SERVICE MANUAL

W110C Tier 4
Wheel loader

Print No. 84581910B

NEW HOLLAND
CONSTRUCTION

W110C

Loader

84581910B

Use for Repair Manual

W110C Wheel Loader
Repair Manual
84581910B

Table of Contents

CNH Italia S.p.A.
Via Plava, 80
10135 Torino
Italia

84581910B

Issued July, 2012

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Table of Contents

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SECTION INDEX

GENERAL

Section 1001

GENERAL TORQUE SPECIFICATIONS

TABLE OF CONTENTS

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.

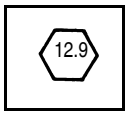
Grade 8.8 Bolts, Nuts, and Studs

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

TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

O-ring Face Seal End					O-ring Boss End Fitting or Lock Nut		
Nom. SAE Dash Size	Tube OD	Thread Size	Pound-Inches	Newton metres	Thread Size	Pound-Inches	Newton metres
-4	1/4 inch 6.4 mm	9/16-18	120 to 144	14 to 16	7/16-20	204 to 240	23 to 27
-6	3/8 inch 9.5 mm	11/16-16	216 to 240	24 to 27	9/16-18	300 to 360	34 to 41
-8	1/2 inch 12.7 mm	13/16-16	384 to 480	43 to 54	3/4-16	540 to 600	61 to 68
					Thread Size	Pound-Feet	Newton metres
-10	5/8 inch 15.9 mm	1-14	552 to 672	62 to 76	7/8-14	60 to 65	81 to 88
Nom. SAE Dash Size	Tube OD	Thread Size	Pound-Feet	Newton metres	1-1/16-12	85 to 90	115 to 122
					1-3/16-12	95 to 100	129 to 136
-12	3/4 inch 19.0 mm	1-3/16-12	65 to 80	90 to 110	1-5/16-12	115 to 125	156 to 169
-14	7/8 inch 22.2 mm	1-3/16-12	65 to 80	90 to 110	1-5/8-12	150 to 160	203 to 217
-16	1.0 inch 25.4 mm	1-7/16-12	92 to 105	125 to 140	1-7/8-12	190 to 200	258 to 271
-20	1-1/4 inch 31.8 mm	1-11/16-12	125 to 140	170 to 190			
-24	1-1/2 inch 38.1 mm	2-12	150 to 180	200 to 254			

Section 1002

FLUIDS AND LUBRICANTS

TABLE OF CONTENTS

CAPACITIES AND LUBRICANTS

Engine Oil
- Capacity with Filter Change ..... 10.9 liters (11.5 U.S. Quarts)
- Total system capacity ..... 11.8 liters (12.5 U.S. Quarts)
- Type of oil .....AMBRA UNITEK CJ-4 ENGINE OIL (SAE 15W-40) - see engine oil recommendations on page 4

Engine Cooling System
- Capacity.....22 liters (23.2 U.S. Quarts)
- Type of Coolant .....50% water and 50% Ethylene Glycol

Fuel Tank
- Capacity ..... 189 liters (50 U.S. Gallons)
- Type of Fuel..... See Diesel fuel specifications on page 5

Hydraulic System
- Hydraulic Reservoir Refill Capacity .....56.8 liters (15.0 U.S. Gallons)
- Total System Capacity.....113.6 liters (30.0 U.S. Gallons)
- Type of Oil .....AMBRA Hydrosystem 46HV®

Transmission
- Refill Capacity with Filter Change ..... 18.9 liters (35.9 U.S. Quarts)
- Type of Oil .....AMBRA MULTI G 134^{TM} HYDRAULIC TANSMISSION OIL (SAE 10W-30)

Axles
- Capacity
  - Standard Front ..... 22 liters (23.2 U.S. Quarts)
  - Standard Rear..... 22 liters (23.2 U.S. Quarts)
  - Optional Front ..... 22 liters (23.2 U.S. Quarts)
  - Optional Rear..... 22 liters (23.2 U.S. Quarts)
- Type of Lubricant..... AMBRA MULTI G 134^{TM} HYDRAULIC TANSMISSION OIL

DEF (Diesel Exhaust Fluid)
- Total Capacity Urea Tank .....28.6 liters (10.20 U.S. Gallons)

NOTE: *DO NOT use an alternate oil in the axles. The brake components in the axles could be damaged as a result of using an alternate oil. Machines are shipped from the factory with break-in oil.*

Brake System
Type of Fluid (Same as Hydraulic System).....AMBRA Hydrosystem 46HV®

Grease Fittings
Grease fittings as required by maintenance schedule..... AMBRA GR 75 MD

ENGINE OIL RECOMMENDATIONS

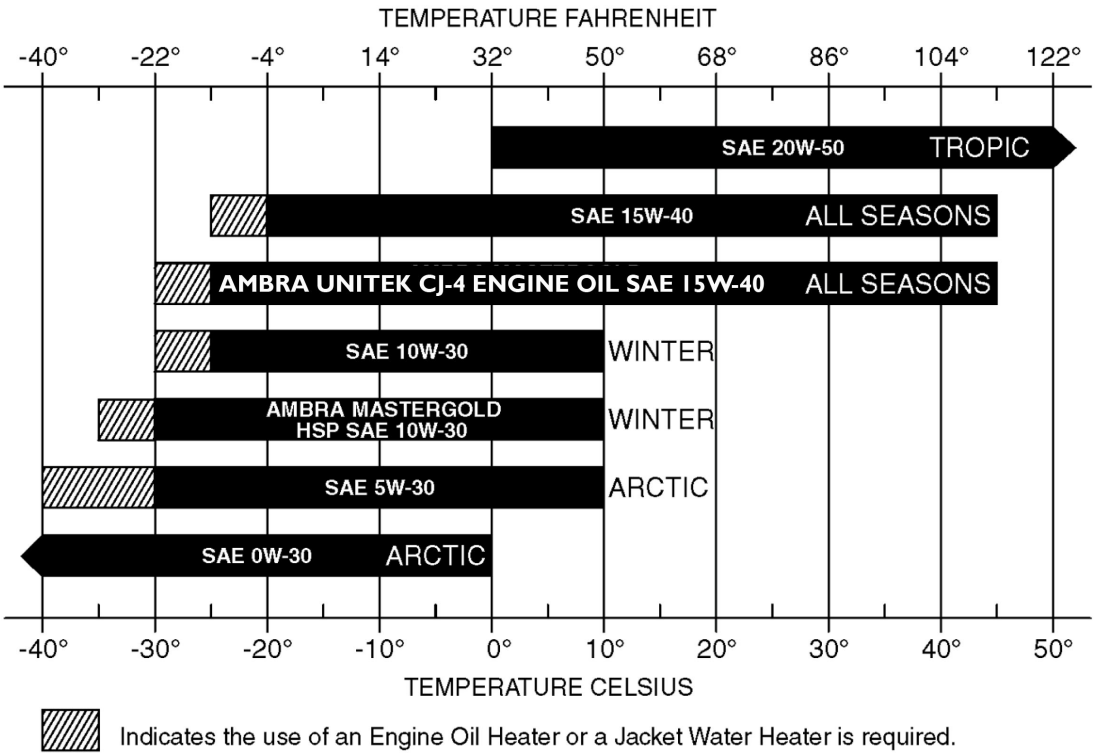
AMBRA UNITEK CJ-4 ENGINE OIL (SAE 15W-40) engine oil is recommended for use in your engine. AMBRA UNITEK CJ-4 ENGINE OIL (SAE 15W-40) engine Oil will lubricate your engine correctly under all operating conditions.

If AMBRA UNITEK CJ-4 ENGINE OIL (SAE 15W-40) Multi-Viscosity Oil is not available, use only oil meeting API engine oil service category CI-4.

RH99K130

See the chart below for recommended viscosity at ambient air temperature ranges.

NOTE: *Do not put performance additives or other oil additive products in the engine crankcase. The oil change intervals given in this manual are according to tests with* AMBRA UNITEK CJ-4 ENGINE OIL (SAE 15W-40) *lubricants.*



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DIESEL FUEL SYSTEM

Use No. 2 diesel fuel in the engine of this machine. The use of other fuels can cause the loss of engine power and high fuel consumption.

In very cold temperatures, a mixture of No. 1 and No. 2 diesel fuels is temporarily permitted. See the following Note.

NOTE: *See your fuel dealer for winter fuel requirements in your area. If the temperature of the fuel lowers below the cloud point (wax appearance point), wax crystals in the fuel will restrict the fuel filter and cause the engine to lose power or not start.*

The diesel fuel used in this machine must meet the specifications as shown below in, “Specifications for Acceptable No. 2 Diesel Fuel”, or “Specification D975-81” of the American Society for Testing and Materials.

Fuel Storage

If you keep fuel in storage for a period of time, you can get foreign material or water in the fuel storage tank. Many engine problems are caused by water in the fuel.

Keep the fuel storage tank outside and keep the fuel as cool as possible. Remove water from the storage container at regular periods of time.

Fill the fuel tank at the end of the daily operating period to prevent condensation in the fuel tank.

Specifications for Acceptable No. 2 Diesel Fuel

API gravity, minimum	34
Flash point, minimum	60°C (140°F)
Cloud point (wax appearance point), maximum	-20°C (-5°F) See Note above
Pour point, maximum	-26°C (-15°F) See Note above
Distillation temperature, 90% point	282 to 338°C (540 to 640°F)
Viscosity, at 38°C (100°F)	
Centistokes	2.0 to 4.3
Cetane number, minimum	43 (45 to 55 for winter or high altitudes)
Water and sediment, by volume, maximum	0.05%

What is selective Catalytic Reduction (SCR)

The main components of the SCR system include the SCR catalyst, the Diesel Exhaust Fluid (DEF)/ AdBlue® injection unit, the DEF/AdBlue® tank, and the DEF/AdBlue® dosing control unit.

How does Selective Catalytic Reduction (SCR) work?

During combustion, harmful Nitrogen Oxide (NOx) molecules are formed in the exhaust. By injecting a DEF/AdBlue® solution into the exhaust prior to a catalyst, the NOx can be converted to harmless elemental Nitrogen and water. This happens when the NOx molecules react inside the catalyst with the heat generated by the engine and the ammonia in the DEF/AdBlue® solution.

During cold engine operation at low engine coolant and ambient air temperatures, water vapor will be visible from the exhaust when the engine operates. This water vapor will resemble steam or light white smoke and will dissipate as the engine and machine components warm and is considered normal.

NOTE: *After engine shutdown, the SCR system will perform a purge cycle, which permits the supply module to continue to run for up to 70 seconds. This is to be considered normal and requires no action from the operator.*

What is Diesel Exhaust Fluid (DEF)/AdBlue®?

DEF/AdBlue® is a non-toxic aqueous urea solution (32.5 %) with a slight ammonia odor used to chemically reduce NOx emissions from heavy-duty diesel powered vehicles.

DEF/AdBlue® is neither explosive nor harmful to the environment and is classified under the minimum-risk category of transportable fluids. DEF/AdBlue® quality is defined by ISO 22241-1. The American Petroleum Institute (API®) has a voluntary certification program for DEF/AdBlue®. To ensure DEF/ AdBlue® satisfies the requirements of ISO 22241. DEF/AdBlue®. API Diesel Exhaust Fluid Certification Mark is a registered trademark of API in the United States and or other countries.

Storage, handling, and transport

IMPORTANT: *Storage temperatures above 30 °C (86 °F) greatly reduce the shelf life of DEF/AdBlue®.*

DEF/AdBlue® has a typical shelf life of 6-12 months. Refer to the SHELF LIFE table below. In order for DEF/AdBlue® to remain in a usable condition, storage requirements need to be met.

- Store between -11 °C (12 °F) and 30 °C (86 °F).
- Use only an approved DEF/AdBlue® container.
- Keep container tightly closed.
- Keep container in a cool, well-ventilated area.
- Keep away from heat and direct sunlight.

Thawing

- The machine is equipped with an internal tank heater to thaw frozen DEF/AdBlue®. The machine will still function until the DEF/AdBlue® begins to flow. The SCR system will then function normally.
- Do not heat DEF/AdBlue® for long periods of time at temperatures above 30 °C (86 °F). This causes the solution to decompose, which very slowly decreases the expected shelf life.

IMPORTANT: *Do not use an anti-gelling or freeze point improver in your DEF/AdBlue®. The 32.5 % solution is specifically designed to provide the optimum NOx reduction properties. Any further blending or adjusting of the DEF/AdBlue® mixture will lessen its ability to perform correctly and may cause damage to the SCR components.*

Handling and supply of additives, if any

- Personal Protective Equipment (PPE) is not required under normal conditions. If splashing is likely, wear eye protection. For prolonged or repeated contact, impervious gloves are recommended. Follow the precautions listed in the SAFETY INFORMATION chapter when handling any service fluid.
- No additives are required.

IMPORTANT: *Contaminated DEF/AdBlue® can affect the performance of your machine. Follow all instructions in this manual when handling DEF/AdBlue®.*

Shelf life

Constant ambient storage temperature and minimum shelf life

Less than or equal to 10 °C (50 °F) 36 months
Less than or equal to 25 °C (77 °F) [1] 18 months
Less than or equal to 30 °C (86 °F) 12 months
Less than or equal to 35 °C (95 °F) 6 months
Greater than 35 °C (95 °F) -[2]

[1] To prevent decomposition of DEF/AdBlue®, prolonged transportation or storage above 25 °C (77 °F) should be avoided.

[2] Significant loss of shelf life: check every batch before use. See your New Holland dealer for more information on testing.

NOTE: *The main factors taken into account to define the shelf life in the previous figures are the ambient storage temperature and the initial alkalinity of DEF/AdBlue®. The difference in evaporation between vented and non-vented storage containers is an additional factor.*

NOTE: *The information in this table is for reference only and has been provided by the International Organization for Standardization, Document number ISO 22241-3 Diesel engines - NOx reduction agent AUS 32 - Part 3: Handling, transportation and storage.*

Disposal

- Dispose of DEF/AdBlue® and any filter accumulations in accordance with all applicable Federal, State, and local laws governing waste disposal.

For machines sold in California CNH must warrant the diesel emission control system in the application for which it is sold or leased to be free from defects in design, materials, workmanship, or operation of the diesel emission control system which cause the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706, and 2710, for the periods of time listed below, provided there has been no abuse, neglect, or improper maintenance of your diesel emission control system, vehicle or equipment, as specified in the owner's manuals. Where a warrantable condition exists, this warranty also covers the engine from damage caused by the diesel emission control system, subject to the same exclusions for abuse, neglect or improper maintenance of your vehicle or equipment. Please review your owner's manual for other warranty information. The diesel emission control system may include a core part (e.g., particulate filter, diesel oxidation catalyst, selective catalytic reduction converter) as well as hoses, connectors, and other emission-related assemblies.

Disposal

DEF	Diesel Exhaust Fluid
ISO	International Organization for Standardization
MSDS	Material Safety Data Sheet
NOx	Nitrogen Oxide
PPE	Personal Protective Equipment
SCR	Selective Catalytic Reduction
ULSD	Ultra Low Sulfur Diesel

SELECTIVE CATALYTIC REDUCTION (SCR) - BASIC INSTRUCTIONS

Requirements

The operator must maintain appropriate DEF/AdBlue® levels at all times. The SCR system is compatible with up to 7% bio-diesel fuel.

Diesel Exhaust Fluid (DEF)/AdBlue® refilling

The DEF/AdBlue® tank cap (1) can be identified by the “blue” color of the cap. A fitting under the cap prevents the insertion of a diesel fill nozzle.

NOTE: *If any DEF/AdBlue® spills or contacts any surface other than the storage tanks, immediately clean the affected surface with clear water. DEF/AdBlue® will cause corrosion on painted and unpainted metallic surfaces, and may distort some plastic and rubber components.*

It is recommended that DEF/AdBlue® filling equipment should be used having a fill nozzle/pump with the correct length and diameter, triggered by the magnet in the tank filler neck and with overfill flow cut out.

This will ensure that:

- The screen in the filler neck will not be damaged.
- Impurities are not entering the DEF/AdBlue® tank. The standardized DEF/AdBlue® nozzle matches the filler neck diameter.
- The DEF/AdBlue® tank is not overfilled, as the DEF/AdBlue® pump will stop when the DEF/AdBlue® tank is full.
- DEF/AdBlue® is not pumped in the fuel tank, as the DEF/AdBlue® nozzle cannot pump when the magnet is not sensed.

IMPORTANT: *Refilling with a funnel is not recommended as this may lead to damage of the screen in the filler neck.*

NOTE: *The information above has been provided by the International Organization for Standardization (ISO), Document number ISO 22241-4 Diesel engines - NOx reduction agent AUS 32 - Part 4: Refilling interface.*

Diesel Exhaust Fluid (DEF)/AdBlue® consumption

NOTE: *DEF/AdBlue® consumption is highly dependent on engine loads, humidity levels, DEF/AdBlue® fluid concentration, and engine speed.*

MAINTENANCE SCHEDULE
Model W110C

SERVICE INTERVAL	SERVICE POINTS	FREQUENCY IN HOURS						
		CHECK	GREASE	REPLACE	CLEANING	DRAIN FLUID	CHANGE FLUID	ADJUST
Daily inspection	General	X						
Every 10 Hours	Engine Oil	X						
Every 50 Hours	Bucket/attachment grease fittings		X					
	Grease machine and attachments		X					
	Hydraulic oil level	X						
	Transmission oil level	X						
	Engine Coolant	X						
Initial 100 Hours	Wheel torque	X						
	Fuel prefilter				X			
	Fuel filter				X			
Every 100 Hours	Grease fittings		X					
	Grease lift arm		X					
Every 250 Hours	Grease drive shaft slip joints		X					
	Cab air filter				X			
	Drive belt			X				
	Wheels and tires	X						
Every 500 Hours	Engine oil filter			X				
	Replace fuel prefilter			X				
	Fuel filter	X						
	Fuel tank sediment					X		
	Axle oil level	X						
	Battery fluid level	X						
Every 1000 Hours	Pivot points		X					
	Articulation fittings		X					
	Hydraulic oil level			X				
	Drive belt			X				
	Cab air filter			X				
	Replacing the engine breather filter			X				
Every 1500 Hours	Change front and rear axle oil						X	
	Transmission fluid and filter						X	
	Clean breather				X			
	Calibrating the gear box							X
	Transmission declutch pressure adjustment							X
Every 2000 Hours	Hydraulic oil and filters						X	
	Engine coolant						X	
	Engine air filters			X				
	Frame and cab - lubricate		X					
	Engine valve clearance	X						
As required	Fuel pre-filter					X		
	Air conditioning condenser				X			
	Height control and return to travel							X
	Return to dig							X
	Parking brake	X						
	Secondary steering	X						
	Cab service	X						

Electrical System	Battery service				X			
	Battery electrolyte level	X						
	Auxiliary battery connections	X						
	Battery removal and installation			X				
	Fuses and relays			X				
	Work lights			X				
	Driving lights			X				
	Additional features	X						

MAINTENANCE POINTS

Model W110C

See your Operators manual for maintenance of safety related items and for detailed information of the service items on this chart. Operators and service manuals are available for this machine from your dealer.

If you operate the machine in severe conditions, lubricate and service the machine more frequently.

Section 1003

METRIC CONVERSION CHART

TABLE OF CONTENTS

CONVERSION FACTORS

Metric to U.S.

	MULTIPLY	BY	TO OBTAIN
Area:	sq. meter hectare	10.763 91 2.471 05	square foot acre
Force:	newton newton	3.596 942 0.224 809	ounce force pound force
Length:	millimeter meter kilometer	0.039 370 3.280 840 0.621 371	inch foot mile
Mass:	kilogram	2.204 622	pound
Mass/Area:	kilogram/hectare	0.000 466	ton/acre
Mass/Energy:	gr/kW/hr.	0.001 644	lbs/hp/hr.
Mass/Volume:	kg/cubic meter	1.685 555	lb/cubic yd.
Power:	kilowatt	1.341 02	horsepower
Pressure:	kilopascal bar	0.145 038 14.50385	lb/sq. inch lb/sq. inch
Temperature:	degree C	1.8 x C +32	degree F
Torque:	newton meter newton meter	8.850 748 0.737 562	lb/inch lb/foot
Velocity:	kilometer/hr.	0.621 371	miles/hr.
Volume:	cubic centimeter cubic meter cubic meter milliliter litre litre litre litre	0.061 024 35.314 66 1.307 950 0.033 814 1.056 814 0.879 877 0.264 172 0.219 969	cubic inch cubic foot cubic yd. ounce (US fluid) quart (US liquid) quart (Imperial) gallon (US liquid) gallon (Imperial)
Volume/Time:	litre/min. litre/min.	0.264 172 0.219 969	gallon/min. (US liquid) gallon/min. (Imperial)

U.S. to Metric

	MULTIPLY	BY	TO OBTAIN
Area:	square foot acre	0.092 903 0.404 686	square meter hectare
Force:	ounce force pound force	0.278 014 4.448 222	newton newton
Length:	inch foot mile	25.4 * 0.304 8 * 1.609 344 *	millimeter meter kilometer
Mass:	pound ounce	0.453 592 28.35	kilogram gram
Mass/Area:	ton/acre	2241 702	kilogram/hectare
Mass/Energy:	lb/hp/hr	608.277 4	gr/kW/hr
Mass/Volume:	lb/cubic yd.	0.593 276	kg/cubic meter
Power:	horsepower	0.745 700	kilowatt
Pressure:	lbs/sq. in. lbs/sq. in. lbs/sq. in.	6.894 757 0.069 0.070 303	kilopascal bar kg/sq. cm
Temperature:	degree F	1.8 F - 32	degree C
Torque:	pound/inch pound/foot	0.112 985 1.355 818	newton meter newton meter
Velocity:	miles/hr.	1.609 344 *	kilometer/hr.
Volume:	cubic inch cubic foot cubic yard ounce (US fluid) quart (US liquid) quart (Imperial) gallon (US) gallons (Imperial)	16.387 06 0.028 317 0.764.555 29.573 53 0.946 353 1.136 523 3.785 412 4.546 092	cubic centimeter cubic meter cubic meter milliliter litre litre litre litre
Volume/Time:	gallon/min.	3.785 412	litre/min.

* = exact

SECTION INDEX

ENGINES

FOR ENGINE REPAIR, SEE THE ENGINE REPAIR MANUAL 84392403

Section
2000

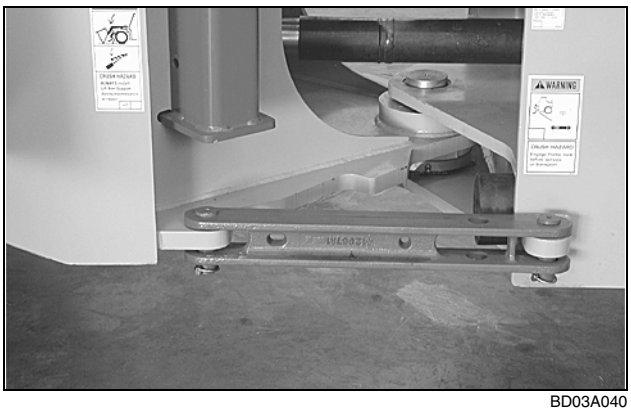
ENGINE AND RADIATOR REMOVAL AND INSTALLATION

TABLE OF CONTENTS

ENGINE

Removal

STEP 1



BD03A040

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

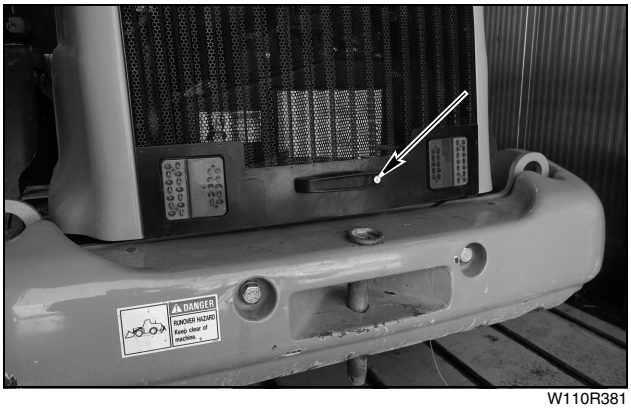
STEP 2

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

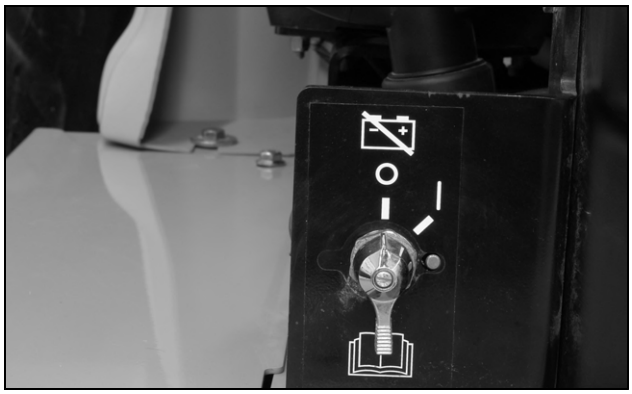
Slowly loosen the filler cap for hydraulic reservoir to release air pressure in hydraulic reservoir.

STEP 4



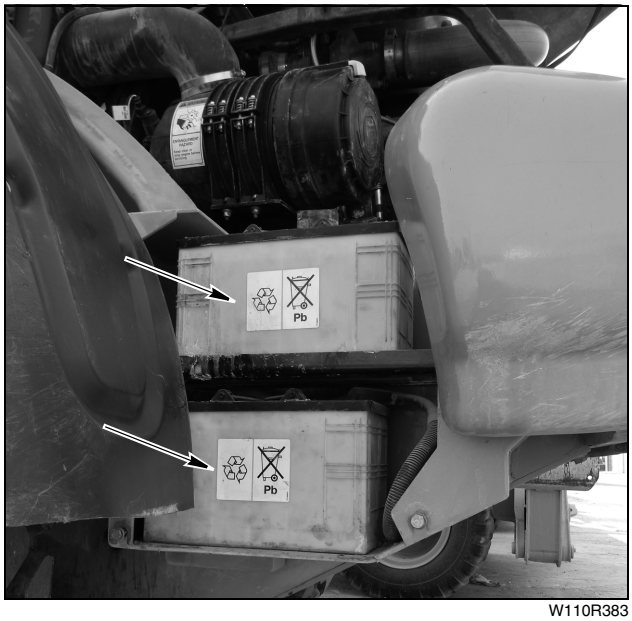
W110R381

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

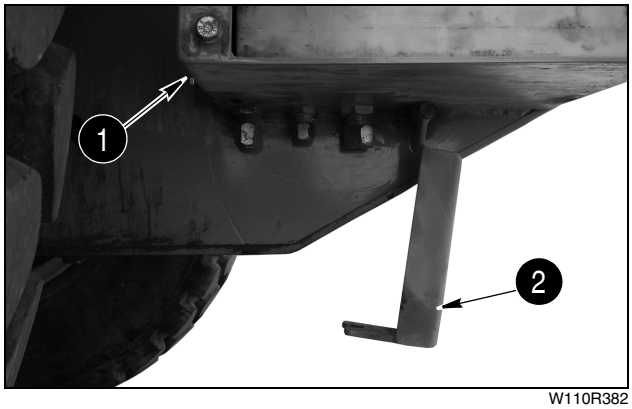
STEP 5



W110R383

Remove both battery covers and disconnect batteries from the machine.

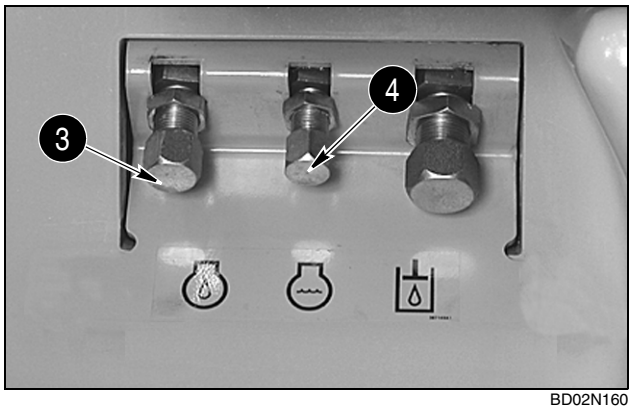
STEP 6



W110R382

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

STEP 7

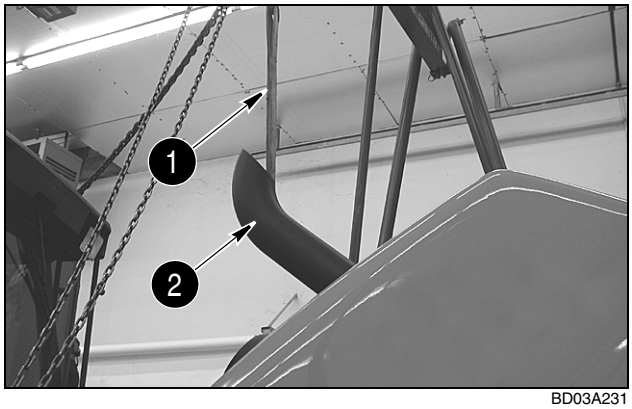


BD02N160

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.*

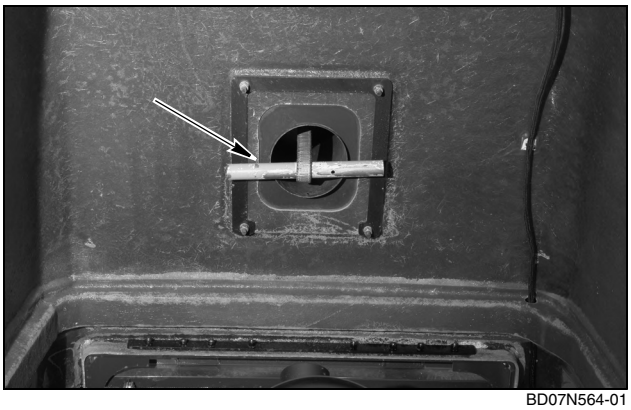
STEP 8



BD03A231

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

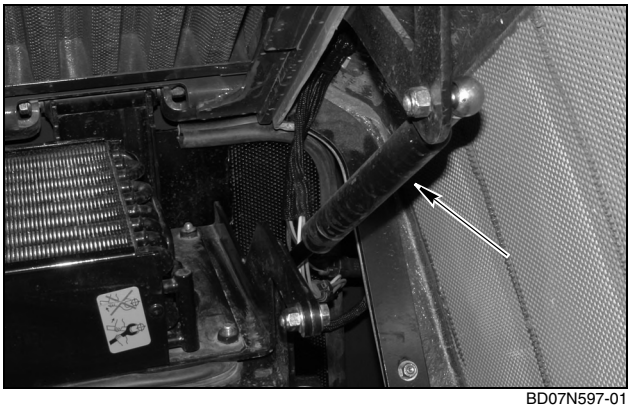
STEP 9



BD07N564-01

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

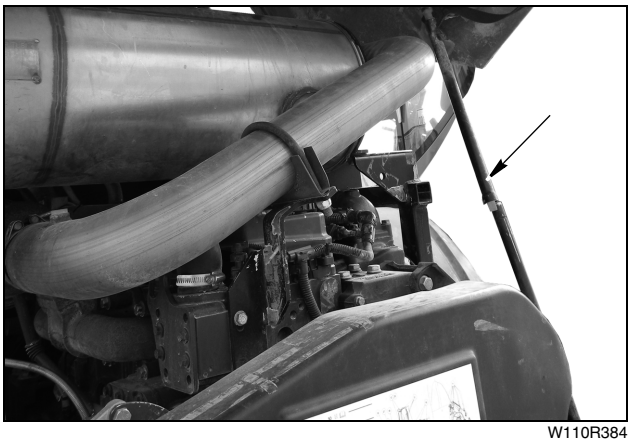
STEP 10



BD07N597-01

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

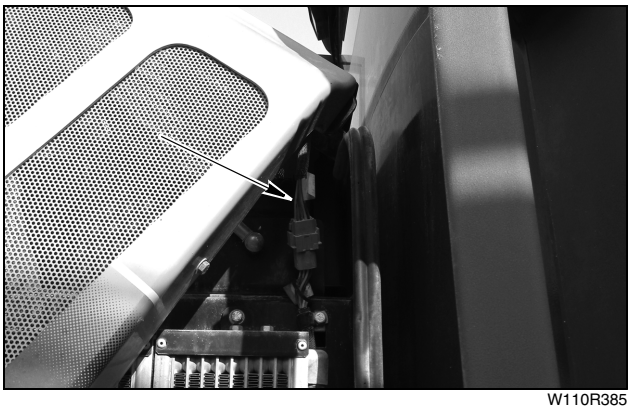
STEP 11



W110R384

Remove the rear lift cylinder from the machine.

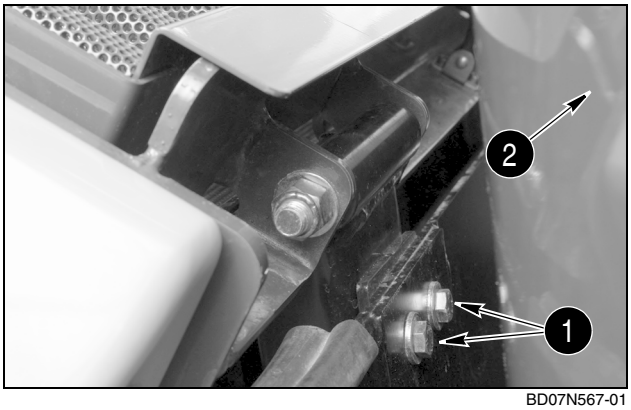
STEP 12



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

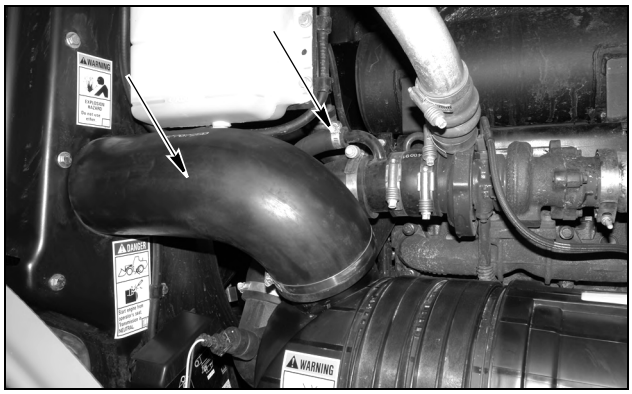
Carefully raise and remove hood from loader. Lower hood onto suitable platform and disconnect lifting equipment.

STEP 15

W110R386

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

STEP 16



BD07N569-01

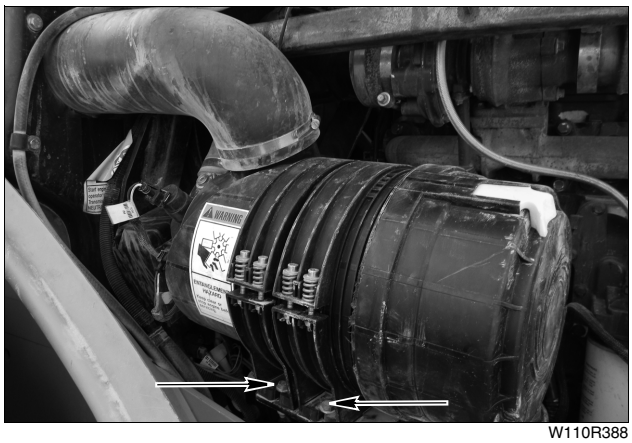
Loosen clamp on air cleaner intake hose and remove the crankcase ventilation hose.

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

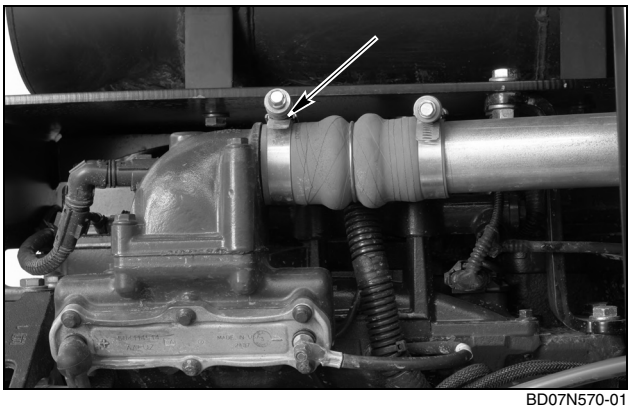
Loosen the clamp on the turbocharger for the after cooler inlet hose.

STEP 20

W110R390

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

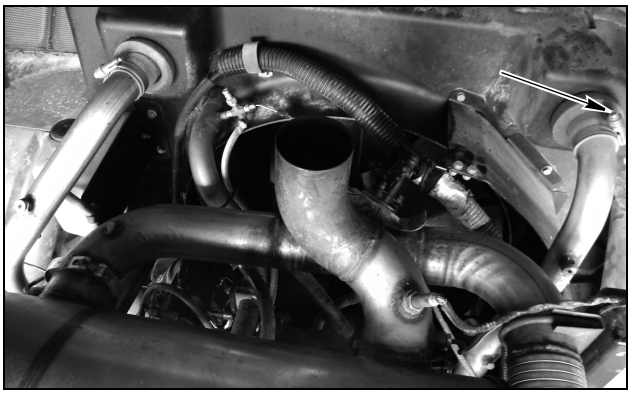
STEP 21



BD07N570-01

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

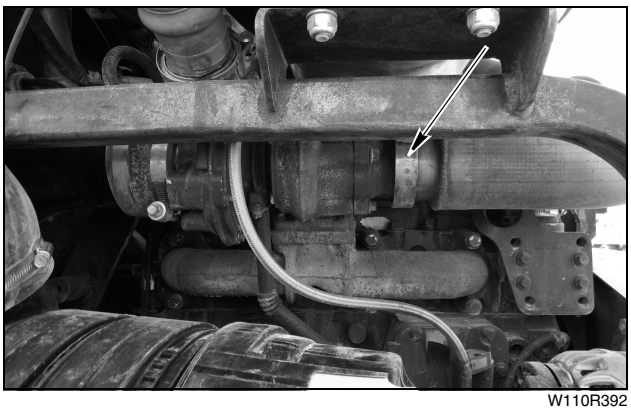
STEP 22



W110R391

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

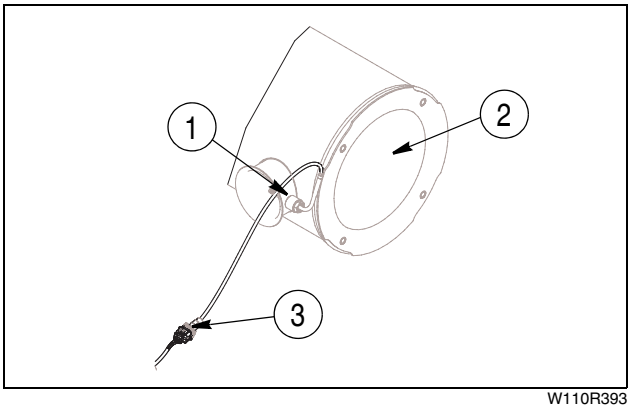
STEP 23



W110R392

Loosen the exhaust clamp from the turbocharger.

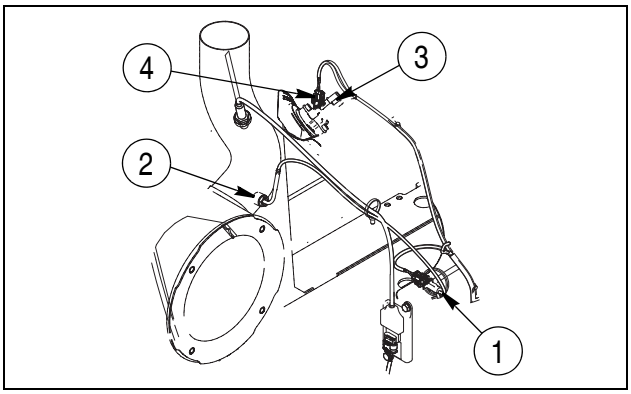
STEP 24



W110R393

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

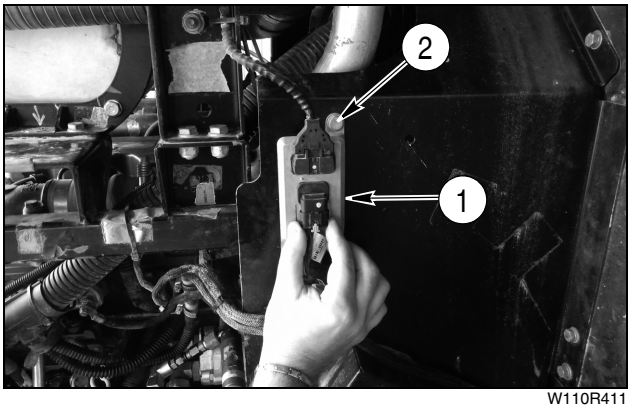
STEP 25



W110R394

Disconnect the electrical connector (1) from exhaust temperature sensor (2) after the SCR catalist.
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.

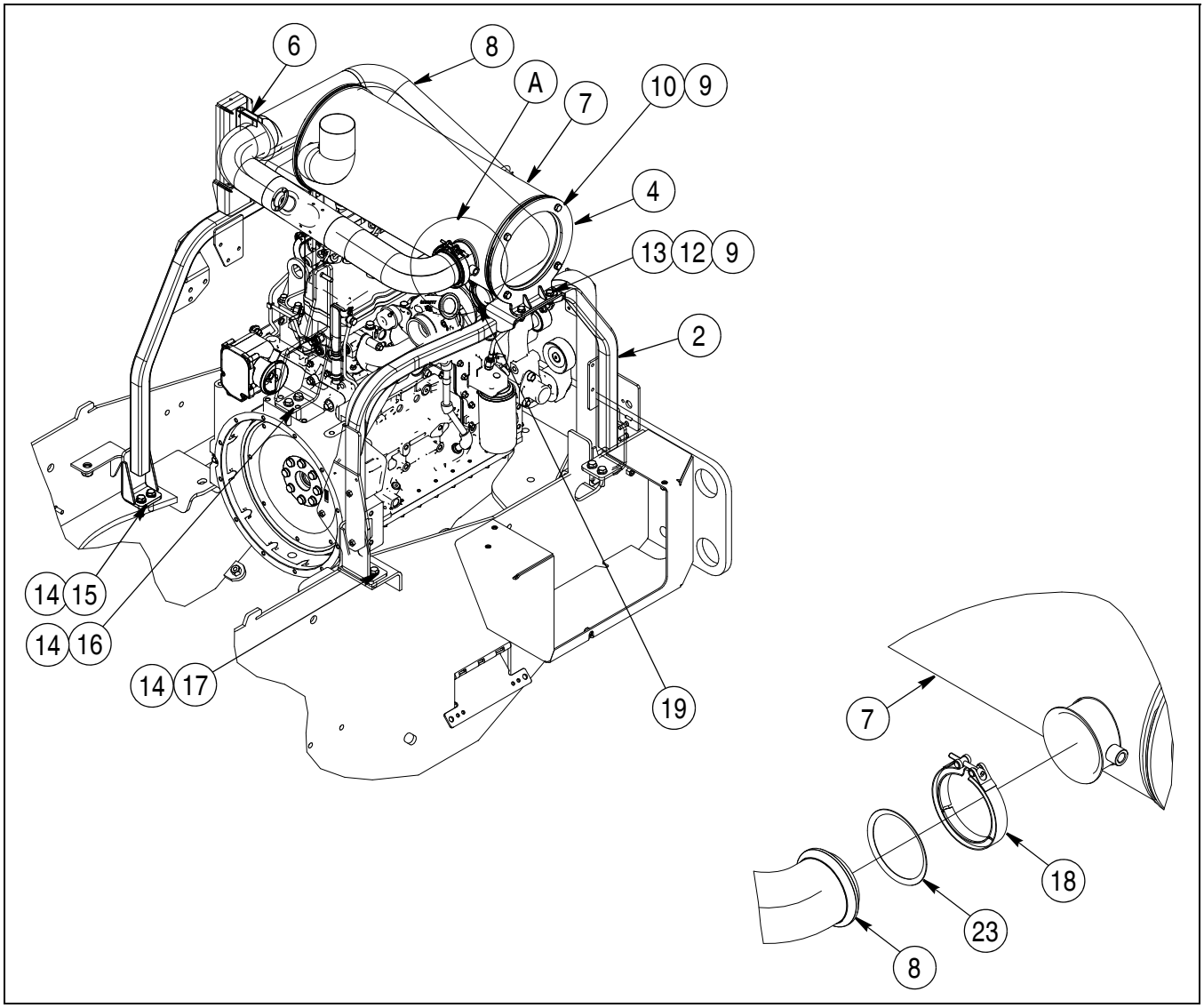
Remove hex bolts (2) securing NOx sensor module to mounting support bracket and remove module.

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

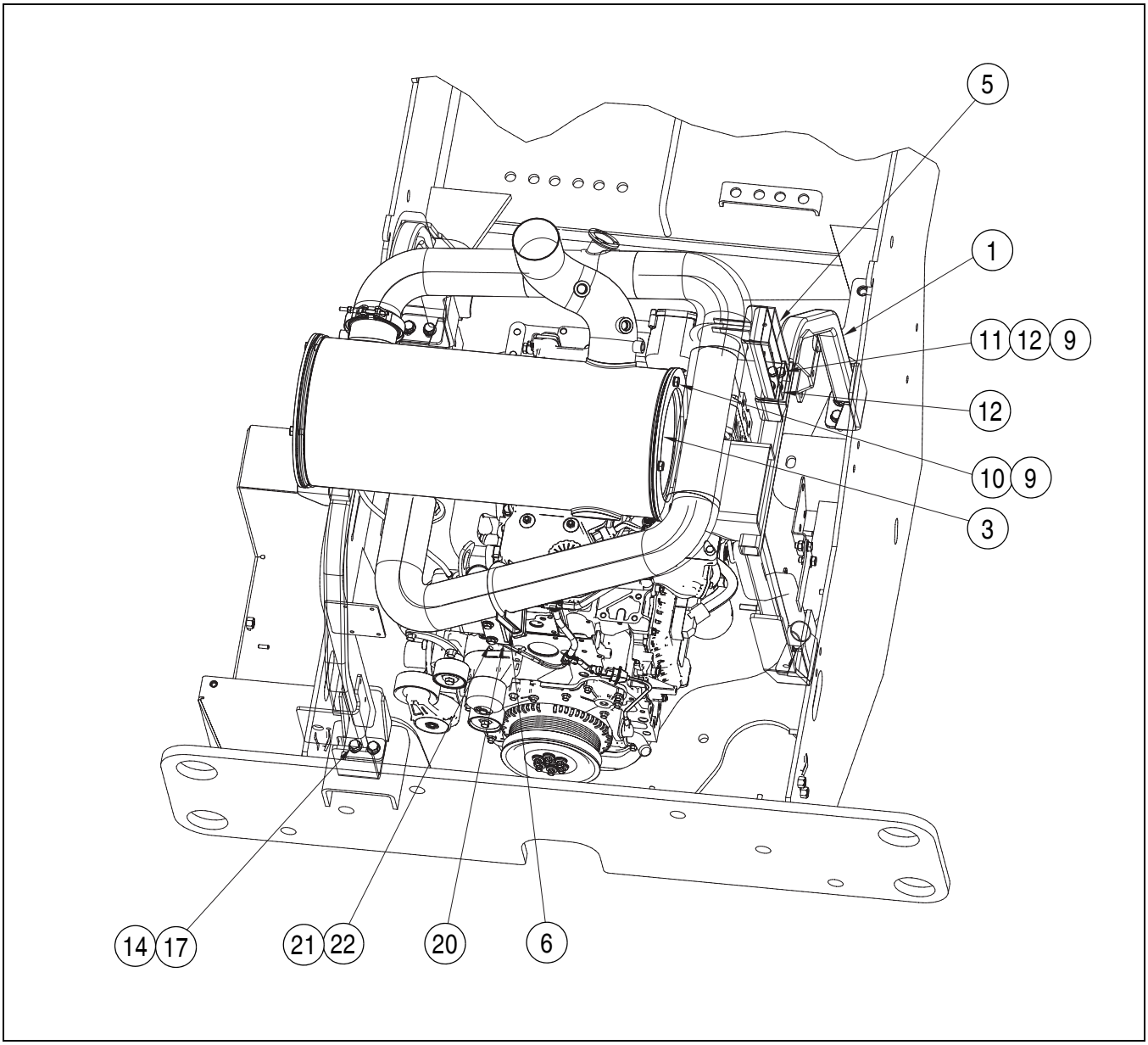
Remove the four mounting bolts 17-15 - two on each side and remove the support muffler left and right (1-2).



W110R397

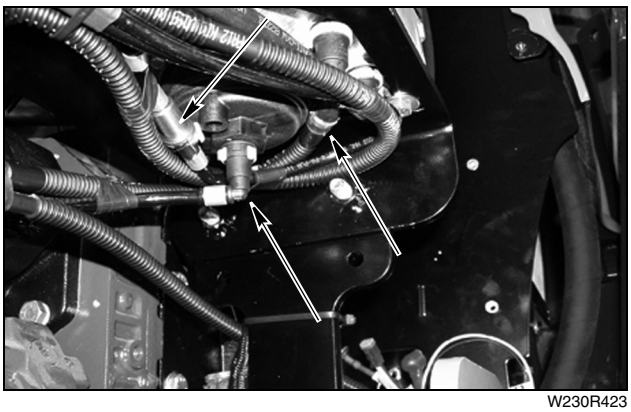
Muffler installation

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



W110R397

STEP 29



W230R423

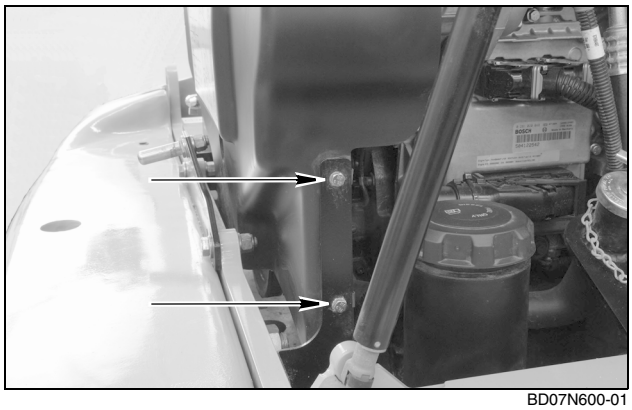
Remove from the bottom on Electronic Control Unit DENOX Urea supply the electrical connections.

STEP 30

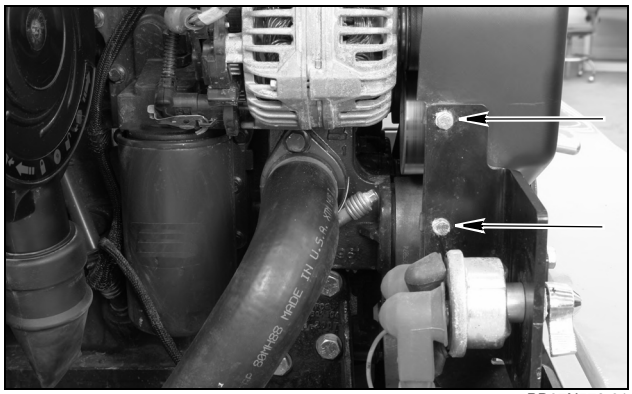
W230R424

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

STEP 31



BD07N600-01

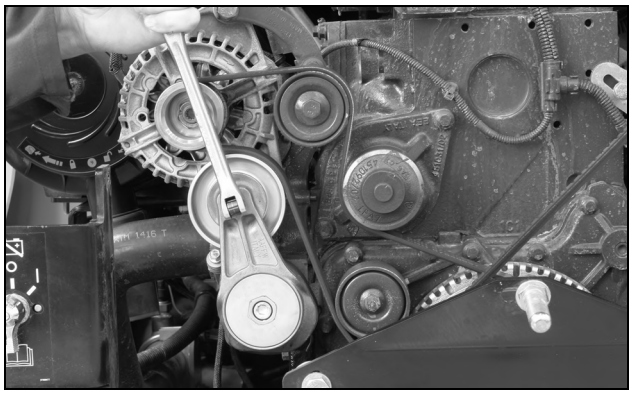


BD07N573-01

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.*

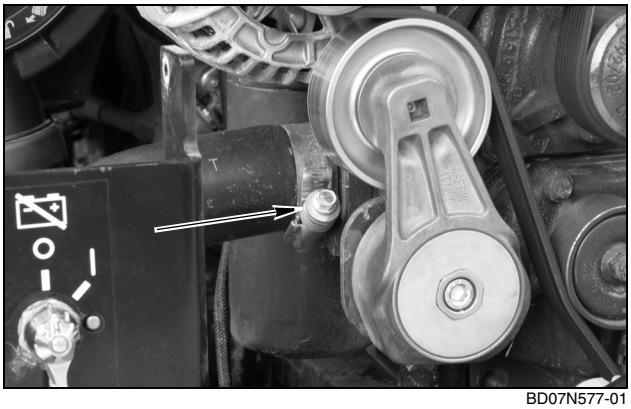
STEP 32



BD07N576-01

Remove the drive belt from the engine.

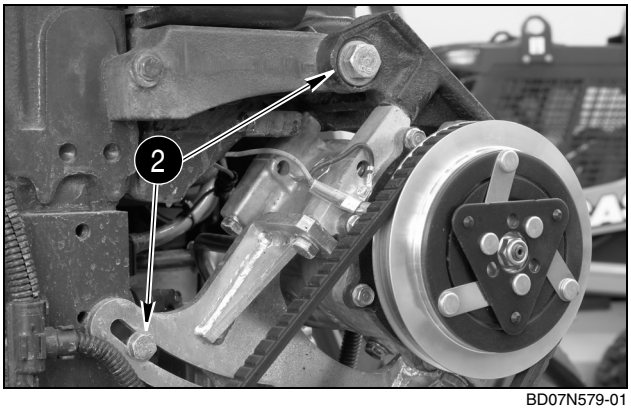
STEP 33



BD07N577-01

Loosen clamps and remove lower cooler hose from the engine.

STEP 34

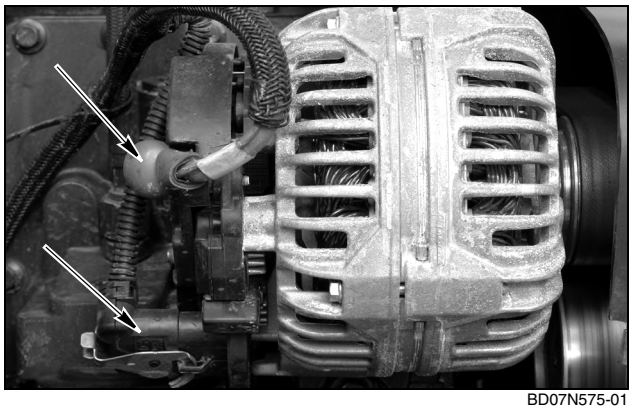


BD07N579-01

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.

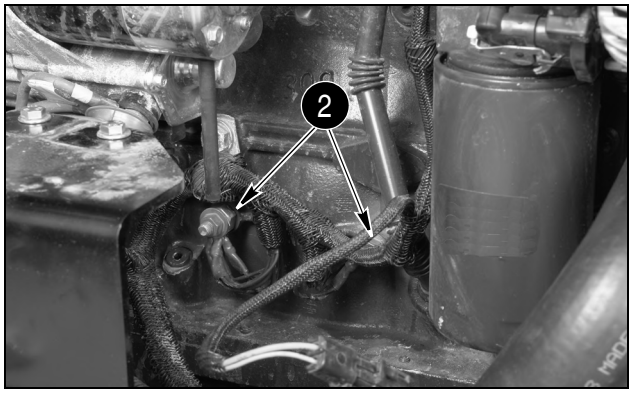
STEP 35



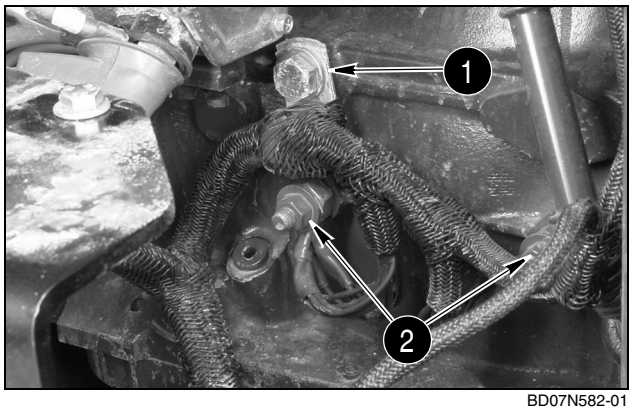
BD07N575-01

Tag and disconnect the wiring from the alternator.

STEP 36



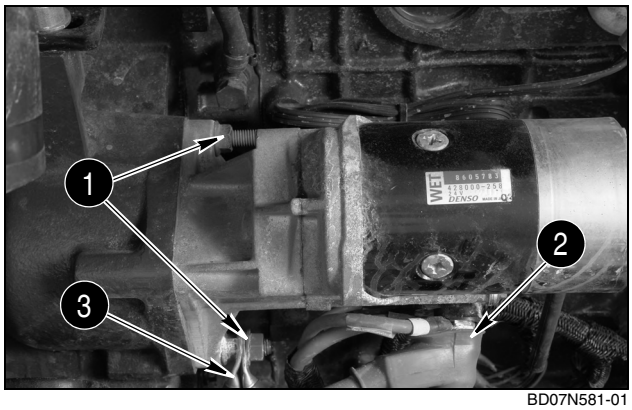
BD07N580-01



BD07N582-01

Remove bolt securing wiring harness clamp (1) to the engine. Remove ground wires (2) from the engine.

STEP 37

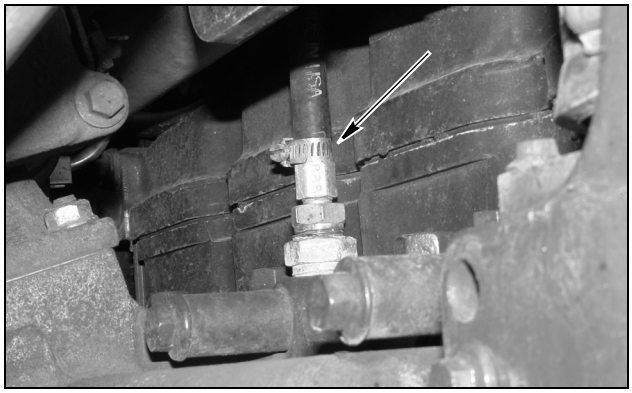


BD07N581-01

Tag and remove the wires from the starter solenoid (2), remove the ground cable and ground strap (3) from the starter. Then remove the two mounting bolts (1).

NOTE: *Move the starter cables away from the engine, move the wiring harness away from the engine.*

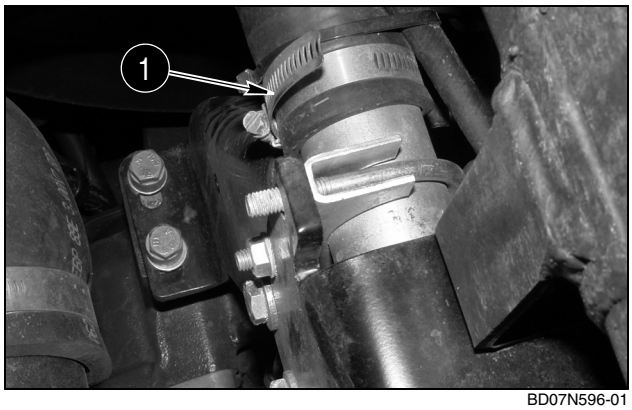
STEP 38



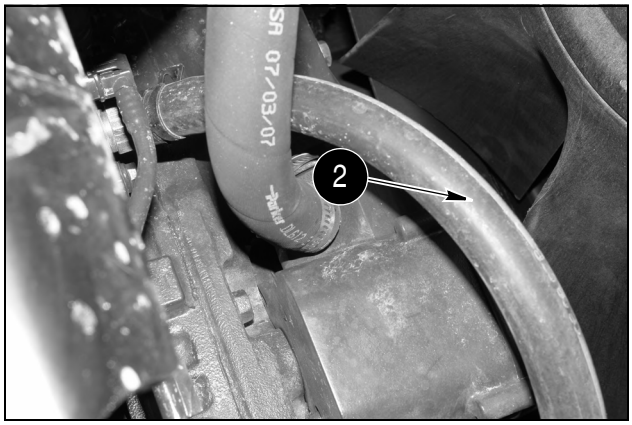
BD07N599-01

Disconnect the engine coolant vent hose and route to the rear of the engine.

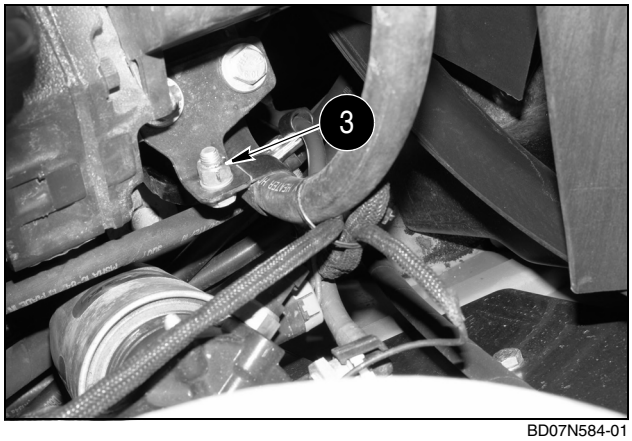
STEP 39



BD07N596-01



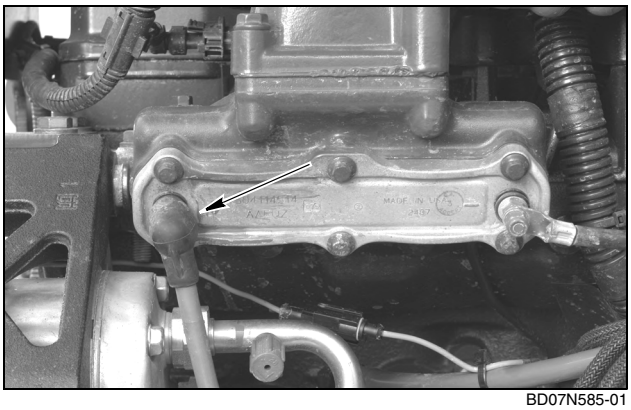
BD07N583-01



BD07N584-01

Remove the radiator hose (1) from the rear of the engine, remove the heater hose from the rear of the engine (2), remove the clamp bolts and clamps (3) from the bell housing.

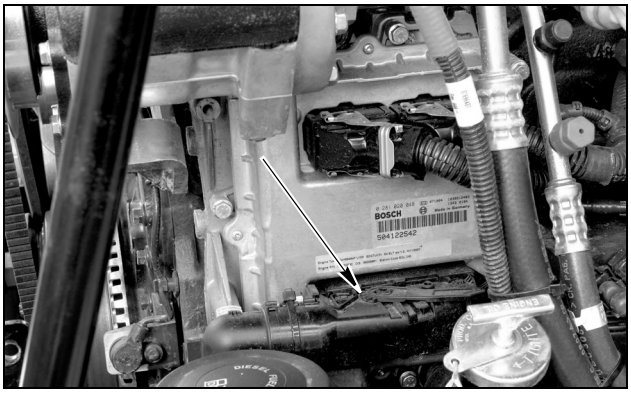
STEP 40



BD07N585-01

Tag and remove the grid heater cable.

STEP 41

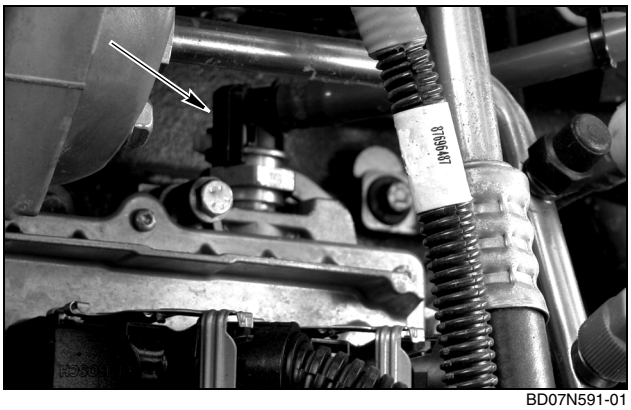


BD07N586-01

Disconnect the wiring harness from the EDC 7 controller.

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

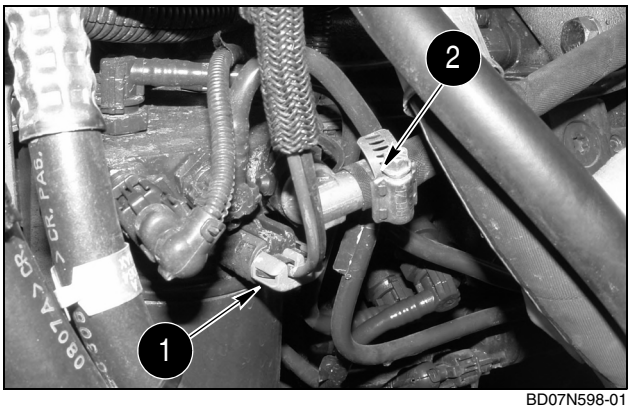
STEP 42



BD07N591-01

Remove the fuel line from the top of the EDC 7 controller, plug the line and cap the fitting.

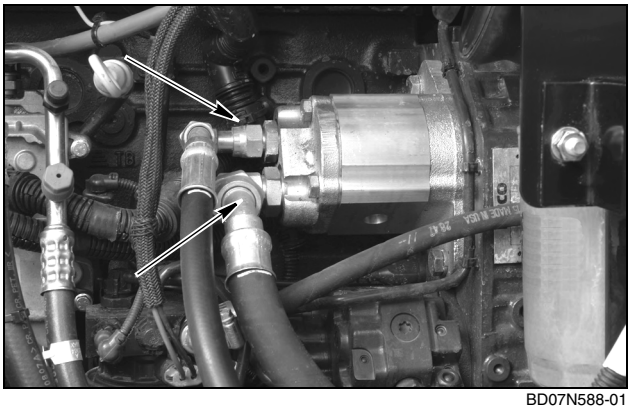
STEP 43



BD07N598-01

Tag and disconnect the fuel filter heater wires (1), disconnect the fuel line (2) from the fuel filter head, plug the line and cap the fitting.

STEP 44



BD07N588-01

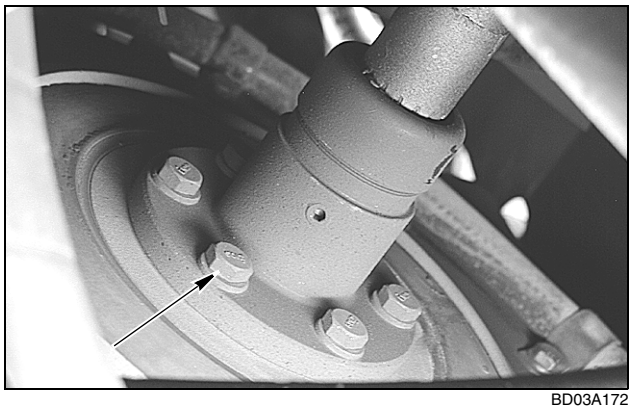
Connect and turn on vacuum pump to hydraulic reservoir. Tag and remove the hydraulic lines from the brake system pump, plug the lines and cap the fittings.

STEP 45

BD07N589-01

Remove the lower cover for the drive shaft.

STEP 46



BD03A172

Remove the drive shaft bolts from the flywheel. Move the drive shaft clear of the flywheel.

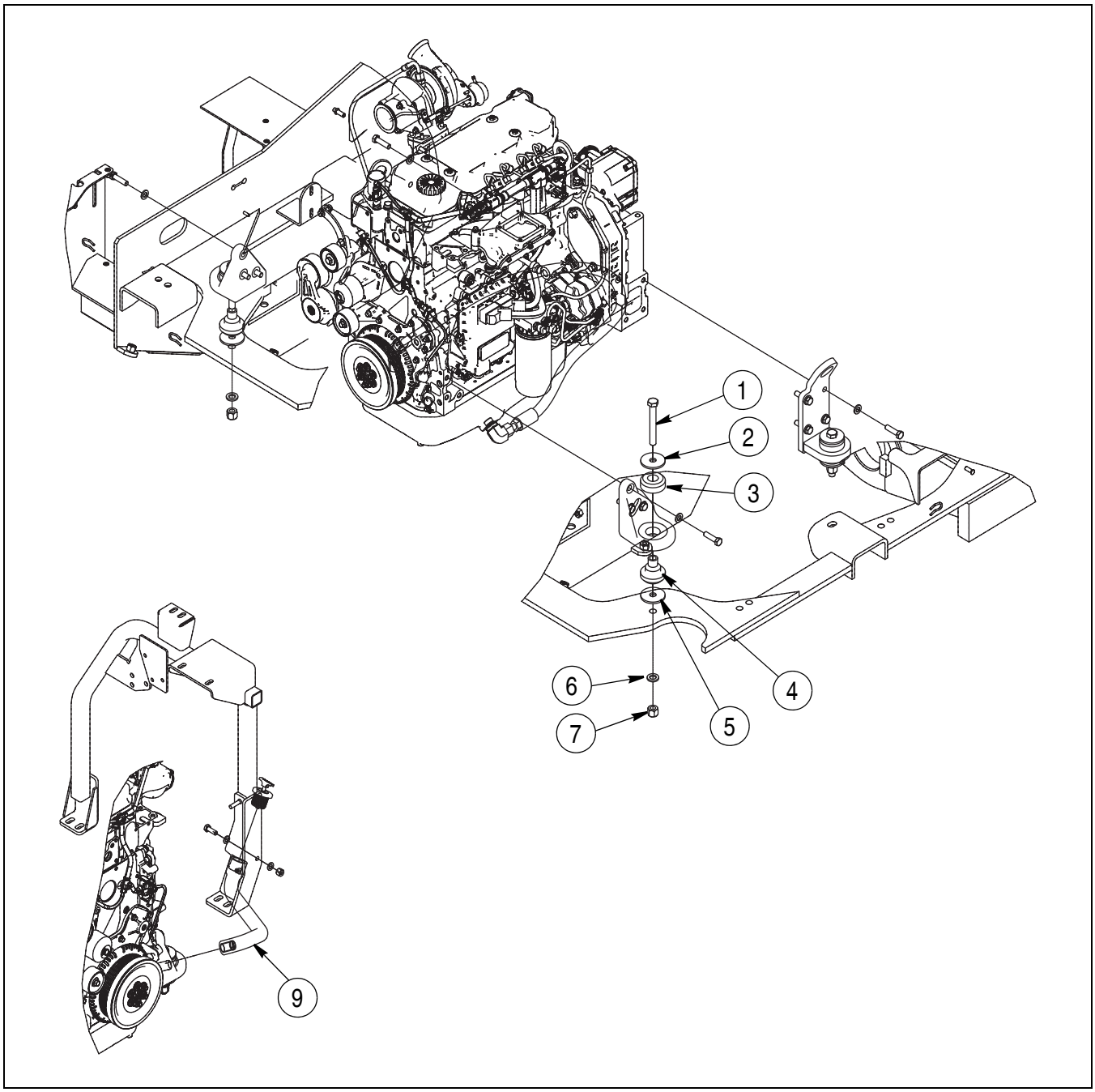
STEP 47

Connect suitable lifting equipment to engine lifting brackets. Take up all slack in lifting equipment. Remove the engine mounting bolts and lift the engine enough to gain access to the drain hose, pull the engine oil drain hose with the engine.

STEP 48

Slowly raise engine from rear chassis. Be sure all harness connections and hoses have been disconnected and are clear of the engine. Remove engine from machine.

Installation



W110R468

ENGINE INSTALLATION

1. ENGINE MOUNT BOLT, 244-298 NM (182-220 LB-FT)
2. WASHER
3. INSOLATOR UPPER
4. INSOLATOR LOWER
5. WASHER
6. WASHER
7. NUT
8. REMOTE OIL DRAIN HOSE
9. OIL FILL TUBE

STEP 49

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

STEP 50

Slowly raise engine and move into position over rear chassis. Be sure all harness connections and hoses are out of the way then lower engine. Put washer (5) between front rubber isolator (4) and chassis. Install washer (2), bolt (1), washer (6), and nut (7) in engine isolators. Lower engine into position.

STEP 51

Tighten engine mounting bolts to a torque of 244 to 298 Nm (180 to 220 lb-ft).

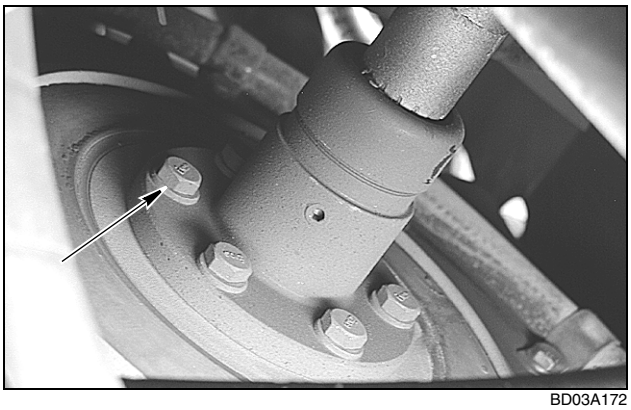
STEP 52

Disconnect lifting equipment from engine lifting brackets.

STEP 53

Connect engine oil drain hose to frame bracket.

STEP 54



BD03A172

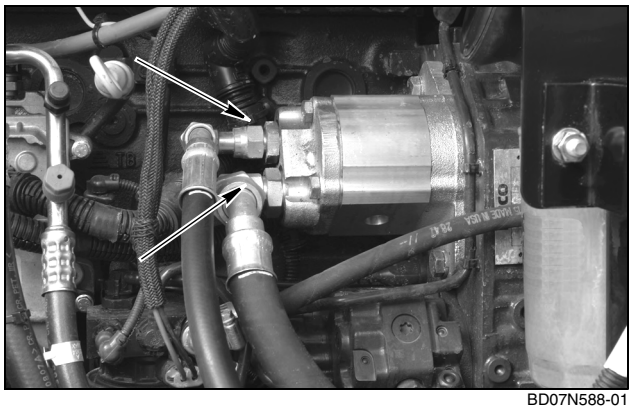
At front of engine, position drive shaft on engine coupling. Install six bolts to secure drive shaft to engine coupling. Apply Loctite 242 to threads and tighten the six bolts to a torque of 53 to 62 Nm (39 to 46 lb-ft).

STEP 55

BD07N589-01

Install the lower cover for the drive shaft.

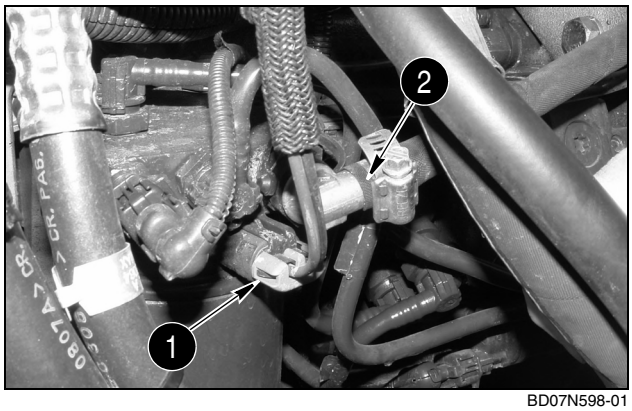
STEP 56



BD07N588-01

Connect and turn on vacuum pump to the hydraulic reservoir. 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.

STEP 57



BD07N598-01

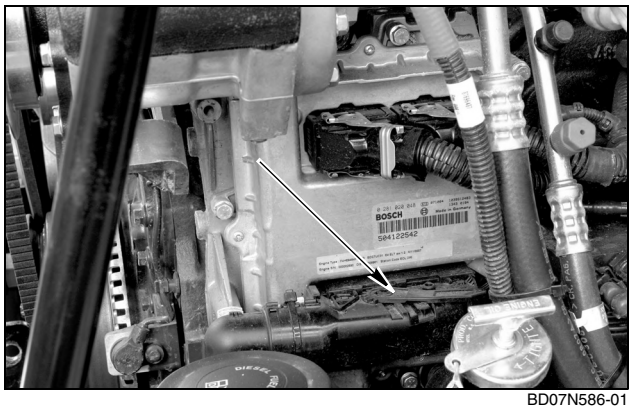
Remove cap from fitting and plug from the hose, connect fuel line (2). Connect fuel filter heater wires (1). Remove and discard tag.

STEP 58

BD07N591-01

Remove cap from fitting and plug from the hose, connect fuel line to EDC 7.

STEP 59

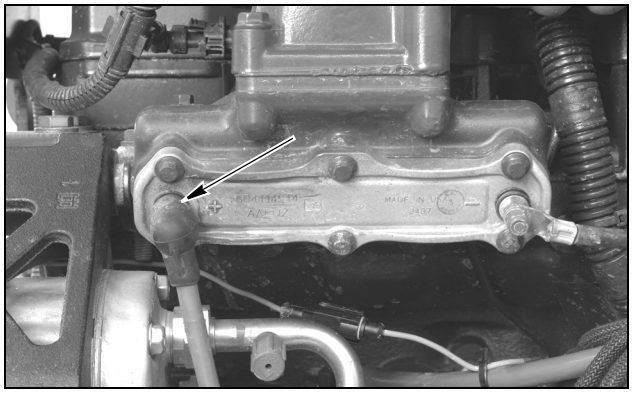


BD07N586-01

Connect wiring harness to EDC 7 controller.

NOTE: *Start the connector on the EDC 7 with lever straight out from EDC 7. Use lever to pull connector into position.*

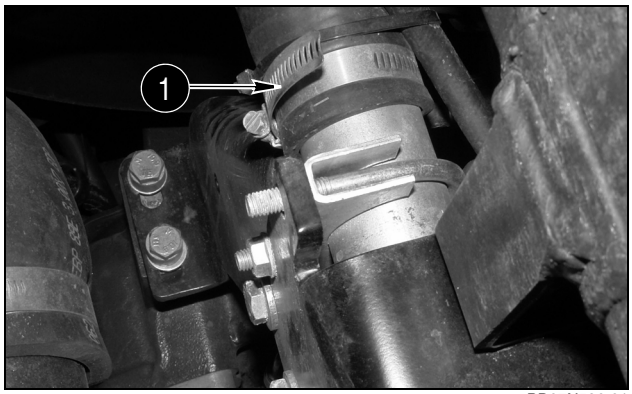
STEP 60



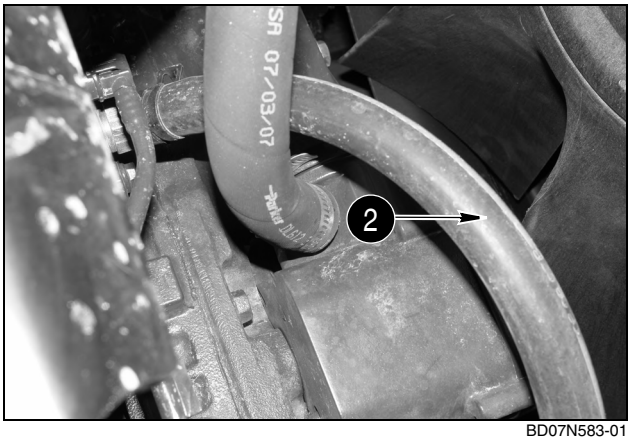
BD07N585-01

Connect grid heater cable to grid heater. Remove and discard tag.

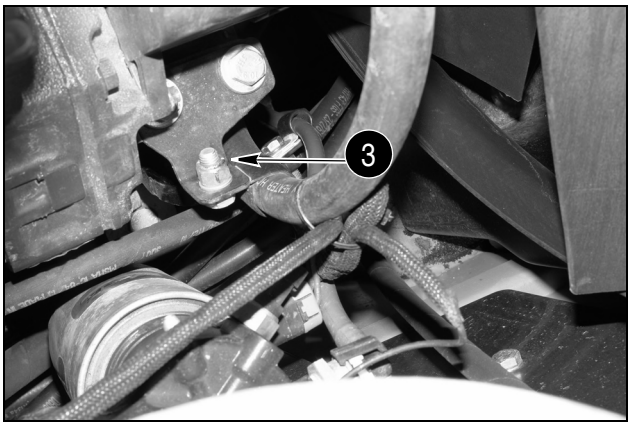
STEP 61



BD07N596-01



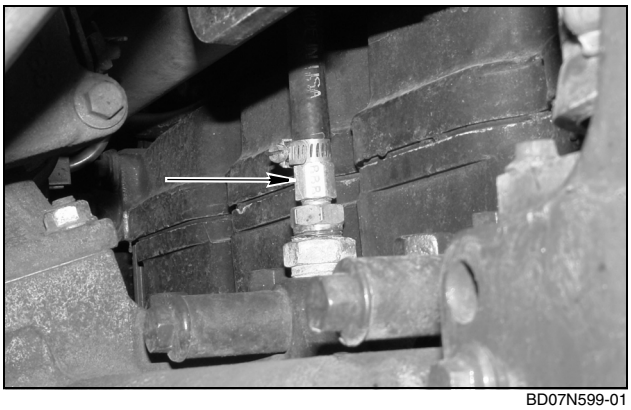
BD07N583-01



BD07N584-01

Install the heater hose (2) to the rear of the engine, mount the clamps (3), install the radiator hose (1).

STEP 62

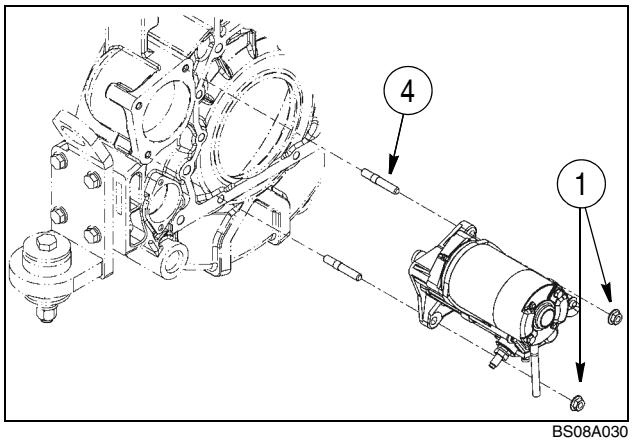


BD07N599-01

Connect the engine coolant vent hose.

STEP 63

BD07N581-01

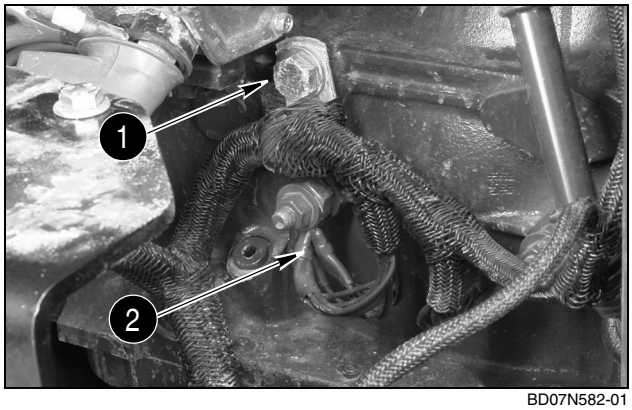


BS08A030

Install the wires (2) to the starter solenoid, install the ground cable and ground strap (3), to the starter. Torque starter mounting nuts (1) to 40 to 50 Nm (29 to 37 pound-feet). Remove and discard tags.

NOTE: If the starter mounting studs (4) have to be replaced apply Loctite 747 primer to studs and holes and apply Loctite 271 to each stud and hole and torque to 19 to 29 Nm (14 to 21 pound-feet).

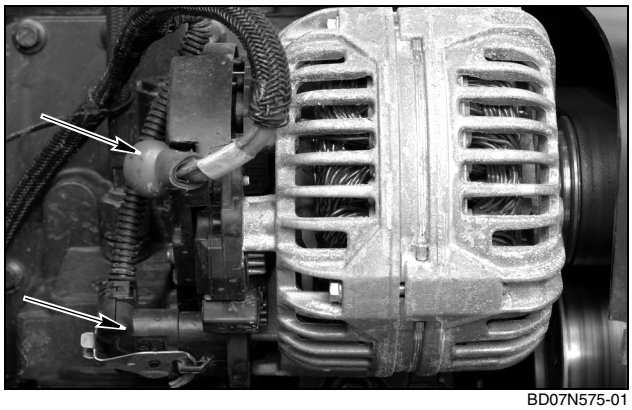
STEP 64



BD07N582-01

Install bolt securing wiring harness (1) clamp to the engine. Install ground wires (2) to the engine.

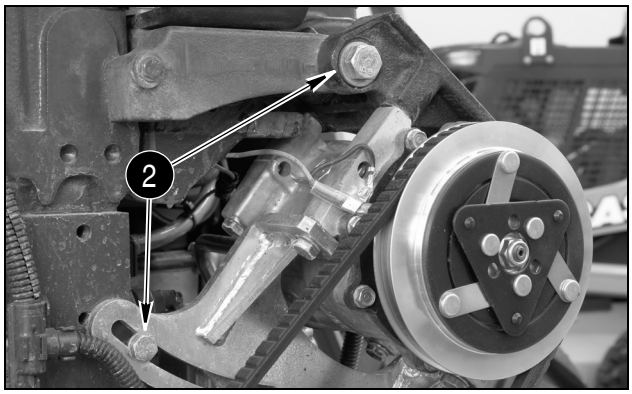
STEP 65



BD07N575-01

Connect the wiring to the alternator. Remove and discard tags.

STEP 66

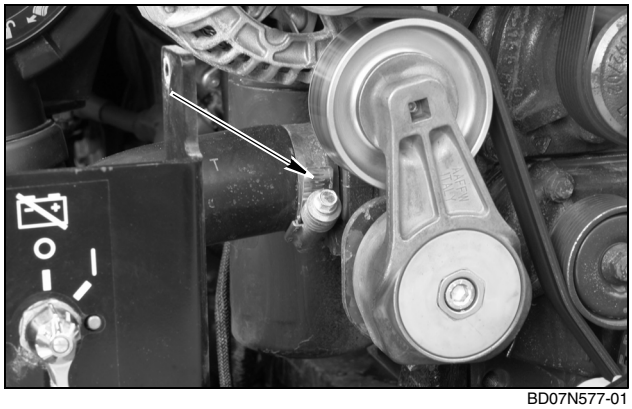


BD07N579-01

W110R395

If loader is equipped with air conditioning, mount the compressor using the two mounting bolts (2), connect the engine wiring harness connectors to air compressor clutch connector (1). Remove and discard tags.

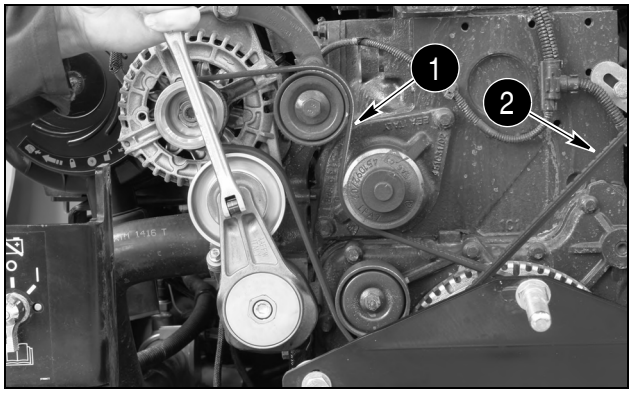
STEP 67



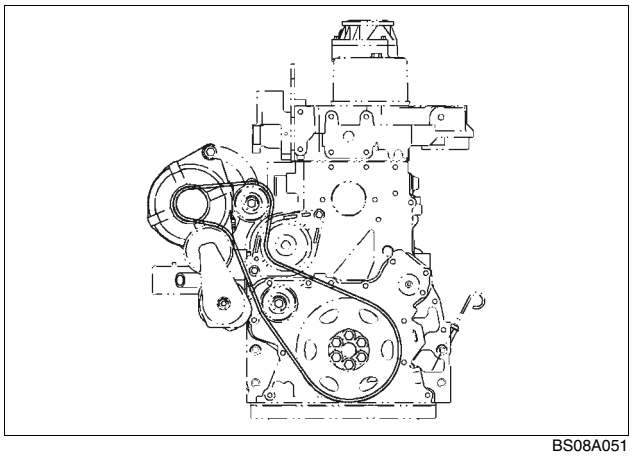
BD07N577-01

Install lower cooler hose to the engine and tighten the clamps to a torque of 10.1 to 11.3 Nm (90 to 100 lb-inch).

STEP 68



BD07N576-01



BS08A051

DRIVE BELT ROUTING W/O AC (SEPARATE BELT FOR AC)

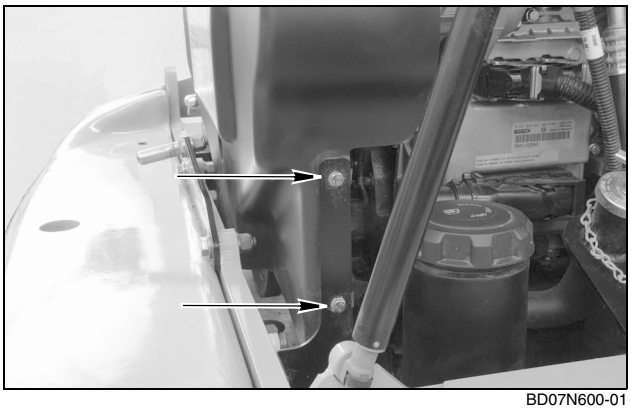
Install the drive belt (1) on the pulleys. If equipped with air conditioning install belt (2).

NOTE: *A/C compressor belt tension:*

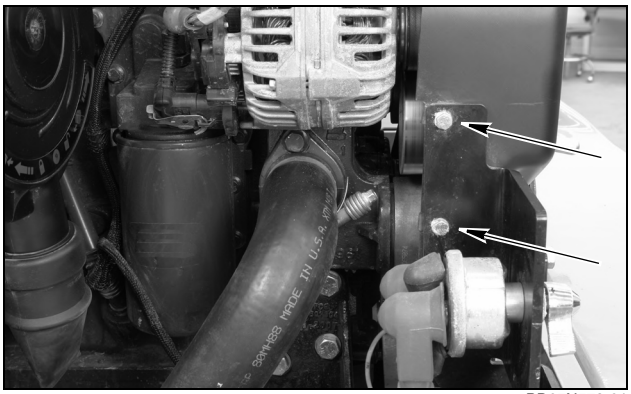
A. Tension for a new belt is 45 Kg (100 lbs.).

B. Tension for a belt used more than 20 hours is 41 Kg (90 lbs).

STEP 69



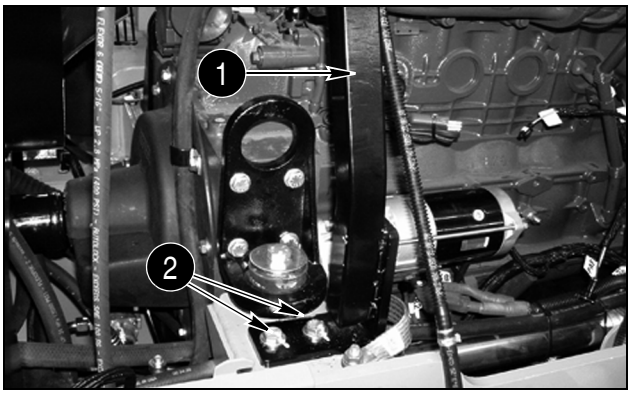
BD07N600-01



BD07N573-01

Install the cover mounting brackets to the machine frame. Install the belt cover, install the four mounting bolts for the belt cover..

STEP 70



W230R427

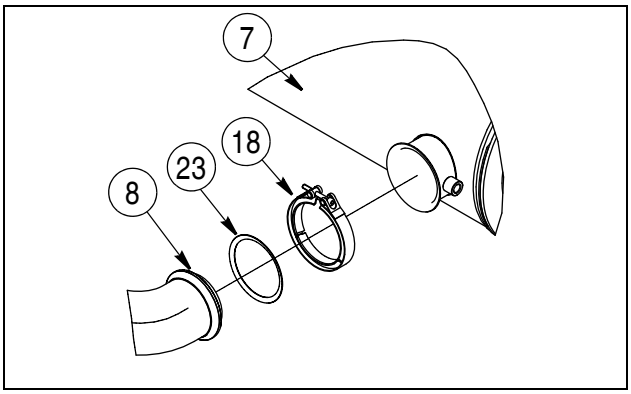
Install the support muffler (1), install the four mounting bolts (2, two on each side). Install the support muffler (2).

STEP 71

W110R396

Place the muffler on the brackets. Install the eight mounting bolts (four on each side). Tighten the bolts to a torque of 28.9 to 35.3 Nm (21.3 to 26 lb-ft).

STEP 72

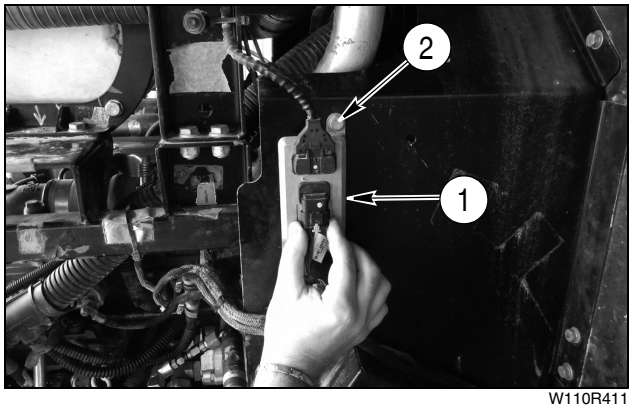


W110R398

NOTE: *Position exhaust tube into place using muffler inlet and fixture. So that flexible tube is halfway between fully extended and fully compressed lengths.*

Tighten the clamp on the exhaust pipe (8) (torque muffler clamp 6.0 Nm/53 lbs-in).

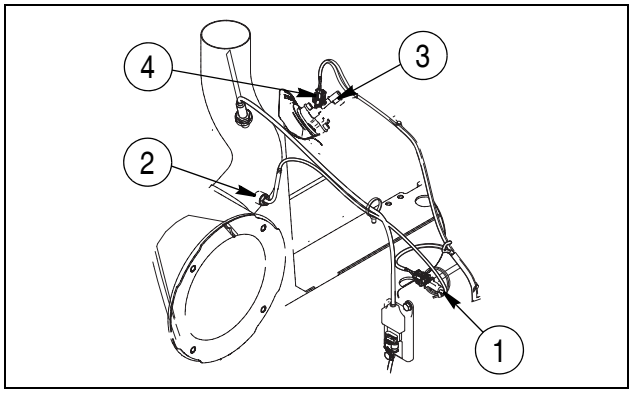
STEP 73



W110R411

Install NOx sensor module (1) and secure it to mounting support bracket using hex bolt (2). Reconnect machine wiring harness to NOx sensor module.

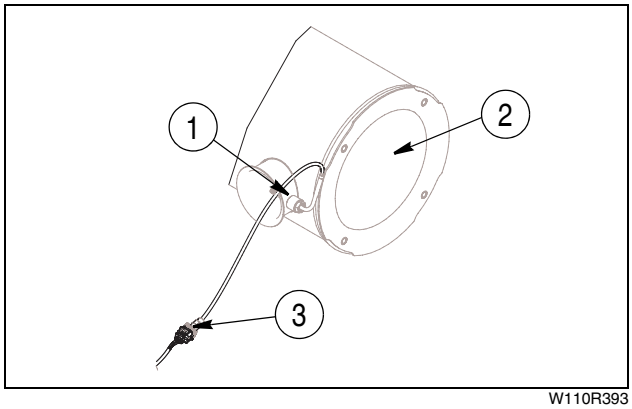
STEP 74



W110R394

Reconnect the hoses on Dosing Unit Injector (3) and reconnect electrical connector (4). Reconnect the electrical sensor connector (1).

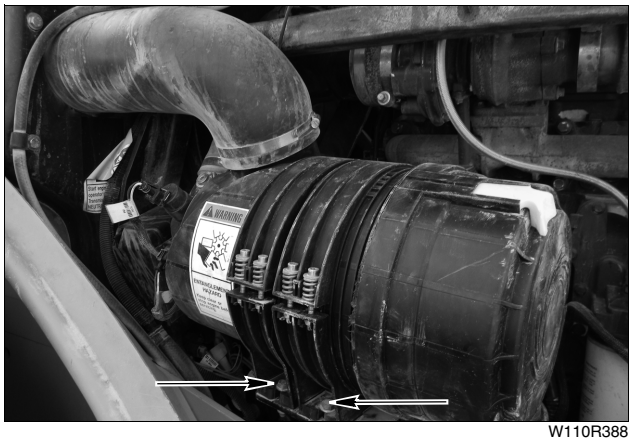
STEP 75



W110R393

Reconnect the electrical connector (3).

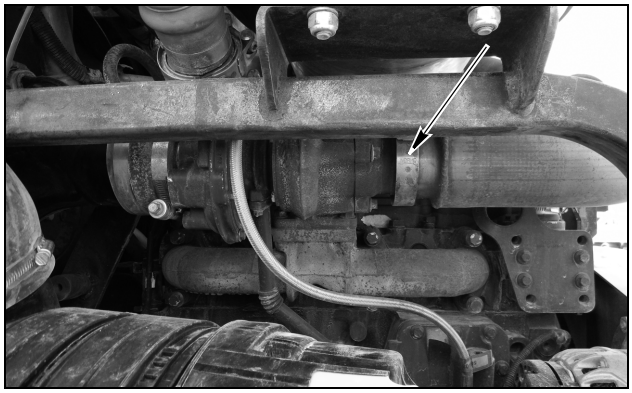
STEP 76



W110R388

Place air cleaner on bracket. Install four mounting bolts in air cleaner and tighten.

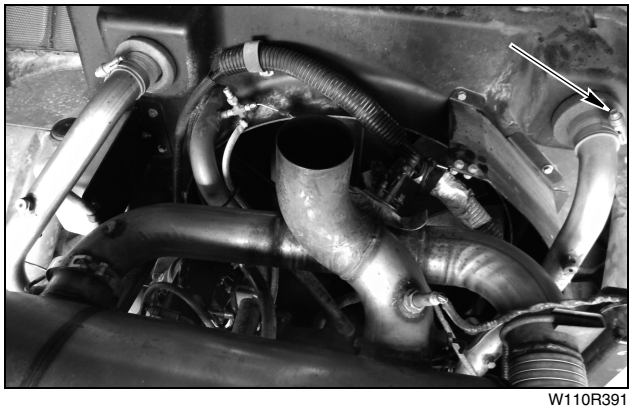
STEP 77



W110R392

Install and tighten the exhaust clamp on the turbocharger, tighten the muffler mounting bolts.

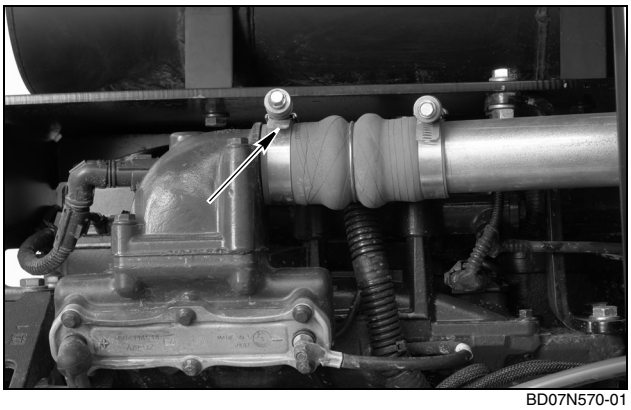
STEP 78



W110R391

Place the after cooler outlet hose on the machine. Tighten the clamp on the after cooler.

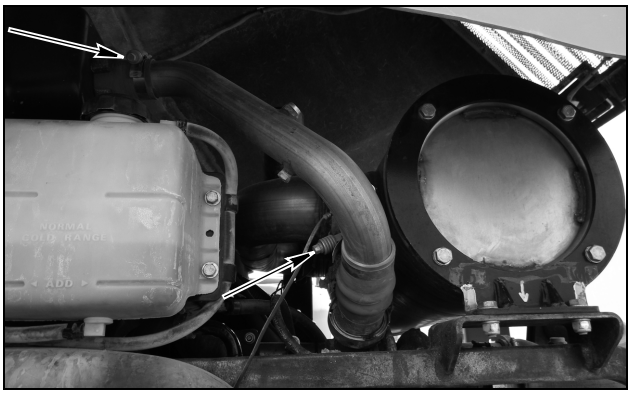
STEP 79



BD07N570-01

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

STEP 80



W110R389

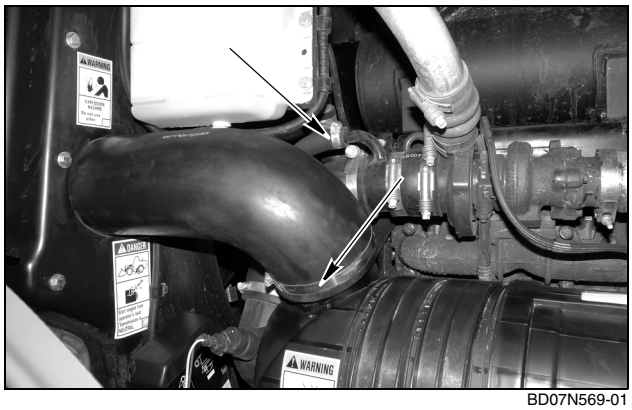
Place the after cooler inlet hose on the machine. Tighten the clamp on the after cooler.
Tighten the clamp on the turbocharger for the after cooler inlet hose.

STEP 81

W110R387

Install the intake hose and tighten the clamps on turbocharger and air cleaner.

STEP 82



BD07N569-01

Install the crankcase ventilation hose and tighten the clamp on air cleaner intake hose.

STEP 83

W110R387

Connect engine wiring harness connector to air filter restriction switch. Remove and discard tag.

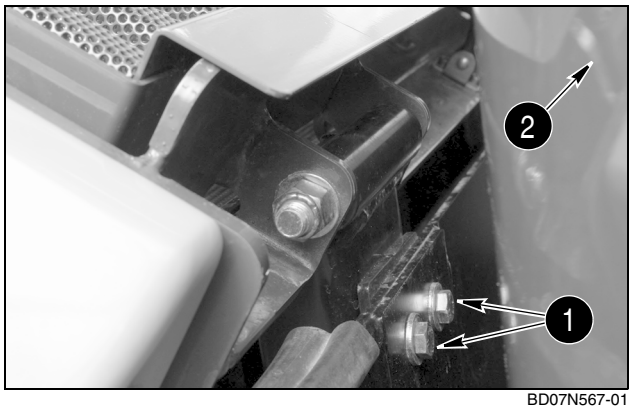
STEP 84

BD03A232

Carefully raise and place hood over loader.

NOTE: *Refer to step 8 and 9 of removal for lifting procedure.*

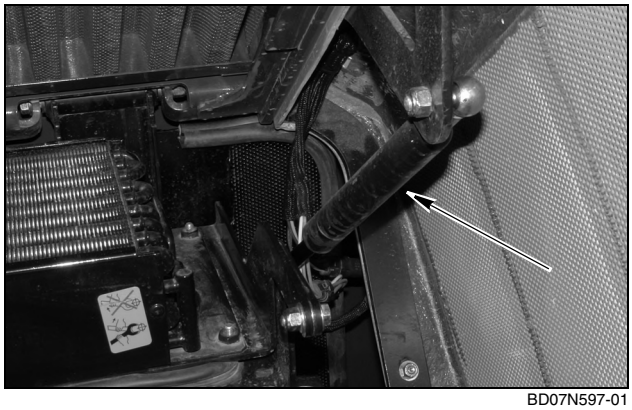
STEP 85



BD07N567-01

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

STEP 86



BD07N597-01

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

STEP 87

W110R384

Install the rear lift cylinder on the machine.