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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 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.*

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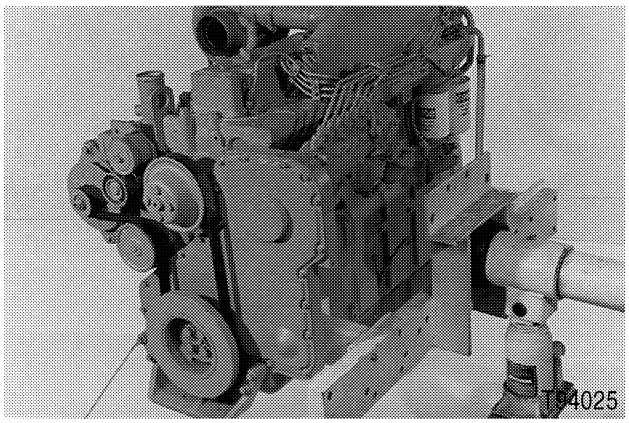
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Rac 8-71601 Issued 11-91 Printed in U.S.A

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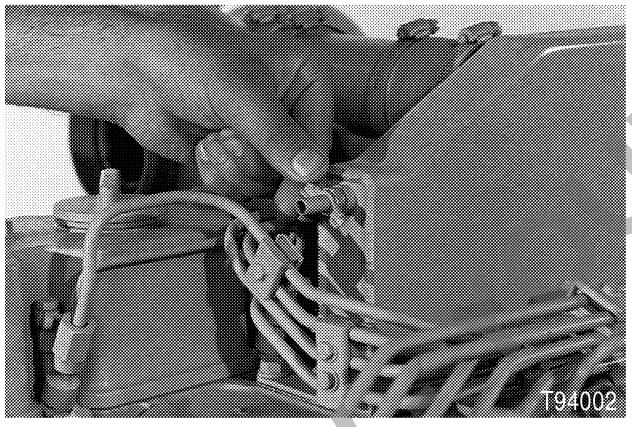
SERVICING THE AFTERCOOLER
Removal

STEP 1



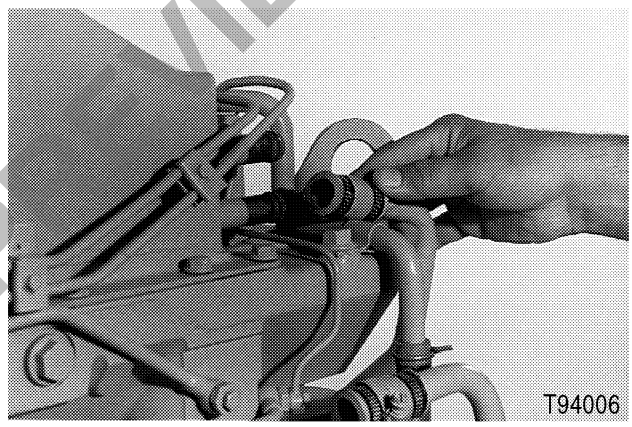
Case 6TA 830 engine.

STEP 2



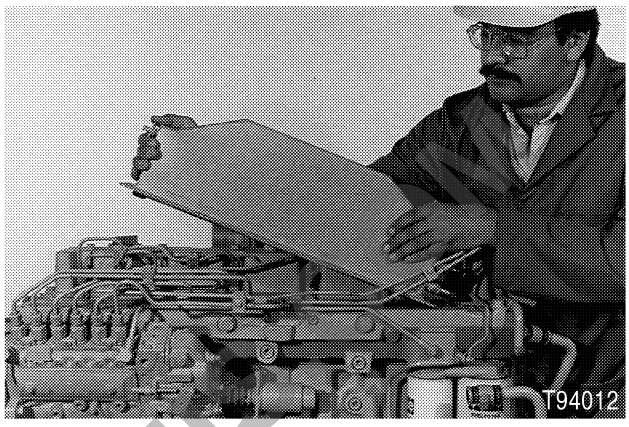
Drain the coolant from the engine. Open the air vent valve on the aftercooler to help drain the coolant.

STEP 3



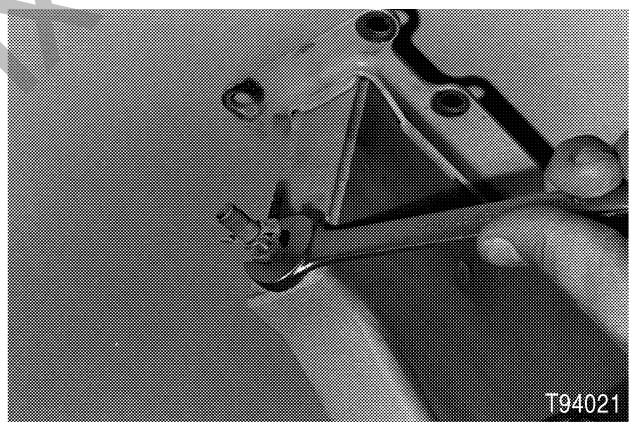
Remove all fuel lines and water hoses from the aftercooler.

STEP 4



Remove the bolts and aftercooler. Discard the gasket. Clean the gasket surfaces. Inspect the housing and core for damage.

STEP 5



Remove the air vent valve from the aftercooler.

STEP 6



Install a plug in the air vent valve and put a cap on one of the aftercooler water hose tube. Attach regulated air pressure to the other water hose tube. Pressurize the core to 206 kPa (2 bar) (30 PSI) and submerge the aftercooler in water. Inspect for any air leaks. If there leaks or damage, the aftercooler must be replaced.

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ENGINE SPECIFICATION DETAILS

Cylinder Block Prior to Engine Serial Number 44487830

	Metric Value
Type	Wet Sleeved
Material	Cast Iron
Main Bearing Bore	104.987 to 105.013 mm
Camshaft Bore	63.987 to 64.013 mm
Lifter Bore	16.000 to 16.030 mm
Maximum Service Limit	16.055 mm
Cylinder Sleeve Bore	132.900 to 132.950 mm
Cylinder Sleeve Counterbore	132.938 to 132.958 mm
Warpage at Cylinder Head Mounting Surface (TOTAL)	0.075 mm
Within any 25 mm Diameter Area (Maximum)	0.02 mm

Cylinder Block Engine Serial Number 44487830 and After

Type	Wet Sleeved
Material	Cast Iron
Main Bearing Bore	104.987 to 105.013 mm
Camshaft Bore	63.987 to 64.013 mm
Lifter Bore	16.000 to 16.030 mm
Maximum Service Limit	16.050 mm
Cylinder Sleeve Bore	130.900 to 130.950 mm
Cylinder Sleeve Counterbore	130.938 to 130.958 mm
Warpage at Cylinder Head Mounting Surface (TOTAL)	0.075 mm
Within any 25 mm Diameter Area (Maximum)	0.02 mm

Cylinder Sleeve Prior to Engine Serial Number 44487830

Type	Wet, Can Be Replaced
Material	Cast Iron
OD of Cylinder Sleeve (At Top of Piston)	132.947 to 132.949 mm
ID of Cylinder Sleeve	114.000 to 114.040 mm
Maximum Service Limit	114.117 mm
Maximum Out of Round (Installed in Block)	0.04 mm
Maximum Taper (Installed in Block)	0.04 mm
Sleeve Protrusion Above Block	0.015 to 0.109 mm

Cylinder Sleeve Engine Serial Number 44487830 and After

Type	Wet, Can Be Replaced
Material	Cast Iron
OD of Cylinder Sleeve (At Top of Piston)	132.947 to 132.949 mm
ID of Cylinder Sleeve	114.000 to 114.040 mm
Maximum Service Limit	114.117 mm
Maximum Out of Round (Installed in Block)	0.04 mm
Maximum Taper (Installed in Block)	0.04 mm
Sleeve Protrusion Above Block	0.025 to 0.122 mm

Piston Pin

Type	Full Float
OD of Pin	44.997 to 45.002 mm
Maximum Service Limit	44.993 mm
Pin to Piston Clearance	0.003 to 0.015 mm
Pin to Rod Bushing Clearance	0.02 to 0.038 mm

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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

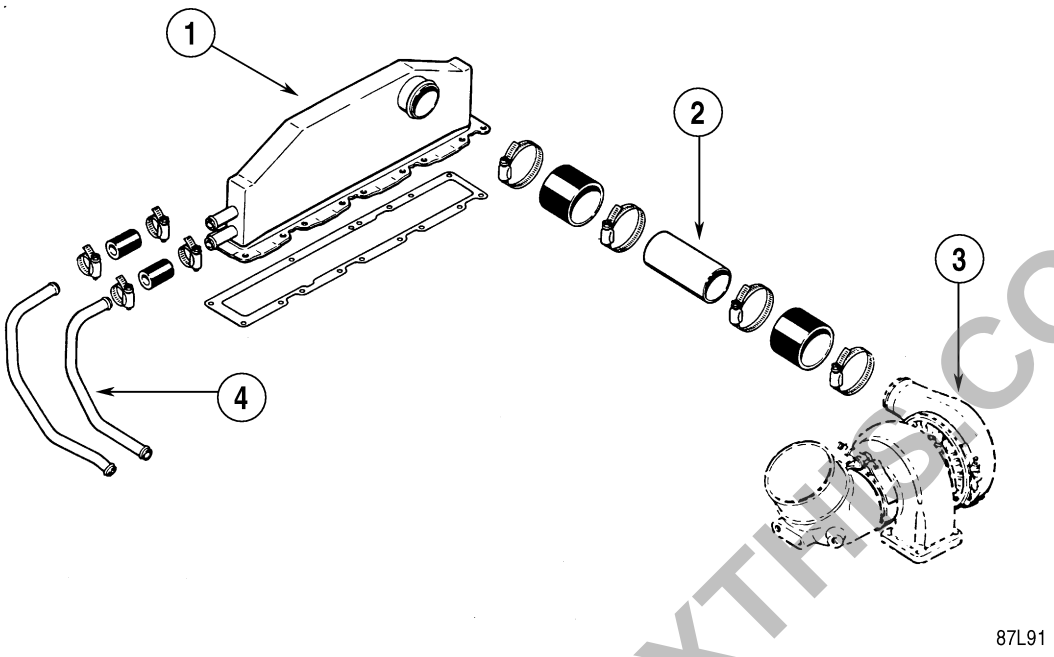


Usually the torque values specified for grade 10.9 fasteners can be used satisfactorily on grade 12.9 fasteners.

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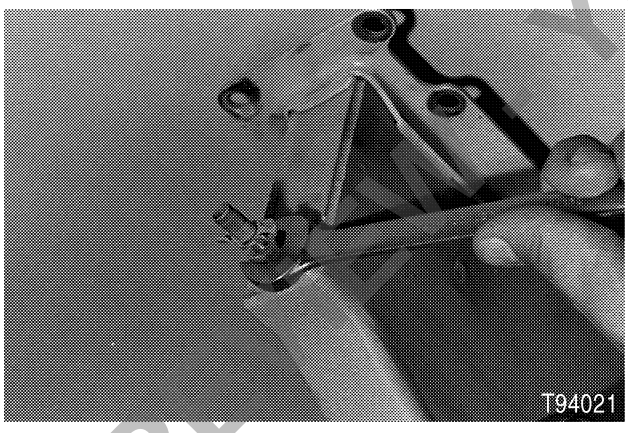
Installation



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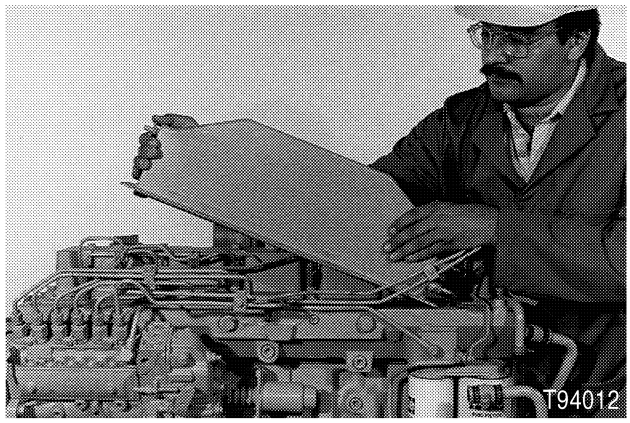
1. Aftercooler
2. Crossover Tube
3. Turbocharger
4. Water Line

STEP 7



Apply teflon thread sealant to threads of air vent valve and install in the aftercooler.

STEP 8



Apply a thin layer of Three Bond RTV Silver Sealer to both sides of a new gasket. Install the gasket and aftercooler on the cylinder head.

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Piston

Type	Cam Ground
Material	Aluminum Alloy
OD at 12 mm from the Bottom, Degrees from Piston Pin	
Standard Size Piston	113.814 to 113.886
Minimum Service Limit	113.776 mm
ID of Piston Pin Bore	45.006 to 45.012 mm
Maximum Service Limit	45.025 mm
Width of 1st Ring Groove (Top)	3.50 mm
Width of 2nd Ring Groove (Intermediate)	3.08 to 3.10 mm
Width of 3rd Ring Groove (Oil Ring)	4.040 to 4.060 mm
Protrusion Above Cylinder Block (Maximum)	0.380 mm
Protrusion Above Cylinder Block (Minimum)	0.018 mm

Piston Rings

No. 1 Compression 6T830 and 6TA830	Keystone Type (Barrel Face)
End Gap in 114.020 ID	0.35 to 0.65 mm (See Note)
No. 1 Compression 6-830 Engine	Keystone Type (Barrel Face)
End Gap in 11.4020 ID	0.35 to 0.65 mm (See Note)
Side Clearance	Use Keystone Gauge
No. 2 Compression	Rectangular Type (Taper Face)
End Gap in 114.020 ID	0.35 to 0.65 mm (See Note)
Side Clearance	0.70 to 0.125 mm
No. 2 Compression	Keystone Type (Barrel Face)
End Gap in 114.020 ID	0.35 to 0.65 mm (See Note)
Side Clearance	Use Keystone Gauge
No. 3 Oil Control Rings	Two Piece
End Gap in 11.4020 ID	0.30 to 0.60 mm (See Note)
Side Clearance	0.020 to 0.065 mm

NOTE: *Add 0.09 mm gap for every 0.03 mm of bore wear up to maximum worn limit.*

Cylinder Head

Cylinder Head Height (New)	115.75 to 116.25 mm
Warpage (Maximum) Side to Side	0.076 mm
Warpage (Maximum) Total Across Head	0.20 mm
Maximum Material Removal	1.00 mm
Minimum Head Height	114.75 mm
New Head Thickness	115.75 to 116.25 mm
Valve Guide Bore	15.931 to 15.971 mm
Insert Bore (Intake)	53897 to 53.927 mm
Insert Bore Depth (Intake)	12.00 to 12.20 mm
Insert Bore (Exhaust)	46.997 to 47.027 mm
Insert Bore Depth (Exhaust)	9.63 to 9.83 mm
Local Flatness (Maximum) 51 mm Area	0.0254 mm

Lifters

Material	Hardened Iron
OD of Lifter	15.929 to 15.980 mm
Minimum Service Limit	15.925 mm

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TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Tube OD Hose ID	Thread Size	Pound-Inches	Newton metres
37 Degree Flare Fitting			
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-Inches	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

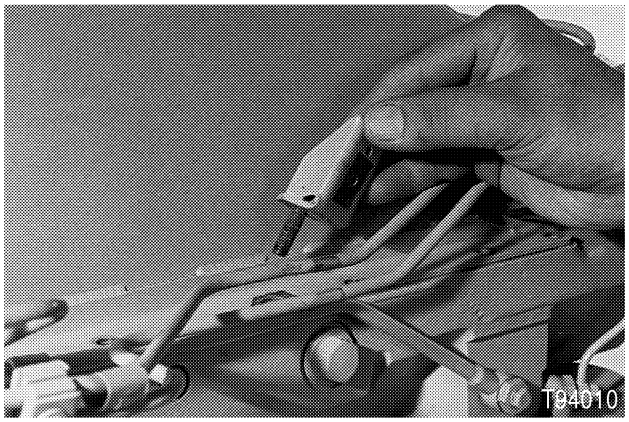
Tube OD Hose ID	Thread Size	Pound-Inches	Newton metres
Straight Threads with O-ring			
1/4 inch 6.4 mm	7/16-20	144 to 228	16 to 26
5/16 inch 7.9 mm	1/2-20	192 to 300	22 to 34
3/8 inch 9.5 mm	9/16-18	300 to 480	34 to 54
1/2 inch 12.7 mm	3/4-16	540 to 804	57 to 91
Tube OD Hose ID	Thread Size	Pound-Inches	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

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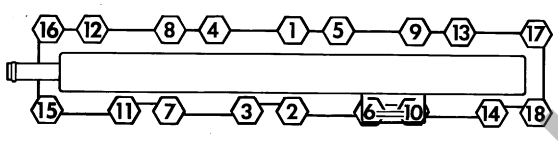
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STEP 9

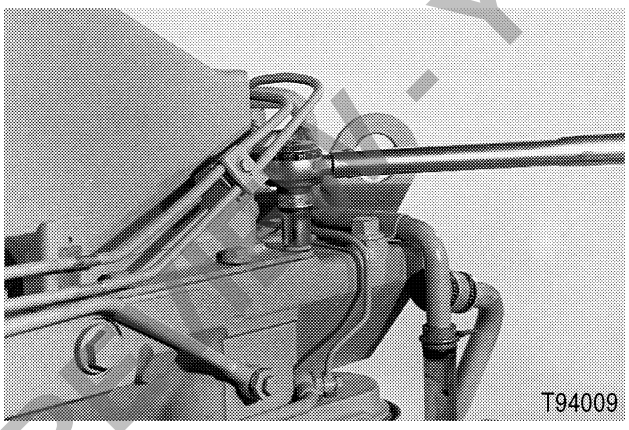


Apply Loctite liquid teflon thread sealer on the injector line mounting bracket bolts. Install the injector line mounting brackets on the aftercooler.

STEP 10

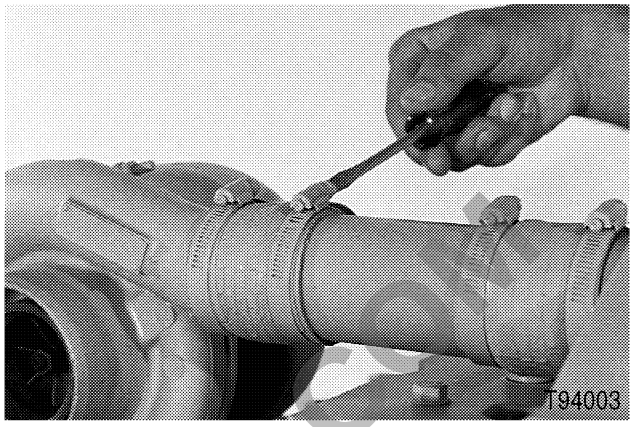


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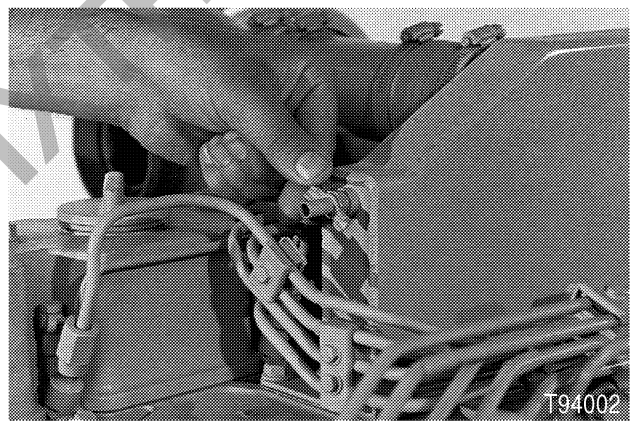
Apply Loctite liquid teflon thread sealer to the remaining aftercooler bolts. Install the aftercooler mounting bolts and tighten to a torque of 21 to 27 Nm following the torque sequence shown above.

STEP 11



Install the crossover tube, injector tubes and water hoses on the aftercooler and turbocharger. Tighten the water hose clamps to a torque of 4 to 6 Nm.

STEP 12



Fill the cooling system with coolant. Open the air vent valve to remove trapped air. Close the valve when coolant appears.

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Connecting Rod

Bushing	Steel Backed Leaded Bronze
Bushing ID Installed (Ream to Size)	45.023 to 45.035 mm
Bearing Liners	Replaceable
Journal ID Without Bearing Liners	80.987 to 81.013 mm
Bearing Oil Clearance	0.033 to 0.117 mm
Side Clearance	0.100 to 0.300 mm
Maximum Service Limit	0.330 mm
Connecting Rod Bend (Maximum)	
Without Bushing	0.200 mm
With Bushing	0.150 mm
Connecting Rod Twist (Maximum)	
Without Bushing	0.500 mm
With Bushing	0.300 mm

Crankshaft

Type	Hardened Steel, Balanced
Main Bearing Liners	Replaceable
Crankshaft End Clearance	0.157 to 0.334 mm
Maximum Service Limit	0.381 mm
Center Main Bearing Thrust Surface Thickness	3.447 to 3.530 mm
Connecting Rod Journal	
OD Standard	75.987 to 76.013 mm
Maximum Service Limit	75.962 mm (See Note)
0.25 mm OD Undersize, Grind to	75.737 to 75.763 mm
Maximum Service Limit	75.712 mm
0.50 mm OD Undersize, Grind to	75.487 to 75.513 mm
Maximum Service Limit	75.462 mm
0.75 mm OD Undersize, Grind to	75.237 to 75.263 mm
Maximum Service Limit	75.212 mm
1.00 mm OD Undersize, Grind to	74.987 to 75.013 mm
Maximum Service Limit	74.962 mm
Connecting Rod Journal Maximum Taper	0.013 mm
Journals Out of Round Maximum	0.050 mm
Undersize Main Bearing Liners for Service	0.25, 0.50, 0.75 and 1.00 mm
Main Bearing Oil Clearance	0.66 to 0.134 mm
Main Bearing Journal	
OD, Standard	97.987 to 98.013 mm
Maximum Service Limit	97.962 mm
0.25 mm OD Undersize, Grind to	97.737 to 97.763 mm
Maximum Service Limit	97.712 mm
0.50 mm OD Undersize, Grind to	97.487 to 97.513 mm
Maximum Service Limit	97.462 mm
0.75 mm OD Undersize, Grind to	97.237 to 97.263 mm
Maximum Service Limit	97.212 mm
1.00 mm OD Undersize, Grind to	96.987 to 97.013 mm
Maximum Service Limit	96.972 mm
Main Bearing Thrust Surfaces	
Standard	42.975 to 43.076
0.25 mm Oversize	43.225 to 43. 326
0.50 mm Oversize	43.475 to 43.576
Main Bearing Journal Bore ID No Liners	104.987 to 105.013 mm
Main Journal Width:	
1st, 2nd, 3rd, 5th and 6th	42.924 to 43.076 mm
4th	42.975 to 43.025 mm
Connecting Rod Journals Width	45.950 to 46.050 mm

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6T-830 and 6TA-830 Engine
Service Manual 7-65441
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CASE CANADA CORPORATION
3350 South Service Road
Burlington, ON L7N 3M6 CANADA

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Section

1001

STANDARD TORQUE SPECIFICATIONS

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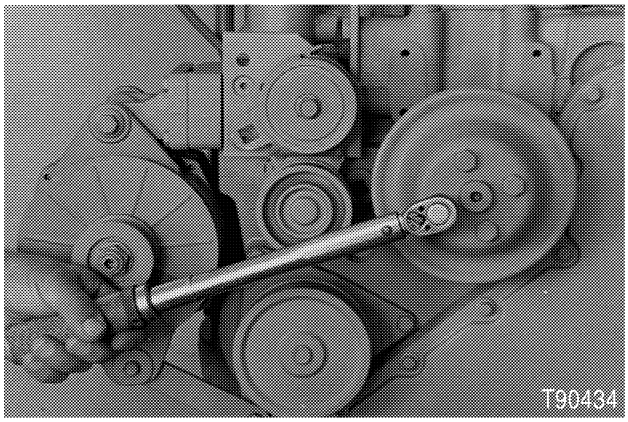
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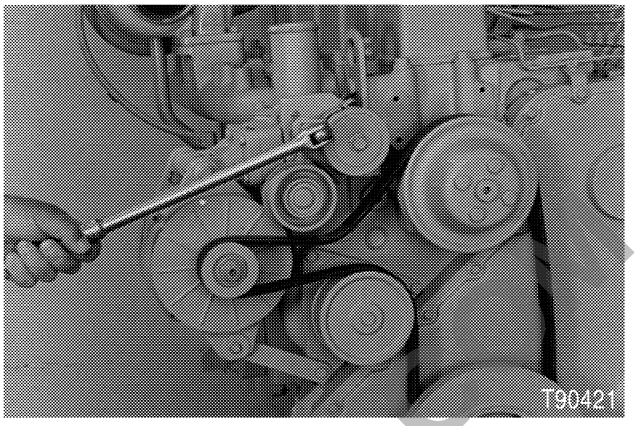
STEP 337



Install the fan pulley and fan pulley bolts. Tighten the fan pulley bolts to a torque of:

Grade 8.8 Size M8 ..... 21 to 31 Nm
Grade 10.9 Size M8 ..... 37 to 43 Nm
Grade 8.8 Size M10 ..... 51 to 62 Nm
Grade 10.9 Size M10 ..... 51 to 62 Nm

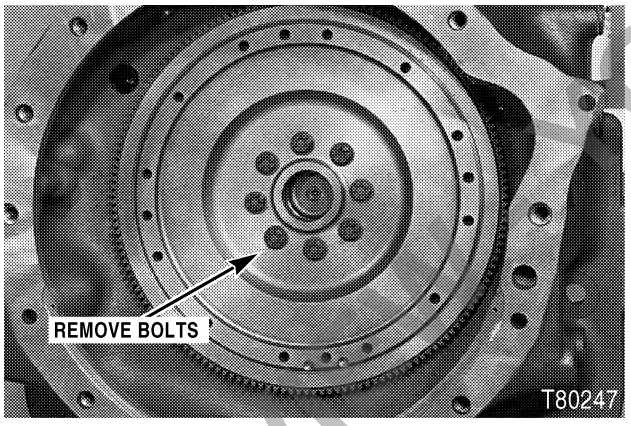
STEP 338



Lift the belt tensioner and install the fan belt.

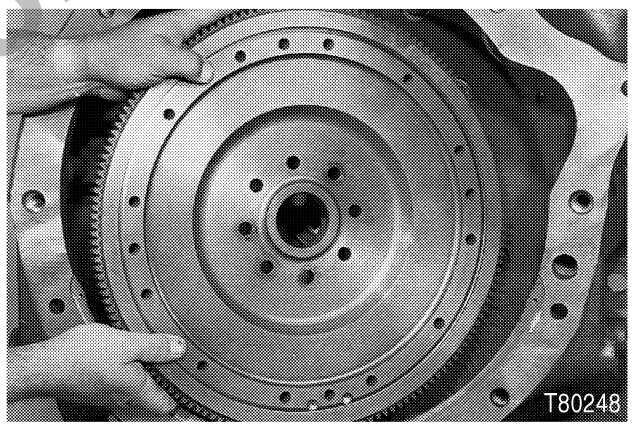
FLYWHEEL
Removal

STEP 339



Remove the bolts from the flywheel.

STEP 340



Remove the flywheel from the flywheel housing.

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