BASIC 6101 ENGINE SPECIFICATIONS

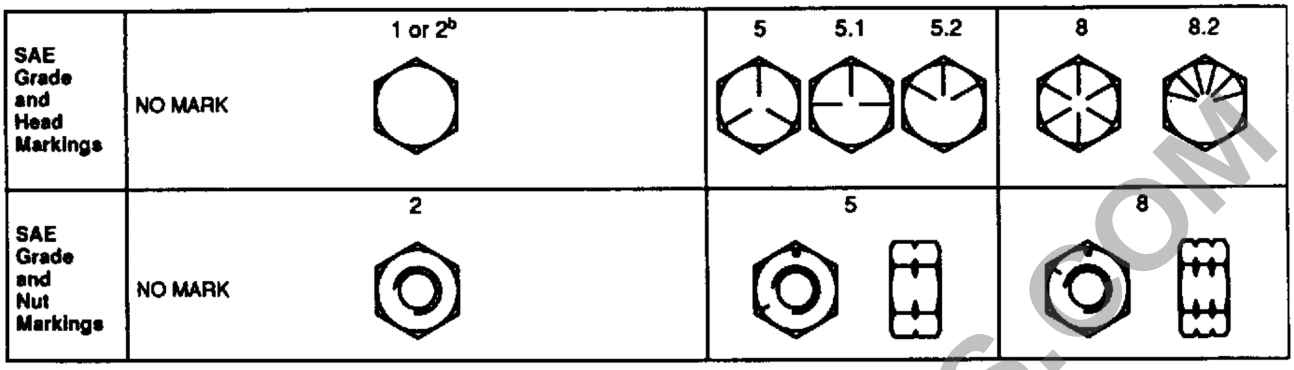
Item	Unit of Measure	6101A	6101H
Number of Cylinders	--	6	6
Fuel	--	Diesel	Diesel
Bore	mm (in.)	130 (5.12)	130 (5.12)
Stroke	mm (in.)	127 (5)	127 (5)
Displacement	L (cu. in.)	10.15 (619)	10.15 (619)
Piston Speed	m/min (ft/min)	533 (1750)	533 (1750)
Compression Ratio	--	14.7:1	14.7:1
Firing Order	--	1-5-3-6-2-4	1-5-3-6-2-4
Rated Speed	rpm	2100	2100
Slow Idle Speed	rpm	800	800
Normal Working Range (Std. Gov.)	rpm	1400-2100	1400-2100
Number of Mains	--	7	7
Main ID	mm (in.)	95.2 (3.75)	95.2 (3.75)
Main Width	mm (in.)	36.6 (1.44)	36.6 (1.44)
Thrust Width	mm (in.)	40.7 (1.60)	40.7 (1.60)
Rod Journal OD	mm (in.)	88.9 (3.50)	88.9 (3.50)
Rod Journal Width	mm (in.)	47.6 (1.87)	47.6 (1.87)
FUEL SYSTEM			
Supply Pump Pressure	kPa (bar) (psi)	200 (2.0) (29)	200 (2.0) (29)
Injection Nozzle Size	mm	21	21
Fuel Filter Area	cm^2 (sq in.)	3,542 (549)	3.542 (549)
Filter Particle Size - 97% Efficiency	Microns	12—15	12—15
LUBRICATION SYSTEM			
Pump Capacity	L/min (gpm)	109.5 (29)	109.5 (29)
Oil Pressure-Slow Idle	kPa (psi)	206 (30)	206 (30)
-Rated Speed	kPa (psi)	310 (45)	310 (45)

S55,0000,N -19-17NOV95

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UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES



TS1162 -19-04MAR91

Size	Grade 1				Grade 2[b]				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	240	175	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510	375	400	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

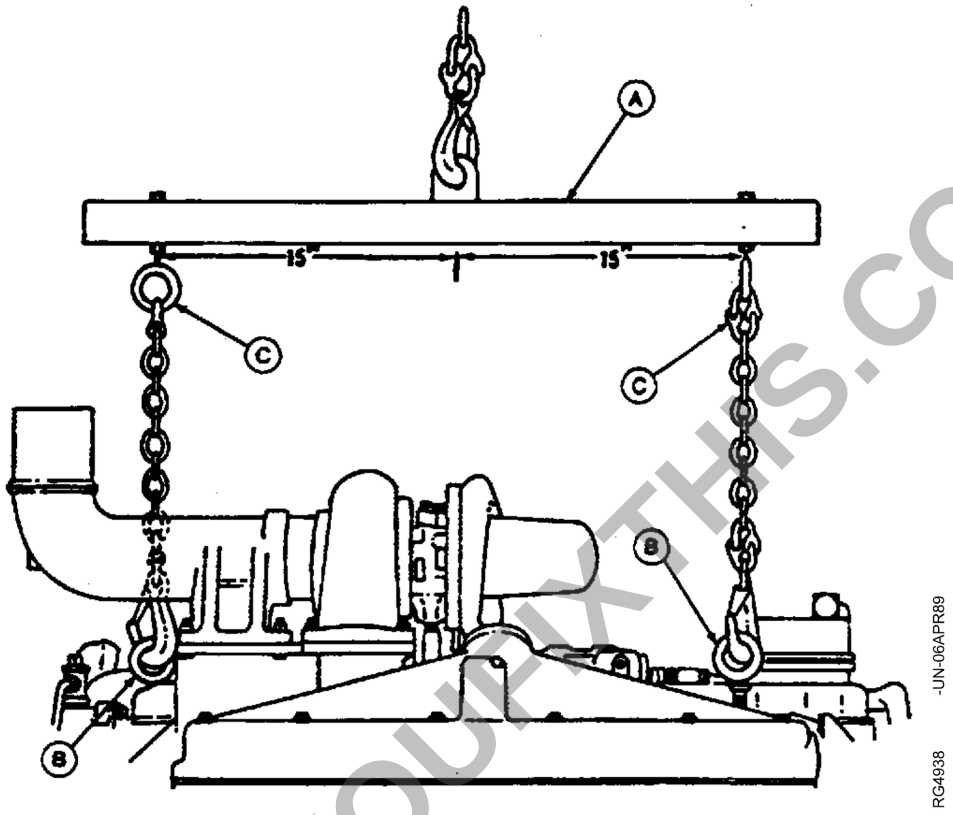
[a] "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

[b] Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.

DX,TORQ1 -19-20JUL94

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ENGINE LIFTING PROCEDURE



CAUTION: The only recommended method for listing the 6101 Engine is with the use of JDG23 Lifting Sling and R60980 Eyebolts with locknuts. Use extreme caution when lifting and NEVER permit any part of the body to be positioned under a load being lifted or suspended.

1. Screw both eyebolts (B) to fullest depth in cylinder head and securely tighten locknuts.

NOTE: Lift chains (C) spacing on sling is adjustable. Position chains 381 mm (15 in.) from center of bar as shown.

2. Attach the JDG23 Engine Lifting Sling (A) to eyebolts and overhead hoist or floor crane of adequate lifting capacity.

3. Carefully lift engine to desired location.

S55,0000,Q -19-14JUN89

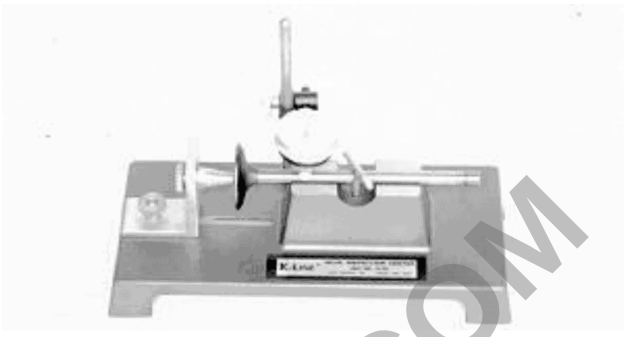
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2. Use D0508ST Valve Inspection Center to determine if valves are out of round, bent or have excessive runout.

Maximum permissible runout of valve face . . . . . 0.05 mm (0.002 in.)

3. Valves determined to be serviceable should be refaced to specifications given above.



RG4234 -UN-23FEB89

S11,0401,W -19-13MAR92

INSPECT AND CLEAN CYLINDER HEAD

Inspect all cylinder head passages for restrictions. Heads with restricted or clogged passages can be cleaned by soaking them in a tank of hot caustic solution.

05
20

Scrape all old gasket material from head. Use a powered wire brush to clean sealing surfaces.

If cylinder head is not put in a chemical hot tank for cleaning, clean with solvent and a brush. Dry with compressed air and be sure to blow out all passages.

S11,2005,KW -19-16AUG94

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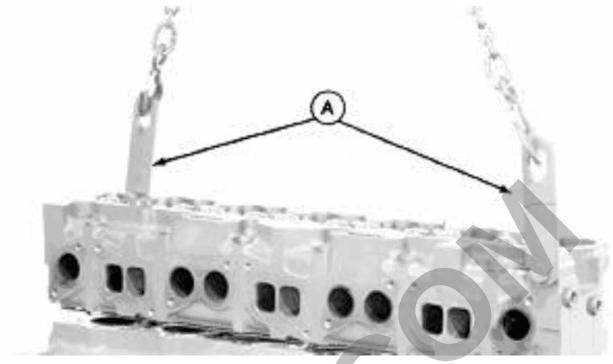
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14. Remove all 26 cylinder head cap screws.

NOTE: If desired, check and record each cylinder head cap torque before removing.

IMPORTANT: DO NOT use screwdrivers or pry bars between cylinder block and cylinder head to loosen head-to-block gasket seal.

Lift cylinder head from block. If cylinder head sticks, use a soft hammer to tap the cylinder head.



RG3492 -UN-10NOV89

15. Remove cylinder head and gasket. Inspect possible oil, coolant, or combustion chamber leaks. Also, check for evidence of incorrect or defective head gasket being used.

NOTE: Do not rotate crankshaft with cylinder head removed unless all cylinder liners are secured with cap screws and large flat washers as described in Group 10.

16. If desired, check valve height in relation to cylinder head and record measurements as described later in this group.

S55,2505,G -19-14JUN89

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HANDLE FLUIDS SAFELY—AVOID FIRES

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.



TS227 -UN-23AUG88

DX,FLAME -19-04JUN90

PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16˚C (60˚F).



TS204 -UN-23AUG88

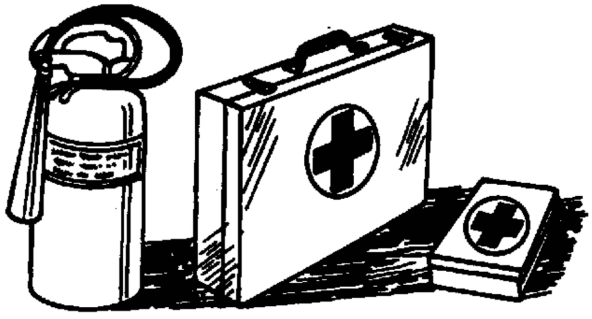
DX,SPARKS -19-03MAR93

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



TS291 -UN-23AUG88

DX,FIRE2 -19-03MAR93

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ABOUT THIS MANUAL

This Component Technical Manual (CTM20) covers the recommended repair procedure for all 6101, 10.1 L (619 cu. in.) diesel engines Serial No. (—499999), produced in Waterloo, Iowa. Before beginning repair of an engine, clean engine and mount on a repair stand. (See Group 03.)

This manual contains SI Metric units of measure, followed immediately by the U.S. customary units of measure.

Some components of this engine may be serviced without removing the engine from the machine. Refer to the specific machine technical manuals for information on components that can be serviced without removing the engine from the machine and for engine removal and installation procedures.

Read each module completely before performing service to check for differences in procedure or specifications. Follow only the procedures that apply to the engine model number you are working on. If only one procedure is given, that procedure applies to all 6101 diesel engines in this manual.

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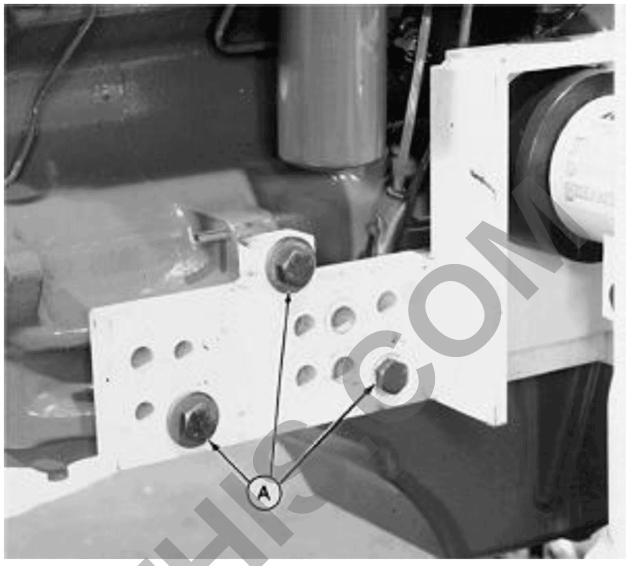
S55,0000,K -19-17NOV95

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MOUNT ENGINE ON REPAIR STAND

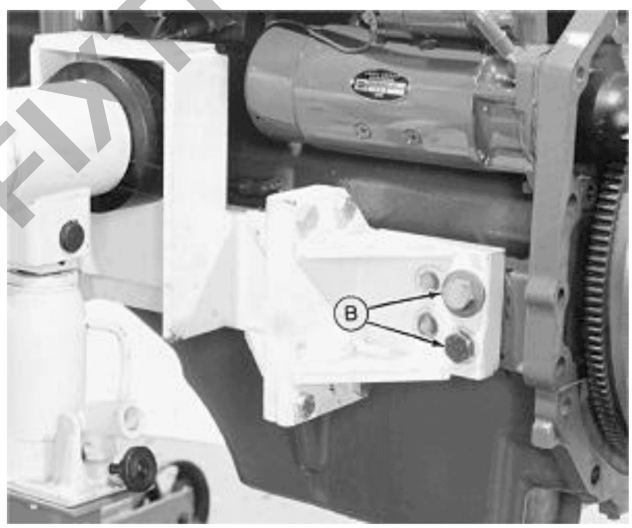
NOTE: If complete engine disassembly is required, remove starting motor before installing engine into repair stand.

1. Mount engine to front engine adapter using three 3/4-10 x 2-3/4 in. cap screws (A). Tighten cap screws to 365 N·m (270 lb-ft).



RG4931 -UN-19JAN90

2. Mount engine to rear engine adapter using two 3/4-10 x 2-3/4 in. cap screws (B). Tighten cap screws to 365 N·m (270 lb-ft).



RG4932 -UN-19JAN90

S55,0000,O,1 -19-15NOV95

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INSTALL OVERSIZE VALVE SEAT INSERTS

NOTE: If the valve seat insert bore is damaged, it will require machining. In this case, oversize inserts are available in 0.25 mm (0.010 in.) oversize only.

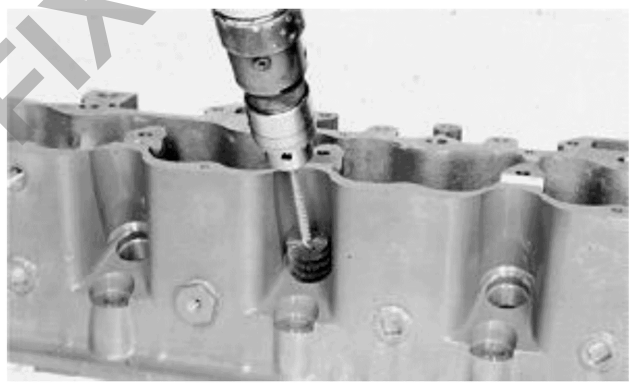
1. Remove valve seats. (See REPLACE VALVE SEAT INSERTS in this group.)

2. Machine seat inside bore to 53.62 to 53.72 mm (2.1110 to 2.1150 in.) for intake valves and 49.91 to 50.01 mm (1.9650 to 1.9690 in.) for exhaust valves.

3. Install valve seat inserts.

S11,2505,Y -19-31MAY95

CLEAN AND INSPECT CYLINDER HEAD NOZZLE BORE



RG5251 -UN-14DEC88

1. Inspect condition of threads for gland nut. Threads are metric (M28 x 1.5).

2. Inspect condition of nozzle seating surface in cylinder head.

Cylinder head threads and nozzle seating surface must be free of debris and carbon deposits.

IMPORTANT: If the injection nozzle gland nut threads are not clean, a false torque reading may be obtained when the injection nozzle is installed. This may prevent the injection nozzle from seating properly in the cylinder head.

3. Clean threads which have light foreign deposits using a drill and the D17030BR Thread Cleaning Brush. Work brush up and down several times to clean threads.

S11,2005,NS -19-14JUN95

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INSPECT AND MEASURE CONNECTING ROD BEARINGS



RG3823 -UN-13DEC88

Inspect rod bearings for damage or wear.

IMPORTANT: Never use new connecting rod cap screws when checking rod bearing ID. Use new cap screws only for final assembly of connecting rods.

Rod bearing-to-journal oil clearance can be checked with PLASTIGAGE, if rod is connected to crankshaft. If rod is out of engine, measure ID of connecting rod bearings and compare with OD of crankshaft journal.

1. With crankshaft removed, measure connecting rod journal OD at several points.

2. Install connecting rod cap (A) on rod (B) with bearings (C) in correct position.

3. Tighten rod cap-to-rod using TORQUE-TURN method. (See USE TORQUE-TURN METHOD FOR PROPER TORQUE, as described later in this group.)

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S11,2010,KD -19-02APR93

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5. The JDG719 Seal Puller Adapter along with JDE38-2 Shank and JDE38-3 Slide Handle is the preferred method for removing crankshaft front oil seal. If these tools are not available, JDG22 Seal Remover can be used to remove the seal. Follow same procedure for both pullers.

6. Remove keyway on stub of crankshaft.



RG,CTM61,G15,10-19-06OCT95

REMOVE CRANKSHAFT FRONT WEAR SLEEVE (WITH TIMING GEAR COVER INSTALLED)

NOTE: Front wear sleeve can be removed with timing gear cover installed or removed using either JDG726 or JDG786 puller set.

• **Remove Wear Sleeve Using JDG726:**

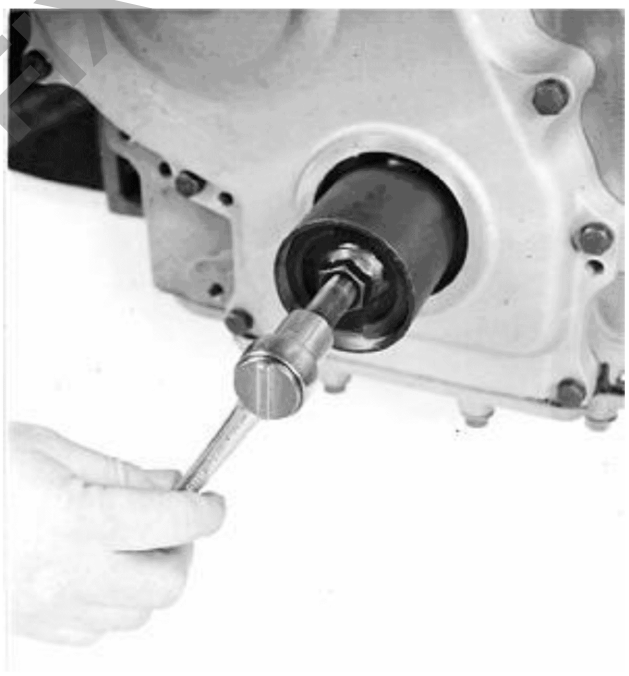
1. Position pulling jaws and jack screw assembly onto lip of wear sleeve. Slide collar over pulling jaws.

2. Hold collar onto pulling jaws and tighten jack screw until wear sleeve is free from crankshaft flange.

3. Inspect crankshaft flange for nicks or burrs.

4. Clean up flange with a light file and emery cloth.

5. Measure crankshaft front oil seal bore runout. Maximum allowable runout is 0.254 mm (0.010 in.).



RG,CTM61,G15,11-19-03JUL95

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INSTALL FLYWHEEL HOUSING AND FLYWHEEL



RG4323 -UN-09NOV89

1. Coat threads of NEW flywheel attaching cap screws with LOCTITE 242 Thread Lock and Sealer or its equivalent.

2. Position flywheel over dowel pin and start two cap screws (B). Do not tighten.

3. Install remaining flywheel attaching cap screws.

4. Tighten flywheel attaching cap screws to 176 N·m (130 lb-ft).

NOTE: For wet clutch applications, use a new gasket while installing flywheel housing.

5. Install flywheel housing (A) and tighten flywheel housing-to-cylinder block cap screws with lock washers to 407 N·m (300 lb-ft). Tighten flywheel housing-to-oil pan cap screws to 325 N·m (240 lb-ft).

IMPORTANT: Perform flywheel-to-flywheel housing runout checks as outlined earlier in this group.

6. Coat threads of cap screws with LOCTITE 242 and install starting motor, if removed. Tighten cap screws to 102 N·m (75 lb-ft).

S11,2515,X -19-06OCT95

COMPLETE FINAL ASSEMBLY

1. Install oil pan and clean engine oil. (See Lubrication System, Group 20.)

2. Fill cooling system with proper coolant. (See Fuels, Lubricants, and Coolant, Group 02.)

3. Perform engine break-in as instructed in Group 05 or your machine technical manual.

S11,2515,AX -19-03JUL95

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ASSEMBLE BYPASS VALVE HOUSING AND OIL COOLER ASSEMBLY

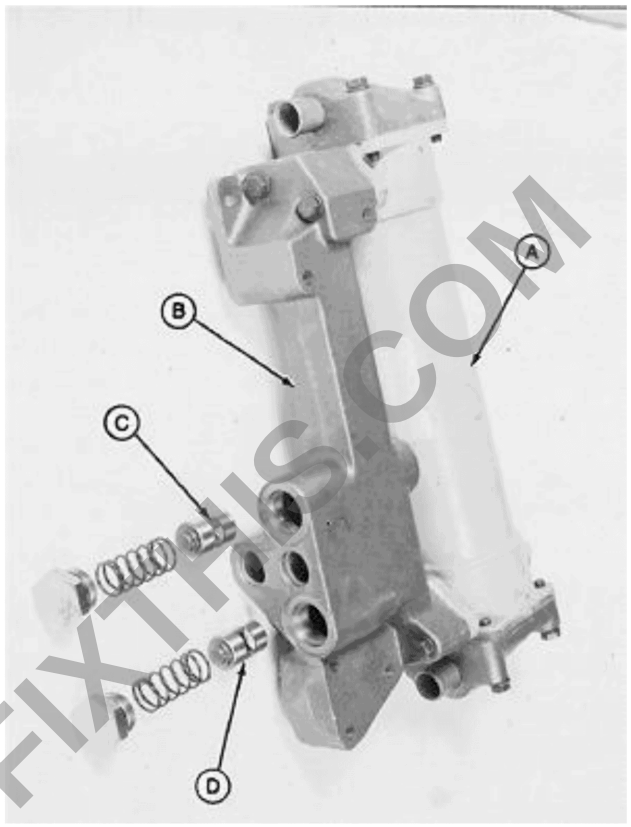
1. Using new gaskets install oil cooler end caps and tighten cap screws to 41 N·m (30 lb-ft), if removed.

2. Using new gaskets assemble oil cooler (A) onto bypass valve housing (B). Tighten cap screws 47 N·m (35 lb-ft).

NOTE: Dip valves in clean engine oil before installing.

3. Using new O-rings on plugs, install oil cooler bypass valve (C) and oil filter bypass valve (D) assemblies as shown. Tighten plugs securely.

A—Oil Cooler
B—Bypass Valve Housing
C—Oil Cooler Bypass Valve
D—Oil Filter Bypass Valve



RG,CTM61,G20,7 -19-16MAR92

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INSPECT COOLANT FILTER CONDITIONER COMPONENTS

1. Inspect all hoses for cranks or pin holes. Replace as necessary.

2. Inspect filter base and shut-off valves for debris and damage. Replace as necessary.

3. Clean all coolant filter conditioner component parts using liquid household soap and water. Rinse thoroughly.

4. Dry with compressed air.

S11,2525,V -19-11FEB92

INSTALL COOLANT FILTER CONDITIONER

IMPORTANT: Apply joint sealing compound to all fittings before installation.

1. Install coolant conditioner filter base (C) to mounting bracket. Tighten cap screws to 47 N·m (35 lb-ft).

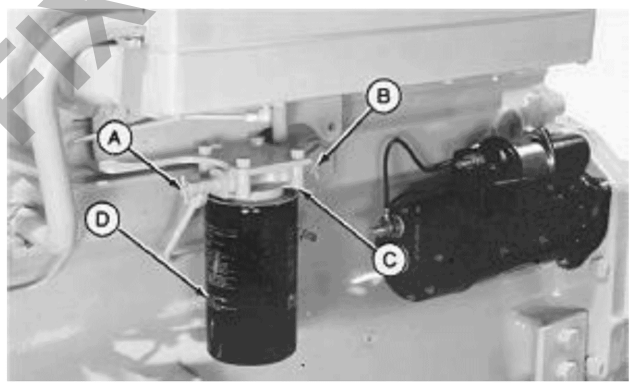
NOTE: Replace all packings at coolant line connections.

2. Install inlet shut-off valve (B) and outlet shut-off valve (A). Tighten all connections securely.

3. Install inlet and outlet lines. Tighten connections securely.

4. Apply a thin layer of clean engine oil on new coolant conditioner filter element gasket and install filter element (D).

5. Hand tighten filter element until gasket contacts filter base. Tighten element another 1/2—3/4 turn. DO NOT overtighten.



RG5519 -UN-09JAN90

A—Outlet Shut-Off Valve
B—Inlet Shut-Off Valve
C—Filter Base
D—Filter Element

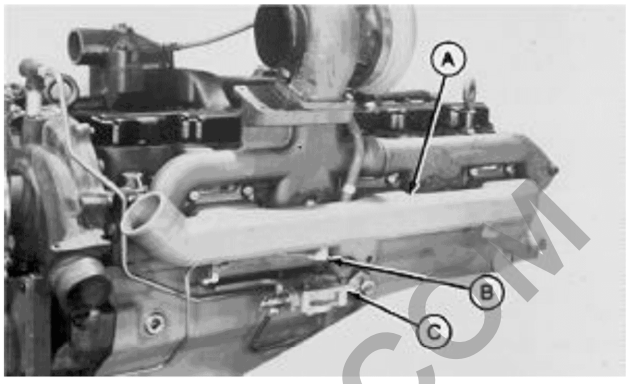
S55,2525,Q -19-15MAR89

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REMOVE, INSPECT, INSTALL INTAKE MANIFOLD (6101H ENGINES)



RG5557 -UN-09JAN90

1. Refer to your machine technical manual and disconnect air intake piping at intake manifold (A).

2. Disconnect aneroid-to-intake manifold line (B).

3. Remove cap screws and remove intake manifold with coolant conditioner filter bracket (C).

4. Check intake manifold for damage. Scraper all gasket material from cylinder block and intake manifold.

5. Inspect machined mounting surfaces for burrs or other defects which might prevent gaskets from sealing properly. Repair or replace as required.

IMPORTANT: Make sure intake manifold is clean and debris-free before assembly.

6. To install intake manifold, reverse removal procedure and use new gaskets.

7. Tighten intake manifold cap screws to 75 N·m (55 lb-ft).

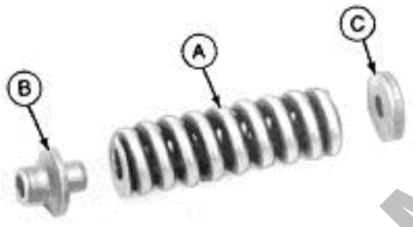
S55,3005,BH -19-14APR89

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FUEL INJECTION NOZZLE SPECIFICATIONS



RG3410 -UN-20DEC88

A new nozzle or a used nozzle with a new spring (A), shoudl open at approximately the following pressures. A used nozzle that has been rebuilt with a new spring and/or valve should be reset to the same pressures as a new nozzle. New nozzle opening pressures are:

New Nozzle Opening Pressures

6 x 0.285 mm . . . . . 29000—29800 kPa (290—298 bar) (4200—4300 psi)

On nozzles which have been in service, the spring (A) and spring seat (B) will have taken a normal set. In this case, a satisfactory opening pressure should be at least (but not more than the new opening pressure) as follows:

Used Nozzle Minimum Operating Pressures

6 x 0.285 mm . . . . . 26200 kPa (262 bar) (3800 psi)

Shims (C) are available for changing the opening pressure adjustment. Each 0.05 mm (0.002 in.) shim changes the opening pressure approximately 700 kPa (7 bar) (100 psi).

IMPORTANT: Always use John Deere nozzle adjusting shims which are specially hardened. Other shims will not be satisfactory.

If the opening pressure is not correct, disassemble the injection nozzle (as described later in this group) and change shims until nozzle opens at the proper used nozzle pressure given above. The difference in nozzle opening pressure in any one cylinder of the engine should not exceed 350 kPa (3.5 bar) (50 psi).

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(Refer to illustration on previous page)

As shown, oil is drawn up from the oil pan (a) through the oil pump (B). After leaving the oil pump, oil flows through the oil pressure relief valve housing (C) which discharges oil back into the sump when excessively high pressure oil (during cold starts) is sensed. The oil proceeds to the bypass valve housing (D) and then through the oil cooler (E). If high restriction is sensed at the bypass valve housing, the oil bypasses the oil cooler and goes directly towards the oil filter. If excessively high restriction is sensed across the primary (full-flow) oil filter (G), oil is diverted directly to the main oil gallery.

During normal operation, oil from the oil cooler or bypass valve housing goes up the outside vertical tube (F) and enter the full-flow oil filter, migrating from the outside of the filter element to the inside. Once the oil is filtered, it goes through the filter base (H) towards the inside vertical tube (J). A small portion of this already filtered oil is diverted to the bypass filter (I) for super cleaning and then to the oil pan sump. The majority of the filtered flow, however, is directed to the bypass valve housing and then on to the main oil gallery in the cylinder block. Engine oil pressure is sensed along this gallery by the oil pressure regulating valve (K) and excess flow is divierted back to the sump to maintain an acceptable oil pressure operating level.

Clean oil is pressure fed to the main and rod bearing, piston spray jets, camshaft bushings and up to the cylinder head from the oil gallery. Oil in the cylinder head is fed to the rocker arms valve train components.

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DIAGNOSING MECHANICAL FUEL SUPPLY PUMP MALFUNCTIONS

IMPORTANT: Visually inspect the fuel inlet fitting and pump filter for possible plugging before disassembling to determine cause of malfunction.

Symptom	Problem	Solution
Low Supply Pump Output Pressure or Pump Not Functioning Correctly	Restriction at fuel inlet fitting.	Thoroughly clean fuel tank, lines, filters, and inlet fitting.
	Worn or pitted valves caused by foreign material lodging in valve.	Replace valves as required.
	Missing or broken spring(s).	Replace spring(s).
	Broken spindle.	Replace pump.
	Out of fuel.	Add fuel to fuel tank.
	Fuel shut off at tank.	Open fuel shut off valve.
	Restricted fuel line.	Clean as required.
	Air leak in fuel line between pump and tank.	Repair as required.
	Loose or damaged fuel line connetions.	Repair.
	Worn or damaged valve assemblies.	Repair or replace.
	Broken valve spring(s)	Repair or replace.
Diesel Fuel Leaking Into Injection Pump Crankcase	Worn spindle and/or pump housing.	Replace pump.
	Defective O-ring seal.	Replace O-ring seal.

RG,CTM61,115,32-19-13MAY93

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