Caterpillar

Service Manual

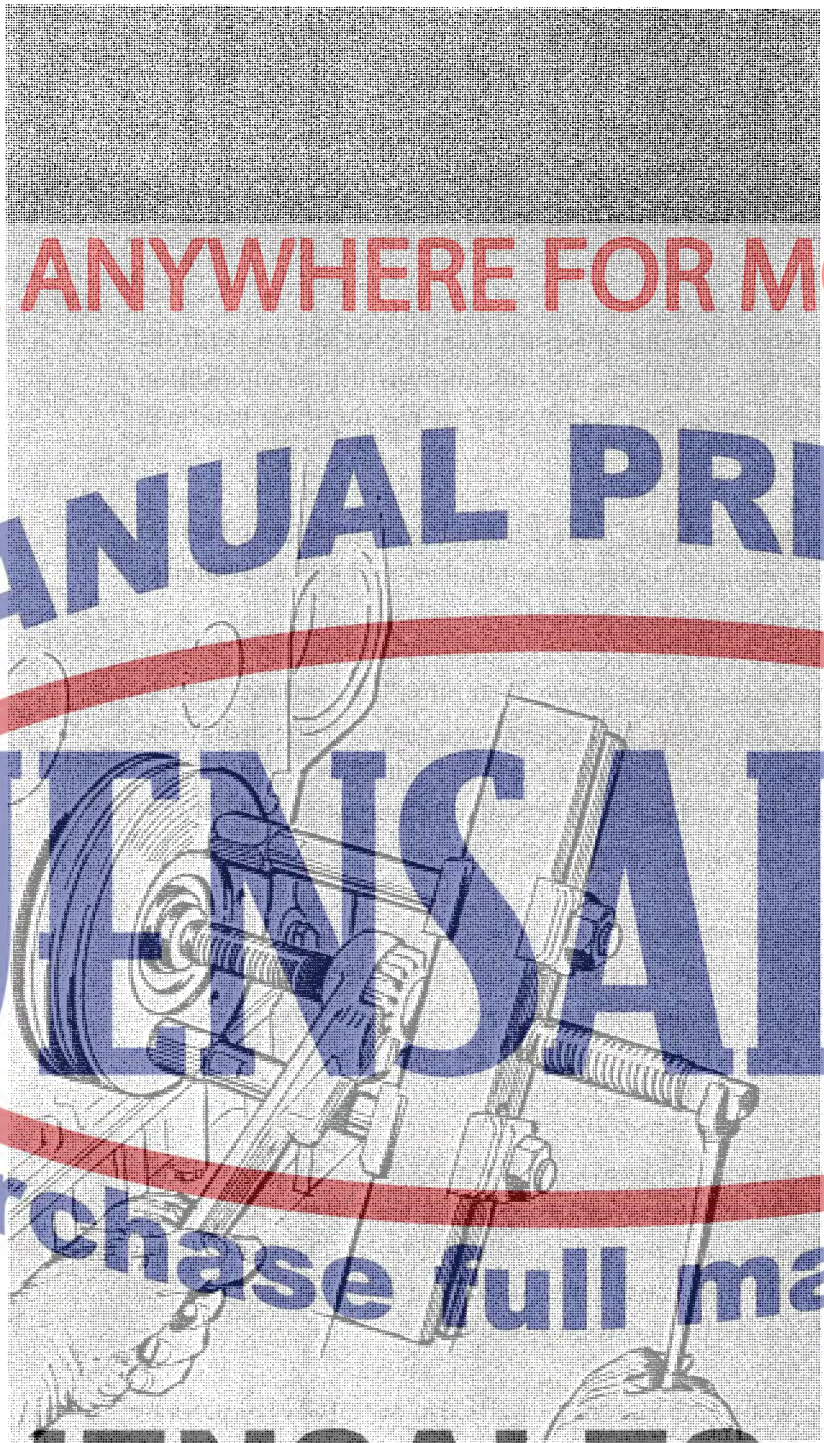
3208 Engine

S/n 75V1 & 90N1

Service® Manual

CT-S-ENG 3208

FORM NO. SENR7105
FOR USE IN SERVICE MANUALS:
3208 ENGINE, REG01658
V160 THRU V300 LIFT
TRUCKS, REG01275



DISASSEMBLY AND ASSEMBLY

3208 INDUSTRIAL & MARINE ENGINES

SERIAL NUMBERS
75V1-UP
90N1-UP

This publication has instructions and procedures for the subject on the front cover. The information, specifications, and illustrations in this publication are on the basis of information that was current at the time this issue was written.

Correct operation, maintenance, test and repair procedures will give this product a long service life. Before starting a test, repair or rebuild job, the serviceman must read the respective sections of the Service Manual, and know all the components he will work on.

Your safety, and the safety of others, is at all times very important. When you see this symbol or this symbol ⚠ in the manual, you must know that caution is needed for the procedure next to it. The symbols are warnings. To work safely, you must understand the job you do. Read all instructions to know what is safe and what is not safe.

It is very important to know the weight of parts. Do not lift heavy parts by hand. Use a hoist. Make sure heavy parts have a good stability on the ground. A sudden fall can cause an accident. When lifting part of a machine, make sure the machine has blocks at front and rear. Never let the machine hang on a hoist, put blocks or stands under the weight.

When using a hoist, follow the recommendation in the manual. Use correct lift tools as shown in illustrations to get the correct balance of the component you lift. This makes your work safer at all times.

SYSTEMS OPERATION

Air Inlet and Exhaust System (Marine Engines With Turbocharger) 19
Turbocharger 20
Air Inlet and Exhaust System 16

Basic Block 34
Crankshaft 34
Cylinder Block 34
Cylinder Head 34
Pistons, Rings and Connecting Rods 34
Vibration Damper 34

Cooling System (Industrial Engines) 27
Cooling System (Marine Engines Without Turbocharger) 30
Cooling System (Marine Engines With Turbocharger) 32
Cylinder Head and Valves (75V1-75V1446, 90N1-90N6120) 21
Cylinder Head and Valves (75V1447-Up, 90N6121-Up) 22

Electrical System 35
Alternator 35
Circuit Breaker 36
Regulator 35
Solenoid 36

Starting Motor 35
Wiring Diagrams 37, 38

Fuel System (75V1-Up, 90N6121-Up) 10
Automatic Timing Advance Unit 14
Constant Bleed Valve 13
Flow of Fuel Using the Priming Pump 13
Fuel Temperature Compensated Torque Control Group 13
Function of Fuel Junction Block 15
Operation of 9L6969 & 9N3979 Fuel Injection Nozzle 14
Operation of Fuel Injection Pumps 13
Water Separator 16

Fuel System (90N1-90N6120) 4
Automatic Timing Advance Unit 8
Constant Bleed Valve 6
Flow of Fuel Using the Priming Pump 6
Function of Fuel Junction Block 7
Operation of 9L7883 Fuel Injection Nozzle 7
Operation of Fuel Injection Pumps 6

Lubrication System (Engines With Oil Filter Bypass Valve in Oil Filter) 23
Lubrication System (Engines With Oil Filter Bypass Valve in Oil Cooler Base) 25

TESTING AND ADJUSTING

For INDEX see page 39.

SPECIFICATIONS

NOTE: For Specifications with illustrations, make reference to SPECIFICATIONS FOR 3208 INDUSTRIAL & MARINE ENGINES Form No. REG01684. If the Specifications in Form No. REG01684 are not the same as in the Systems Operation and the Testing and Adjusting, look at the printing date on the back cover of each book. Use the Specifications given in the book with the latest date.

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The "Alphabetical and Service Index" is a list of all components and service operations found in this manual. It gives page numbers and also an operation number for each component.

All operations in the column "Component Operation" are removal and installation instructions, unless other descriptions are given for the operations. The numbers under the column "Operation" are numbers given to each operation for use under the column "Other Needed Operations" which gives all other component operations by number that are necessary to do the respective job.

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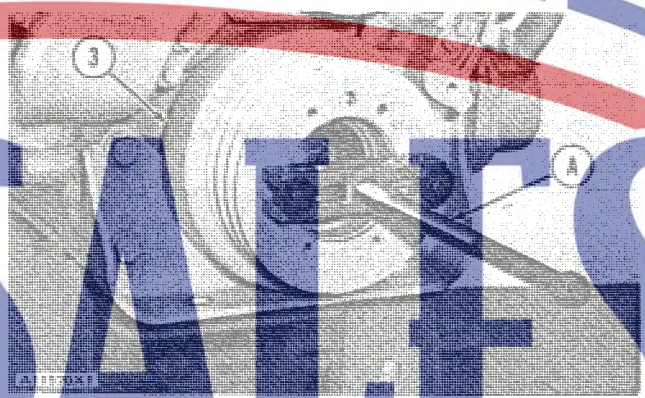
CRANKSHAFT PULLEY

REMOVE CRANKSHAFT PULLEY (INDUSTRIAL ENGINE) 11–1205

Tools Needed		A
5F7465	Puller Assembly	1
8B7560	Step Plate	1
5M2894	Washer	1
S1590	Bolt	1

1. Remove alternator belts.

2. Remove bolt (1) and washer (2).



3. Install tooling (A) on crankshaft pulley (3) and remove the crankshaft pulley.

INSTALL CRANKSHAFT PULLEY (INDUSTRIAL ENGINE) 12–1205

Tools Needed		A
1F7464	Bolt 1"–14 NF x 4" long	1

1. Put clean engine oil on the lip of the front crankshaft seal and sealing surface of the crankshaft pulley.

2. Put crankshaft pulley (1) in position on end of crankshaft.

3. Install a standard washer and tool (A) in pulley and tighten bolt until the pulley makes contact with the crankshaft gear. Remove tool (A) and the standard washer.

4. Install the original washer and bolt in the end of the crankshaft. Tighten the bolt to a torque of 460 ± 60 lb. ft. (63.6 ± 8.3 mkg).

5. Install the alternator belts. Make an adjustment to the belt tension. See FAN AND ALTERNATOR BELTS in LUBRICATION AND MAINTENANCE GUIDE.

CAMSHAFT AND GEARS

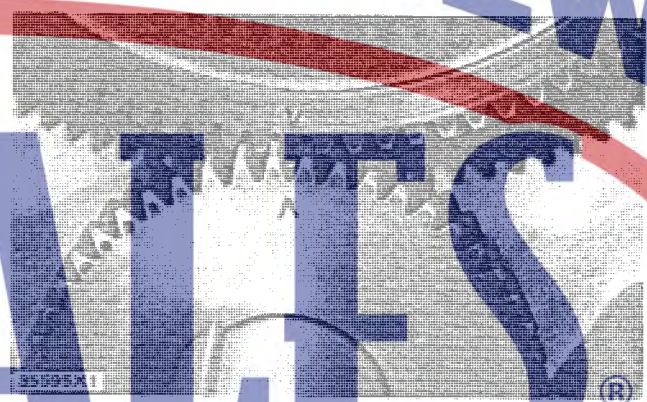
INSTALL CAMSHAFT AND GEARS

12—1210 & 1212

Tools Needed		A
3P1544	Timing Pin	1

1. Put clean engine oil on the camshaft lobes and journals. Install camshaft (1) and the gears as a unit. Make sure the timing marks on the crankshaft gear and camshaft gear are in alignment.

2. Install the thrust pin. Tighten the pin to a torque of 35 ± 5 lb.ft. (4.8 ± 0.7 mkg).



3. Put gear (3) in position and install tachometer drive adapter shaft (2). Tighten the shaft to a torque of 80 ± 5 lb. ft. (11.1 ± 0.7 mkg).

NOTE: See Step 2 and NOTE on Pages 13 and 16 for earlier and later tachometer drive shaft torques.

4. After valve lifters and timing gear cover have been installed, check the timing as follows:

a) Remove timing pin (A).

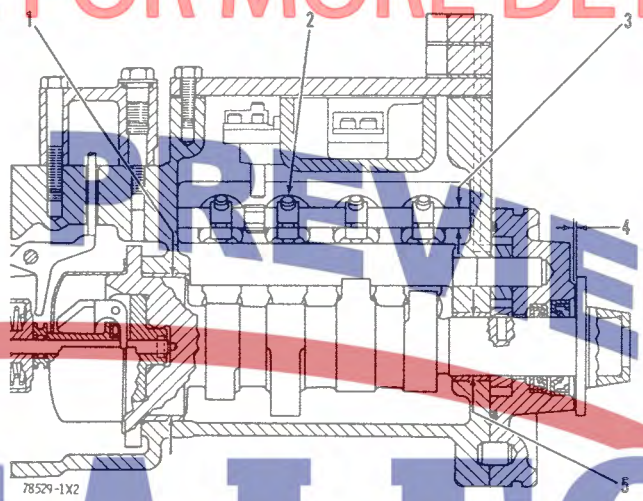
b) Turn the crankshaft clockwise as seen from the front of the engine approximately 1/2 turn. Install timing pin (A) again.

c) While turning the crankshaft clockwise, push on timing pin (A) until it slides into the groove (slot) in the fuel injection pump camshaft.

d) Remove the plug from the timing hole in the front cover and install a 5/16"—18 NC bolt (4) 2 1/2 in. long. The cover bolt from hole (5) can be used. Turn the crankshaft clockwise until bolt (4) can be installed into the timing gear and is in the center of the timing hole. The camshaft for the fuel injection pump is now in correct time with the engine.

e) Remove the bolt and install the plug. Remove timing pin (A) and install the plug.

FUEL INJECTION PUMP



Firing order (injection sequence) 1, 2, 7, 3, 4, 5, 6, 8

Injection timing before TC (top center) . . . . . 16°

Torque for the nuts that hold the fuel lines (Use 5P144 Fuel Line Socket) . . . . . 30 ± 5 lb. ft. (4.1 ± 0.7 mkg)

4N605 Spring for bypass valve:

Length under test force . . . . . 1.231 in. (31.27 mm)

Test force . . . . . 1.41 ± 0.14 lb. (0.639 ± 0.006 kg)

Free length after test . . . . . 1.504 in. (38.21 mm)

Outside diameter . . . . . .531 in. (13.49 mm)

(1) Bore in the rear bearing for the camshaft (new) . . . . . 2.3750 ± .0005 in. (60.325 ± 0.013 mm)

Diameter of rear bearing surface (journal) of the camshaft (new) . . . . . 2.3720 ± .0005 in. (60.249 ± 0.013 mm)

Maximum permissible clearance between the bearing and the camshaft bearing surface (journal) (worn) . . . . . .006 in. (0.15 mm)

(2) Torque for screws that hold sleeve control levers . . . . . 24 ± 2 lb. in. (27.7 ± 2.3 cm.kg)

(3) Bore in the housing for the fuel control shaft (new) . . . . . .3543 ± .0005 in. (8.999 ± 0.013 mm)

Diameter of sleeve control shaft (new) . . . . . .3530 ± .0003 in. (8.966 ± 0.008 mm)

Maximum permissible clearance between the bore in the housing and the sleeve control shaft (worn) . . . . . .003 in. (0.07 mm)

(4) End play for camshaft with sleeve installed (new) . . . . . .023 ± .018 in. (0.58 ± 0.46 mm)

NOTE: When installing sleeve on end of camshaft, support the camshaft to prevent damage to parts inside of injection pump and governor housing.

(5) Bore in the front bearing for the camshaft (new) . . . . . 1.0005 ± .0005 in. (25.413 ± 0.013 mm)

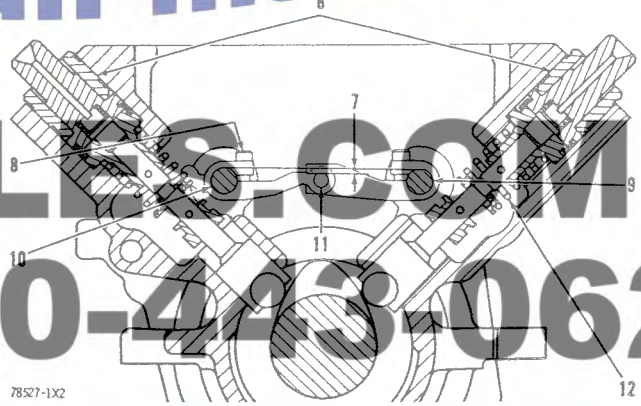
Diameter of front bearing surface (journal) of the camshaft (new) . . . . . .9990 ± .0005 in. (25.375 ± 0.013 mm)

Maximum permissible clearance between the bearing and the camshaft bearing surface (journal) (worn) . . . . . .004 in. (0.10 mm)

(6) Torque for bushing . . . . . 70 ± 5 lb. ft. (9.7 ± 0.7 mkg)

(7) Distance from top of pin (11) to top of shafts (9 and 10) with 3P1546 Calibration Pin installed . . . . . .0828 in. (2.103 mm)

(8) Torque for screws that hold crossover levers . . . . . 24 ± 2 lb. in. (27.7 ± 2.3 cm.kg)



(12) 4N4318 Spring for injection pump:

Length under test force . . . . . 1.348 in. (34.24 mm)

Test force . . . . . 12.5 ± 1.3 lb. (5.67 ± 0.58 kg)

Free length after test . . . . . 1.566 in. (39.78 mm)

Outside diameter . . . . . .728 ± .010 in. (18.49 ± 0.25 mm)

NOTE: FOR TORQUE VALUES NOT GIVEN, SEE THE FIRST PAGE OF SPECIFICATIONS FOR GENERAL TIGHTENING TORQUES

MANIFOLD AND VENTILATION VALVE
(Industrial Engines)

Put 8H5137 Form A Gasket on threads of adapter and plug.

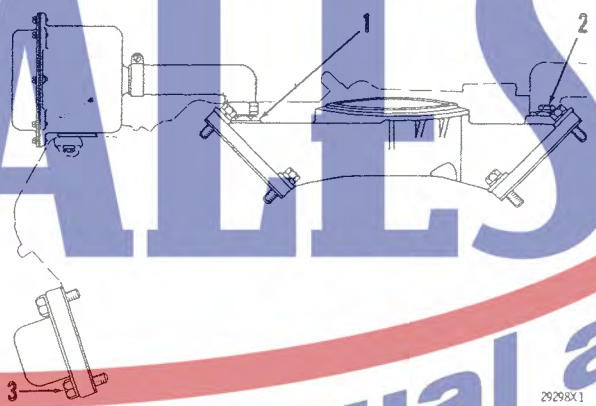
(1) Torque for adapter ..... 108 ± 36 lb. in. (125 ± 44 cm.kg)

(2) Torque for plug ..... 108 ± 36 lb. in. (125 ± 44 cm.kg)

(3) Torque for bolts holding the exhaust manifold ..... 32 ± 5 lb. ft. (4.4 ± 0.7 mkg)

Locks must be bent on a flat side of the bolt head. Bolts must be turned no more than 30° of a turn for the alignment of locks with a flat side of the bolt head.

MANIFOLD AND VENTILATION VALVE
(Marine Engines)



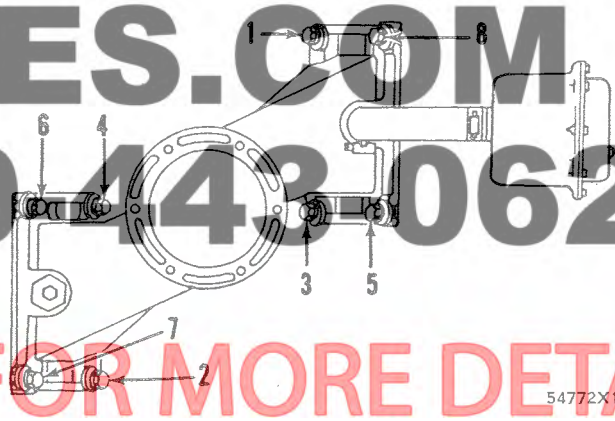
Put 8H5137 Form A Gasket on threads of adapter and plug.

(1) Torque for adapter ..... 108 ± 36 lb. in. (125 ± 44 cm.kg)

(2) Torque for plug ..... 108 ± 36 lb. in. (125 ± 44 cm.kg)

(3) Torque for bolts holding the exhaust manifold ..... 32 ± 5 lb. ft. (4.4 ± 0.7 mkg)

AIR INLET MANIFOLD



Tighten bolts (3) and (4) to ..... 15 ± 5 lb. ft. (2.0 ± 0.7 mkg)

Tighten all bolts in number sequence to ..... 32 ± 5 lb. ft. (4.4 ± 0.7 mkg)