

SERVICE MANUAL

**Wheel Loader
W110C
Tier 4**

Print No. 84581910A



W110C Wheel Loader Repair Manual 84581910A

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SECTION INDEX

GENERAL

Section Title	Section Number
Standard Torque Specifications	1001
Fluids and Lubricants	1002
Metric Conversion Chart	1003

TORQUE SPECIFICATIONS - DECIMAL HARDWARE

Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphities, Molydisulfide greases, or other extreme pressure lubricants are used.

Grade 5 Bolts, Nuts, and Studs		
  		
Size	Pound-Inches	Newton metres
1/4 inch	108 to 132	12 to 15
5/16 inch	204 to 252	23 to 28
3/8 inch	420 to 504	48 to 57
Size	Pound-Feet	Newton metres
7/16 inch	54 to 64	73 to 87
1/2 inch	80 to 96	109 to 130
9/16 inch	110 to 132	149 to 179
5/8 inch	150 to 180	203 to 244
3/4 inch	270 to 324	366 to 439
7/8 inch	400 to 480	542 to 651
1.0 inch	580 to 696	787 to 944
1-1/8 inch	800 to 880	1085 to 1193
1-1/4 inch	1120 to 1240	1519 to 1681
1-3/8 inch	1460 to 1680	1980 to 2278
1-1/2 inch	1940 to 2200	2631 to 2983

Grade 8 Bolts, Nuts, and Studs		
  		
Size	Pound-Inches	Newton metres
1/4 inch	144 to 180	16 to 20
5/16 inch	288 to 348	33 to 39
3/8 inch	540 to 648	61 to 73
Size	Pound-Feet	Newton metres
7/16 inch	70 to 84	95 to 114
1/2 inch	110 to 132	149 to 179
9/16 inch	160 to 192	217 to 260
5/8 inch	220 to 264	298 to 358
3/4 inch	380 to 456	515 to 618
7/8 inch	600 to 720	814 to 976
1.0 inch	900 to 1080	1220 to 1465
1-1/8 inch	1280 to 1440	1736 to 1953
1-1/4 inch	1820 to 2000	2468 to 2712
1-3/8 inch	2380 to 2720	3227 to 3688
1-1/2 inch	3160 to 3560	4285 to 4827
NOTE: Use thick nuts with Grade 8 bolts.		

TORQUE SPECIFICATIONS - METRIC HARDWARE

Use the following torques when specifications are not given.

These values apply to fasteners with coarse threads as received from supplier, plated or unplated, or when lubricated with engine oil. These values do not apply if graphite or Molydisulfide grease or oil is used.

Grade 8.8 Bolts, Nuts, and Studs



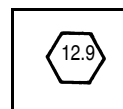
Size	Pound-Inches	Newton metres
M4	24 to 36	3 to 4
M5	60 to 72	7 to 8
M6	96 to 108	11 to 12
M8	228 to 276	26 to 31
M10	456 to 540	52 to 61
Size	Pound-Feet	Newton metres
M12	66 to 79	90 to 107
M14	106 to 127	144 to 172
M16	160 to 200	217 to 271
M20	320 to 380	434 to 515
M24	500 to 600	675 to 815
M30	920 to 1100	1250 to 1500
M36	1600 to 1950	2175 to 2600

Grade 10.9 Bolts, Nuts, and Studs



Size	Pound-Inches	Newton metres
M4	36 to 48	4 to 5
M5	84 to 96	9 to 11
M6	132 to 156	15 to 18
M8	324 to 384	37 to 43
Size	Pound-Feet	Newton metres
M10	54 to 64	73 to 87
M12	93 to 112	125 to 150
M14	149 to 179	200 to 245
M16	230 to 280	310 to 380
M20	450 to 540	610 to 730
M24	780 to 940	1050 to 1275
M30	1470 to 1770	2000 to 2400
M36	2580 to 3090	3500 to 4200

Grade 12.9 Bolts, Nuts, and Studs



Usually the torque values specified for grade 10.9 fasteners can be used satisfactorily on grade 12.9 fasteners.

TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

37 Degree Flare Fitting			
Tube OD Hose ID	Thread Size	Pound- Inches	Newton metres
1/4 inch 6.4 mm	7/16-20	72 to 144	8 to 16
5/16 inch 7.9 mm	1/2-20	96 to 192	11 to 22
3/8 inch 9.5 mm	9/16-18	120 to 300	14 to 34
1/2 inch 12.7 mm	3/4-16	180 to 504	20 to 57
5/8 inch 15.9 mm	7/8-14	300 to 696	34 to 79
Tube OD Hose ID	Thread Size	Pound- Feet	Newton metres
3/4 inch 19.0 mm	1-1/16-12	40 to 80	54 to 108
7/8 inch 22.2 mm	1-3/16-12	60 to 100	81 to 135
1.0 inch 25.4 mm	1-5/16-12	75 to 117	102 to 158
1-1/4 inch 31.8 mm	1-5/8-12	125 to 165	169 to 223
1-1/2 inch 38.1 mm	1-7/8-12	210 to 250	285 to 338

Straight Threads with O-ring			
Tube OD Hose ID	Thread Size	Pound- Inches	Newton metres
1/4 inch 6.4 mm	7/16-20	144 to 228	16 to 26
5/16 inch 7.9 mm	1/2-20	192 to 300	22 to 34
3/8 inch 9.5 mm	9/16-18	300 to 480	34 to 54
1/2 inch 12.7 mm	3/4-16	540 to 804	57 to 91
Tube OD Hose ID	Thread Size	Pound- Feet	Newton metres
5/8 inch 15.9 mm	7/8-14	58 to 92	79 to 124
3/4 inch 19.0 mm	1-1/16-12	80 to 128	108 to 174
7/8 inch 22.2 mm	1-3/16-12	100 to 160	136 to 216
1.0 inch 25.4 mm	1-5/16-12	117 to 187	159 to 253
1-1/4 inch 31.8 mm	1-5/8-12	165 to 264	224 to 357
1-1/2 inch 38.1 mm	1-7/8-12	250 to 400	339 to 542

Split Flange Mounting Bolts		
Size	Pound- Inches	Newton metres
5/16-18	180 to 240	20 to 27
3/8-16	240 to 300	27 to 34
7/16-14	420 to 540	47 to 61
Size	Pound- Feet	Newton metres
1/2-13	55 to 65	74 to 88
5/8-11	140 to 150	190 to 203

Section 2000

ENGINE AND RADIATOR REMOVAL AND INSTALLATION

ENGINE

Removal

STEP 1



BD03A040

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

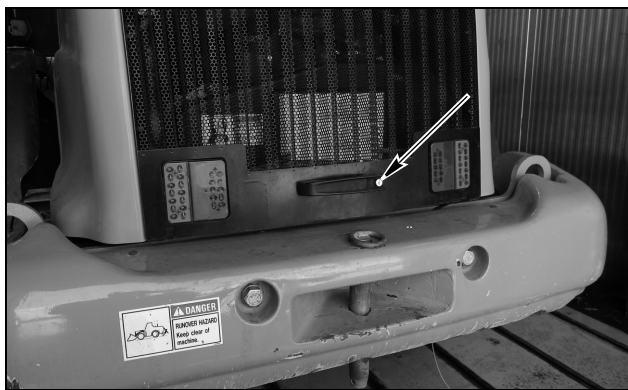
STEP 2

Stop engine. Actuate brake pedal several times to discharge brake accumulators. Put key switch in ON position and move loader control lever back and forth at least 30 times to release any pressure from hydraulic circuit. Put key switch in OFF position.

STEP 3

Slowly loosen the filler cap for hydraulic reservoir to release air pressure in hydraulic reservoir.

STEP 4



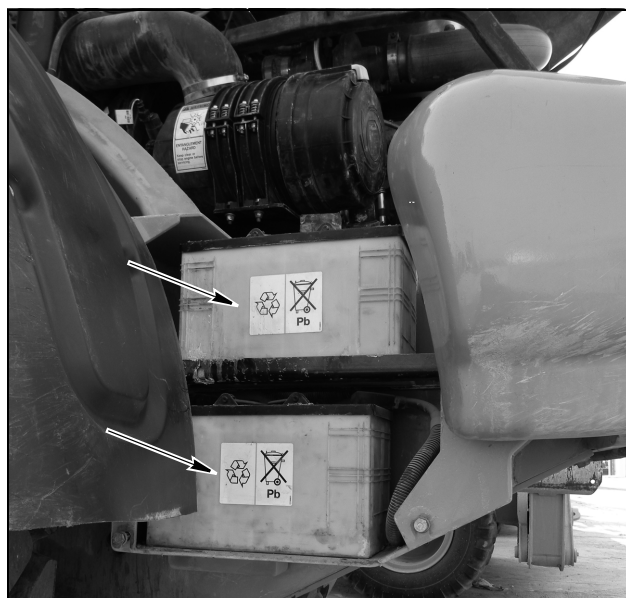
W110R381

The master switch disconnect is located under the hood on the left read side of the machine. Raise the hood put master disconnect switch in OFF position.



W110R381

STEP 5



W110R383

Remove both battery covers and disconnect batteries from the machine.

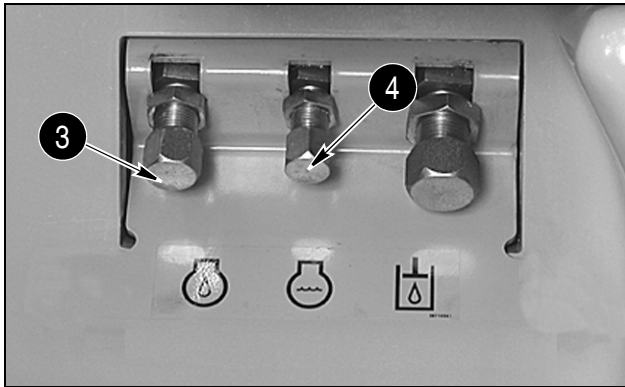
STEP 6



W110R382

Loosen the screw (1) and open the access cover (2).

STEP 7



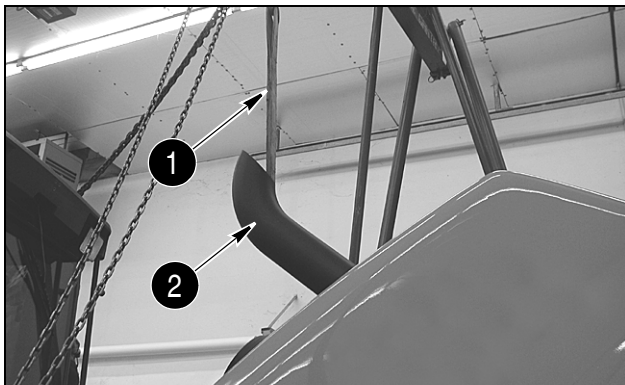
BD02N160

Put a container capable of holding at least 22.7 liter (6.0 gallon) below radiator drain. Remove radiator cap (4). Remove cap and drain coolant into container. Install cap after coolant has drained. Install radiator cap.

Put a container capable of holding at least 12.3 liter (13 U.S. quarts) below engine oil drain. Remove cap (3) and drain oil into container. Install cap after oil has drained.

NOTE: After draining oil disconnect drain hose from frame for removal with engine.

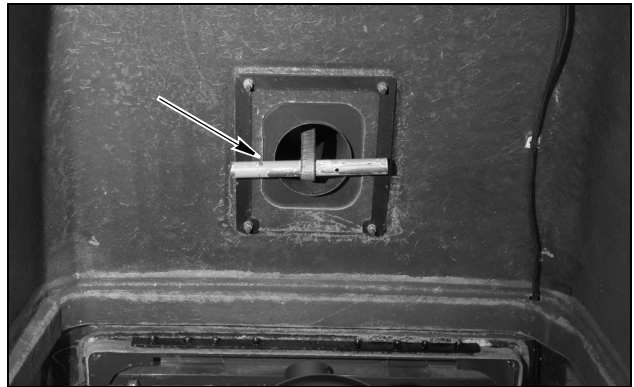
STEP 8



BD03A231

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

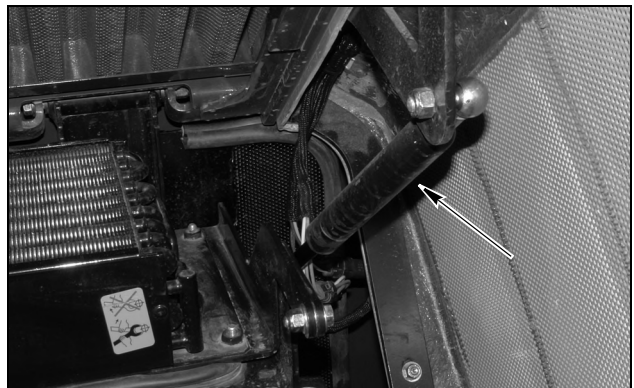
STEP 9



BD07N564-01

Place a solid steel bar through the strap, raise the hood and release tension on the lifting motor.

STEP 10



BD07N597-01

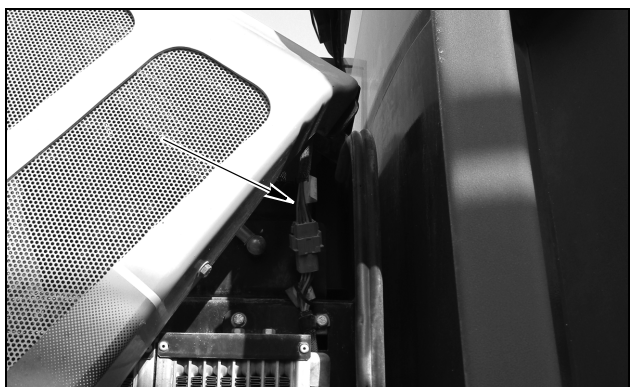
Remove the right front lift cylinder from the hood. Repeat the procedure for the left hand side.

STEP 11



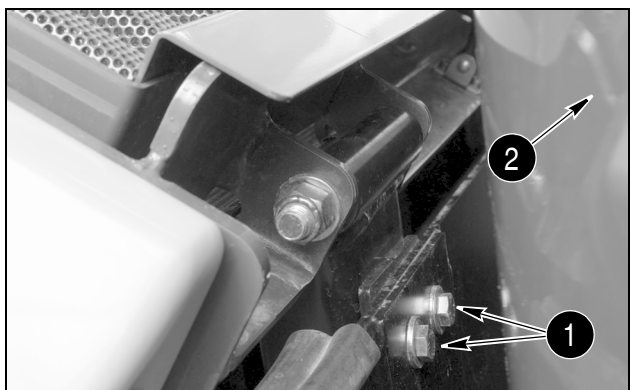
W110R384

Remove the rear lift cylinder from the machine.

STEP 12

W110R385

Tag and disconnect hood wiring harness connector and backup alarm connector from rear chassis wiring harness connector.

STEP 13

BD07N567-01

Have another person balance the hood, and remove the hood hinge mounting bolts (1) located outside the hood by the cab (2) from the cooler frame. Repeat procedure for the other side.

STEP 14

BD03A232

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

STEP 15

W110R386

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

STEP 16

BD07N569-01

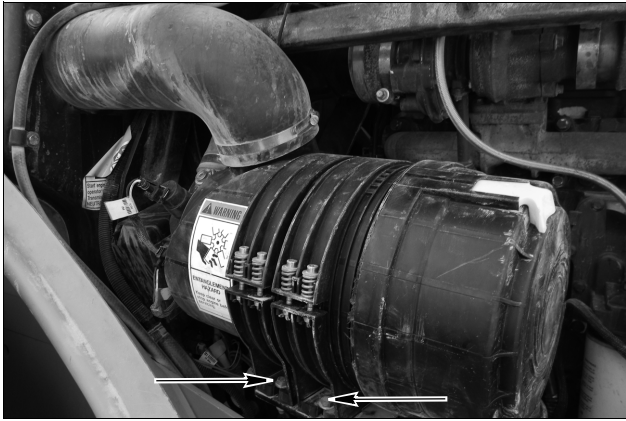
Loosen clamp on air cleaner intake hose and remove the crankcase ventilation hose.

STEP 17

W110R387

Loosen clamps on turbocharger and air cleaner, remove the intake hose.

STEP 18



W110R388

Remove the air cleaner by removing the four bolts.

STEP 19



W110R389

Loosen the clamp on the turbocharger for the after cooler inlet hose.

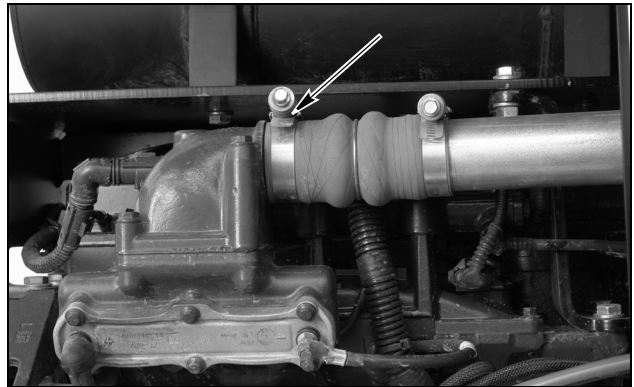
STEP 20



W110R390

Loosen the clamp on the after cooler and remove the after cooler inlet hose from the machine.

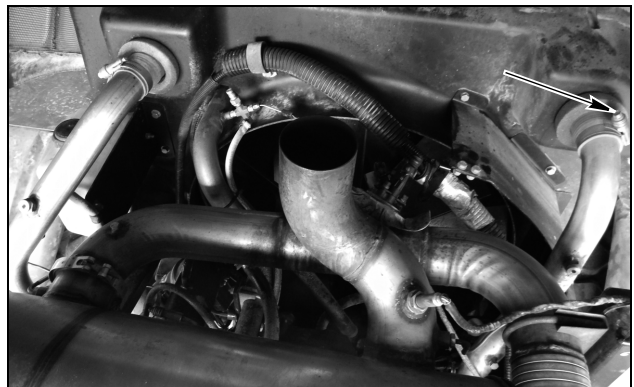
STEP 21



BD07N570-01

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

STEP 22



W110R391

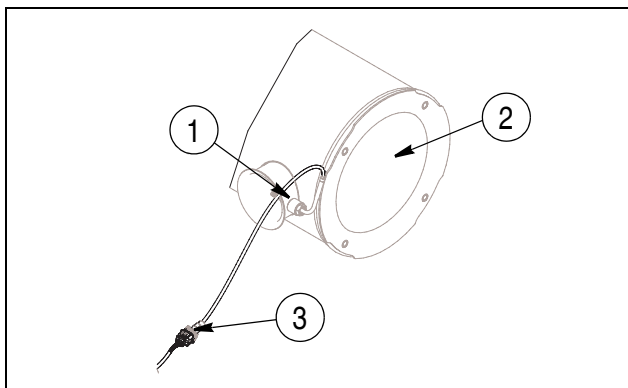
Loosen the clamp on the after cooler and remove the after cooler outlet hose from the machine.

STEP 23



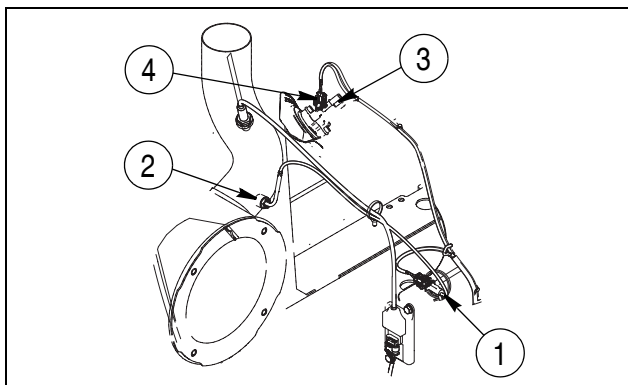
W110R392

Loosen the exhaust clamp from the turbocharger.

STEP 24

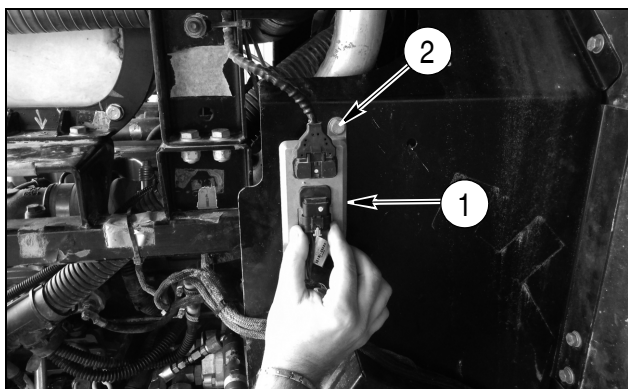
W110R393

Disconnect the electrical connector (3) from exhaust sensor (1) before the SCR catalyst (2).

STEP 25

W110R394

Disconnect the electrical connector (1) from exhaust temperature sensor (2) after the SCR catalyst. Tag and disconnect two hoses from Dosing Unit Injector (3) and disconnect electrical connector (4).

STEP 26

W110R411

Disconnect NOx sensor module (1) from machine wiring harness.

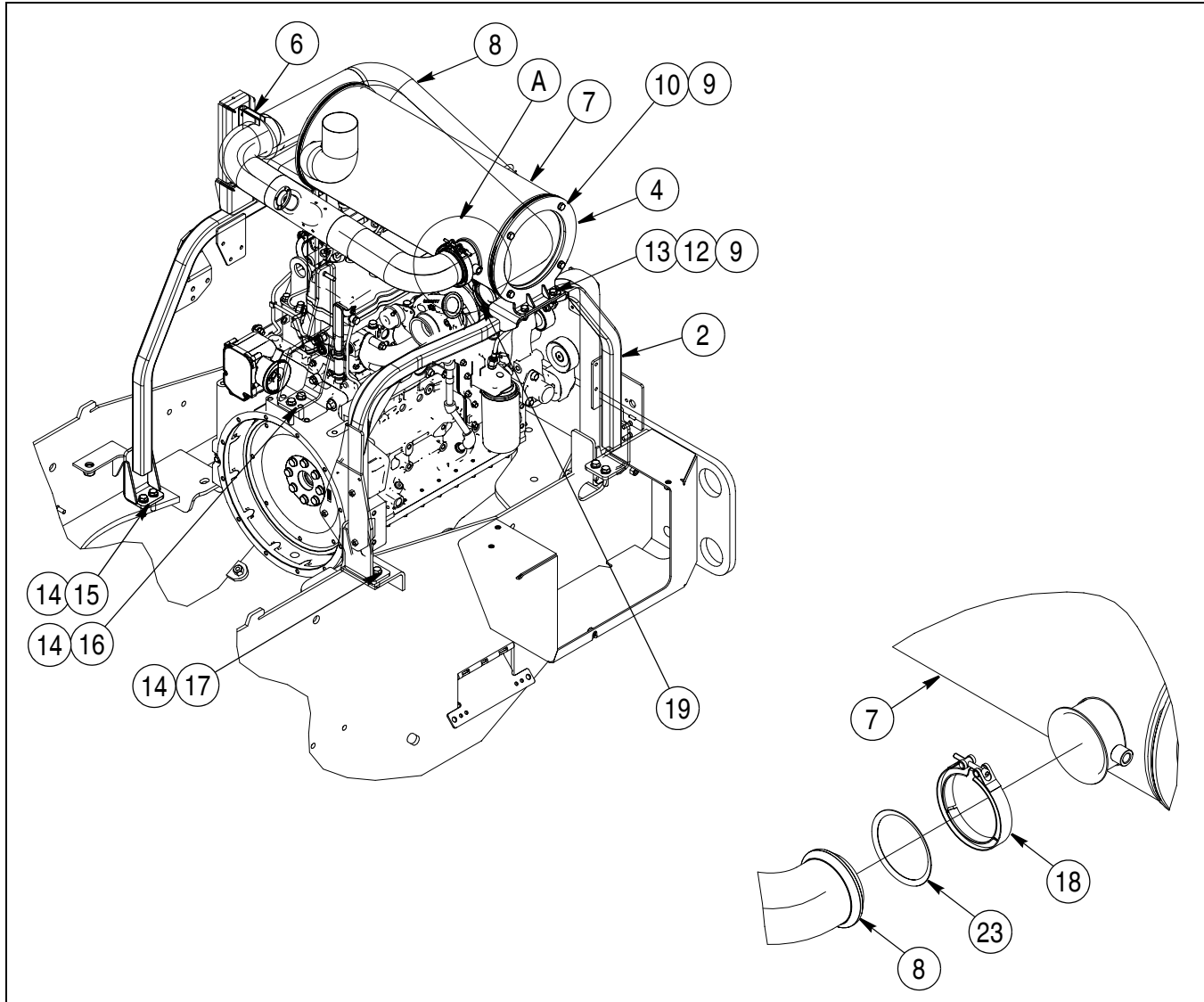
Remove hex bolts (2) securing NOx sensor module to mounting support bracket and remove module.

STEP 27

Loosen two bolt clamp muffler (6) from brackets (5-20). Remove eight mounting bolts (10) from brackets (4) on left side and right side (4 on each side). Remove muffler SCR (7) from brackets.

STEP 28

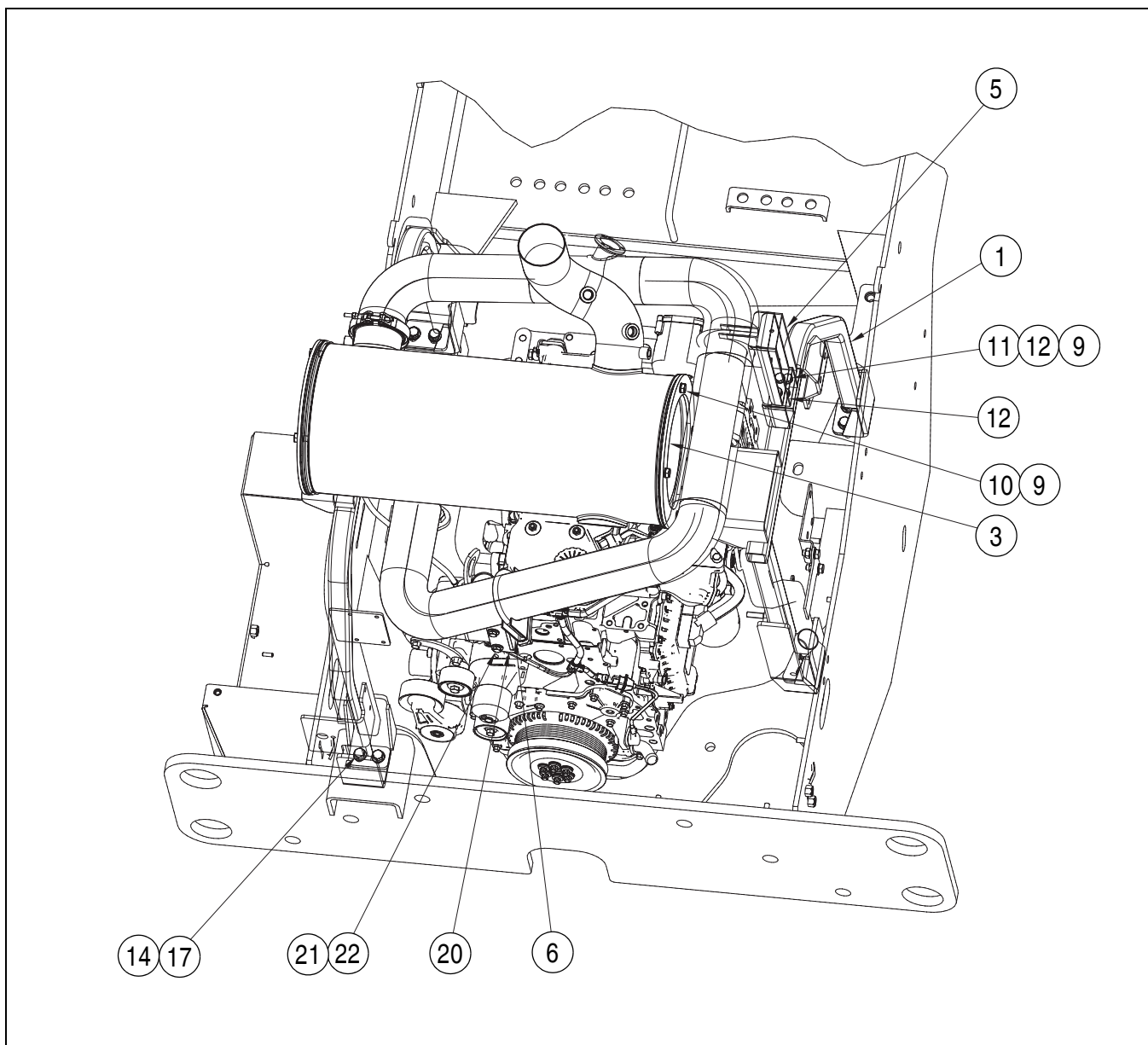
Remove the four mounting bolts 17-15 - two on each side and remove the support muffler left and right (1-2).



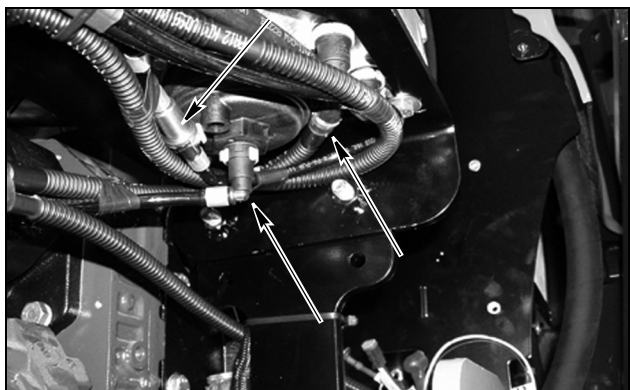
W110R397

Muffler installation

- | | |
|---------------------------|----------------------------|
| 1. Support, Muffler - RH | 13. Bolt, M10x30 |
| 2. Support, Muffler - LH | 14. Washer, 13.5x24x2.5 mm |
| 3. Bracket, Muffler - RH | 15. Bolt, M12x50 |
| 4. Bracket, Muffler - LH | 16. Bolt, M12x65 |
| 5. Bracket | 17. Bolt, M12x45 |
| 6. Clamp Muffler | 18. Clamp |
| 7. Muffler, SCR | 19. Strap, Retaining |
| 8. Pipe exhaust system | 20. Bracket |
| 9. Washer, 10.5x18x1.6 mm | 21. Washer, 9x21x2.5 mm |
| 10. Bolt, M10x20 | 22. Bolt, M8x25 |
| 11. Bolt, M10x25 | 23. Seal |
| 12. Nut, M10 | |



W110R397

STEP 29

W230R423

Remove from the bottom on Electronic Control Unit DENOX Urea supply the electrical connections.

STEP 30

W230R424

Remove from the rear on Electronic Control Unit DENOX Urea supply the wiring harness.

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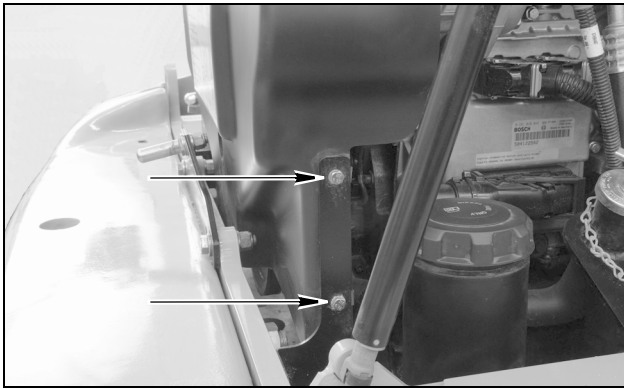


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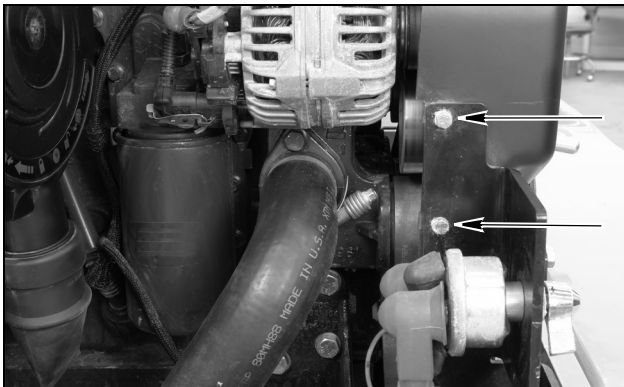
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Thank you so much for reading.

STEP 31



BD07N600-01



BD07N573-01

Remove the four mounting bolts from the belt cover, remove the cover. Disconnect the master switch wiring.

NOTE: After removing the belt cover remove the cover mounting brackets from the machine frame.

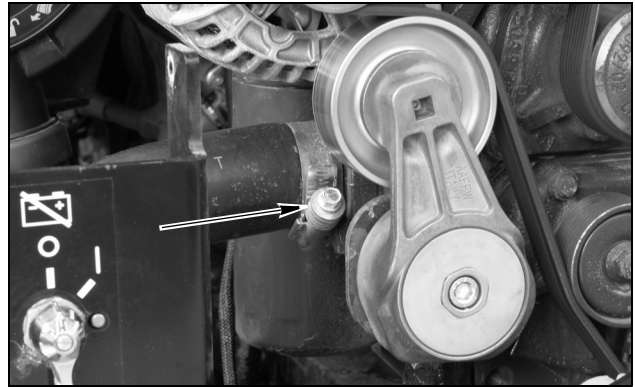
STEP 32



BD07N576-01

Remove the drive belt from the engine.

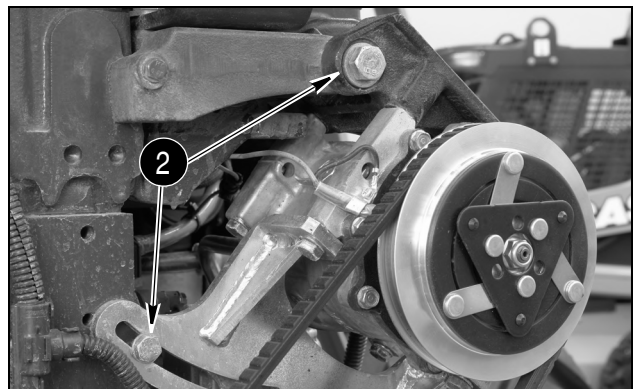
STEP 33



BD07N577-01

Loosen clamps and remove lower cooler hose from the engine.

STEP 34



BD07N579-01



W110R395

If loader is equipped with air conditioning, identify, tag, and disconnect the engine wiring harness connectors from air compressor clutch connector (1). Remove the two mounting bolts (2) for the compressor and set the compressor on the left battery cover.