

410/420 SKID STEER

Service Manual

Bur 6-78950

Table of Contents

Description	Section Number	Publication Form Number
General	Tab 1	
Section Index - General		6-79040
Fluids and Lubricants	1001	6-79030
Standard Torque Specifications	1002	7-52931
Metric Conversion Chart	1003	7-52950
Engines	Tab 2	
Section Index - Engines		6-79050
Engine and Radiator Removal and Installation	2000	6-79130
For Engine Repair - See Engine Service Manual		6-79550
Fuel Systems	Tab 3	
Section Index - Fuel Systems		6-79060
For Fuel System Repair - See the Engine Service Manual		6-79550
Electrical	Tab 4	
Section Index - Electrical		6-79070
Electrical Specifications and Troubleshooting and Schematics	4001	6-79540
Battery	4005	7-51310
Starter and Starter Solenoid	4006	7-53091
Power Train	Tab 6	
Section Index - Power Train		6-79080
Hydrostatic System Troubleshooting	6001	6-79330
Removal and Installation of Hydrostatic Components	6002	6-79530
Drive Coupling	6003	6-79120
Piston Pump	6004	6-49580
Drive Motors (Eaton)	6005	6-79020
Single Speed Drive Motors	6005	6-79000
Sprocket, Chains, and Axle Assemblies	6007	6-79300
Wheels and Tires	6011	6-79310

410/420 SKID STEER Service Manual Bur 6-78950

Table of Contents (Continued)

Description	Section Number	Publication Form Number
Brakes	Tab 7	
Section Index - Brakes		6-79090
Removal and Installation of Park Brake Components	7002	6-79570
410 Brakes - Spring Applied - Hydraulic Release (Refer to Section 6005 - Single Speed Drive Motor)		
420 Brakes - Spring Applied - Hydraulic Release	7004	6-79580
Hydraulics	Tab 8	
Section Index - Hydraulics		6-79100
Hydraulic System Troubleshooting and Schematics	8001	6-79510
Cleaning the Hydraulic System and Hydrostatic System	8002	6-45290
Removal and Installation of Hydraulic Components	8003	6-79520
Gear Pump (Equipment and High Flow)	8004	6-79350
Cylinders	8006	6-79360
Flat Faced Couplers	8007	7-54740
Accumulator for Ride Control	8013	6-45550
Mounted Equipment	Tab 9	
Section Index - Mounted Equipment		6-79110
Pedals and Levers	9001	6-79500
Loader	9002	6-79390
Attachment Coupler	9003	6-79400
ROPS Canopy, Seat, Seat Belts, and Operators Compartment	9004	6-79410
Heater	9006	6-79450
Schematic Set		
Hydraulic and Electrical Schematic Foldout	In Rear Pocket	6-78970

SECTION INDEX

GENERAL

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

Section 1001

FLUIDS AND LUBRICANTS

TABLE OF CONTENTS

CAPACITIES AND LUBRICANTS 3

ENVIRONMENT 3

ENGINE LUBRICATION 4

 Engine Oil Selection 4

 Oil Viscosity/Temperature Ranges 4

DIESEL FUEL SYSTEM 5

 Fuel Storage 5

 Specifications for Acceptable No. 2 Diesel Fuel 5

CAPACITIES AND LUBRICANTS

FUEL TANK

Capacity 83.3 litres (22 U.S. gallons)
 Specifications See diesel fuel specifications on page 5

COOLING SYSTEM

Capacity 17 litres (17.9 quarts)
 Recovery bottle capacity 2 litres (2.1 quarts)
 Specifications 50% water and 50% ethylene glycol

HYDRAULIC SYSTEM

Capacity - Total System 50.2 litres (13.3 gallons)
 Capacity - Reservoir 32.4 litres (7.1 gallons)
 Specifications Case Akcela No. 1 Engine Oil SAE 10W30

CHAIN COMPARTMENTS

Capacity - Each Side 5.7 litres (6.0 quarts)
 Specifications Case Akcela No. 1 Engine Oil, SAE 10W30

BATTERY

Quantity As required
 Specifications Distilled water

GREASE FITTINGS

Quantity As required
 Attachments (If equipped) Quantity as required
 Specifications Case molydisulfide grease

ENGINE CRANKCASE OIL (410 and 420 MACHINES)

Capacity - with filter change 8.7 litres (9.2 quarts)
 Capacity - without filter change 8.5 litres (9 quarts)
 Specifications Case Akcela No. 1 Engine Oil SAE 10W-30 (API service CH-4)
 (See Oil Viscosity/Temperature Ranges Chart on page 4)

ENGINE CRANKCASE OIL (430 and 440 MACHINES)

Capacity - with filter change 12 litres (12.7 quarts)
 Specifications Case Akcela No. 1 Engine Oil SAE 10W-30 (API service CH-4)
 (See Oil Viscosity/Temperature Ranges Chart on page 4)

ENVIRONMENT

Before you service this machine and dispose of oil, fluids and lubricants, always remember the environment. Do not put oil or fluids into the ground or into containers that can leak. Check with your local environmental, recycling center or your Case dealer for correct disposal information.

ENGINE LUBRICATION

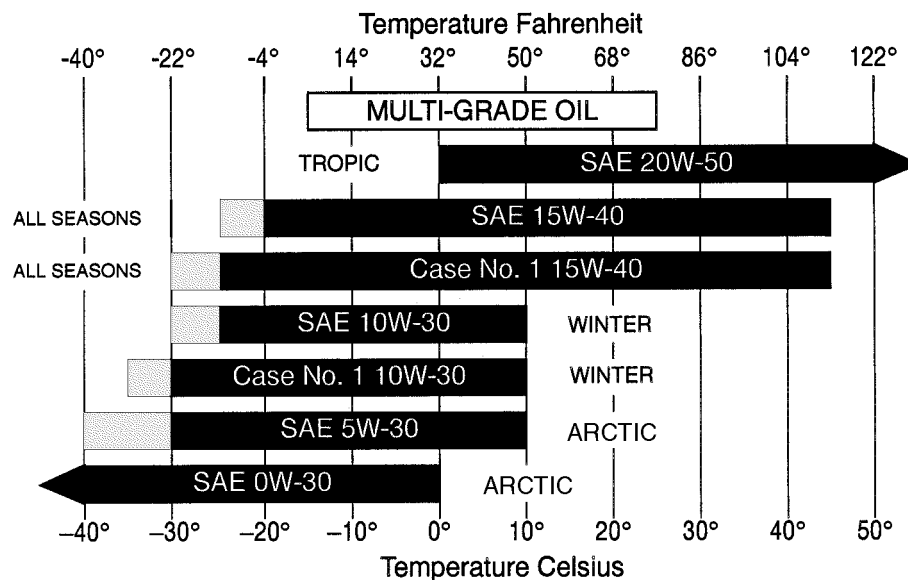
Engine Oil Selection

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

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

NOTE: Do not put Performance Additives or other oil additive products in the engine crankcase. The oil change intervals given in the operating manual are according to tests with Case lubricants.

Oil Viscosity/Temperature Ranges



Indicates use of an engine oil heater or a jacket water heater is required.

BS99N019

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: 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 loose power or not start.

The diesel fuel used in this machine must meet the specifications below, "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)
Pour Point, Maximum	-26° C (-15° F)
Distillation Temperature, 90% Point	282 to 338° C (540 to 640° F)
Viscosity, at 38° C (100° F)	
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	0.5 of 1%
Sulphur, by Weight, Maximum	0.5 of 1%
Copper Strip Corrosion, Maximum	No. 2
Ash, by Weight, Maximum	0.1 of 1%

NOTES

Section 1002

STANDARD TORQUE SPECIFICATIONS

TABLE OF CONTENTS

TORQUE SPECIFICATIONS - DECIMAL HARDWARE 3

 Grade 5 Bolts, Nuts, and Studs 3

 Grade 8 Bolts, Nuts, and Studs 3

TORQUE SPECIFICATIONS - METRIC HARDWARE 4

 Grade 8.8 Bolts, Nuts, and Studs 4

 Grade 12.9 Bolts, Nuts, and Studs 4

 Grade 10.9 Bolts, Nuts, and Studs 4

TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS 5

 37 Degree Flare Fitting 5

 Straight Threads with O-ring 5

 Split Flange Mounting Bolts 6

 O-Ring Face Seal End 6

 O-Ring Boss End

 Fitting or Lock Nut 6

 Pipe fittings 7

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	Newton metres	Pound-Inches
1/4 inch	10 to 12	91 to 103
5/16 inch	21 to 24	188 to 212
3/8 inch	38 to 43	336 to 378
		Pound-Feet
7/16 inch	61 to 69	45 to 51
1/2 inch	94 to 104	68 to 76
9/16 inch	132 to 149	98 to 110
5/8 inch	183 to 210	138 to 155
3/4 inch	325 to 370	242 to 270
7/8 inch	530 to 595	390 to 435
1.0 inch	790 to 890	585 to 655
1-1/8 inch	980 to 1100	725 to 805
1-1/4 inch	1385 to 1555	1020 to 1145
1-3/8 inch	1810 to 2030	1335 to 1495
1-1/2 inch	2400 to 2700	1770 to 1990

Grade 8 Bolts, Nuts, and Studs		
		
Size	Newton metres	Pound-Inches
1/4 inch	15 to 16	130 to 145
5/16 inch	30 to 34	268 to 301
3/8 inch	54 to 60	474 to 534
		Pound-Feet
7/16 inch	86 to 97	63 to 71
1/2 inch	132 to 149	96 to 110
9/16 inch	191 to 213	140 to 155
5/8 inch	260 to 293	190 to 215
3/4 inch	480 to 515	340 to 380
7/8 inch	745 to 835	550 to 615
1.0 inch	1120 to 1280	825 to 925
1-1/8 inch	1585 to 1785	1170 to 1315
1-1/4 inch	2215 to 2235	1650 to 1855
1-3/8 inch	2930 to 3295	2160 to 2430
1-1/2 inch	3895 to 4375	2870 to 3225
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 both coarse and fine 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. Use of a click type torque wrench, or better is required.

Grade 8.8 Bolts, Nuts, and Studs

		
Size	Newton metres	Pound-Inches
M4	3 to 4	31 to 35
M5	5 to 6	49 to 55
M6	10 to 11	84 to 94
M8	23 to 26	229 to 277
M10	46 to 51	408 to 460
		Pound-Feet
M12	80 to 90	59 to 66
M14	128 to 145	94 to 106
M16	200 to 220	149 to 161
M20	400 to 450	293 to 330
M24	690 to 780	510 to 575
M30	1375 to 1545	1010 to 1140
M36	2400 to 2700	1770 to 1990

Grade 10.9 Bolts, Nuts, and Studs

		
Size	Newton metres	Pound-Inches
M4	5 to 6	44 to 49
M5	8 to 9	71 to 79
M6	14 to 15	120 to 136
M8	33 to 37	293 to 329
		Pound-Feet
M10	65 to 74	48 to 54
M12	114 to 128	85 to 94
M14	183 to 205	136 to 153
M16	285 to 320	208 to 235
M20	555 to 620	406 to 460
M24	955 to 1075	705 to 790
M30	1900 to 2140	1400 to 1580
M36	3315 to 3730	2445 to 2750

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				
Nom. SAE Dash Size	Tube OD/Hose ID	Thread Size	Newton metres	Pound-Inches
-2		5/16 - 24	8 to 9	72 to 84
-3		3/8 - 24	11 to 12	96 to 108
-4	6.4 mm (1/4 inch)	7/16 - 20	14 to 16	120 to 144
-5	7.9 mm (5/16 inch)	1/2 - 20	18 to 21	156 to 192
-6	9.5 mm (3/8 inch)	9/16 - 18	27 to 33	240 to 300
-8	12.7 mm (1/2 inch)	3/4 - 16	46 to 56	408 to 504
-10	15.9 mm (5/8 inch)	7/8 - 14	77 to 85	684 to 756
				Pound-Feet
-12	19.0 mm (3/4 inch)	1-1/16 - 12	107 to 119	79 to 88
-14	22.2 mm (7/8 inch)	1-3/16 - 12	127 to 140	94 to 103
-16	25.4 mm (1.0 inch)	1-5/16 - 12	131 to 156	97 to 117
-20	31.8 mm (1-1/4 inch)	1-5/8 - 12	197 to 223	145 to 165
-24	38.1 mm (1-1/2 inch)	1-7/8 - 12	312 to 338	230 to 250

Straight Threads with O-ring				
Nom. SAE Dash Size	Tube OD/Hose ID	Thread Size	Newton metres	Pound-Inches
-2		5/16 - 24	8 to 9	72 to 84
-3		3/8 - 24	11 to 12	96 to 108
-4	6.4 mm (1/4 inch)	7/16-20	20 to 25	180 to 228
-5	7.9 mm (5/16 inch)	1/2-20	27 to 33	240 to 300
-6	9.5 mm (3/8 inch)	9/16-18	43 to 54	384 to 480
-8	12.7 mm (1/2 inch)	3/4-16	73 to 90	648 to 804
				Pound-Feet
-10	15.9 mm (5/8 inch)	7/8-14	100 to 124	74 to 92
-12	19.0 mm (3/4 inch)	1-1/16-12	138 to 173	102 to 128
-14	22.2 mm (7/8 inch)	1-3/16-12	173 to 216	128 to 160
-16	25.4 mm (1.0 inch)	1-5/16-12	203 to 253	150 to 187
-20	31.8 mm (1-1/4 inch)	1-5/8-12	308 to 357	227 to 264
-24	38.1 mm (1-1/2 inch)	1-7/8-12	492 to 542	363 to 400

Split Flange Mounting Bolts

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

O-Ring Face Seal End

O-Ring Boss End Fitting or Lock Nut

Nom. SAE Dash Size	Tube OD	Thread Size	Newton metres	Pound-Inches	Thread Size	Newton metres	Pound-Inches
-4	6.4 mm (1/4 inch)	9/16-18	23 to 26	204 to 228			
-6	9.5 mm (3/8 inch)	11/16-16	34 to 40	300 to 348	9/16-18	48 to 54	432 to 480
-8	12.7 mm (1/2 inch)	13/16-16	52 to 57	456 to 504	3/4-16	70 to 78	612 to 684
-10	15.9 mm (5/8 inch)	1-14	81 to 90	720 to 792	7/8-14	102 to 114	Pound-Feet
				Pound-Feet			75 to 84
-12	19.0 mm (3/4 inch)	1-3/16-12	117 to 128	86 to 94	1-1/16-12	142 to 160	105 to 117
-16	25.4 mm (1.0 inch)	1-7/16-12	152 to 174	112 to 128	1-5/16-12	237 to 254	175 to 187
-20	31.8 mm (1-1/4 inch)	1-11/16-12	179 to 201	132 to 148			
-24	38.1 mm (1-1/2 inch)	2-12	213 to 235	157 to 173			

Pipe fittings		
Nom. SAE Dash Size	Thread Size	TFFT (Turns For Finger Tight)
-2	1/8 - 27	2.0 - 3.0
-3	1/8 - 27	2.0 - 3.0
-4	1/8 - 27	2.0 - 3.0
-5	1/8 - 27	2.0 - 3.0
-6	1/4 - 18	1.5 - 3.0
-8	3/8 - 18	2.0 - 3.0
-10	1/2 - 14	2.0 - 3.0
-12	3/4 - 14	2.0 - 3.0
-14	3/4 - 14	2.0 - 3.0
-16	1 - 11 1/2	1.5 - 2.5
-20	1 1/4 - 11 1/2	1.5 - 2.5
-24	1 1/2 - 11 1/2	1.5 - 2.5
-32	2 - 11 1/2	1.5 - 2.5

NOTE: Apply sealant/lubricant to male pipe threads. The first two threads should be left uncovered to avoid system contamination. Screw pipe fitting into female pipe port to the finger tight position. Wrench tighten fitting to the appropriate turns from finger tight (TFFT) shown in table above, making sure the tube end of an elbow or tee fitting is aligned to receive incoming tube or hose fitting.

Section 1003

1003

METRIC CONVERSION CHART

TABLE OF CONTENTS

CONVERSION FACTORS 3

 Metric to U.S. 3

 U.S. to Metric 4

CONVERSION FACTORS

Metric to U.S.

	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>
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

	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>
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
ENGINE

Section Title	Section Number
Engine and Radiator Removal and Installation	2000
For Engine Repair, see the Engine Service Manual	

Section 2000

ENGINE AND RADIATOR REMOVAL AND INSTALLATION

TABLE OF CONTENTS

RADIATOR 3
 Removal 3
 Installation 7
ENGINE 8
 Removal 8
 Installation 12

RADIATOR

Removal

NOTE: Photos may be slightly different from the machine you are repairing. The procedure is the same.

NOTE: Put caps on all fittings and plugs in all disconnected hoses.

STEP 1

Park the machine on a level surface.

STEP 2

Lift the hood and open the rear access door on the machine.

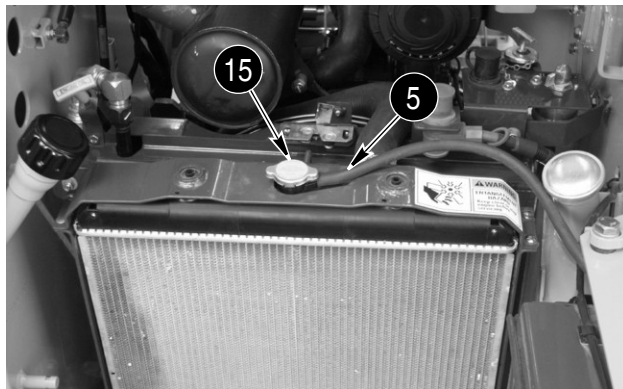
STEP 3

Turn the ignition switch and the master disconnect switch (if equipped) to the OFF position.

STEP 4

Disconnect the negative battery cable from the battery.

STEP 5

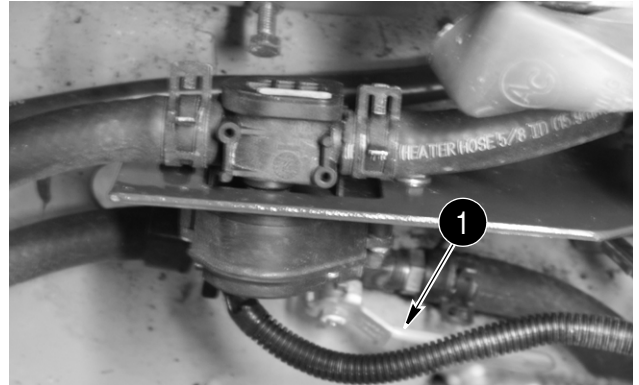


BD04C007

Slowly loosen the radiator cap (15). Disconnect the overflow hose (5) from the radiator neck.

NOTE: Refer to illustration on page 5.

STEP 6



BD05A024

If equipped with a heater, open the heater coolant valve.

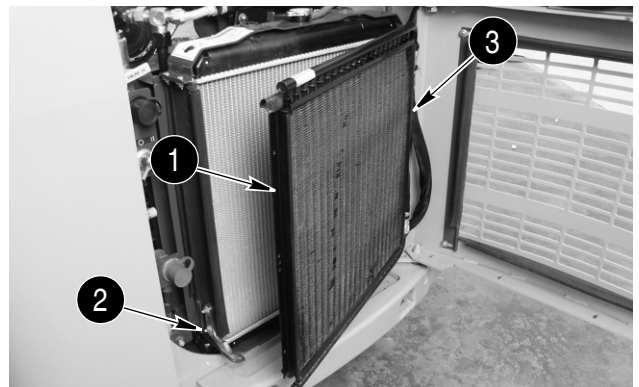
STEP 7

Install a hose on the drain valve (16) and drain the radiator (1) into a clean container that holds approximately 17 litres (4.5 gallons).

STEP 8

If equipped with a heater, close the heater coolant valve (1).

STEP 9



BD05A026

If the machine is equipped with a High Flow Oil Cooler (1), release the latch (2) on the lower left side of the oil cooler and swing the oil cooler away from the radiator. Remove mounting bolts (3) from the hinge and remove the oil cooler (1) from the radiator mounting location. Secure the oil cooler away from the radiator.

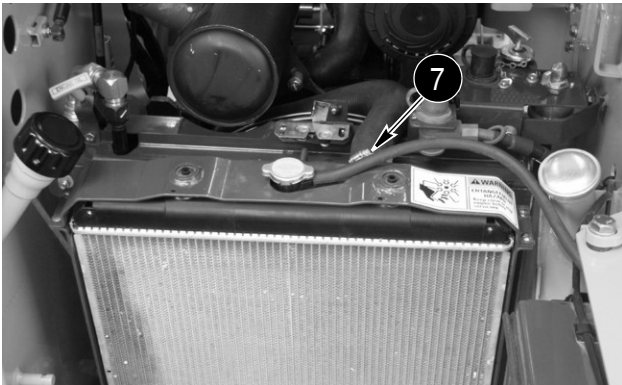
STEP 10



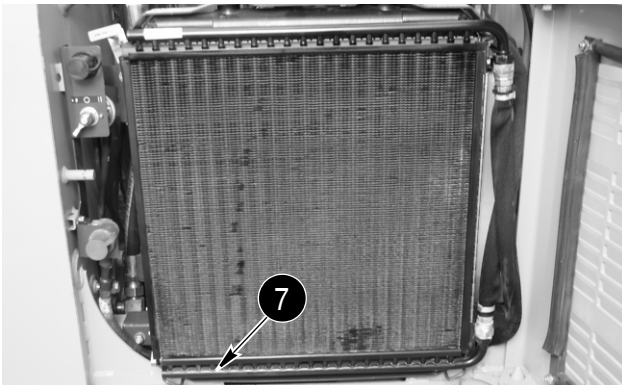
BD04C026

Release the latch on the top of the radiator and tip the radiator out from the mounting location.

STEP 11



BD04C007

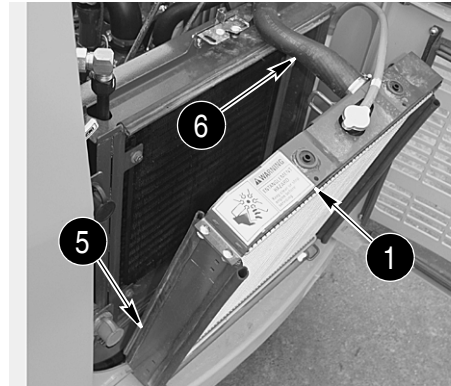


BD05A025

Loosen the clamps (7) on the lower radiator hose (10) and clamps (7) on the upper radiator hose (8). Remove the upper radiator hose (8) and the lower radiator hose (10) from the radiator (1).

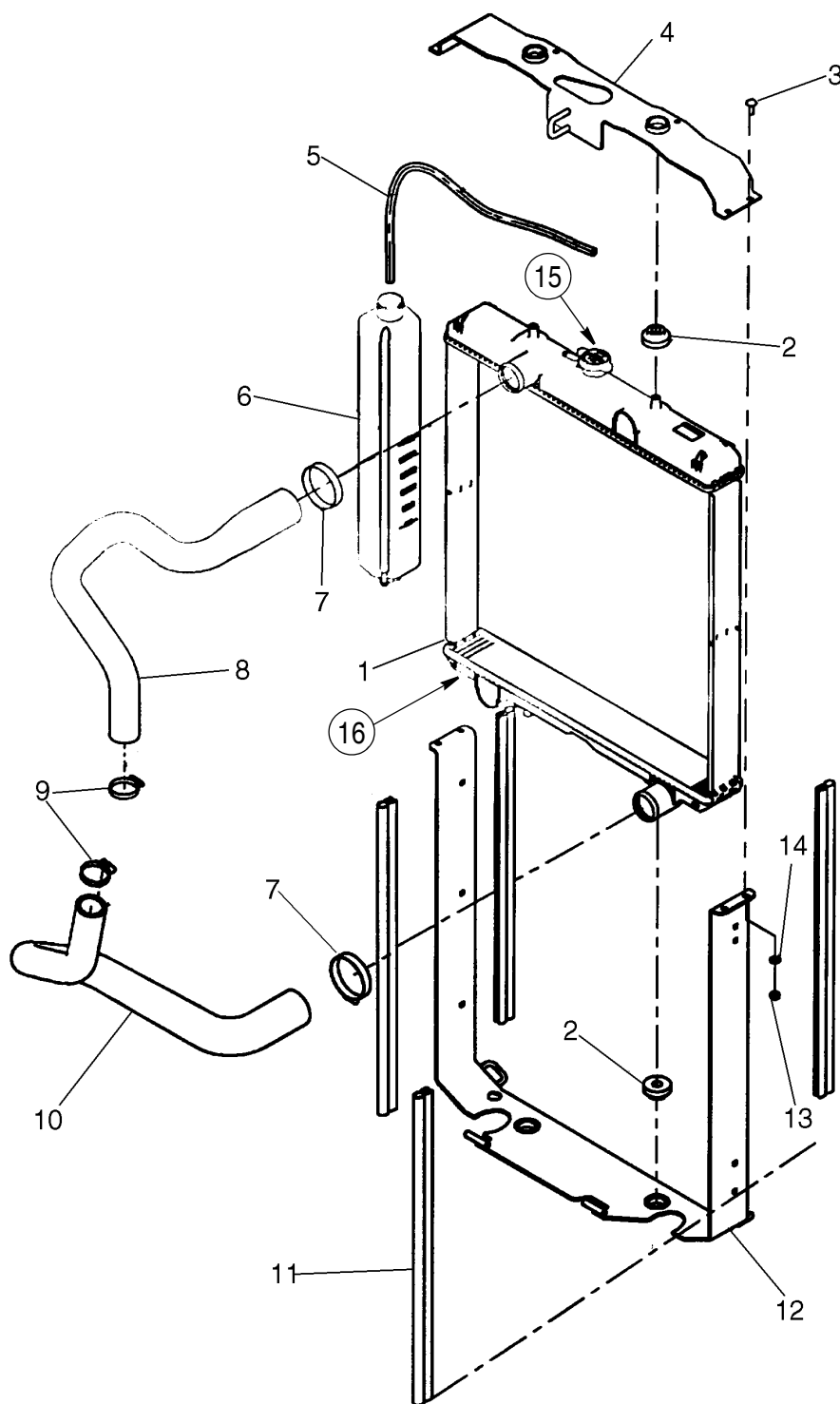
NOTE: Refer to illustration on page 5.

STEP 12



BD04K036

Move the radiator (1) away from the upper radiator hose (6) and lower radiator hose (5). Remove the radiator (1) from the machine.



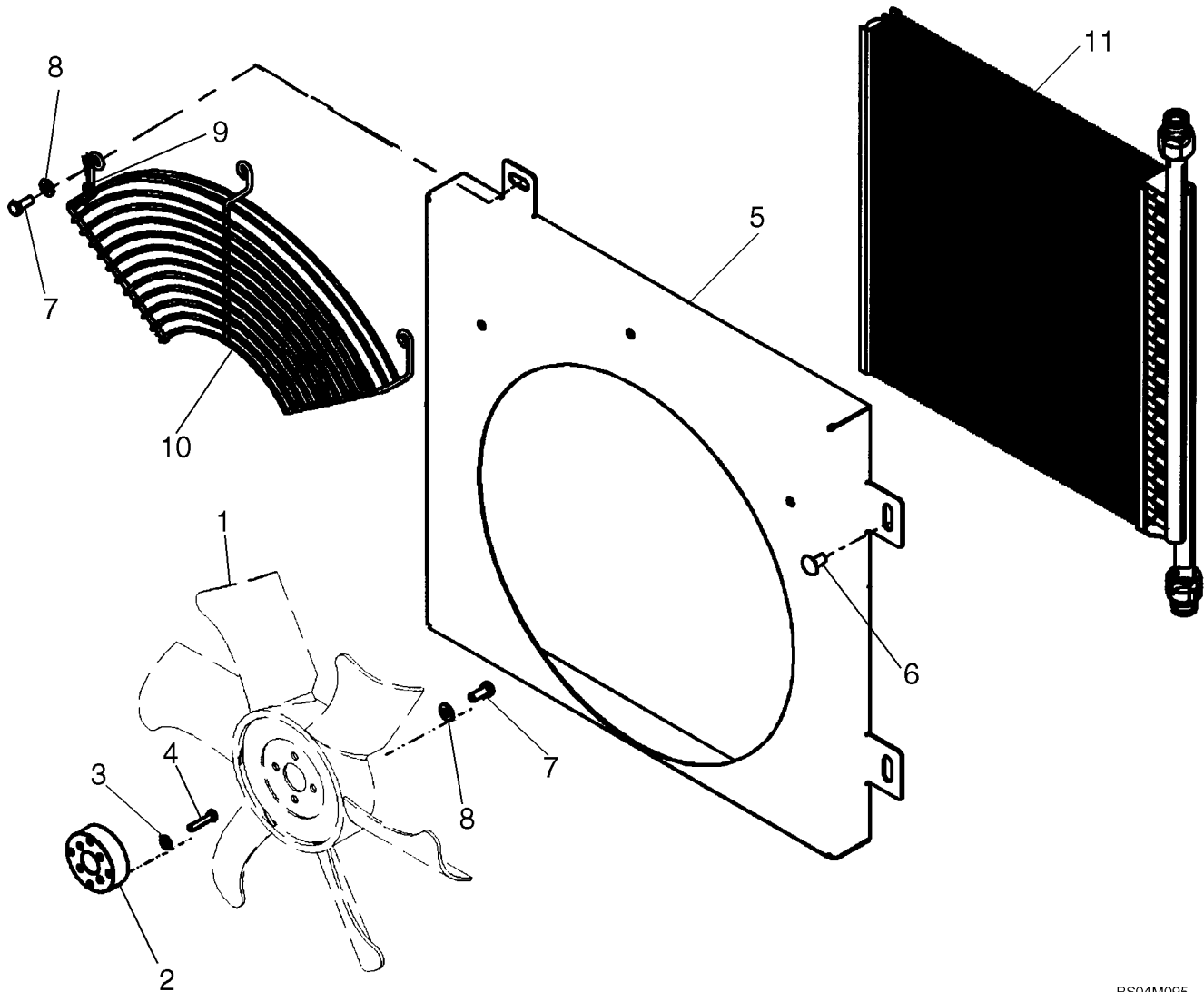
BS04M094

BS04M094

1. RADIATOR
2. CUSHION
3. BOLT
4. UPPER FRAME ASSEMBLY
5. COOLANT RECOVERY HOSE
6. COOLANT RECOVERY BOTTLE
7. CLAMP
8. UPPER RADIATOR HOSE

9. CLAMP
10. LOWER RADIATOR HOSE
11. SEAL
12. LOWER FRAME ASSEMBLY
13. NUT
14. LOCK WASHER
15. RADIATOR CAP
16. DRAIN VALVE

410 AND 420 RADIATOR MOUNTING



BS04M095

1. FAN BLADE
2. SPACER
3. LOCK WASHER
4. CAP SCREW
5. SHROUD
6. BOLT

7. CAP SCREW
8. LOCK WASHER
9. WASHER
10. FAN GUARD
11. OIL COOLER

BS04M095

410 AND 420 FAN MOUNTING