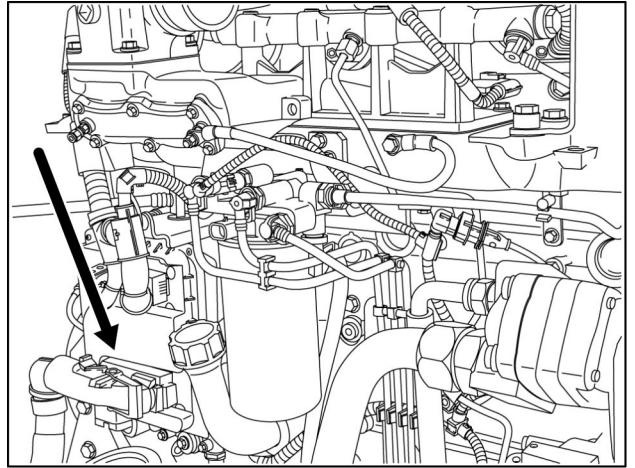
58. Use a suitable lifting device to carefully lift muffler support structure (with muffler system components attached) from the machine.



RAPH12WEL0075AA 58

59. Disconnect the wiring harness from the EDC 7 controller.

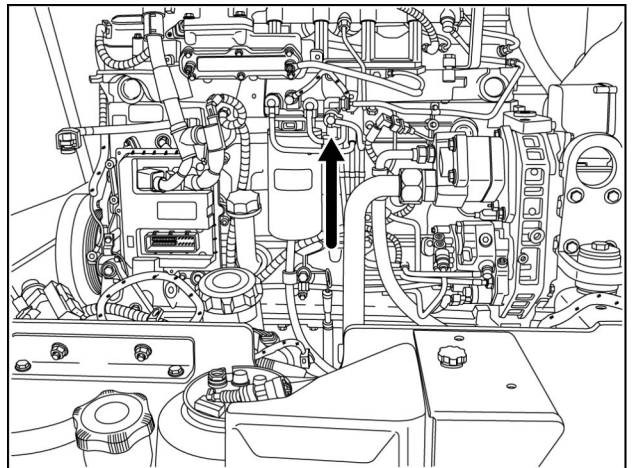
NOTE: Lifting up on the lever will release the connector from the controller.



RAPH12WEL0076AA 59

60. Remove the fuel line from the top of the primary fuel filter, plug the line and cap the fitting.

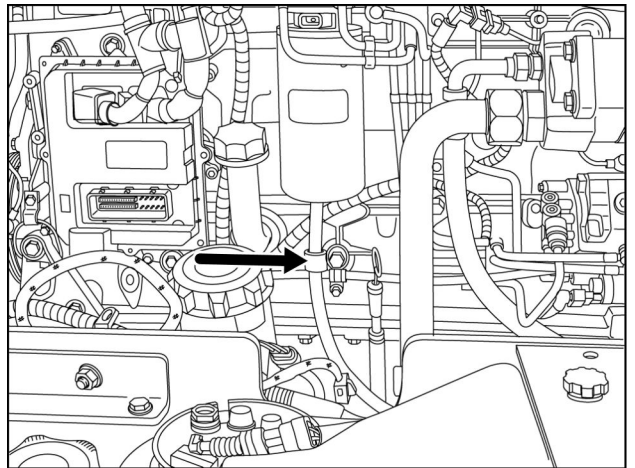
NOTE: Make note on how fuel lines are routed.



RAPH12WEL0077AA 60

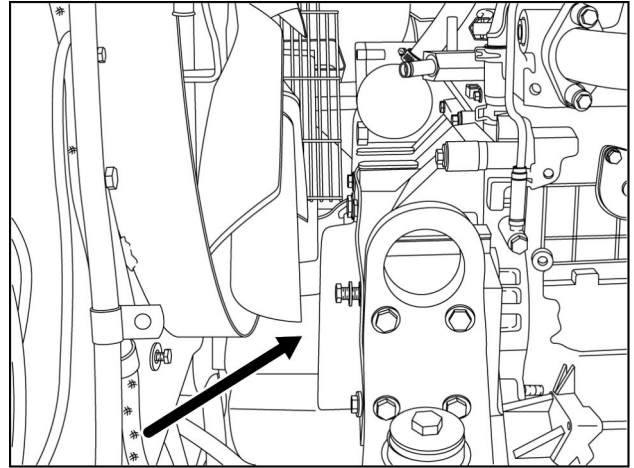
61. Remove the fuel line support clamp.

NOTE: Make note on how fuel lines are routed.



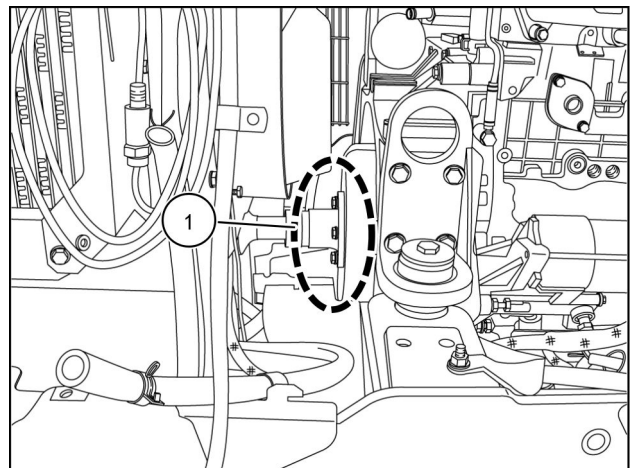
RAPH12WEL0078AA 61

62. Remove the upper and lower dust covers for the drive shaft.



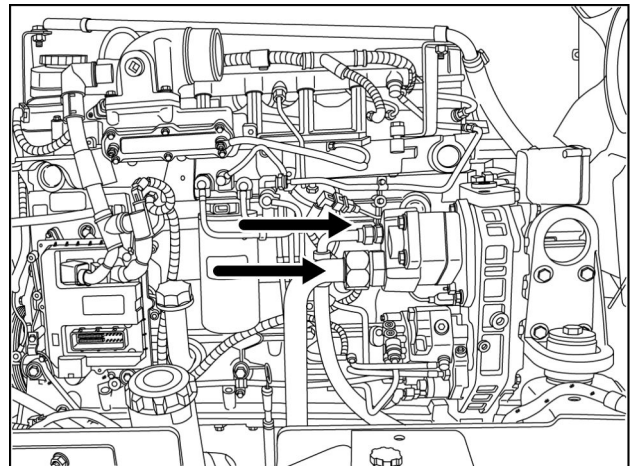
RAPH12WEL0079AA 62

63. Remove the drive shaft bolts (1) from the flywheel. Move the drive shaft clear of the flywheel.



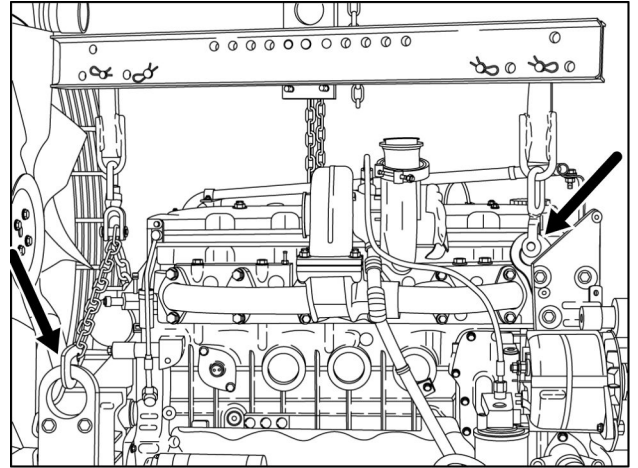
RAPH12WEL0080AA 63

64. Connect and turn on vacuum pump to hydraulic reservoir. Tag and remove the hydraulic lines from the brake system pump (arrow), plug the lines and cap the fittings.



RAPH12WEL0081AA 64

65. Connect suitable lifting equipment to engine lifting brackets. Take up all slack in lifting equipment. Remove the engine mounting bolts.
66. Slowly raise engine from rear chassis. Be sure all wire harness connections and hoses have been disconnected and are clear of the engine. Guide the oil drain hose from the frame as the engine is lifted. Remove engine from machine.



RAPH12WEL0082AA 65

Next operation:
Engine - Install (10.001)

Engine - Install

621F INT, 721F INT

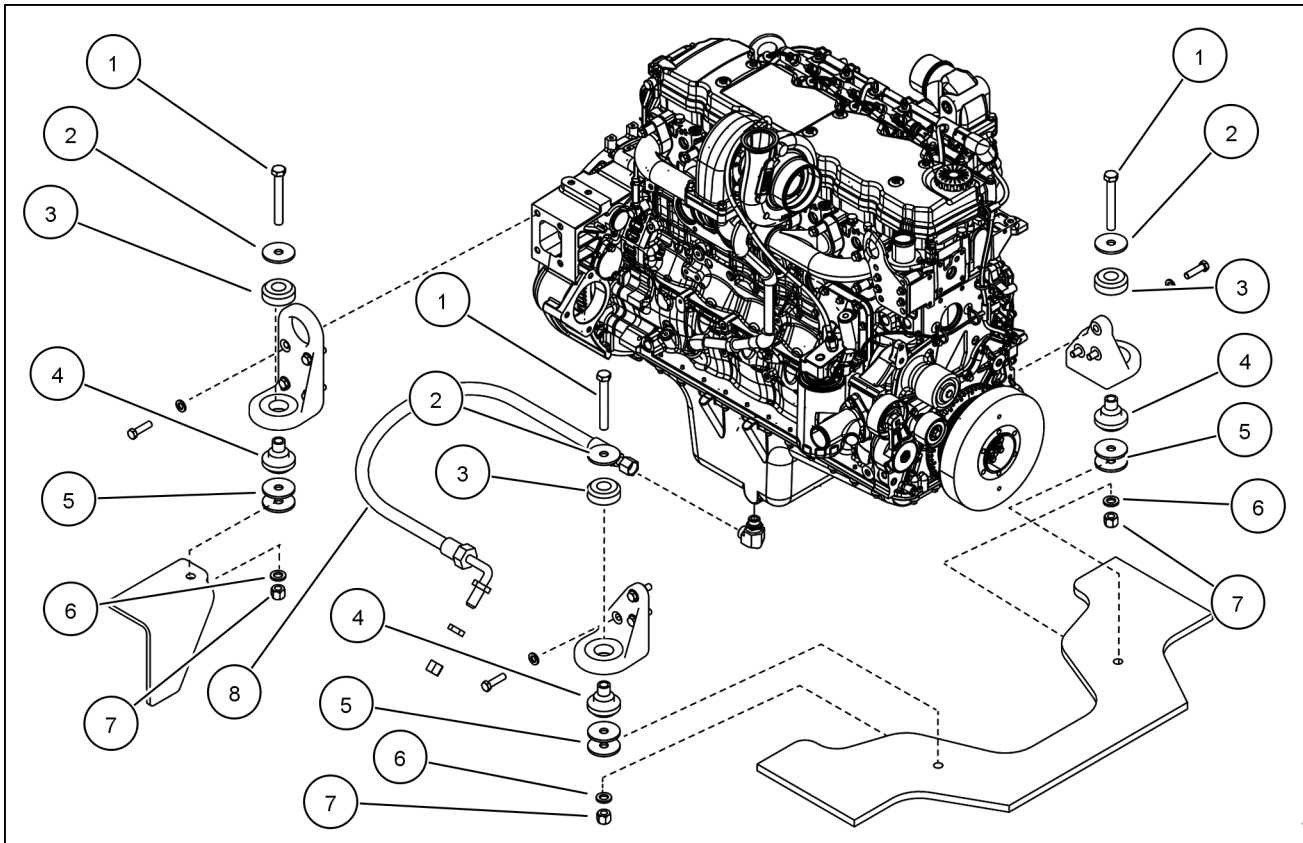
▲ WARNING

Hot liquid under pressure!

Never remove the filler cap or the recovery tank cap while the engine is running or the coolant is hot. Let the system cool. Turn the filler cap to the first notch and allow any pressure to escape, and then remove the filler cap. Loosen the recovery tank cap slowly to allow any pressure to escape. Failure to comply could result in death or serious injury.

W0296A

**Prior operation:
Engine - Remove (10.001)**

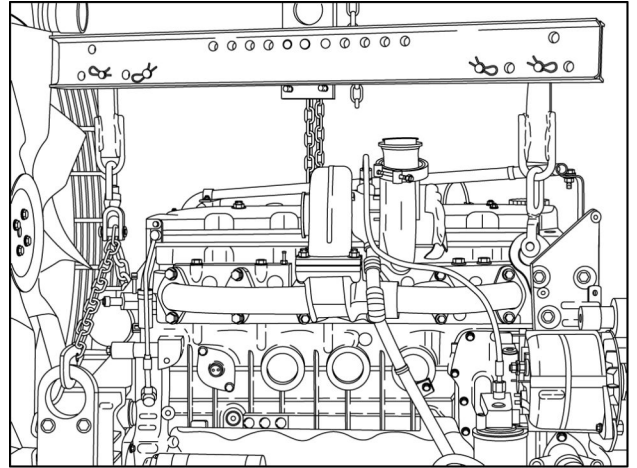


RAIL12WEL0130FA 1

- | | |
|----------------------|--------------------------|
| 1. Engine mount bolt | 5. Washers |
| 2. Washer | 6. Washer |
| 3. Isolator upper | 7. Nut |
| 4. Isolator lower | 8. Remote oil drain hose |

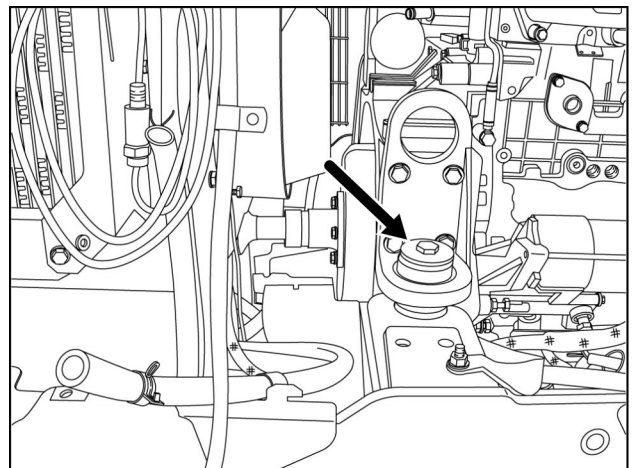
1. Inspect engine mounts. If engine rubber isolators require replacement, remove and discard isolators (3) and (4). Install new rubber isolator (4), then rubber isolator (3).

2. Attach suitable lifting device to the engine and slowly move it into position over the rear chassis. Be sure all harness connections and hoses are out of the way or positioned correctly for reconnecting, before lowering engine.



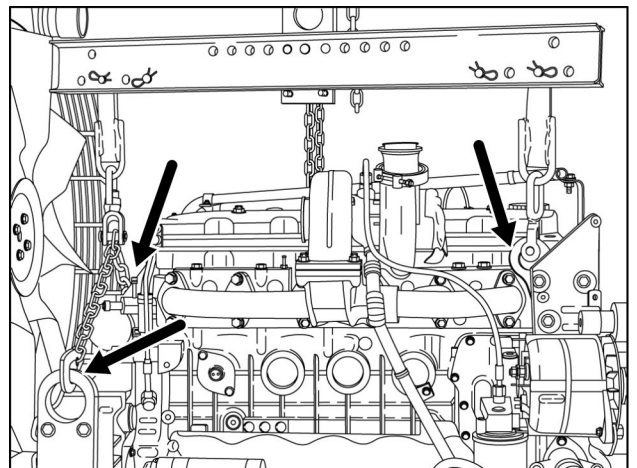
RAPH12WEL0082AA 2

3. Tighten engine mounting bolts to a torque of **244 - 298 N·m (180 - 220 lb ft)**.



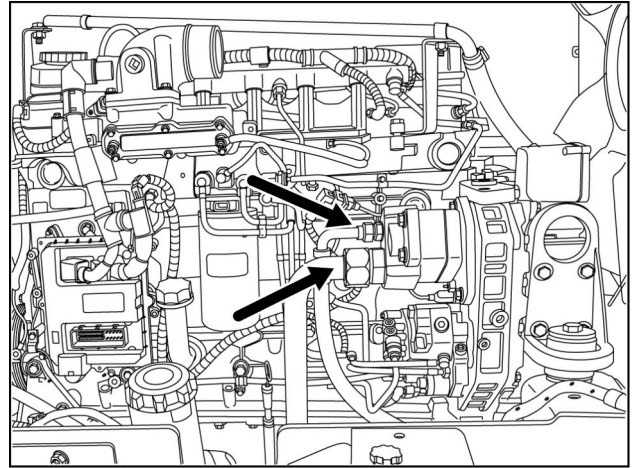
RAPH12WEL0080AA 3

4. Disconnect lifting equipment from engine lifting brackets.



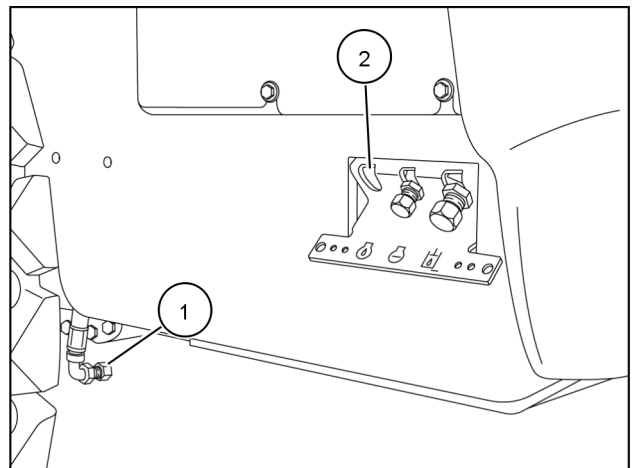
RAPH12WEL0082AA 4

5. Connect vacuum pump to the hydraulic reservoir and turn it on. Remove caps from fittings and plugs from hoses. Connect hoses to brake pump following tags installed during removal. Remove and discard tags. Turn off and disconnect vacuum pump from hydraulic reservoir.



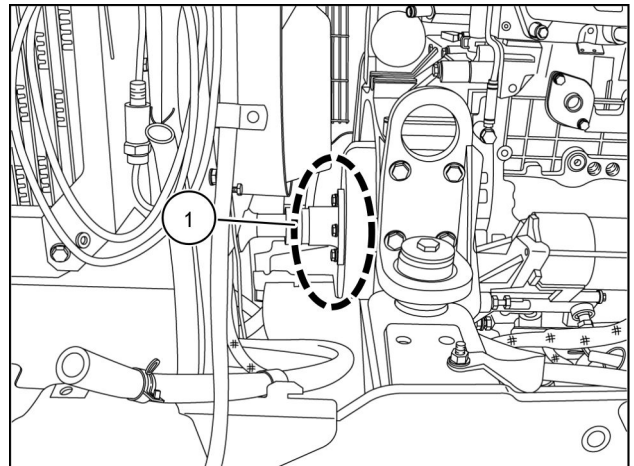
RAPH12WEL0081AA 5

6. Connect engine oil drain hose (1) to frame bracket (2).



RAPH12WEL0098AA 6

7. At front of engine, position drive shaft on engine coupling. Install bolts to secure drive shaft to engine coupling. Tighten the bolts to a torque of **53 - 62 N·m (39 - 46 lb ft)**.



RAPH12WEL0080AA 7



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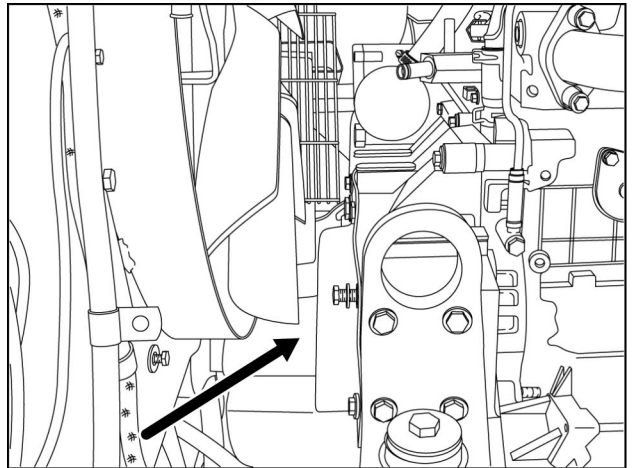
first, and then click the above link

to download the complete manual.

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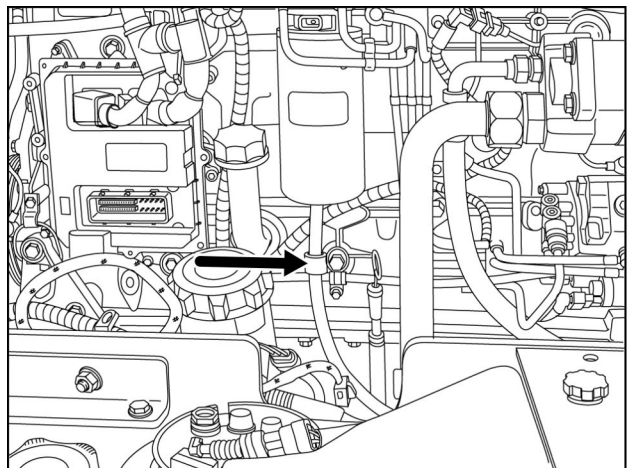
8. Install the upper and lower drive shaft dust covers.
Torque to **20 - 27 N·m (15 - 20 lb ft)**.

NOTE: Attach p-clamp, securing coolant line.



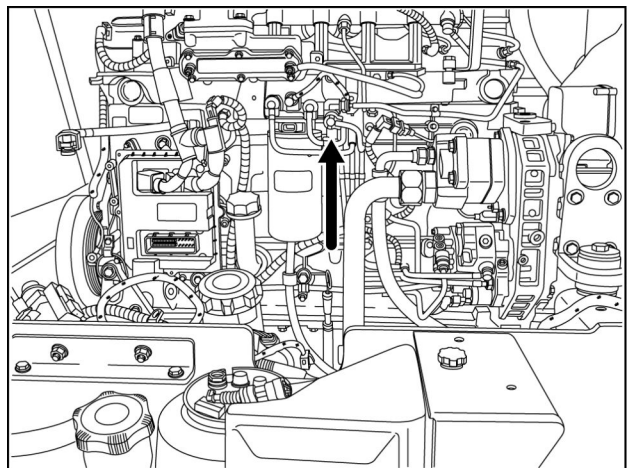
RAPH12WEL0079AA 8

9. Install bolt and clamp for fuel return hose.



RAPH12WEL0078AA 9

10. Remove cap from fitting and plug from the hose. Then connect fuel line to the top of the primary fuel filter.



RAPH12WEL0077AA 10

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