

1187C Excavator

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SECTION INDEX - GENERAL

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1001

STANDARD TORQUE SPECIFICATIONS

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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 graphites, molydisulfide greases, or other extreme pressure lubricants are used.

Grade 5 Bolts, Nuts, and Studs   		
Size	Pound-Feet	Newton metres
1/4 in	9-11	12-15
5/16 in	17-21	23-28
3/8 in	35-42	48-57
7/16 in	54-64	73-87
1/2 in	80-96	109-130
9/16 in	110-132	149-179
5/8 in	150-180	203-244
3/4 in	270-324	366-439
7/8 in	400-480	542-651
1.0 in	580-696	787-944
1-1/8 in	800-880	1085-1193
1-1/4 in	1120-1240	1519-1681
1-3/8 in	1460-1680	1980-2278
1-1/2 in	1940-2200	2631-2983

Grade 8 Bolts, Nuts, and Studs   		
Size	Pound-Feet	Newton metres
1/4 in	12-15	16-20
5/16 in	24-29	33-39
3/8 in	45-54	61-73
7/16 in	70-84	95-114
1/2 in	110-132	149-179
9/16 in	160-192	217-260
5/8 in	220-264	298-358
3/4 in	380-456	515-618
7/8 in	600-720	814-976
1.0 in	900-1080	1220-1465
1-1/8 in	1280-1440	1736-1953
1-1/4 in	1820-2000	2468-2712
1-3/8 in	2380-2720	3227-3688
1-1/2 in	3160-3560	4285-4827
NOTE: Use thick nuts with Grade 8 bolts.		

TORQUE SPECIFICATIONS - METRIC HARDWARE

Use the following torques when special torques 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-Feet	Newton metres
M4	2-3	3-4
M5	5-6	6.5-8
M6	8-9	10.5-12
M8	19-23	26-31
M10	38-45	52-61
M12	66-79	90-107
M14	106-127	144-172
M16	160-200	217-271
M20	320-380	434-515
M24	500-600	675-815
M30	920-1100	1250-1500
M36	1600-1950	2175-2600

Grade 10.9 Bolts, Nuts, and Studs 		
Size	Pound-Feet	Newton metres
M4	3-4	4-5
M5	7-8	9.5-11
M6	11-13	15-17.5
M8	27-32	37-43
M10	54-64	73-87
M12	93-112	125-15
M14	149-179	200-245
M16	230-280	310-380
M20	450-540	610-730
M24	780-940	1050-1275
M30	1470-1770	2000-2400
M36	2580-3090	3500-4200

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

Tube OD Hose ID	Thread Size	Pound- Feet	Newton metres
37 Degree Flare Fittings			
1/4 in 6.4 mm	7/16-20	6-12	8-16
5/16 in 7.9 mm	1/2-20	8-16	11-21
3/8 in 9.5 mm	9/16-18	10-25	14-33
1/2 in 12.7 mm	3/4-16	15-42	20-56
5/8 in 15.9 mm	7/8-14	25-58	34-78
3/4 in 19.0 mm	1-1/16-12	40-80	54-108
7/8 in 22.2 mm	1-3/16-12	60-100	81-135
1.0 in 25.4 mm	1-5/16-12	75-117	102-158
1-1/4 in 31.8 mm	1-5/8-12	125-165	169-223
1-1/2 in 38.1 mm	1-7/8-12	210-250	285-338

Tube OD Hose ID	Thread Size	Pound- Feet	Newton metres
Straight Threads with O-ring			
1/4 in 6.4 mm	7/16-20	12-19	16-25
5/16 in 7.9 mm	1/2-20	16-25	22-23
3/8 in 9.5 mm	9/16-18	25-40	34-54
1/2 in 12.7 mm	3/4-16	42-67	57-90
5/8 in 15.9 mm	7/8-14	58-92	79-124
3/4 in 19.0 mm	1-1/16-12	80-128	108-174
7/8 in 22.2 mm	1-3/16-12	100-160	136-216
1.0 in 25.4 mm	1-5/16-12	117-187	159-253
1-1/4 in 31.8 mm	1-5/8-12	165-264	224-357
1-1/2 in 38.1 mm	1-7/8-12	250-400	339-542

Split Flange Mounting Bolts		
Size	Pound- Feet	Newton metres
5/16-18	15-20	20-27
3/8-16	20-25	26-33
7/16-14	35-45	47-61
1/2-13	55-65	74-88
5/8-11	140-150	190-203

TORQUE SPECIFICATIONS - O-RING FACE SEAL FITTING

Nom. SAE Dash Size	Tube OD	Thread Size	Pound- Feet	Newton Metres	Thread Size	Pound- Feet	Newton Metres
O-ring Face Seal End					O-ring Boss End Fitting or Locknut		
-4	1/4 in 6.4 mm	9/16-18	10-12	14-16	7/16-20	17-20	23-27
-6	3/8 in 9.5 mm	11/16-16	18-20	24-27	9/16-18	25-30	33-40
-8	1/2 in 12.7 mm	13/16-16	32-40	43-54	3/4-16	45-50	61-68
-10	5/8 in 15.9 mm	1-14	46-56	60-75	7/8-14	60-65	81-88
-12	3/4 in 19.0 mm	1-3/16-12	65-80	90-110	1-1/16-12	85-90	115-122
-14	7/8 in 22.2 mm	1-3/16-12	65-80	90-110	1-3/16-12	95-100	129-136
-16	1.0 in 25.4 mm	1-7/16-12	92-105	125-140	1-5/16-12	115-125	156-169
-20	1-1/4 in 31.8 mm	1-11/16-12	125-140	170-190	1-5/8-12	150-160	203-217
-24	1-1/2 in 38.1 mm	2-12	150-180	200-254	1-7/8-12	190-200	258-271

2001

ENGINE REMOVAL AND INSTALLATION AND RADIATOR REMOVAL AND INSTALLATION

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SPECIFICATIONS

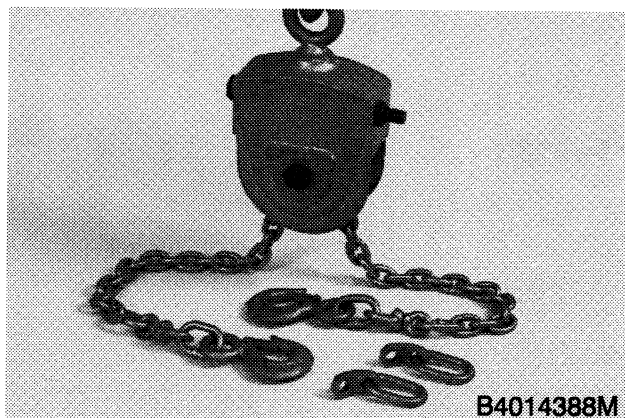
Torque Specifications

Cap screws that fasten the front engine mount to the engine..... 76 to 90 pound-feet
(103 to 122 Nm)

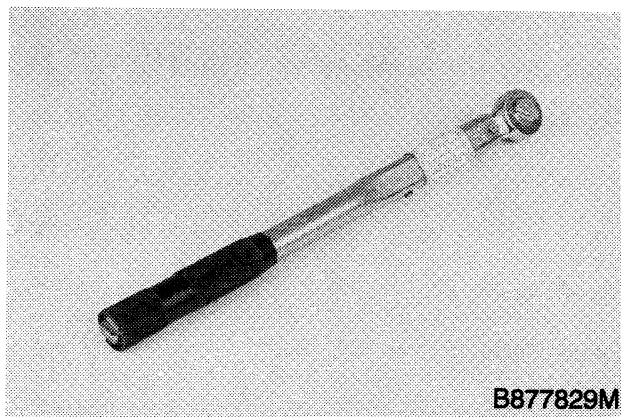
Cap screws that fasten the fan to the engine 456 to 564 pound-inches
(52 to 64 Nm)

SPECIAL TOOLS

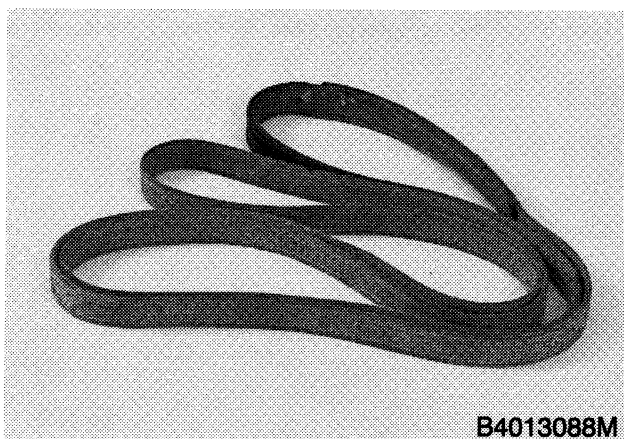
Special tools can be ordered from Service Tools,
P.O. Box 314, Owatonna, Minnesota 55060 in the
U.S.A. and from Jobborn Manufacturing Company, 97
Frid Street, Hamilton Ontario L8P 4M3 in Canada.



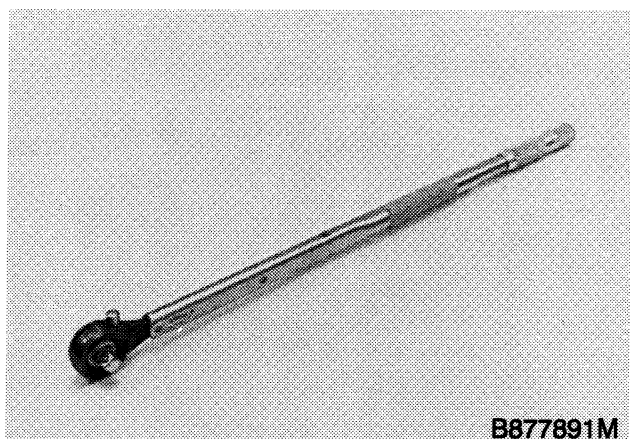
CAS-10119 Adjustable Chain Lifting Sling, Includes
CAS-10700 Lifting Eyes



CAS-10034 100 to 750 Pound-Inch Torque Wrench



CAS-10821 Lifting Sling



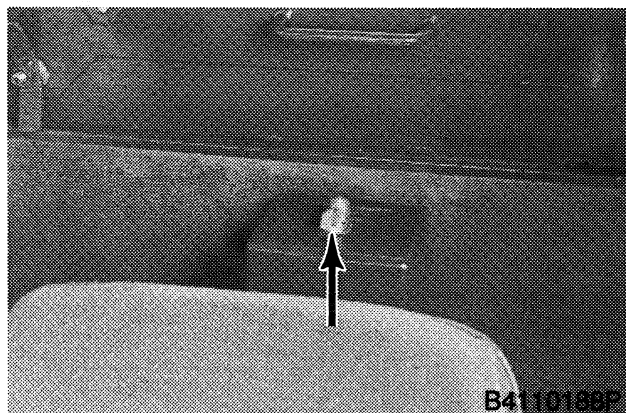
CAS-10036 50 to 250 Pound-Feet Torque Wrench

ENGINE

Removal

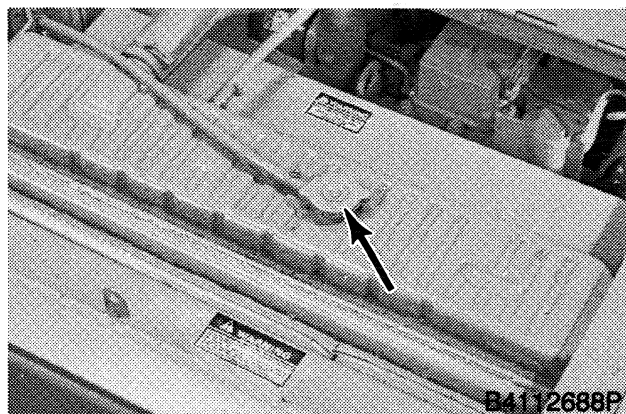
Park the machine on a level surface. Lower the attachment to the floor. Put the drive brake switch in the ON position. Stop the engine and apply the swing brake.

STEP 1



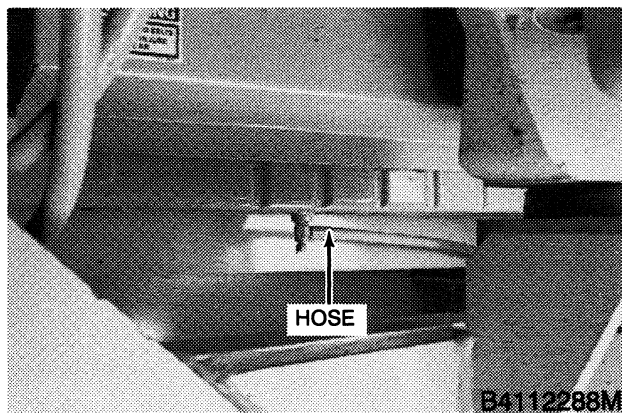
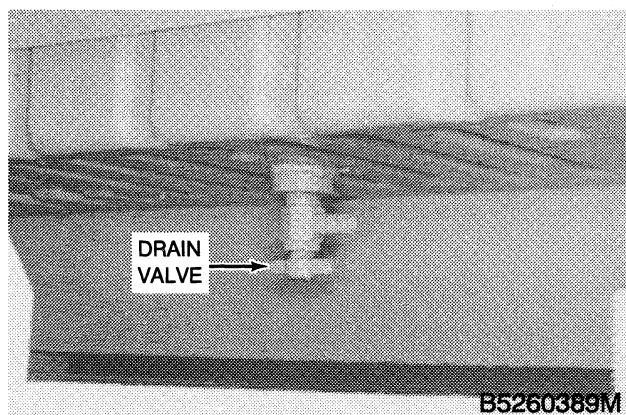
Put the master disconnect switch in the OFF position.

STEP 2



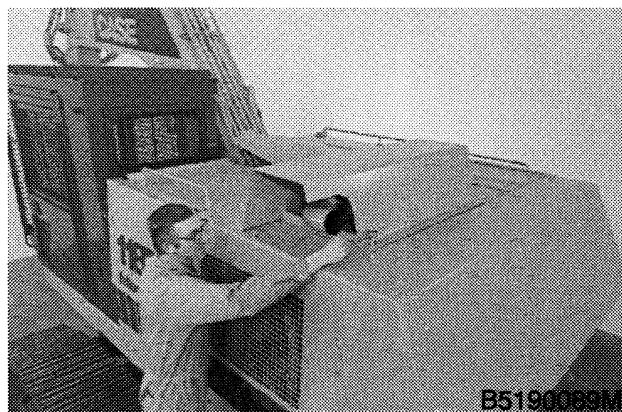
Loosen the cap on the radiator.

STEP 3



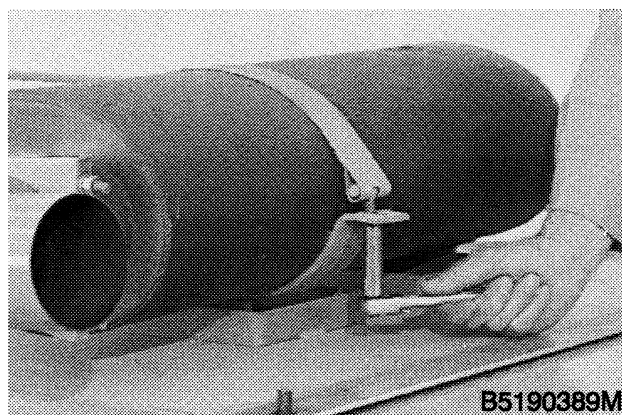
Connect a hose to the drain valve on the radiator. Open the drain valve and drain the coolant from the radiator.

STEP 4



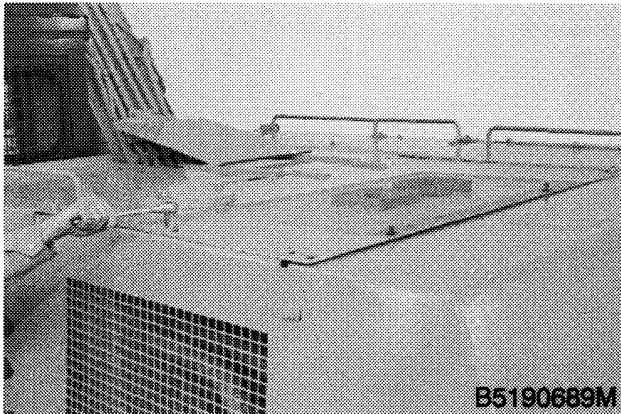
Remove the cover from the muffler.

STEP 5



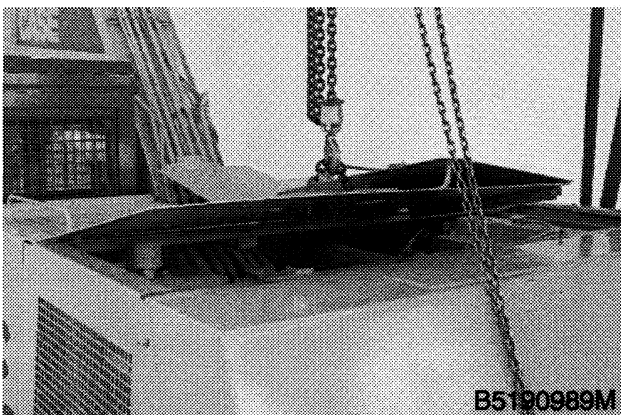
Remove the muffler from the machine.

STEP 6



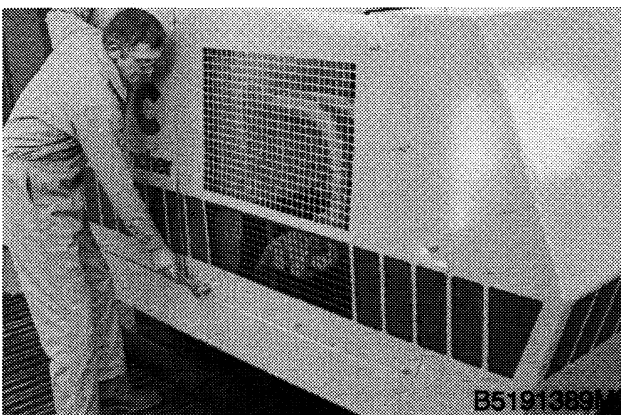
Loosen and remove the hardware that fastens the top rear cover to the machine.

STEP 7



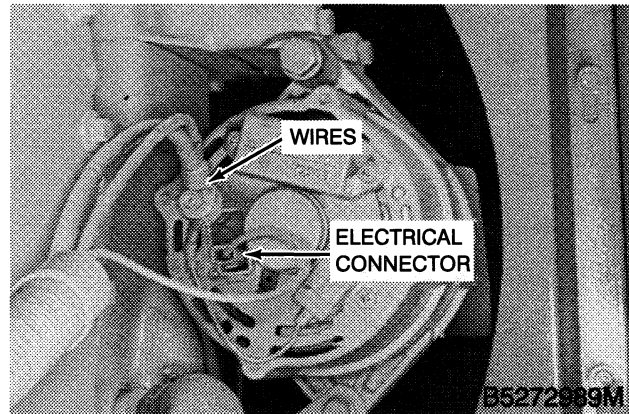
Remove the top rear cover from the machine.

STEP 8



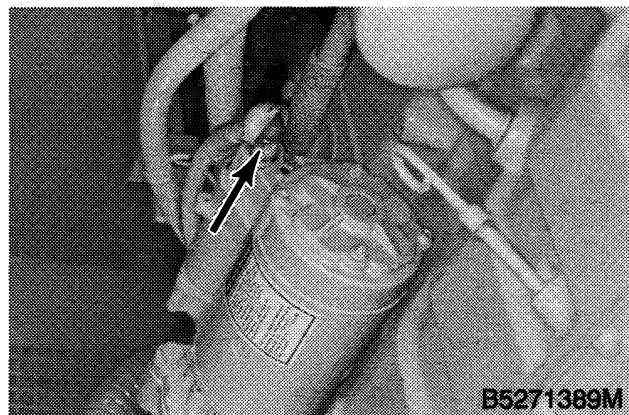
Remove the left rear cover from the machine.

STEP 9



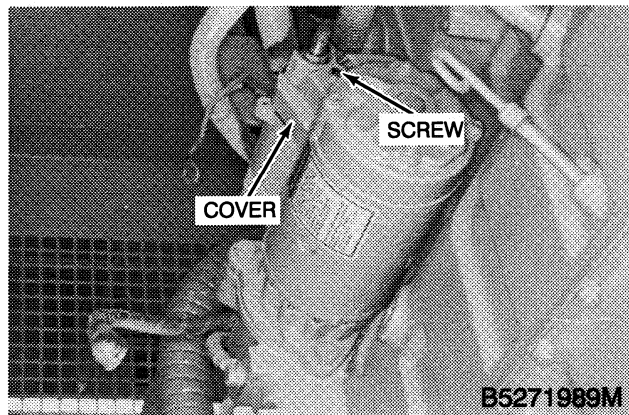
Disconnect the wires from the alternator. Disconnect the electrical connector from the alternator.

STEP 10



Move the rubber boot out of the way and disconnect the wire and cable from the terminal on the starter solenoid.

STEP 11



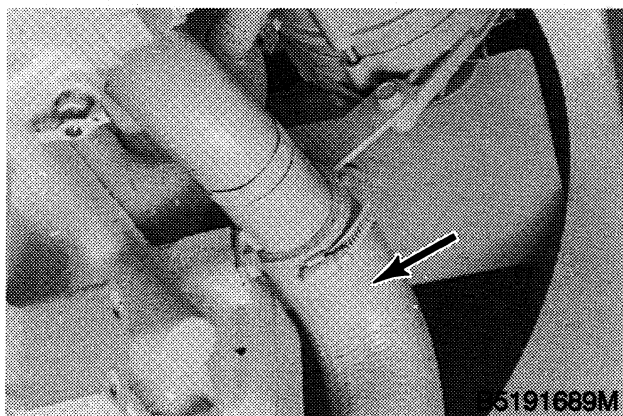
Remove the screw and the cover from the starter solenoid.

STEP 12

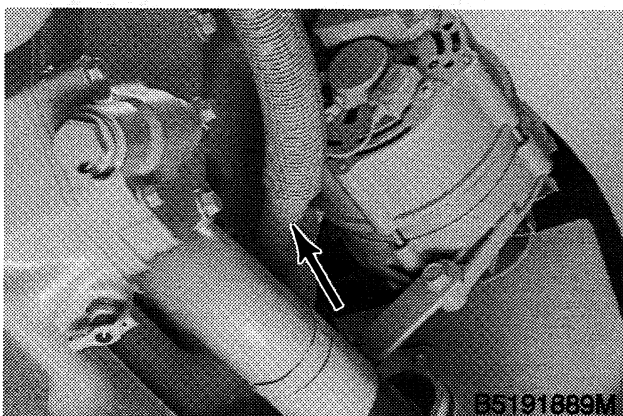
Disconnect the wire from the starter solenoid.

STEP 13

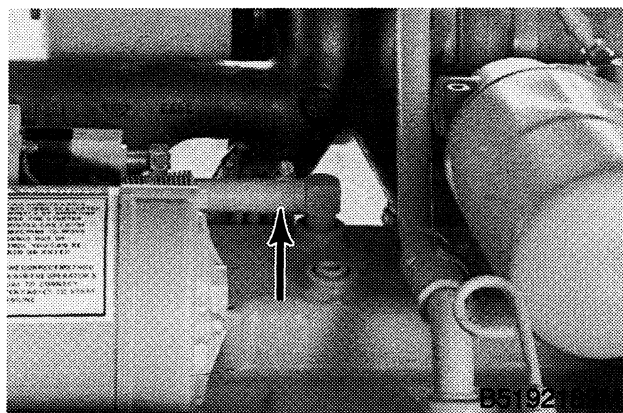
Move the wiring harness out of the way.

STEP 14

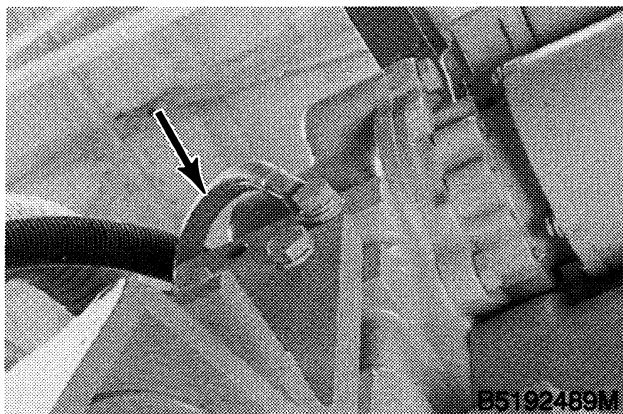
Disconnect the lower radiator hose from the engine.

STEP 15

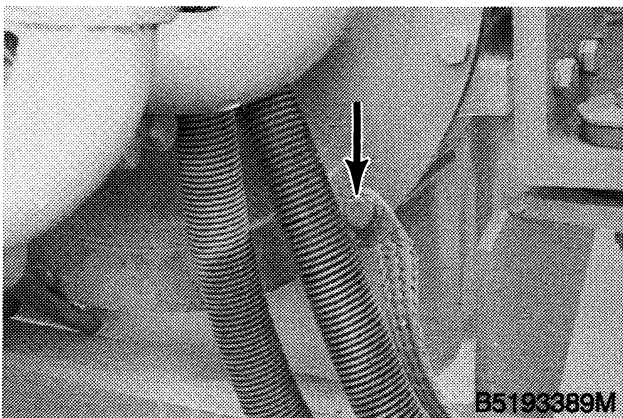
Disconnect the heater hose from the engine. Install a plug in the heater hose.

STEP 16

Disconnect the other heater hose from the engine. Install a plug in the heater hose. Move the heater hoses out of the way.

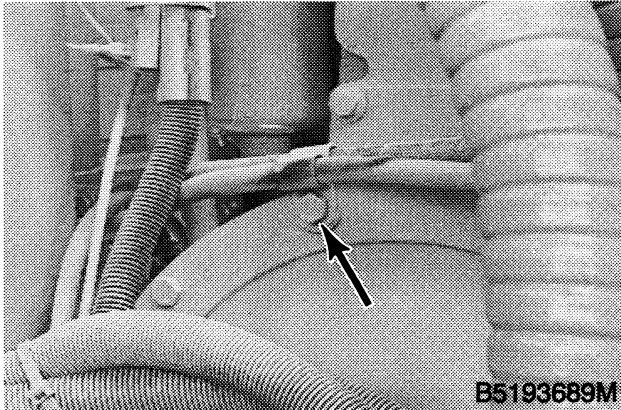
STEP 17

Disconnect the ground cable from the engine.

STEP 18

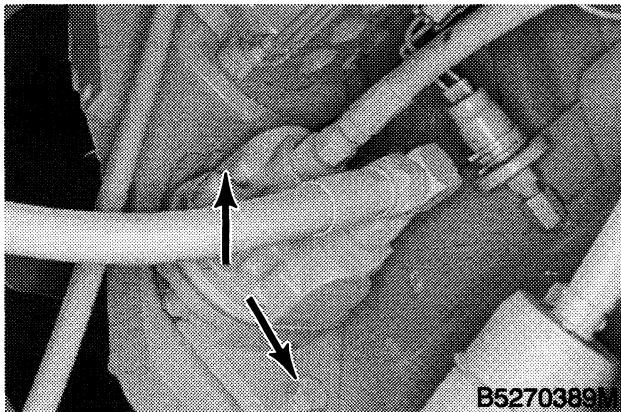
Disconnect the ground strap from the engine.

STEP 19



Disconnect the clamps for the wiring harness and ground cable from the engine. Move the ground cable and wiring harness out of the way.

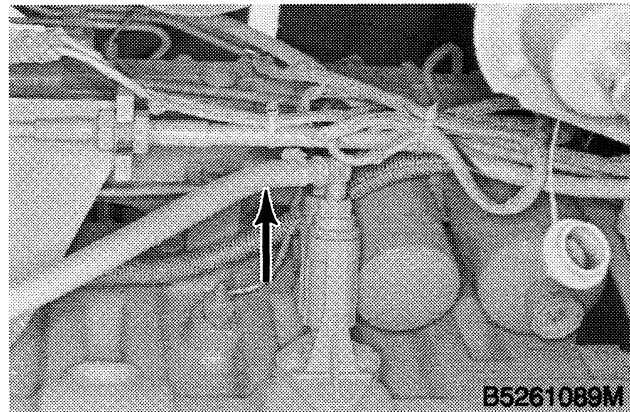
STEP 20



Loosen and remove the cap screws and lock washers that fasten the pilot control pump to the engine. Remove the pilot control pump, gaskets, and shim from the engine. Fasten the pilot control pump out of the way. Be careful not to damage the gear on the pilot control pump.

NOTE: A plug must be installed in the supply hose as soon as the hose is disconnected from the hand primer pump.

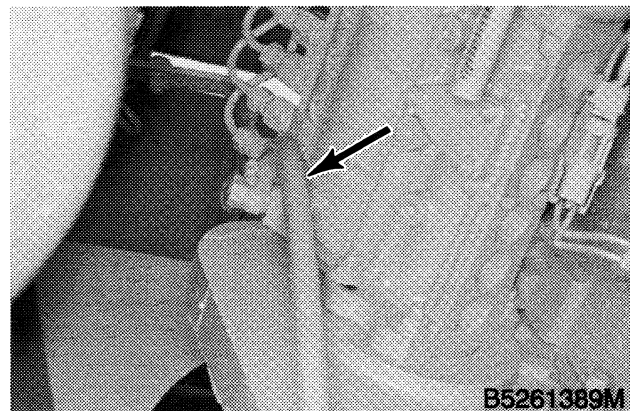
STEP 21



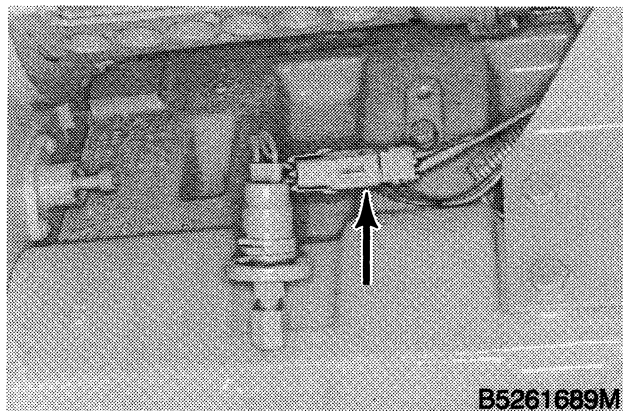
Disconnect the supply hose from the hand primer pump. Install the plug in the supply hose.

NOTE: A plug must be installed in the return hose as soon as the return hose is disconnected from the fuel injection pump in the next step.

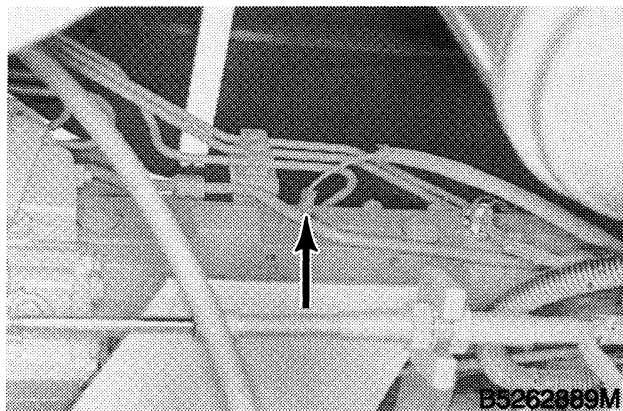
STEP 22



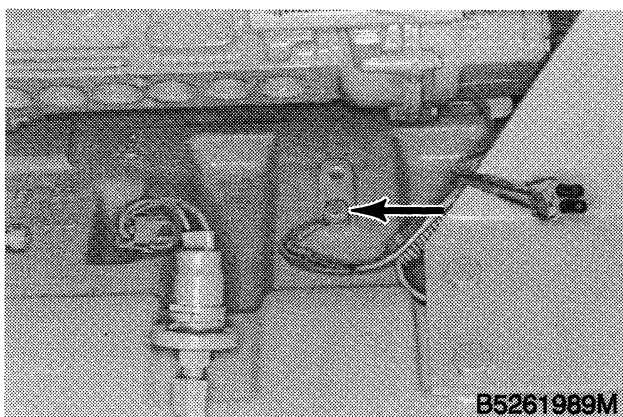
Disconnect the return hose from the fuel injection pump. Install a plug in the return hose.

STEP 23

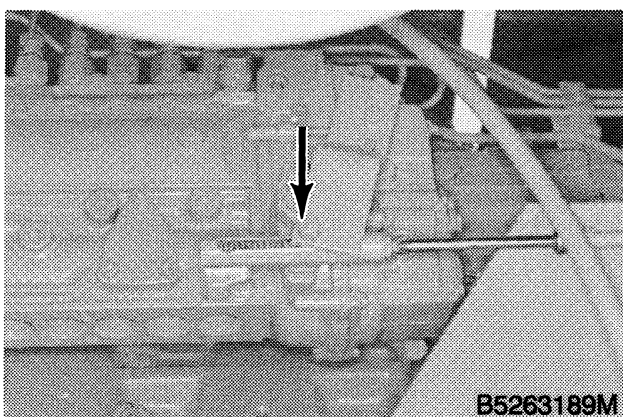
Disconnect the electrical connector for the engine oil pressure switch.

STEP 26

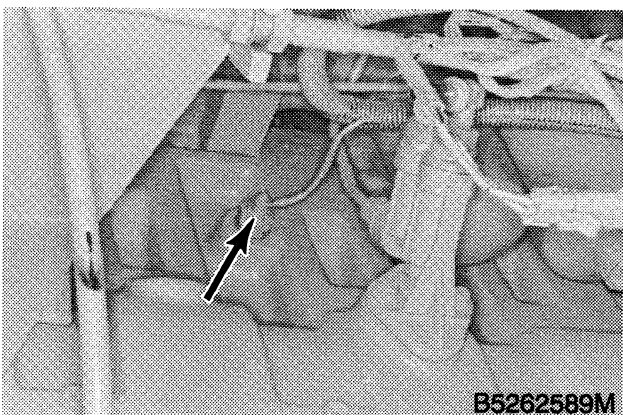
Disconnect the ether injection tube from the fitting on the intake manifold.

STEP 24

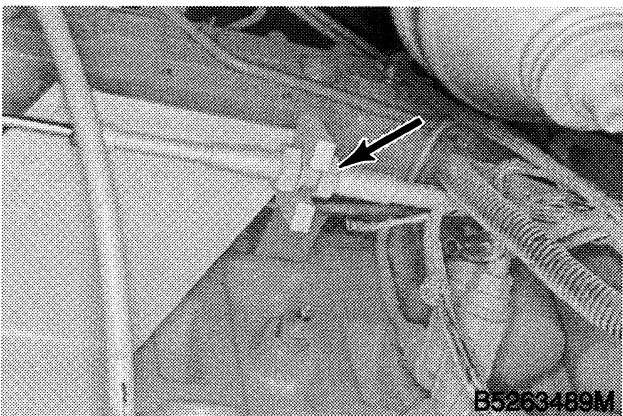
Disconnect the ground wire from the engine.

STEP 27

Disconnect the throttle linkage from the arm on the fuel injection pump.

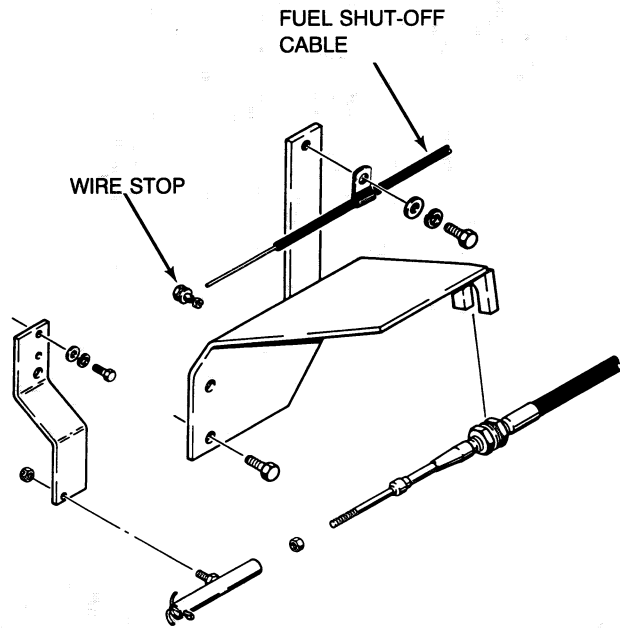
STEP 25

Disconnect the wire from the engine temperature sender.

STEP 28

Loosen the jam nut that holds the throttle linkage to the bracket. Move the throttle linkage out of the way.

STEP 29

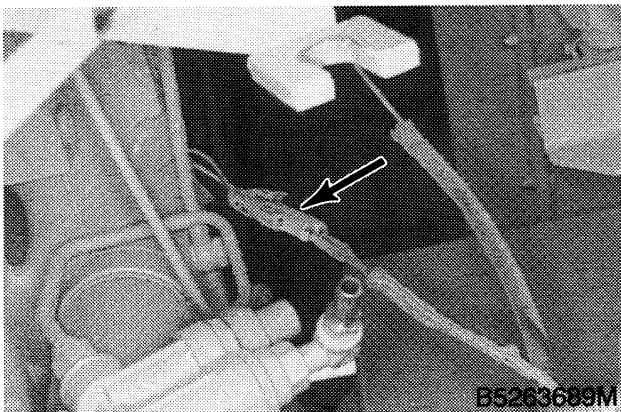


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Fuel Shut-Off Cable Installation

Disconnect the fuel shut-off cable from the lever on the fuel injection pump. Move the fuel shut-off cable out of the way.

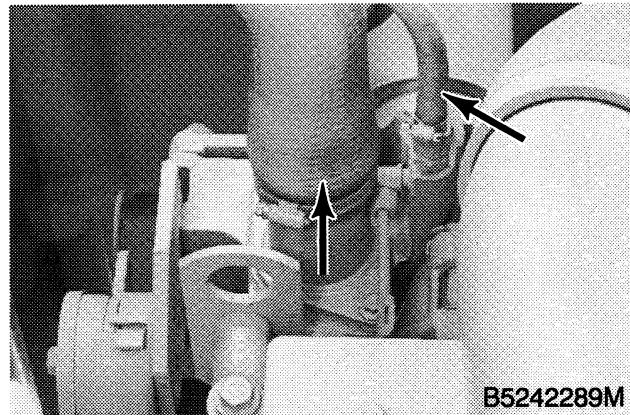
STEP 30



B5263689M

Disconnect the electrical connector for the engine manifold temperature switch. Move the wiring harness out of the way.

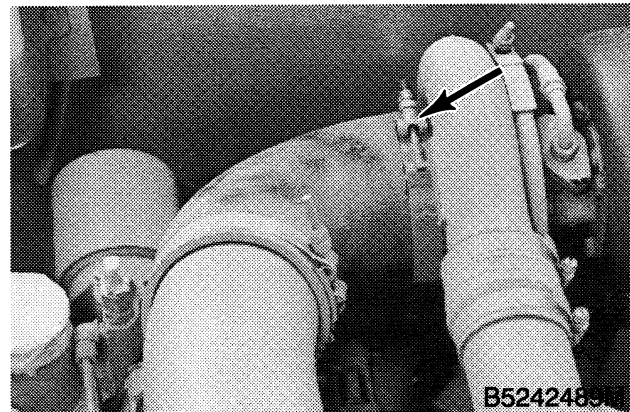
STEP 31



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Disconnect the upper radiator hose and the hose to the coolant filter from the engine. Close the openings in the engine.

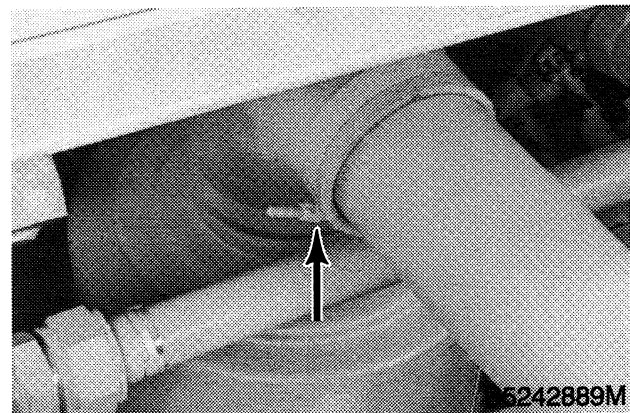
STEP 32



B5242489M

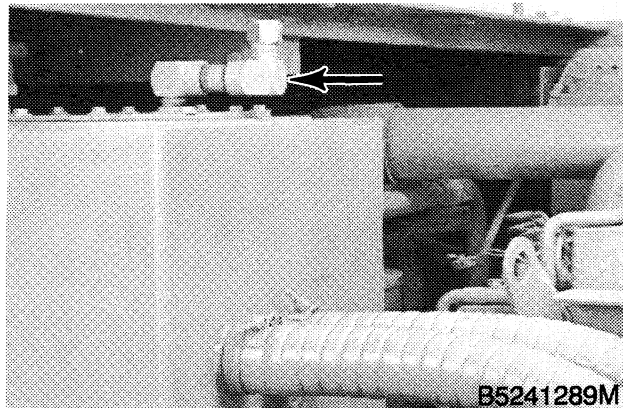
Disconnect the air cleaner hose from the turbocharger.

STEP 33

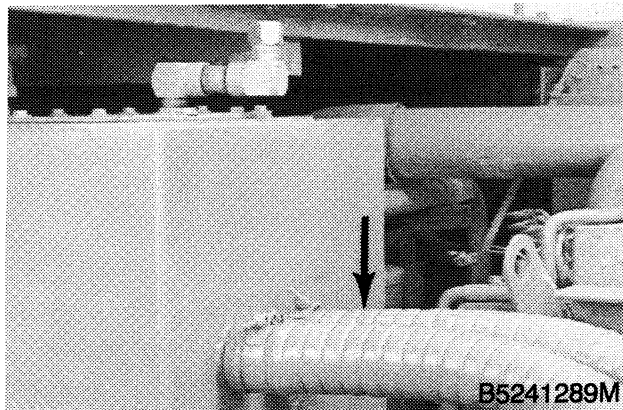


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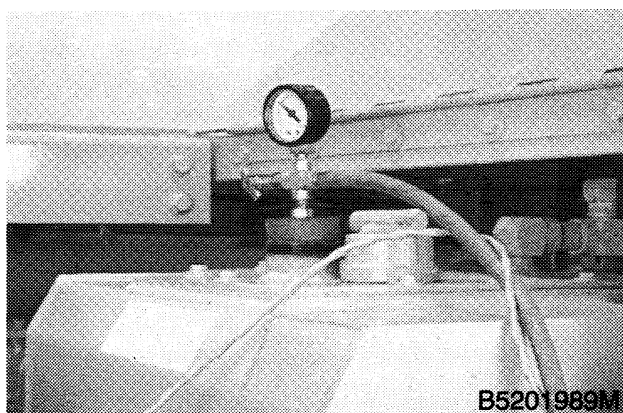
Disconnect the tube for the air cleaner from the rubber elbow at the top of the air cleaner. Remove the air cleaner tube from the machine. Cover the opening in the turbocharger.

STEP 34

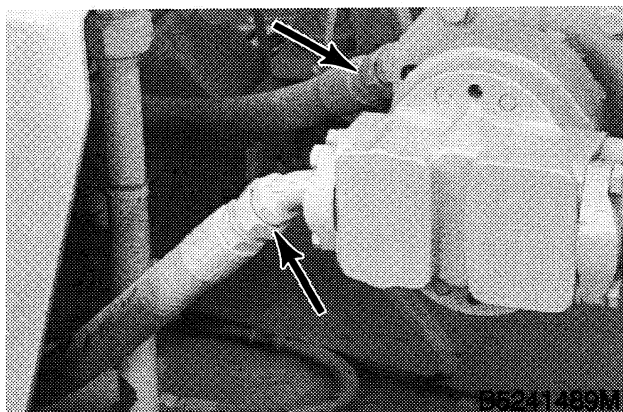
Remove the breather from the hydraulic reservoir. Install a plug in the fitting for the breather.

STEP 37

Disconnect the hoses from the hydraulic reservoir. Install plugs in the hoses and plugs in the openings for the hydraulic reservoir.

STEP 35

Open the access cover behind the operators compartment. Connect a vacuum pump to the hydraulic reservoir. Close the access cover behind the operators compartment.

STEP 38

Disconnect the hoses from the fittings on the hydraulic pump. Install caps on the fittings and plugs in the hoses.

STEP 36

Start the vacuum pump.

STEP 39

Stop the vacuum pump.

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immediately.**



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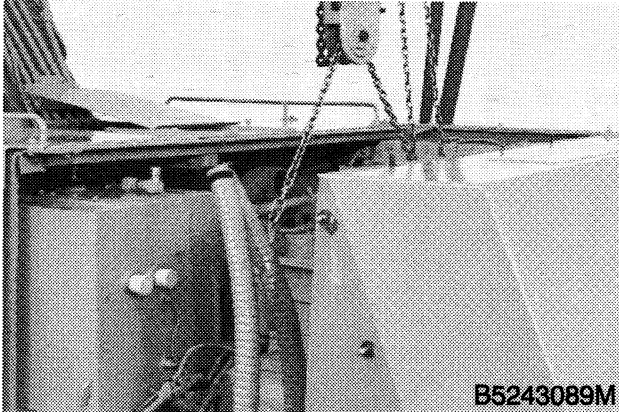


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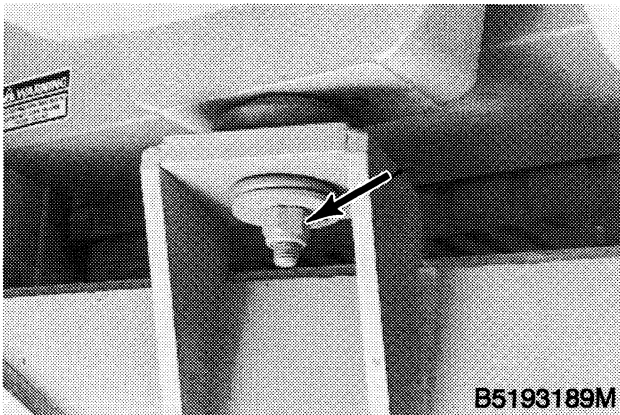
Thank you so much for reading.

STEP 40



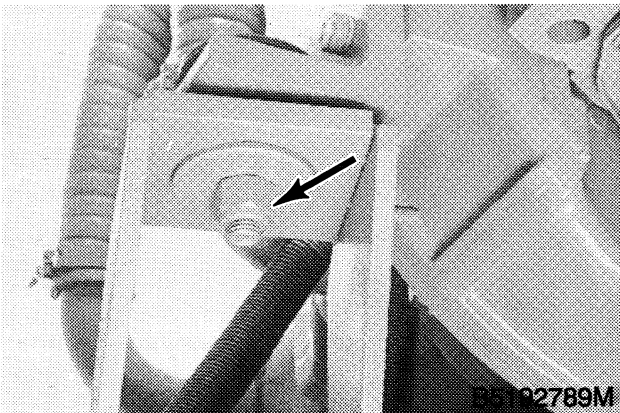
Connect the CAS-10119 adjustable chain lifting sling to the lifting eyes on the engine. Connect the chain hoist to the adjustable chain lifting sling.

STEP 41



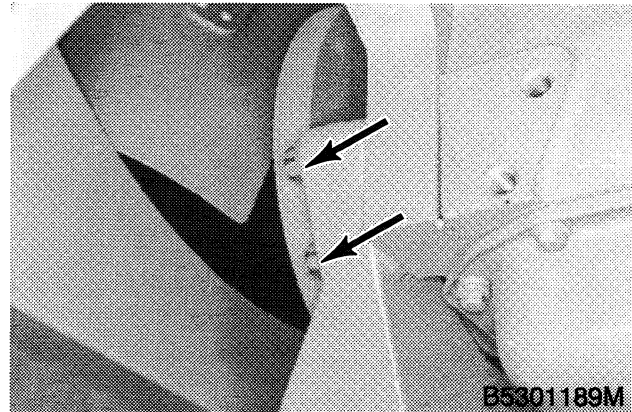
Loosen the self-locking nut on the bolt that fastens the engine to the mounting bracket on the right side of the machine.

STEP 42



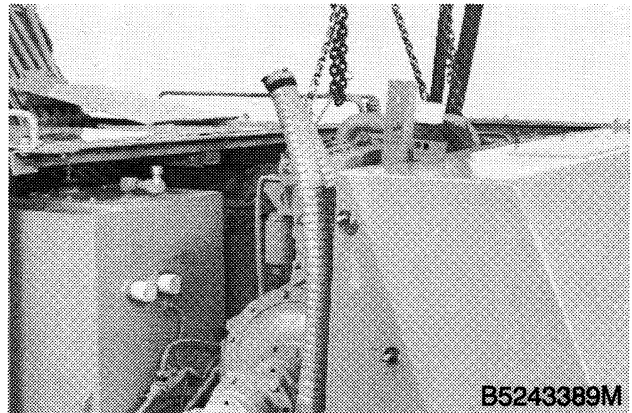
Loosen and remove the bolts, hardened washers, and self-locking nuts that fasten the engine to the mounting brackets on the left side of the machine.

STEP 43



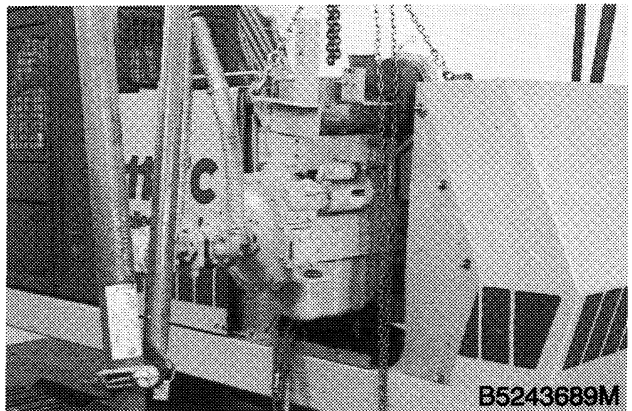
Lift the engine until the weight of the engine is removed from the mounting bracket on the right side of the machine. Loosen and remove the cap screws that fasten the engine support to the engine.

STEP 44



Carefully move the engine toward the left side of the machine until the fan clears the radiator shroud. Lift the engine until the oil pan on the engine will be clear of the machine frame.

STEP 45



Carefully remove the engine from the machine.