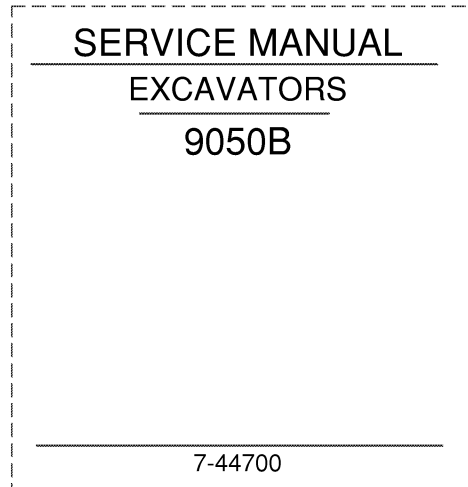


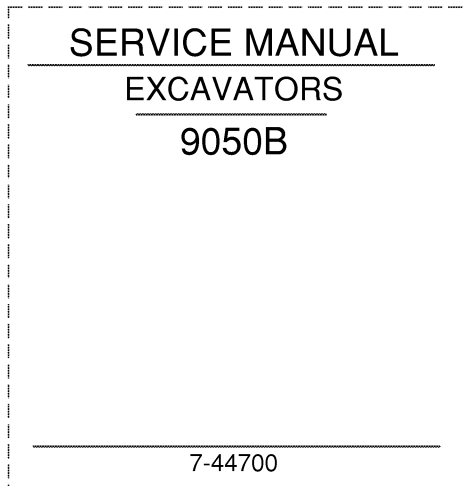
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2. Slide into pocket on Binder Spine.

TYPE 1-4



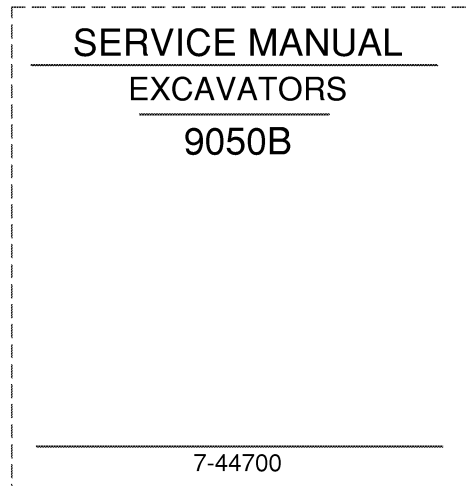
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TYPE 1-4



1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

9050 Excavator Service Manual

Table of Contents

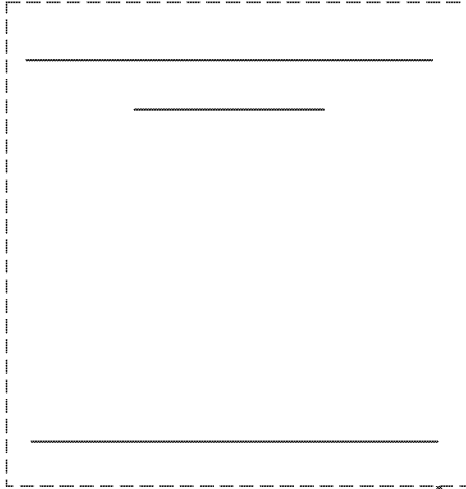
Description	Section No.	Form No.
General		
Tab 1		
Section Index - General		7-45290
Standard Torque Specifications for 9000 Series Excavators	1001	7-44790
Fluids and Lubricants	1002	7-45220
Engines		
Tab 2		
Section Index - Engines		7-45300
Engine Specification Details	2000	7-46340
Engine Removal and Installation	2001	7-45310
Radiator Removal and Installation	2002	7-45320
Mitsubishi Motors Shop Manual		97841-02003
Fuel System		
Tab 3		
Section Index - Fuel System		7-45330
See Mitsubishi Motors Shop Manual in Tab 2		
Electrical		
Tab 4		
Section Index - Electrical		7-45340
Electrical Specifications and Troubleshooting	4001	7-45230
Electrical Schematic Foldout	In Rear Pocket	7-45260
Batteries	4002	7-44950
Systems Display Panel	4005	7-44980
Starter and Starter Solenoid	See Mitsubishi Motors Shop Manual in Tab 2	
Alternator	See Mitsubishi Motors Shop Manual in Tab 2	
Tracks		
Tab 5		
Section Index - Tracks		7-45350
Troubleshooting the Track System	5001	7-44830
Tracks, Rollers, and Idlers	5002	7-44880
Power Train		
Tab 6		
Section Index - Power Train		7-45370
Troubleshooting - See Section 8001		
Drive Motor and Final Drive Transmission	6000	7-45360
Hydraulics		
Tab 8		
Section Index - Hydraulics		7-45380
Cleaning the Hydraulic System	8000	7-45050
Hydraulic Specifications, Troubleshooting, and Pressure Checks	8001	7-45240
Hydraulic Schematic Foldout	In Rear Pocket	7-45260
Main Hydraulic Pump	8002	7-45480

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9050 Excavator Service Manual

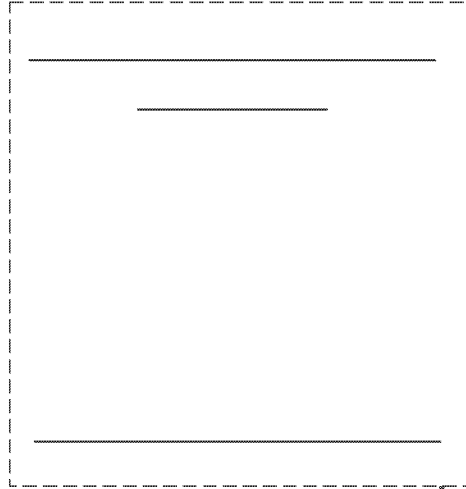
Table of Contents

Description	Section No.	Form No.
Pilot Control Circuit Pump	8003	7-46350
Hydraulic Swivel	8004	7-45390
Main Control Valve	8005	7-45400
Remote Control Valves	8006	7-45410
Solenoid Valves	8007	7-45420
Swing Motor and Swing Reduction Gear Box	8008	7-45430
Cylinders	8009	7-45440
Cushion Control Valve	8010	7-45450
Mounted Equipment	Tab 9	
Section Index - Mounted Equipment		7-45460
Pedals and Levers	9001	7-45250
Turntable Bearing	9003	7-46220
Boom and Arm	9004	7-45470
Seat and Seat Belts	9006	7-45170
Electrical Schematic Foldout	In Rear Pocket	7-45260
Hydraulic Schematic Foldout	In Rear Pocket	7-45260



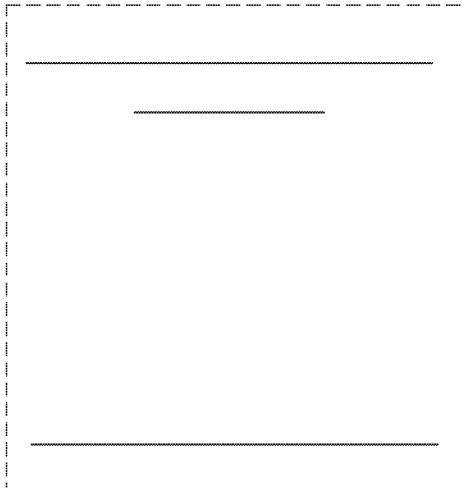
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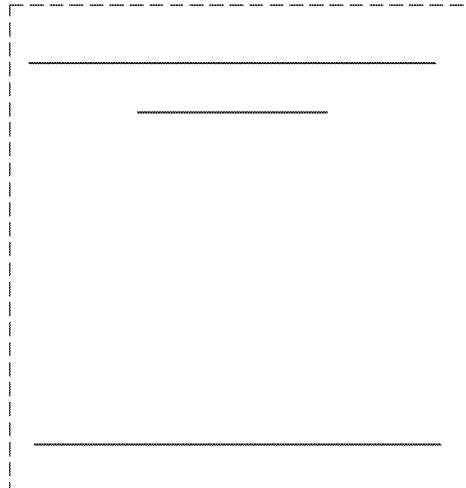
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2. Slide into pocket on Binder Spine.

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Section 1001

STANDARD TORQUE SPECIFICATIONS FOR 9000 SERIES EXCAVATORS



Bur 7-44790

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TABLE OF CONTENTS

TORQUE SPECIFICATIONS - DECIMAL HARDWARE2


TORQUE SPECIFICATIONS - METRIC HARDWARE3


TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS4

TORQUE SPECIFICATIONS - O-RING FACE SEAL FITTINGS5

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 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-Feet	Newton metres
M6	6-7	8-9
M8	14-17	20-23
M10	29-34	39-46
M12	50-59	68-80
M16	128-149	173-202
M20	249-291	337-393
M22	342-399	464-541
M24	431-503	584-681
M27	637-743	864-1008
M30	863-1007	1170-1365
M33	1180-1377	1600-1867
M36	1977-2307	2680-3127
M42	2434-2840	3300-3850
M45	3054-3563	4140-4830
M48	3658-4268	4960-5787
M52	4757-5549	6450-7525
M56	5908-6893	8010-9345
M64	8925-10413	12100-14117

Grade 10.9 Bolts, Nuts, and Studs		
		
Size	Pound-Feet	Newton metres
M6	8-10	11-13
M8	20-24	28-32
M10	41-47	55-64
M12	71-83	96-112
M16	178-208	242-282
M20	350-408	475-554
M22	481-561	652-761
M24	606-707	821-958
M27	900-1050	1220-1423
M30	1217-1420	1650-1925
M33	1667-1945	2260-2637
M36	2124-2478	2880-3360
M39	2773-3235	3760-4387
M42	3422-3992	4640-5413
M45	4293-5009	5820-6790
M48	5141-5998	6970-8132
M52	6690-7805	9070-10582
M56	8334-9723	11300-13183
M64	12612-14714	17100-19950

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	11-22
3/8 in 9.5 mm	9/16-18	10-25	14-34
1/2 in 12.7 mm	3/4-16	15-42	20-57
5/8 in 15.9 mm	7/8-14	25-58	34-79
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	16-26
5/16 in 7.9 mm	1/2-20	16-25	22-34
3/8 in 9.5 mm	9/16-18	25-40	34-54
1/2 in 12.7 mm	3/4-16	42-67	57-91
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	27-34
7/16-14	35-45	47-61
1/2-13	55-65	74-88
5/8-11	140-150	190-203

**NOTE: Use standard metric hardware torque for metric split flange mounting bolts.*

TORQUE SPECIFICATIONS - O-RING FACE SEAL FITTINGS

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 Lock Nut		
-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	34-41
-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	62-76	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

Section 1002

1002

FLUIDS AND LUBRICANTS

TABLE OF CONTENTS

CAPACITIES AND LUBRICANT SPECIFICATIONS	3
HYDRAULIC OIL CHART	4
ENGINE LUBRICATION	5
Engine oil Selection	5
Oil Viscosity/Temperature Ranges	5
DIESEL FUEL	6
Fuel Storage	6

NOTE: The J I Case Company reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold

CAPACITIES AND LUBRICANT SPECIFICATIONS

Fuel Tank

Capacity 132.1 U.S. gallons (500 litres)
 Type of fuel See Diesel Fuel on page 6

Engine Oil Capacity

Capacity with filter change 7.7 U.S. gallons (29 litres)
 Type of Lubricant Case IH Engine Oil, see Engine Lubrication on page 5

Engine Cooling System

Capacity 10 U.S. gallons (38 litres)
 Type of coolant Use a mixture of 55% ethylene glycol and 45% water.
 If lowest ambient temperature will be below -34°F (1.11°C) adjust the mixture.

Hydraulic Reservoir

Tank Capacity 40.1 U.S. gallons (152 litres)
 System Capacity 84.5 U.S. gallons (320 litres)
 Type of fluid See Hydraulic Oil Chart on page 4

Swing Gearbox

Capacity 3.3 U.S. gallons (12.5 litres)
 Type of lubricant Case IH 135H EP Gear Lube

Swing Ring Gear

Capacity 59.5 pounds (27 kg)
 Type of lubricant Case No. 2 Lithium Grease

Turntable Bearing

Capacity As required
 Type of lubricant Case No. 2 Lithium Grease

Final Drives

Capacity 2.2 U.S. gallons (8.5 litres)
 Type of lubricant Case IH 135H EP Gear Lube

Track Roller

Capacity 7.0 ounces (210 cc)
 Type of lubricant Shell Rimula Oil No. 30 or equivalent to API Class CD, SAE 30

Carrier Roller

Capacity 6.6 ounces (200 cc)
 Type of lubricant Shell Rimula Oil No. 30 or equivalent to API Class CD, SAE 30

Idler Wheel

Capacity 12.2 ounces (370 cc)
 Type of lubricant Shell Rimula Oil No. 30 or equivalent to API Class CD, SAE 30

Track Adjustment Cylinder

Capacity As required
 Type of lubricant Case No. 2 Lithium Grease

Grease Fitting

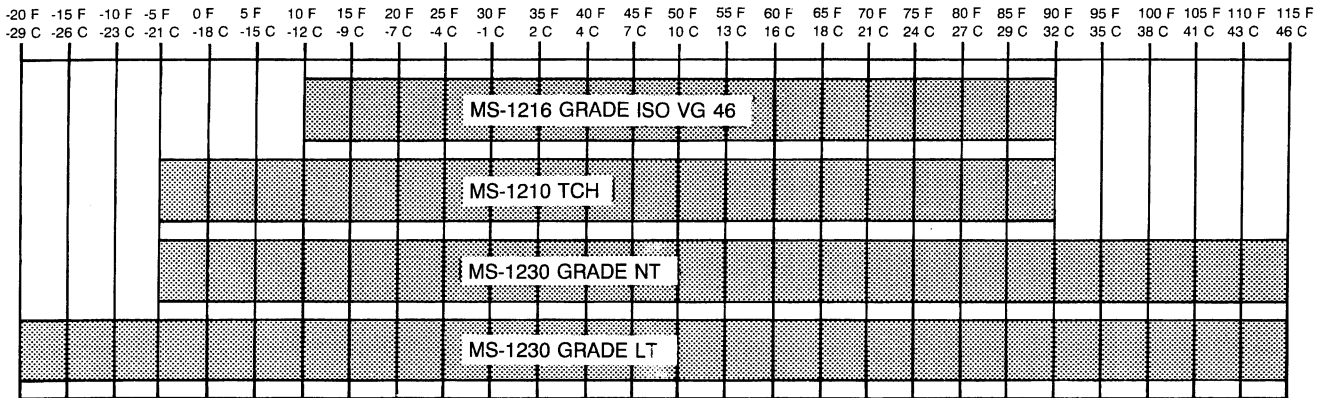
Type of lubricant Case No. 2 Lithium Grease

Batteries

Capacity As required
 Type of lubricant Use drinking or distilled water

HYDRAULIC OIL CHART

Use only hydraulic oils meeting Case specifications of equivalent AW (anti-wear) hydraulic oils.



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NOTE: Case specification MS-1210 TCH Fluid is used in place of ISO VG 32 (-5° to +65°F) and ISO VG 46 (+10° to +90°F).

Case specifications MS-1230 Grade NT or Grade LT is used in place of ISO VG 32 (-5° to +65°F), ISO VG 46 (+10° to +90°F), ISO VG 100 (+30° to 115°F), and MS-1210 TCH.

ENGINE LUBRICATION

Engine oil Selection

Case No. 1 Engine Oil is recommended for use in your Case Engine. Case Engine Oil will lubricate your engine correctly under all operating conditions.



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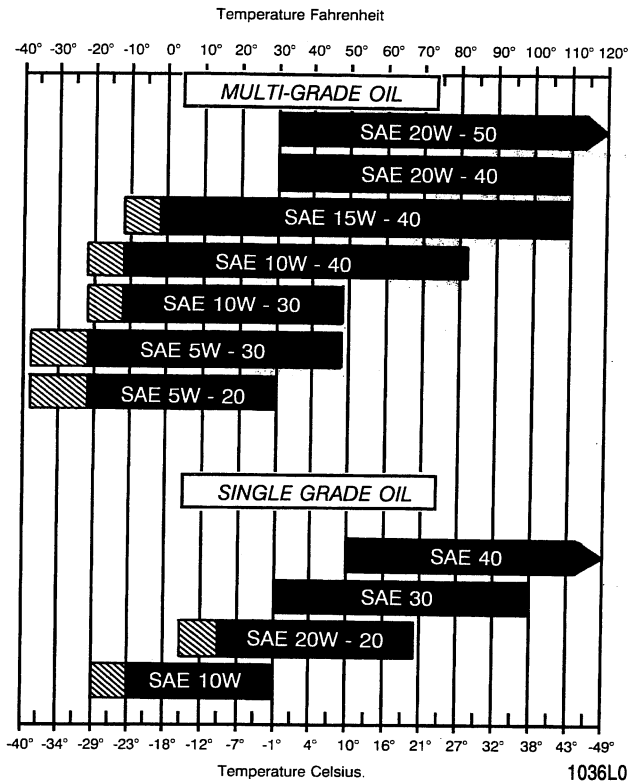
If Case No. 1 Multi-Viscosity or Single Grade Engine Oil is not available, use only oil meeting API engine oil service category CE.



654L9

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 Case lubricants.

Oil Viscosity/Temperature Ranges



NOTE: Use of an engine oil pan heater or an engine coolant heater is required when operating temperatures are in the crosshatched area.

DIESEL FUEL

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 cause the engine to lose power or not start.

The diesel fuel in this machine must meet the specifications in the chart below or Specification D975-81 of the American Society for Testing and Materials.

Specifications for Acceptable No. 2 Diesel Fuel

API gravity, minimum	34
Flash point, minimum	140°F (60°C)
Cloud point (wax appearance point), maximum	-5°F (-20°C) See Note above
Pour point, maximum	-15°F (-26°C) See Note above
Distillation temperature, 90% point	540 to 640°F (282 to 338°C)
Viscosity, at 100°F (38°C)	
Centistokes	2.0 to 4.3
Saybolt Seconds Universal	32 to 40
Cetane number, minimum	43 (45 to 55 for winter or high altitudes)
Water and sediment, by volume, maximum	0.05 of 1%
Sulfur, by weight, maximum	0.50 of 1%
Copper strip corrosion, maximum	No. 2
Ash, by weight, maximum	0.01 of 1%

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.



Engine fuel is flammable and can cause a fire or an explosion. Do not fill the fuel tank or service the fuel system near an open flame, welding, burning cigars, cigarettes, etc.

SECTION INDEX - ENGINES

Section Title	Section Number
Engine Specification Details	2000
Engine Removal and Installation	2001
Radiator Removal and Installation	2002
Mitsubishi Motors Shop Manual	

Section 2000

ENGINE SPECIFICATION DETAILS

IMPORTANT: *This engine was made using the metric measurement system. All measurements and checks must be made with metric tools to make sure of an accurate reading when inspecting parts.*

TABLE OF CONTENTS

ENGINE SPECIFICATION DETAILS	3
Engine Specifications	3
Engine Service Standards	4
Tightening Torque Table	7

NOTE: Case Corporation reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

ENGINE SPECIFICATION DETAILS

Engine Specifications

Engine model 6D22-T

Type Water cooled, 4-cycle, diesel

Number and arrangement of cylinders 6 in-line

Valve mechanism Overhead valve

Combustion chamber Direct injection type

Cylinder bore x stroke (mm) 130 x 140

Total displacement (cc) 11 149

Compression ratio 16

Firing order 1-5-3-6-2-4

Cylinder liner Wet type

Piston Trunk, slipper skirt type

Piston ring Compression ring: 2, Oil ring: 1

Engine Service Standards

Unit: mm

Description	Nominal value [Basic diameter]	Limit
Compression pressure (at 200 rpm)	2.75 MPa (28 kgf/cm ²)	1.96 MPa (20 kgf/cm ²), difference between cylinder within 0.39 Mpa (4 kgf/cm ²)
Rocker to rocker shaft clearance	[28] 0.03 to 0.08	0.2
Outer valve spring		
Free length	89.38	85
Load (Installed length: 58.35)	450 N (46.1 kgf)	380 N (39 kgf)
Inner valve spring		
Free length	65.04	62.0
Load (Installed length: 50.35)	115 N (12 kgf)	100N (10.2 kgf)
Squareness	-	2.5
Crankcase tappet hole to tappet clearance	[35] 0.06 to 0.10	0.2
Push rod runout	-	0.5
Cylinder head bottom surface distortion	0.07 or less	0.08
Height from top to bottom surface of cylinder head	130	129.8
Valve stem OD		
Inlet	11.95 to 11.96	11.85
Exhaust	11.91 to 11.93	11.85
Valve stem to valve guide clearance		
Inlet	[12] 0.05 to 0.09	0.2
Exhaust	[12] 0.09 to 0.12	0.2
Depth of valve from cylinder head bottom surface		
Inlet	0.25 to 0.75	1.0, replace valve seat insert. Service limit: value when a new valve is installed, (- indicates projection amount).
Exhaust	-0.05 to 0.45	0.7, replace valve seat insert. Service limit: value when a new valve is installed, (- indicates projection amount).
Valve seat angle	45°	-
Valve margin		
Inlet	2.2	1.7
Exhaust	2.5	2.0
Seat width of valve seat insert	2.69 to 2.96	3.5
Eccentricity of flywheel housing	-	0.2
Backlash of Timing gears		
Between crankshaft gear and idler gear "B"	0.12 to 0.26	0.4
Between idler gear "A" and camshaft gear	0.13 to 0.26	0.4
Between idler gear "A" and idler gear "C"	0.13 to 0.26	0.4

Engine Service Standards

Unit: mm

Description	Nominal value [Basic diameter]	Limit
Between injection pump gear and idler gear "C"	0.12 to 0.26	0.4
End play of idler gear	0.1 to 0.28	0.4
Idler shaft "A" to idler gear "A" bushing clearance	[40] 0.03 to 0.06	0.2
Idler shaft "C" to idler gear "C" bushing clearance	[46] 0.03 to 0.06	0.2
End play of camshaft gear	0.05 to 0.22	0.4
Camshaft journal to camshaft bushing clearance		
No. 1 journal	[65] 0.03 to 0.08	0.25
No. 2 journal	[65.25] 0.03 to 0.08	0.25
No. 3 journal	[65.50] 0.03 to 0.08	0.25
No. 4 journal	[65.50] 0.03 to 0.08	0.25
No. 5 journal	[65.75] 0.03 to 0.08	0.25
No. 6 journal	[65.75] 0.03 to 0.08	0.25
No. 7 journal	[66] 0.03 to 0.08	0.25
Cam profile (Difference between lobe height and base circle diameter)		
Inlet	[8.83]	8.3, inlet: lobe height, 56.167; base circle diameter, 47.334
Exhaust	[8.82]	8.3, exhaust: lobe height, 56.036; base circle diameter, 47.216
Camshaft bend	0.05 or less	0.08
Crankcase top surface distortion	0.07 or less	0.2
Cylinder liner		
ID	130.014 to 130.054	130.25
Cylindricity (diameter base)	0.02 or less	-
Projection from crankcase top surface	0 to 0.08	-
Piston to cylinder liner clearance (selection fit)	[130] 0.173 to 0.199	-
Piston ring groove to ring clearance		
1st ring	0.06 to 0.11	0.25
2nd ring	0.07 to 0.10	0.15
Oil ring	0.03 to 0.06	0.15
Piston ring open end clearance	0.4 to 0.6	1.5
Projection of piston from top surface of crankcase	0.87 to 1.33	-
Piston pin hole to piston pin clearance	[50] 0.01 to 0.02	0.1
Flatness of cylinder liner flange supporting surface on crankcase	-	More than 0.1

Engine Service Standards

Unit: mm

Description	Nominal value [Basic diameter]	Limit
Connecting rod		
Bushing to piston pin clearance	[50] 0.02 to 0.05	0.1
Bend and torsion	-	0.05 or less
End play	0.2 to 0.5	1.0
Connecting rod bearing		
Oil clearance	[84] 0.07 to 0.13	0.25
Tension when free	-	Less than 90.5
Crankshaft		
End play	0.09 to 0.23	0.4
Bend	0.04 or less	0.1
Out of roundness of journal and pin	0.01 or less	0.08
Cylindricity of journal and pin	0.006 or less	-
Main bearing		
Oil clearance	[100] 0.08 to 0.15	0.25
Tension when free	-	Less than 106.5
Valve clearance		
Inlet	0.4	-
Exhaust	0.6	-
Injection nozzle injection pressure		
One spring nozzle	21.6 MPa (220 kgf/cm ²)	
Two spring nozzle	17.7 MPa (180 kgf/cm ²)	
Prelift	0.10 +/- 0.02	
Two spring regulated pressure (open pressure)	24.8 to 25.4 MPa (253 to 259 kgf/cm ²)	
Two spring regulated pressure (cover pressure) with a 0.05 needle valve lift	23 to 23.5 MPa (235 to 240 kgf/cm ²)	

Tightening Torque Table

Description	Thread size OD x Pitch mm	Tightening torque Nm (kgfm)
Cylinder head bolt	M14 x 2	For tightening procedure refer to 5.2.3 (6) in the engine section of the service manual. Wet.
Rocker shaft bracket bolt	M10 x 1.5	34 (3.5)
Rocker cover bolt	M10 x 1.25	9.8 (1)
Rocker adjusting screw lock nut	M10 x 1.25	59 (6)
Oil jet check valve	M12 x 1.75	34 (3.5)
Connecting rod nut	M13 x 1.25	115 (12) Wet
Main bearing cap bolt	M18 x 2.5	370 (38) Wet
Crankshaft pulley bolt	M14 x 1.5	175 (18)
Camshaft gear nut	M27 x 1.5	265 (27) Wet
Idler shaft bolt "A"	M16 x 2	155 (16)
Idler shaft bolt "C"	M16 x 2	155 (16)
Idler shaft nut (for mounting collar)	M16 x 1.5	98 (10)
Flywheel bolt	M16 x 1.5	315 (32) Wet
Flywheel housing bolt	M12 x 1.75	69 (7)
Oil pump idler gear shaft nut	M12 x 1.25	59 to 78 (6 to 8), apply Loctite 262
Oil bypass alarm	M20 x 1.5	44 to 54 (4.5 to 5.5)
Oil filter center bolt	M16 x 1.5	59 to 69 (6 to 7)
Oil cooler bypass valve	M27 x 1.5	15 to 20 (1.5 to 2.0)
Regulator valve	M27 x 1.5	98 to 115 (10 to 12)
Oil pan drain plug	M18 x 1.5	69 (7)
Oil jet check valve	M12 x 1.75	34 (3.5)
Injection pump bracket	M10 x 1.5	35 to 53 (3.6 to 5.4)
Injection nozzle		
One spring nozzle		
Retaining nut	M22 x 1.5	59 to 78 (6 to 8)
Inlet connector	M14 x 1.5	69 to 78 (7 to 8)
Cap nut	M14 x 1	39 to 49 (4 to 5)
Two spring nozzle		
Retaining nut	M19 x 1	59 to 78 (6 to 8)
Set screw	-	49 to 59 (5 to 6)
Lock nut	-	20 to 25 (2 to 2.5)
Cap nut	M22 x 1.5	39 to 49 (4 to 5)
Inlet connector	M14 x 1.5	69 to 78 (7 to 8)
Injection nozzle bolt (for attaching to cylinder head)	M8 x 1.25	15 (1.5)
Injection pipe union nut		
On pump side	M14 x 1.5	29 (3)

Tightening Torque Table

Description	Thread size OD x Pitch mm	Tightening torque Nm (kgfm)
On nozzle side	M12 x 1.5	29 (3)
Leak off pipe eye bolt	M8 x 1	9.8 to 15 (1 to 1.5)
Fuel filter connector bolt	M14 x 1.5	25 (2.5)
Water separator		
Ring nut	-	5.9 to 7.8 (0.6 to 0.8)
Drain plug	-	2.9 to 3.9 (0.3 to 0.4)
Air plug	M8 x 1.25	7.8 to 9.8 (0.8 to 1.0)
Connector bolt	M14 x 1.5	25 (2.5)
Injection pump piping tightening eye bolt		
Fuel inlet	-	20 to 25 (2 to 2.5)
Fuel feed (feed pump)	-	20 to 25 (2 to 2.5)
Fuel feed (pump proper)	-	20 to 29 (2 to 3)
Fuel overflow	-	20 to 29 (2 to 3)
Lubricant (inlet)	-	12 to 15 (1.2 to 1.5)
Lubricant (outlet)	-	20 to 29 (2 to 3)
Fan drive flange nut	M20 x 1.5	145 (15)
Tension pulley shaft nut	M16 x 1.5	98 (10)
Inlet manifold bolt	M10 x 1.5	35 (3.6)
Exhaust manifold nut	M10 x 1.25	41 (4.2)
Turbocharger attaching nut		
Attaching nut	M10 x 1.25	26 (2.7)
Lock nut	M10 x 1.25	35 (3.6)
Turbocharger (TD-08)		
Coupling assembly	-	5.9 (0.6), apply MOLYKOTE grease or equivalent to threads
Shaft and turbine wheel lock nut	-	20 (2), apply MOLYKOTE grease or equivalent to threads
Alternator pulley nut	M17 x 1.5	83 to 105 (8.5 to 11)
	M20 x 1.5	135 to 160 (13.5 to 16.5)
Alternator shaft nut	-	345 to 360 (35 to 37)

Section 2001

ENGINE REMOVAL AND INSTALLATION

TABLE OF CONTENTS

SPECIFICATIONS	3
ENGINE	4
Removal	4
Installation	8

NOTE: The J I Case Company reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

SPECIFICATIONS

Cooling system capacity 10 U.S. gallons (38 litres)

Special torques

Bolts that hold the engine mounts to the frame 213 to 249 pound-feet (289 to 337 Nm)

Cap screws that hold the rear engine mounts to the engine 80 to 93 pound-feet (108 to 126 Nm)

Cap screws that hold the front engine mounts to the engine 128 to 149 pound-feet (173 to 202 Nm)

Cap screws that hold the fan and the spacer to the engine 38 to 45 pound-feet (51 to 61 Nm)

Cap screws that hold the hydraulic pump to the flywheel housing
(apply Loctite 262 on the threads in the holes in the flywheel housing) 48 to 56 pound-feet (65 to 76 Nm)

Socket head screws that hold the coupling and drive plate to the flywheel 224 to 239 pound-feet (303 to 324 Nm)

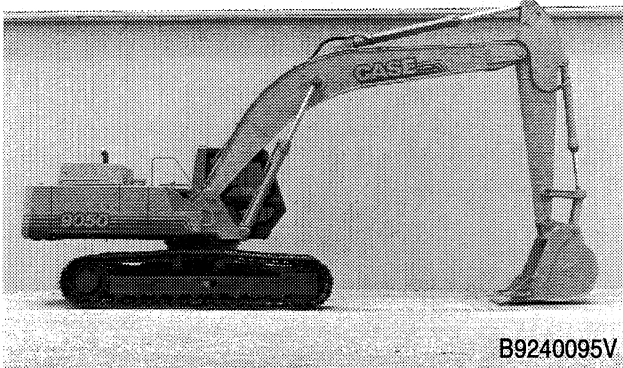
Weight of the hydraulic pump 287 pounds (130 kg)

Weight of the engine 1558 pounds (706 kg)

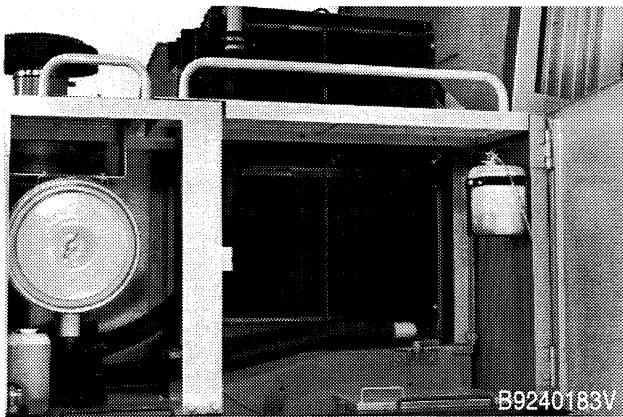
ENGINE

Removal

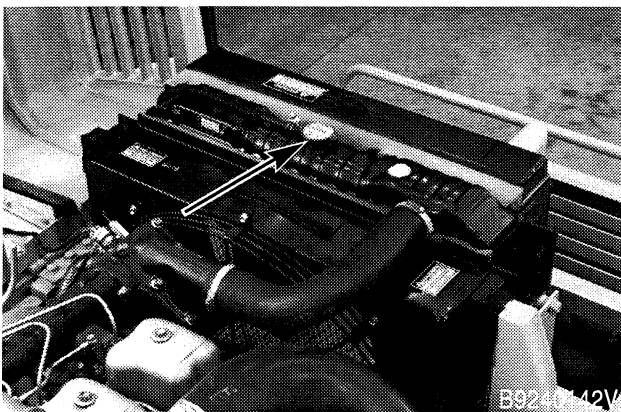
1. Park the machine on a hard level surface. Lower the tool to the floor and stop the engine.



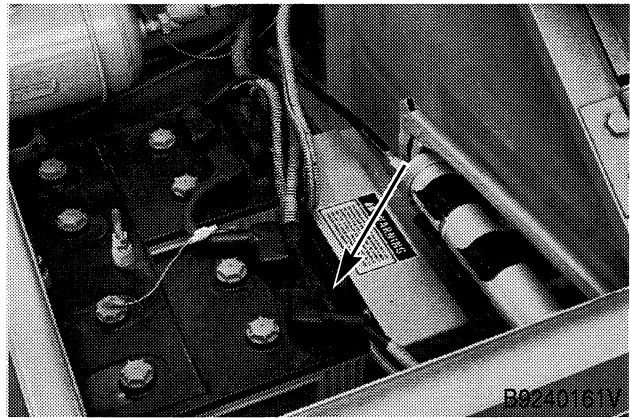
2. Open the access doors over the engine and on each side of the engine compartment. Remove the access covers from under the engine and the radiator.



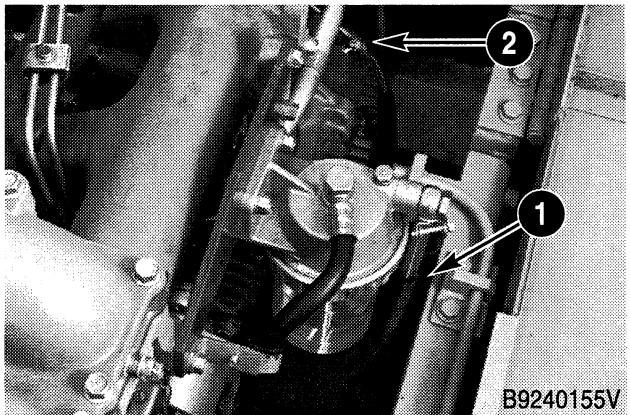
3. Make sure that the engine is cool and remove the radiator cap. Open the drain valve and drain the cooling system. The cooling system holds 10 U.S. gallons (38 litres) of coolant.



4. Raise the access cover for the batteries and disconnect the ground cable.

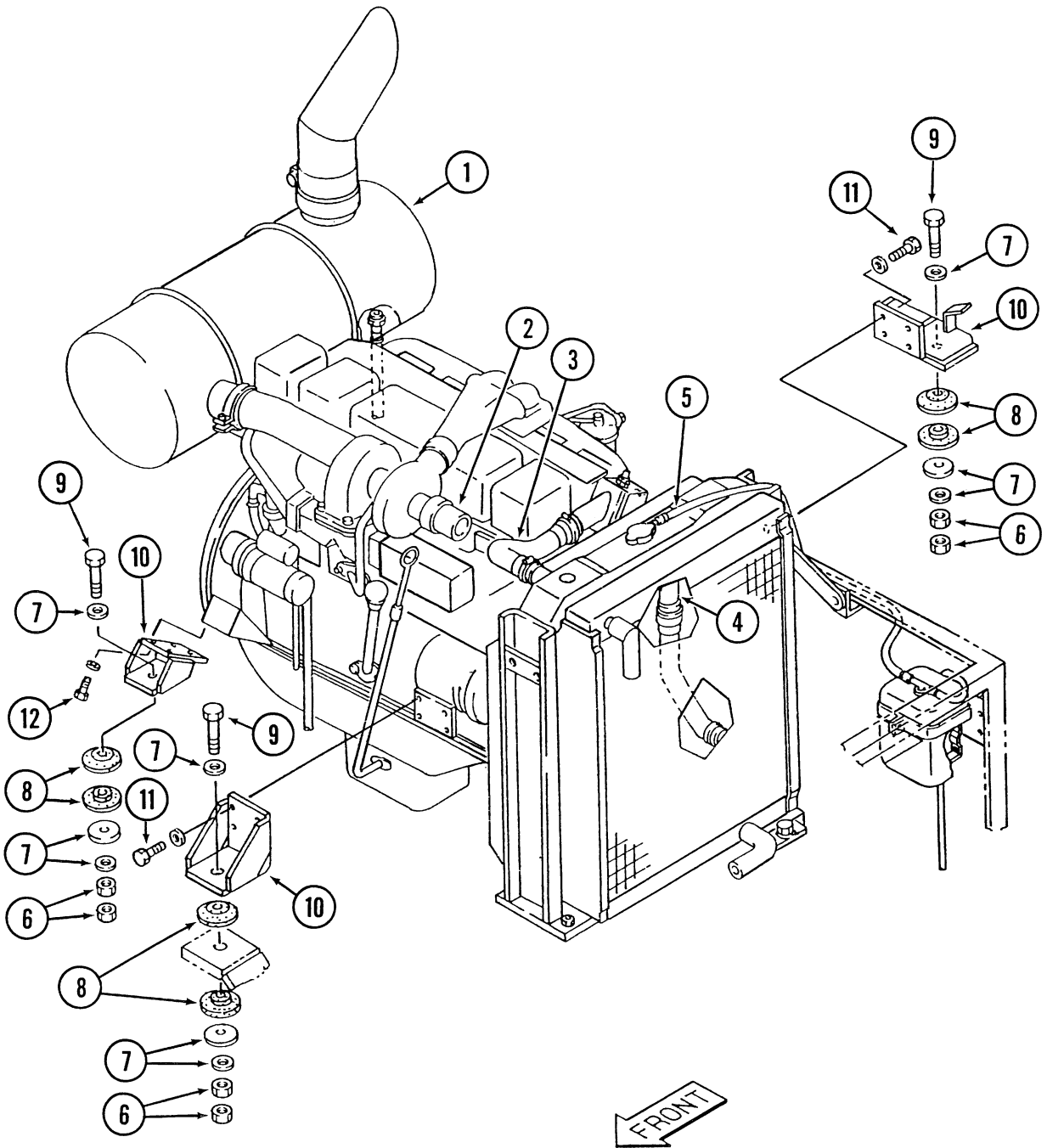


5. Remove the muffler (1) and the mounting bracket for the muffler (1).
6. Disconnect the hose for the air cleaner from the turbocharger (2).
7. Disconnect the top (3) and bottom (4) radiator hoses from the radiator.
8. Disconnect the hose (5) for the coolant reservoir from the radiator.
9. Remove the fan guard and the fan shroud from the radiator.
10. Remove the cap screws and hardware that hold the fan and the spacer to the engine.
11. Disconnect the fuel supply hose and the fuel return hose. Install a plug in each hose.



1. Supply Hose

2. Return Hose

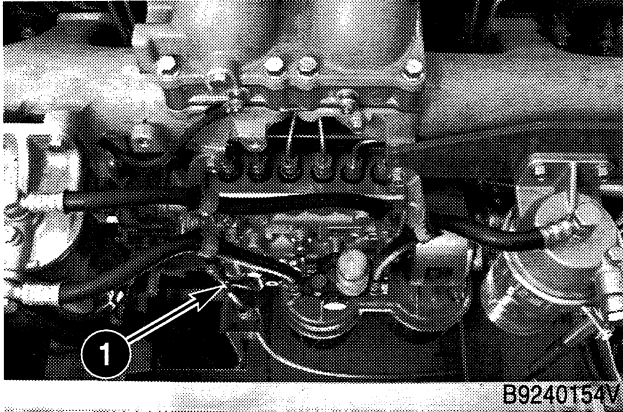


- 1. Muffler
- 2. Disconnect Hose for Air Cleaner Here
- 3. Top Radiator Hose
- 4. Bottom Radiator Hose
- 5. Hose for the Coolant Reservoir
- 6. Self-Locking Nuts

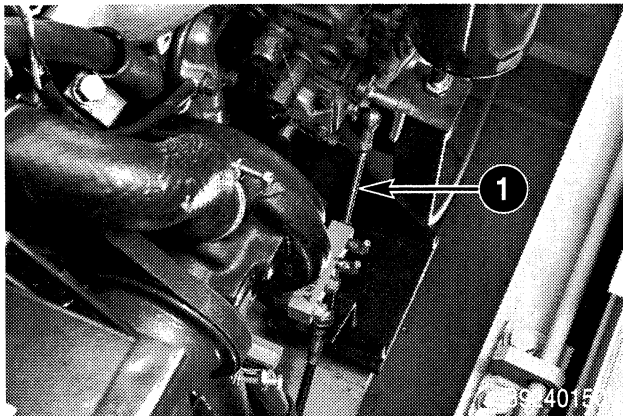
- 7. Washer
- 8. Insulator
- 9. Tighten to 213 to 249 pound-feet (289 to 337 Nm)
- 10. Engine Mounting Bracket
- 11. Tighten to 128 to 149 pound-feet (173 to 202 Nm)
- 12. Tighten to 80 to 93 pound-feet (108 to 126 Nm)

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12. Disconnect the throttle cable and the shutoff cable from the fuel injection pump and the bracket on the engine. Put the throttle cable and the shutoff cable out of the way.

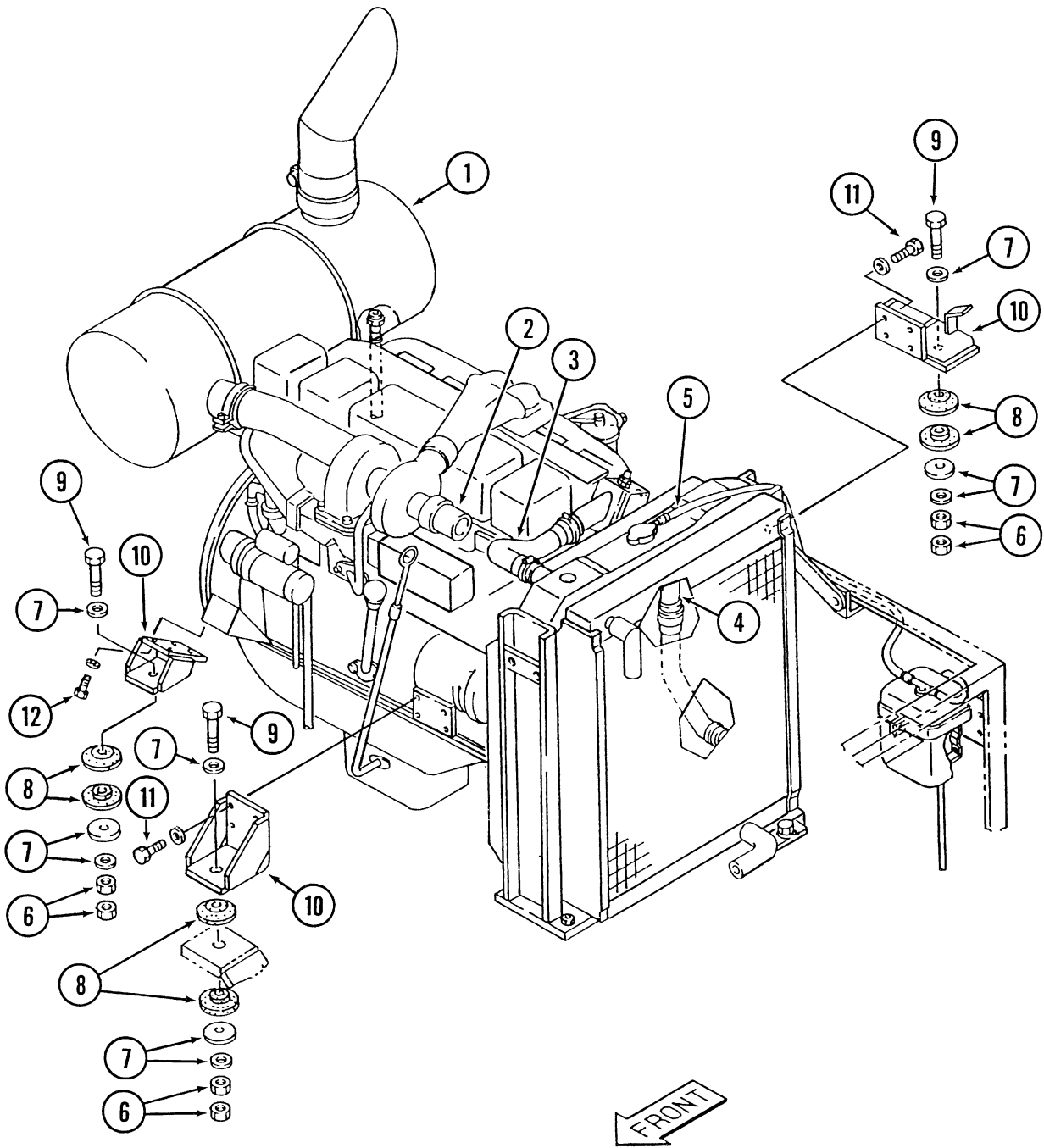


1. Throttle Cable



1. Shutoff Cable

13. Put identification tags on the wiring harness, wires and cables connected to the engine for correct assembly. Disconnect the wiring harness, wires and cables from the engine.
14. Disconnect the hoses for the heater from the engine. Install a plug in each hose.
15. Disconnect the ground strap from the engine.
16. Connect acceptable lifting equipment to the lifting eyes on the engine. The weight of the engine is 1558 pounds (706 kg).
17. Rotate the flywheel and use the access hole in the housing of the hydraulic pump to remove the socket head screws that hold the coupling and drive plate to the flywheel.
18. Connect a lifting sling to the hydraulic pump. The weight of the hydraulic pump is 287 pounds (130 kg). Remove the cap screws and hardened washers that hold the hydraulic pump to the flywheel housing
19. Separate the hydraulic pump from the flywheel housing.
20. Remove the self-locking nuts (6), washers (7), insulators (8), and bolts (9) that hold the engine mounting brackets (10) to the frame.
21. Make sure that all hoses, tubes, cables, wires, and wiring harnesses are out of the way.
22. Lift the engine and remove the engine from the machine.



- 1. Muffler
- 2. Disconnect Hose for Air Cleaner Here
- 3. Top Radiator Hose
- 4. Bottom Radiator Hose
- 5. Hose for the Coolant Reservoir
- 6. Self-Locking Nuts

- 7. Washer
- 8. Insulator
- 9. Tighten to 213 to 249 pound-feet (289 to 337 Nm)
- 10. Engine Mounting Bracket
- 11. Tighten to 128 to 149 pound-feet (173 to 202 Nm)
- 12. Tighten to 80 to 93 pound-feet (108 to 126 Nm)

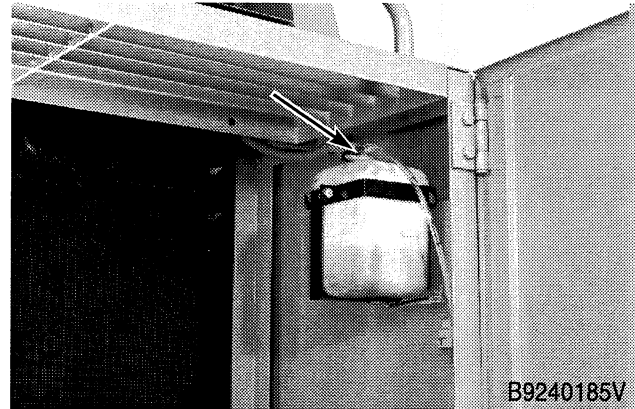
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Installation

Installation is the reverse sequence of removal.

1. Check the condition of the insulators for the engine mounts. If the insulators are damaged, install new insulators.
2. Align the holes in the drive plate and coupling with the holes in the flywheel. Install the socket head screws that hold the coupling and drive plate to the flywheel. Tighten the socket head screws to the torque specifications shown on page 3.
3. Tighten the bolts that hold the engine mounting brackets to the frame to the torque specifications shown on page 3.
4. Tighten the cap screws that hold the hydraulic pump to the flywheel housing to the torque specifications shown on page 3. Loctite 262 must be applied on the threads in the holes in the flywheel housing.
5. Tighten the cap screws that hold the fan and the spacer to the engine to the torque specifications shown on page 3.
6. Do the following procedure to bleed the air from the cooling system.
 - A. Close the drain valve on the radiator. Fill the radiator with coolant and fill the coolant reservoir to the fill neck. If new coolant is being installed, the coolant must be 55% ethylene glycol and 45% water.

- B. Install and tighten the cap for the coolant reservoir.



- C. Start and run the engine at low idle. Look at the water temperature gauge. When the water temperature gauge indicates normal operating temperature (4th or 5th amber bar illuminated), stop the engine and let the engine cool.
- D. Fill the radiator with coolant. Install and tighten the radiator cap.
- E. Fill the coolant reservoir with coolant to the FULL mark. Install the cap for the coolant reservoir.

Section 2002

2002

RADIATOR REMOVAL AND INSTALLATION

TABLE OF CONTENTS

SPECIFICATIONS	2
RADIATOR	3
Removal	3
Installation	3

NOTE: The J I Case Company reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

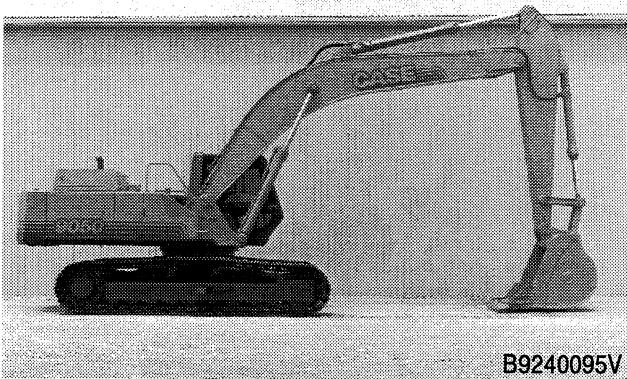
SPECIFICATIONS

Cooling System capacity	10 U.S. gallons (38 litres)
Special torques	
Cap screws that hold the fan and spacer to the engine	38 to 45 pound-feet (51 to 61 Nm)

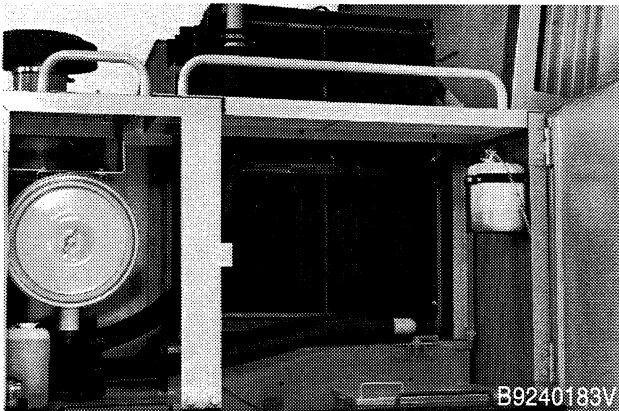
RADIATOR

Removal

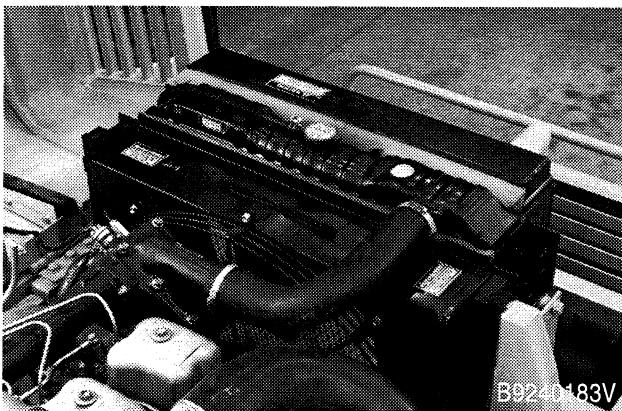
1. Park the machine on a hard level surface. Lower the tool to the floor and stop the engine.



2. Open the access doors over the engine and on the left side of the engine compartment. Remove the access cover from under the radiator.



3. Make sure that the engine is cool and remove the radiator cap. Open the drain valve and drain the cooling system. The cooling system holds 10 U.S. gallons (38 litres) of coolant.

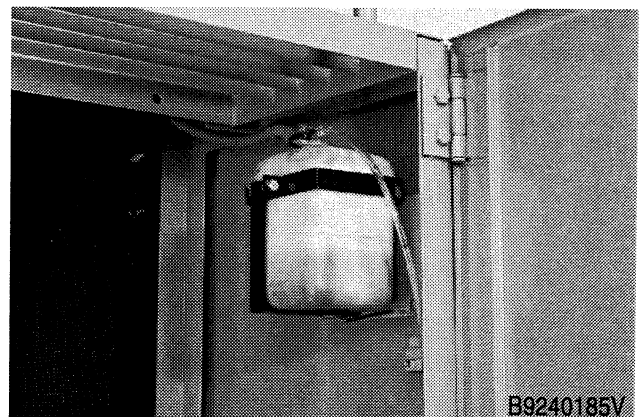


4. Disconnect the top and bottom radiator hoses from the radiator.
5. Disconnect the hose for the coolant reservoir from the radiator.
6. Remove the fan guard and the fan shroud from the radiator.
7. Remove the cap screws and hardware that hold the fan and the spacer to the engine. Remove the fan and the spacer.
8. Connect acceptable lifting equipment to the radiator.
9. Remove the hardware that holds the radiator to the frame.
10. Remove the radiator from the machine

Installation

Installation is the reverse sequence of removal.

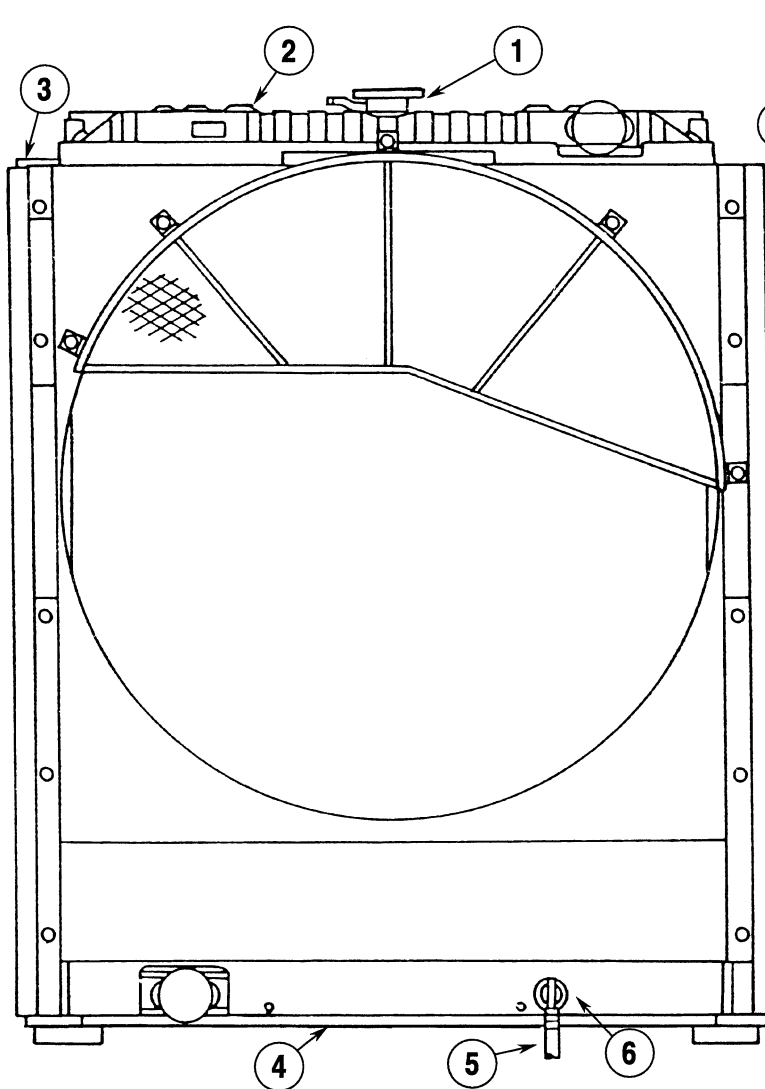
1. If the foam baffles were removed from the radiator, install new foam baffles.
2. Tighten the cap screws that hold the fan and the spacer to the engine to the torque specifications shown on page 2.
3. Do the following procedure to bleed the air from the cooling system.
 - A. Close the drain valve on the radiator. Fill the radiator with coolant and fill the coolant reservoir to the fill neck. If new coolant is being installed, the coolant must be 55% ethylene glycol and 45% water.
 - B. Install and tighten the cap for the coolant reservoir.



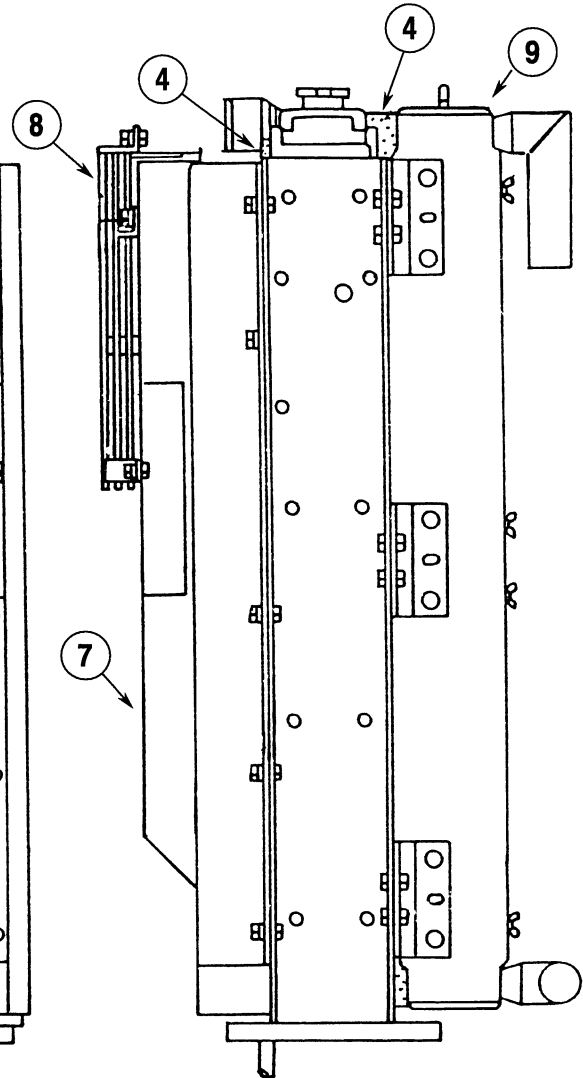
C. Start and run the engine at low idle. Look at the water temperature gauge. When the water temperature gauge indicates normal operating temperature (4th or 5th amber bar illuminated), stop the engine and let the coolant cool.

D. Fill the radiator with coolant. Install and tighten the radiator cap.

E. Fill the coolant reservoir with coolant to the FULL mark. Install the cap for the coolant reservoir.



Front View of Fan Guard, Fan Shroud, and Radiator



Side View of Fan Guard, Fan Shroud, Radiator and Oil Cooler

- 1. Radiator Cap
- 2. Radiator
- 3. Frame

- 4. Foam Baffle
- 5. Drain Hose
- 6. Drain Valve

- 7. Fan Shroud
- 8. Fan Guard
- 9. Oil Cooler

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Shop Manual

diesel engine

6D2 (for industrial use)

