Series 400 6076 Diesel Engines Serial Number (500000-)

JOHN DEERE

COMPONENT TECHNICAL MANUAL

Series 400 6076 Diesel Engines Serial Number (500000-)

CTM42 (24MAR95) English

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Deere Power Systems Group
CTM42 (24MAR95)

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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).



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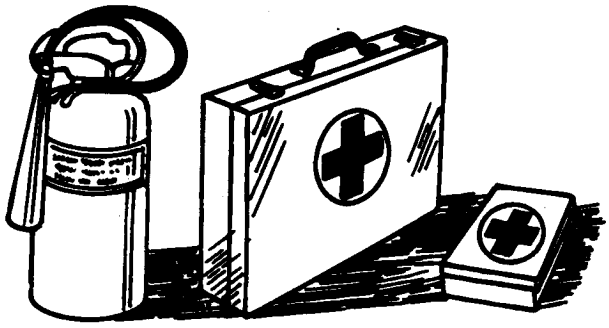
DX,SPARKS -19-03MAR93

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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ENGINE APPLICATION CHART

John Deere Agricultural Equipment Applications

Machine Model No.	Engine Model
COMBINES—HARVESTER WORKS	
CTS Rice Combine*	6076HH030
2056	6076AZ031
2058	6076AZ030
2064	6076AZ030
2066	6076HZ031
9500*	6076HH031, 6076HH032
9600*	6076HH030, 6076HH031
COMBINES—ZWEIBRUCKEN	
2056 Hillmaster	6076AZ031
2058 Hillmaster	6076AZ030
2064 Hillmaster	6076AZ030
2066 Hillmaster	6076HZ031
FORAGE HARVESTERS—ZWEIBRUCKEN	
6610	6076HZ030
COTTON PICKER—DES MOINES	
9960**	6076AN030
9965	6067AN031
TRACTORS—WATERLOO	
7700	6076TRW31
7800	6076TRW30
8100	6076HRW33
8200	6076HRW34
8300	6076HRW35
8560 4-Wheel Drive***	6076HRW30
8570 4-Wheel Drive	6076HRW32

** Beginning with combine serial number (645000—)*

*** Above P.I.N. 4001*

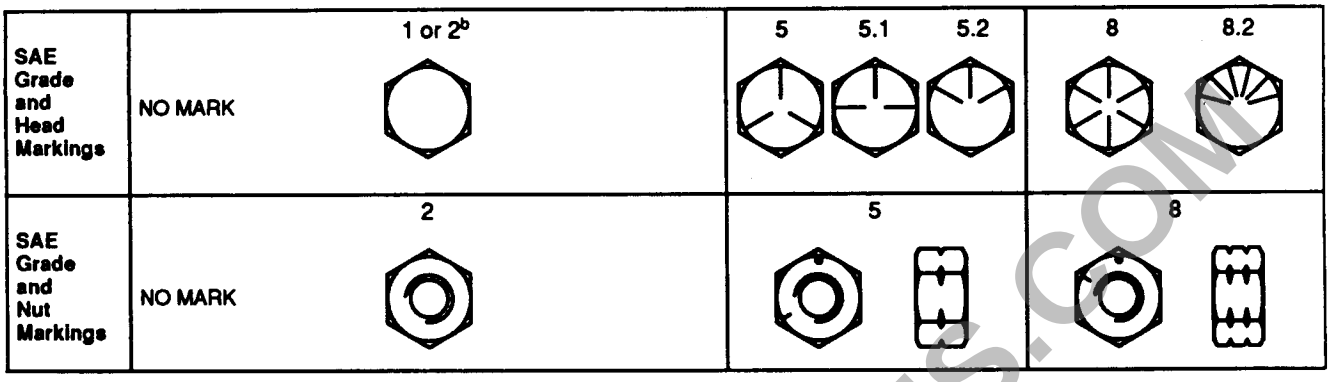
**** Beginning with tractor serial number (5000—)*

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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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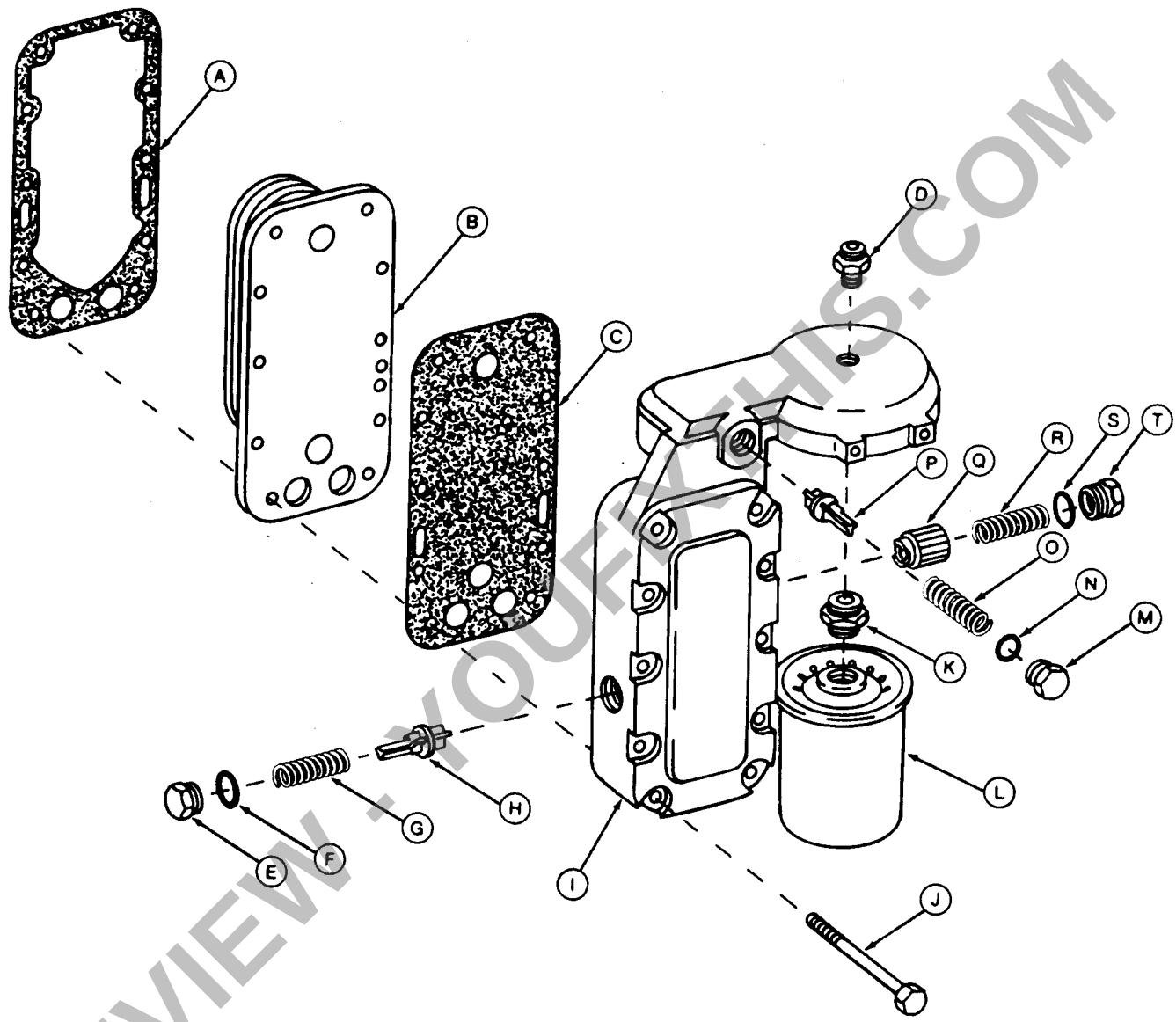
CYLINDER HEAD AND VALVES SPECIFICATIONS

ITEM	SPECIFICATION	WEAR LIMIT
Valve Lift at 0.00 mm (in.) Clearance		
Intake	13.53—13.71 mm (0.533—0.540 in.)	12.65 mm (0.498 in.)
Exhaust	14.52—14.70 mm (0.572—0.579 in.)	13.64 mm (0.537 in.)
Valve Clearance With Engine Cold (Rocker Arm-to-Valve Tip):		
Intake	0.331—0.431 mm (0.013—0.017 in.)	——
Exhaust	0.457—0.559 mm (0.018—0.022 in.)	——
Valve Spring Compressed Height:		
Valve Closed-Intake	52.5 mm @ 345—399 N (2.07 in. @ 78—90 lb-force)	——
Exhaust	54.5 mm @ 284—338 N (2.15 in. @ 64—76 lb-force)	——
Valve Open-Intake	38.1 mm @ 810—880 N (1.50 in. @ 182—198 lb-force)	——
Exhaust	38.5 mm @ 797—867 N (1.52 in. @ 179—195 lb-force)	——
Valve Head OD:		
Intake	50.87—51.13 mm (2.003—2.013 in.)	——
Exhaust	46.87—47.13 mm (1.845—1.856 in.)	——
Valve Stem OD:		
Exhaust	9.44—9.46 mm (0.3717—0.3724 in.)	——
Intake	9.46—9.49 mm (0.3724—0.3736 in.)	——
Oversize Valve (Stem) Available	0.08, 0.38, 0.76 mm (0.003, 0.015, 0.030 in.)	——
Valve Guide ID	9.51—9.54 mm (0.3745—0.3755 in.)	——
Valve Stem-to-Guide Clearance:		
Exhaust	0.051—0.102 mm (0.002—0.004 in.)	——
Intake	0.025—0.076 mm (0.001—0.003 in.)	——
Valve Face Angle	29.25° ±0.25°	——
Valve Seat Angle	30° ±0.50°	——
Valve Seat Width:		
Exhaust	2.0—3.8 mm (0.79—0.150 in.)	——
Intake	1.4—3.8 mm (0.055—0.150 in.)	——
Valve Seat Concentricity with Guide	0.051 mm (0.0020 in.)	——
Valve Recess in Cylinder Head:		
Intake	3.35—3.86 mm (0.132—0.152 in.)	4.62 mm (0.182 in.)
Exhaust	1.19—1.70 mm (0.047—0.067 in.)	2.46 mm (0.097 in.)
Maximum Valve Seat Runout	0.051 mm (0.0020 in.)	——
Maximum Valve Face Runout	0.051 mm (0.0020 in.)	——

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OIL FILTER AND OIL CONDITIONING HOUSING ASSEMBLY



A—Gasket
B—Oil Cooler
C—Gasket
D—Fitting
E—Plug
F—O-Ring
G—Spring
H—Oil Cooler Bypass Valve
I—Oil Conditioning Housing
J—Cap Screw (10 Used)
K—Adapter
L—Oil Filter
M—Plug
N—O-Ring
O—Spring
P—Oil FIlter Bypass Valve
Q—Oil Pressure Regulating Valve
R—Spring
S—O-Ring
T—Plug

RG,CTM42,G20,5 -19-09OCT92

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TURBOCHARGER FAILURE ANALYSIS

The following is a guide for diagnosing the cause of turbocharger failures after removal from the engine.

COMPRESSOR HOUSING INLET DEFECTS

Problem	Possible Cause	Suggested Remedy
Foreign Object Damage	Objects left in intake system.	Disassemble and inspect intake system for foreign objects (this group).
		Inspect engine for internal damage.
	Leaking and/or defective intake system.	Inspect air intake system connections including air filter; repair as required (this group).
		Inspect air intake related engine components.
Compressor Wheel Rub	Bearing failure.	Determine if engine and/or operator contributed to lack of lubrication, contaminated lubrication, excessive temperature, or debris generating engine failure in progress. Correct as required.
	Manufacturing defects.	Correct as required.

COMPRESSOR HOUSING OUTLET DEFECTS

Oil and/or Dirt in Housing	Restricted air intake system.	Inspect and clean air cleaner.
	Prolonged periods of low RPM engine idling.	Check with operator to confirm conditions. (See Operators manual.)
	Defective oil seal ring.	Repair as required. (This group.)
	Restricted oil drain line.	Inspect and clear oil drain line as required.

TURBINE HOUSING INLET DEFECTS

Oil in Housing	Internal engine failure.	Inspect and repair engine as required.
	Oil leaking from compressor housing seal.	Verify that oil is in compressor housing and refer to “Compressor Housing Outlet Defects” as listed earlier in this chart.
Center Wall Deteriorated	Excessive operating temperature.	Check for restricted air intake.
		Check engine for overfueling.
		Check injection pump timing.

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6076 ENGINE DISASSEMBLY SEQUENCE

The following sequence is suggested when complete disassembly for overhaul is required. Refer to the appropriate repair group when removing individual engine components.

NOTE: Remove starting motor before mounting engine into repair stand.

1. Drain all coolant and engine oil. Check engine oil for metal contaminates.

2. Remove turbocharger oil inlet line.

3. Remove breather hose.

4. Remove fan pulley and water manifold assembly.

5. Remove turbocharger exhaust elbow and connector. Remove turbocharger.

NOTE: DO NOT damage option code label (if equipped), when removing rocker arm cover.

6. Remove rocker arm cover.

7. Remove rocker arm assembly and push rods. Identify parts for re-assembly.

8. Remove alternator and mounting brackets.

9. Remove front crankshaft pulley and damper assembly.

10. Remove fuel injection lines and injection nozzles.

11. Remove water pump.

12. Remove engine oil filter and oil conditioning housing.

13. Remove injection pump gear cover and remove injection pump. Remove fuel filter and mounting base.

14. On 6076A Engines, remove aftercooler cover and aftercooler assembly.

15. Remove exhaust manifold and air intake manifold.

16. Remove turbocharger oil return line.

17. Remove cylinder head with valve assembly. Remove head gasket.

18. On SAE No. 3 flywheel housings, remove flywheel then remove flywheel housing.

19. On SAE No. 1 and 2 flywheel housings, remove flywheel housing and then remove flywheel.

20. Roll engine over and remove oil pan and engine oil pump assembly.

21. Remove front timing gear cover.

22. Rotate engine to vertical position. Remove pistons and connecting rods. Identify for re-assembly. Perform wear checks with PLASTIGAGE™.

NOTE: Perform wear check on main bearing surfaces with PLASTIGAGE, when removing main bearing caps.

23. Remove main bearing caps. Remove crankshaft and main bearings. Identify for re-assembly.

24. Remove camshaft and cam followers. Identify for re-assembly.

25. Rotate engine and remove liners and their O-ring seals. Mark liners for reassembly in same bore from which removed.

26. Remove piston cooling orifices.

27. Remove cylinder block plugs and engine serial number plate, if block is to be put in a “hot tank”.

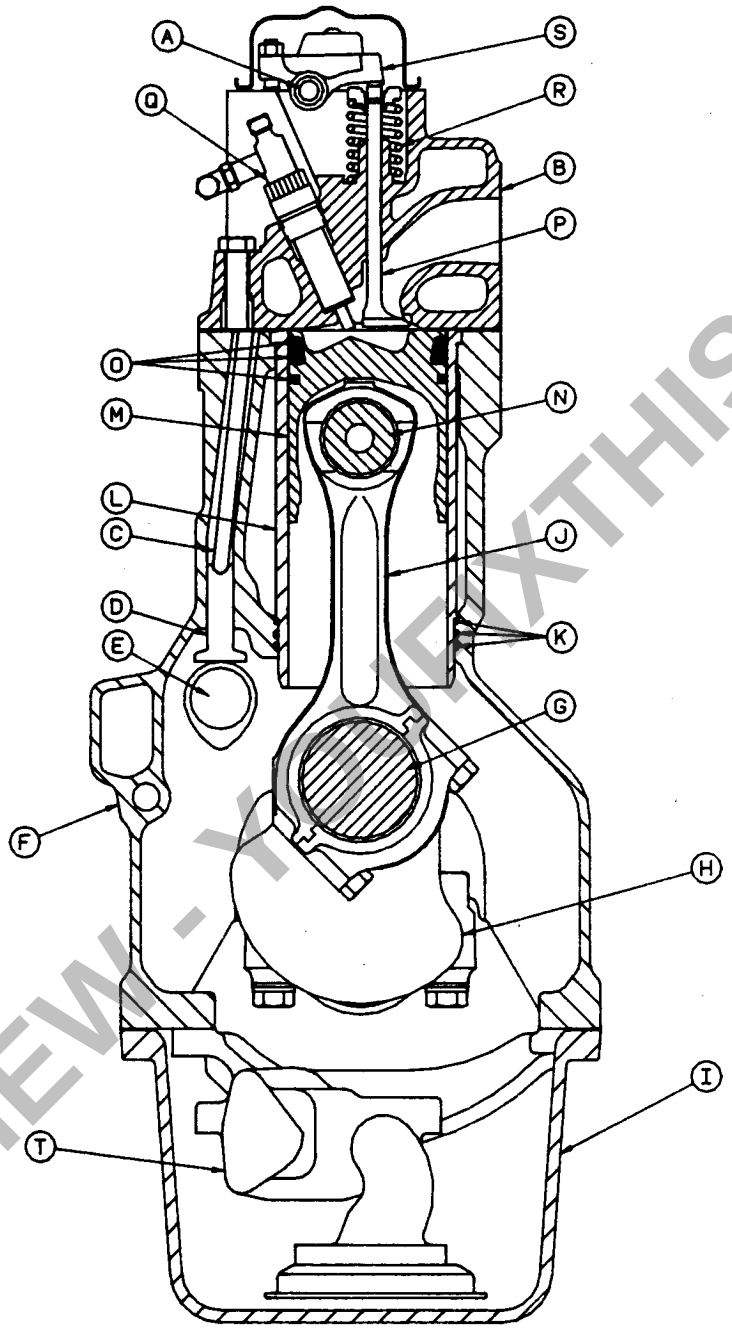
28. Refer to appropriate group for inspection and repair of engine components.

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ENGINE—SECTIONAL VIEW



A—Rocker Arm Shaft
B—Cylinder Head
C—Push Rod
D—Cam Follower
E—Camshaft
F—Cylinder Block
G—Crankshaft
H—Crankshaft Counterweight
I—Oil Pan
J—Connecting Rod
K—Liner Packing Rings
L—Cylinder Liner
M—Piston
N—Piston Pin
O—Piston Rings
P—Valve
Q—Fuel Injection Nozzle
R—Valve spring
S—Rocker Arm
T—Oil Pump

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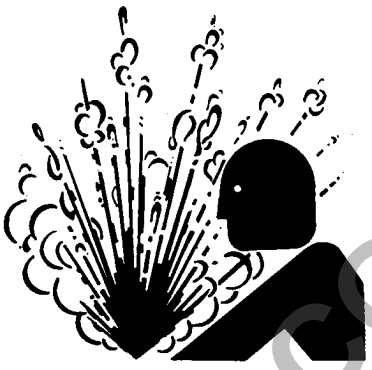
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REMOVE CYLINDER HEAD

It is not necessary to remove engine from machine to service cylinder head on all applications. Refer to your Machine Technical Manual for engine removal procedure, if required.


-UN-23AUG88
TS281

CAUTION: After operating engine, allow exhaust system to cool before removal.

DO NOT drain coolant until the coolant is below operating temperature. Always loosen drain valve slowly to relieve any excess pressure.

Remove rocker arm cover, if not previously done.

1. Drain all engine oil and coolant. Disconnect turbocharger oil inlet line at turbocharger or oil conditioning housing. (See DISCONNECT TURBOCHARGER OIL INLET LINE in Group 03.)

2. Remove water manifold (A) and all coolant piping. (See Cooling System, Group 25.)

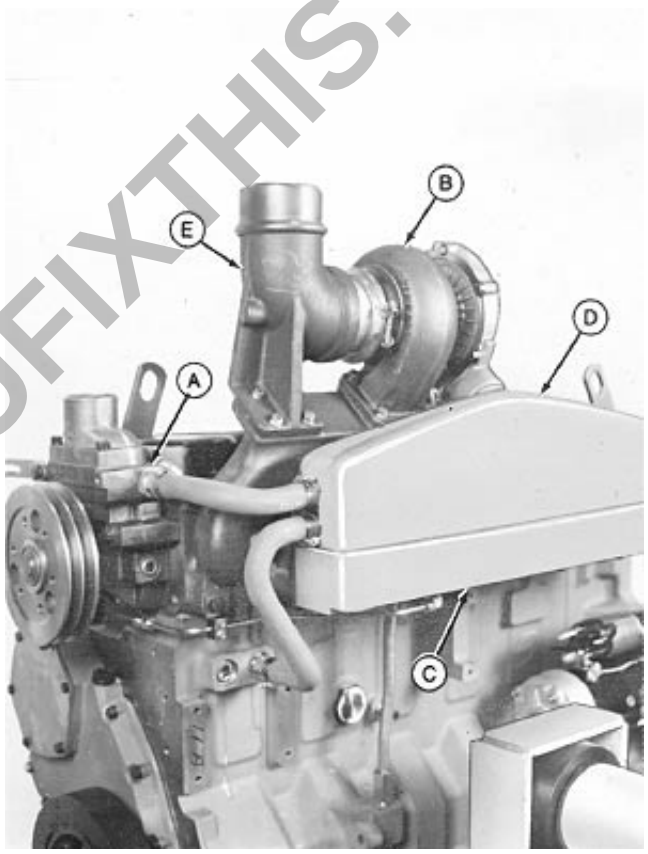
3. Remove turbocharger (B) and exhaust elbow (E). (See Air Intake and Exhaust System, Group 30.)

4. On 6076A Engines, remove aftercooler assembly (D).

NOTE: Remove exhaust manifold before removing intake manifold on 6076HRW33, 34, and 35 engines.

5. Remove air intake manifold (C). (Group 30.)

6. Remove exhaust manifold. (Group 30.)



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RG5792

A—Water Manifold
B—Turbocharger
C—Intake Manifold
D—Aftercooler Assembly
E—Exhaust Elbow

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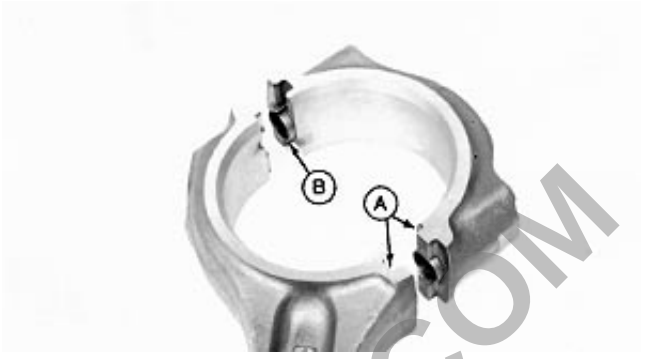
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INSPECT CONNECTING ROD AND CAP

1. Inspect rod and cap for wear or damage, such as chips or cracks in the area of the tongue-and-groove joints (A).

2. Inspect in and around cap screw holes (B) in cap. If any defects are found, replace rod and cap.



S11,0402,AE -19-08MAR94

3. Carefully clamp rod in a soft-jawed vise (cap end upward).

4. Install cap WITHOUT bearing inserts.

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

5. Initially tighten blind hole cap screw to 27 N·m (20 lb-ft), then tighten open hole cap screw to same torque.

6. Tighten cap screws to 75 N·m (55 lb-ft), then tighten each cap screw an additional 90˚—100˚. (See TORQUE-TURN CONNECTING ROD CAP SCREWS, later in this group.)



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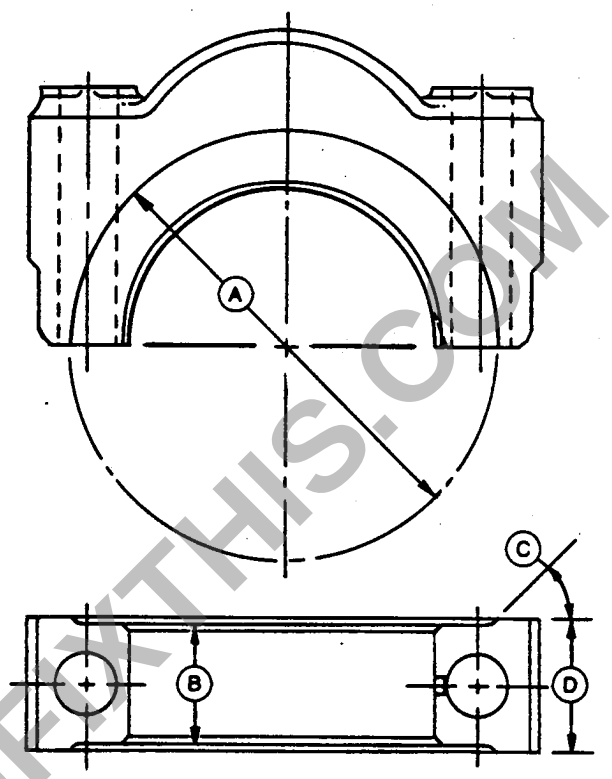
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THRUST BEARING NEW PART SPECIFICATIONS

IMPORTANT: Install thrust bearing in cylinder block and tighten to specification before regrinding or polishing thrust surfaces to assure that all surface on bearing and on block web are correctly aligned.

THRUST BEARING NEW PART SPECIFICATION

Thrust Washer Clearance Base Circle Diameter	123.70—125.30 mm (4.87—4.93 in.)
Thrust Surface Thickness	37.44—37.54 mm (1.474—1.478 in.)
Relief Angle	45°
Bearing Overall Width	39.16—39.66 mm (1.542—1.561 in.)
Maximum Thrust Surface Runout	0.025 mm (0.0010 in.)



RG5269 -UN-14DEC88

A—Thrust Washer Clearance Base Circle Diameter
B—Thrust Surface Thickness
C—Relief Angle
D—Bearing Overall Width

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36

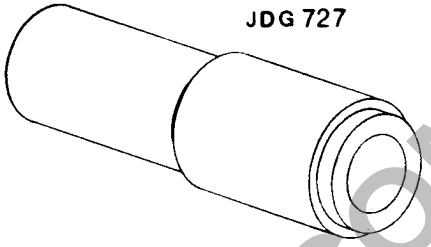
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Bearing Driver JDG727

Used to remove and install water pump bearing assembly in water pump housing. Installs new bearing to the correct depth.



RG5963 -UN-03SEP91

RG,CTM42,G25,35-19-10SEP91

OTHER MATERIAL

Name	Use
LOCTITE 518 (TY6304) Flexible Sealant	Water pump, thermostat cover and water manifold gaskets.
LOCTITE 242 (TY9370) Thread Lock and Sealer	Water outlet manifold-to-cylinder head cap screws.
LOCTITE 592 (TY9375) Pipe Sealant with TEFLON	Water pump and block drain valves.
High Temperature Grease (TY6333 or TY6347)	Pack bearings in fan drive.

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2

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RG5951 -UN-30AUG91

A—Gland Nut O-Ring
B—Gland Nut
C—Nozzle Holder
D—Shim
E—Nozzle Valve Spring
F—Spring Seat
G—Intermediate Plate
H—Nozzle Valve
I—Nozzle
J—Nozzle Retaining Nut

Nippondenso Nozzle (Bosch Similar)

6. Install nozzle assembly on nozzle holder (C) and secure with nozzle retaining nut (J).

7. Clamp nozzle holder in a soft-jawed vise. Tighten nozzle retaining nut (12) to 60—79 N·m (44—58 lb-ft).

8. Install leak-off connector on nozzle holder (C), using a new O-ring.

NOTE: Leak-off connector and O-ring should be installed on nozzle holder even though they will have to be removed to install injection nozzle in cylinder head. This will prevent misplacement of connector and O-ring before installation on engine.

RG,CTM42,G35,60-19-03OCT92

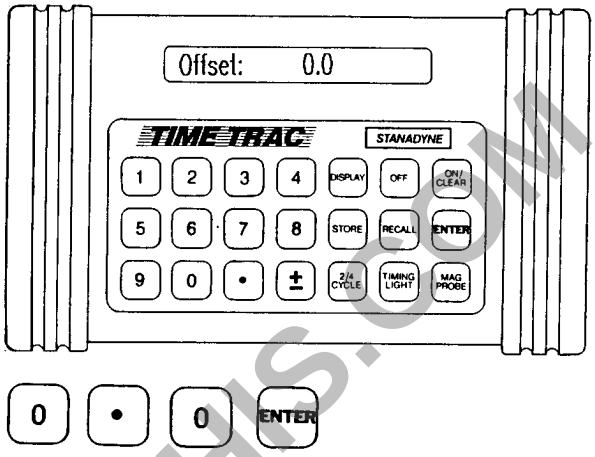
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Display shows: Offset: 20.0˚

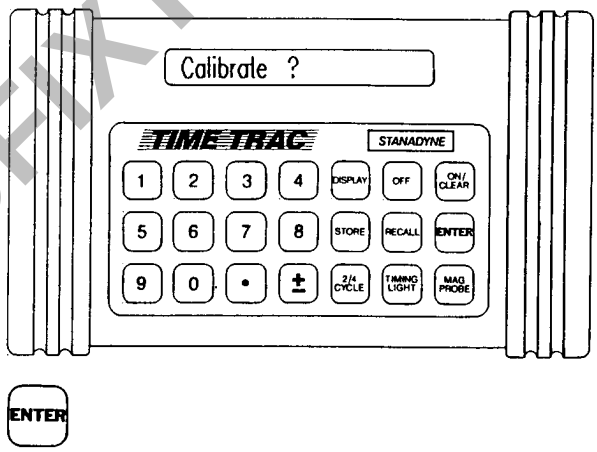
4. Change to offset 0˚ and push ENTER.



-UN-27SEP94
RG7033

Display shows: Calibrate?

5. Start engine and push ENTER.



-UN-06OCT94
RG7129

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