



*Caterpillar*

Service Manual

**3406 Diesel**

**Engine**

**S/n 70V1 & Up**

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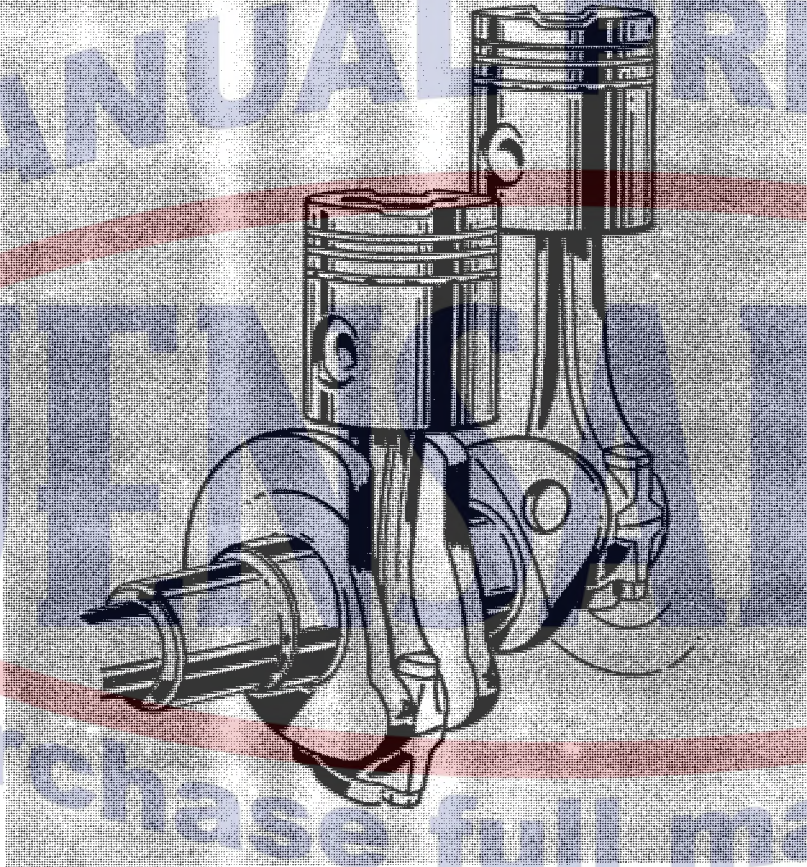
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**CT-S-ENG340670**

**Service Manual**



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SERVICE MANUAL

**3406**

**VEHICLE ENGINE**

SERIAL NUMBERS

70V1-UP

CLICK ANYWHERE FOR MORE DETAILS



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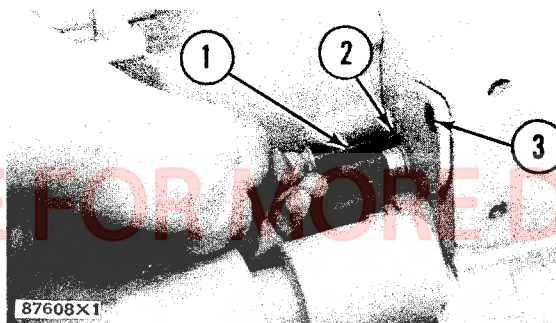
## SPECIFICATIONS

NOTE: For Specifications with illustrations, make reference to ENGINE SPECIFICATIONS for 3406 VEHICLE ENGINE, Form No. REG01439. If the Specifications in Form REG01439 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.

## Fuel Injection Lines

Fuel from the fuel injection pumps is sent through the fuel injection lines to the fuel injection valves.

Each fuel injection line of an engine has a special design and must be installed in a certain location. When fuel injection lines are removed from an engine, put identification marks or tags on the fuel lines as they are removed, so they can be put in the correct location when they are installed.



### LOCATING TOP CENTER (LEFT SIDE OF ENGINE)

1. Timing bolt. 2. Timing bolt location. 3. Storage location.

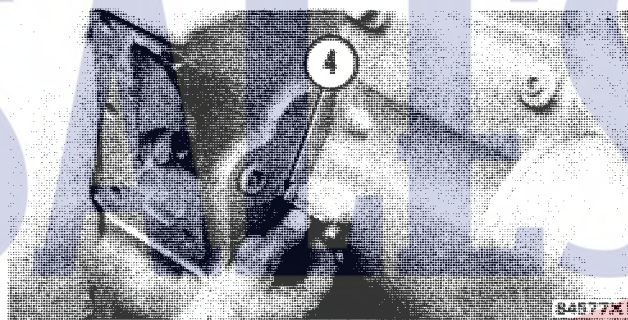
**NOTE:** There are two threaded holes in the flywheel. These holes are in alignment with the holes with plugs in the left and right front of the flywheel housing. The two holes in the flywheel are at a different distance from the center of the flywheel so the timing bolt cannot be put in the wrong hole.



### TIGHTENING THE NUT OF A FUEL INJECTION LINE

1. 5P144 Fuel Line Socket.

The nuts that hold a fuel injection line to an injection valve and injection pump must be kept tight. Use a torque wrench and the 5P144 Fuel Line Socket (1) to tighten the fuel line nuts to  $30 \pm 5$  lb.ft. ( $4.1 \pm 0.7$  mkg).



### LOCATING TOP CENTER (RIGHT SIDE OF ENGINE)

4. Timing bolt location.

**NOTE:** The engine is seen from the flywheel end when direction of crankshaft rotation is given.

To find top center compression stroke for No. 1 piston, first turn the flywheel clockwise (opposite the direction of engine rotation) approximately 30 degrees. The reason for making this step is to be sure the play is removed from the timing gears when the engine is put on top center.

Next, turn the flywheel counterclockwise until the hole in the flywheel is in alignment with the timing bolt. When the timing bolt can be turned freely in the threaded hole in the flywheel, the engine No. 1 piston is on top center.

To see if No. 1 piston is on the compression stroke, look at the valves of No. 1 cylinder. The valves will be closed if No. 1 cylinder is on the compression stroke. You should be able to move the rocker arms up and down with your hand.

## Fuel Bypass Valve

The fuel bypass valve controls fuel pressure to the fuel injection pump at full speed to a pressure of 30 psi ( $2.11$  kg/cm<sup>2</sup>).

## FINDING TOP CENTER COMPRESSION POSITION FOR NO. 1 PISTON

No. 1 piston at top center (TC) on the compression stroke is the starting point for all timing procedures.

The timing bolt (1) is kept in storage at location (3) and can be installed in either the left side of the engine at location (2) or in the right side of the engine at location (4).



## INTRODUCTION

The specifications given in this book are on the basis of information available at the time the book was written. These specifications give the torques, operating pressure, measurements of new parts, adjustments and other items that will affect the service of the product.

When the words "use again" are in the description, the specification given can be used to determine if a part can be used again. If the part is equal to or within the specification given, use the part again.

**NOTE:** The specifications given for "use again" and "permissible" are intended for guidance only and Caterpillar Tractor Co. hereby expressly denies and excludes any representation, warranty or implied warranty of the reuse of any component.

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When the word "permissible" is in the description, the specification given is the "maximum or minimum" tolerance permitted before adjustment, repair and/or new parts are needed.

A comparison can be made between the measurements of a worn part, and the specifications of a new part to find the amount of wear. A part that is worn can be safe to use if an estimate of the remainder of its service life is good. If a short service life is expected, replace the part.

## ENGINE DESIGN

Bore	5.4 in. (137.16 mm)
Stroke	6.5 in. (165.10 mm)
Number of Cylinders	6
Cylinder Arrangement	In Line

Firing Order (Injection Sequence)	1, 5, 3, 6, 2, 4
Direction of Rotation (As Seen From Flywheel End)	Counterclockwise
No.1 Cylinder Location	Front

**NOTE:** This engine uses bolts (3/8 inch size only) with washer heads in some locations. The washer head bolt does not need a plain washer, lockwasher or lockplate. Where these bolts are used on aluminum covers or housings, a plain washer is needed. If you are not sure a washer is used under a bolt head, use the Parts Book to see if a washer is needed.

**NOTE:** For Systems Operation and Testing and Adjusting, make reference to 3406 VEHICLE ENGINE, Form No. REG01438.

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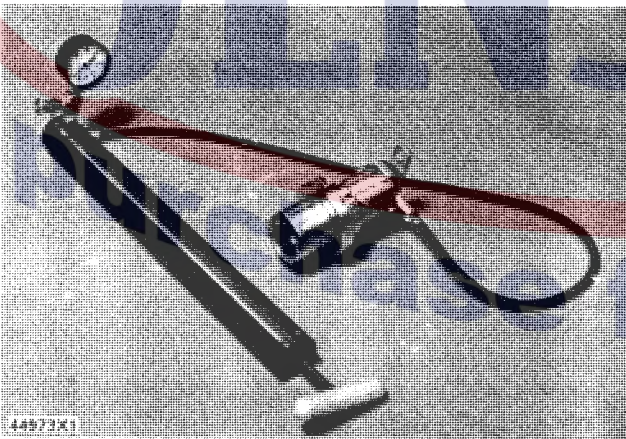
The 9S7373 Air Meter Group is used to check the air flow through the radiator core. The testing procedure is in Special Instruction (GMG00203).

The 1P5500 Portable Phototach Group is used to check the fan speed. The testing procedure is in Special Instruction (GMG00819).



**1P5500 PORTABLE PHOTOTACH GROUP**

The 9S8140 Cooling System Pressurizing Pump Group is used to test pressure caps and pressure relief valves, and to pressure check the cooling system for leaks.



**9S8140 COOLING SYSTEM PRESSURIZING PUMP GROUP**

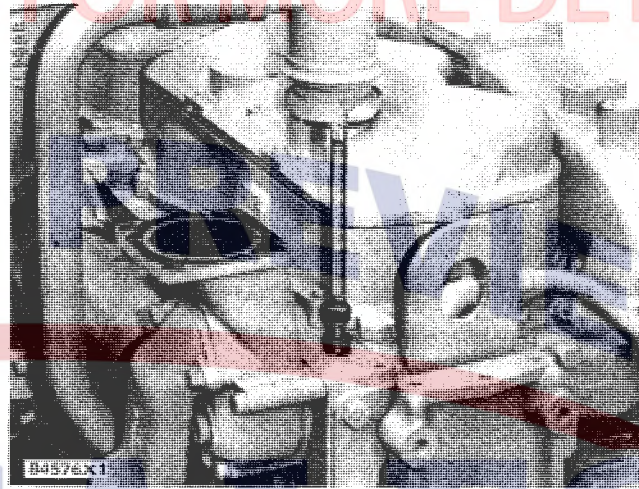
#### Gauge for Water Temperature

**Tools Needed:** 9S9102 Thermistor Thermometer Group.  
or  
2F7112 Thermometer and 6B5072 Bushing.

If the engine gets too hot and a loss of coolant is a problem, a pressure loss in the cooling system could be the cause. If the gauge for water temperature shows that the engine is getting too hot, look for coolant leakage. If a place can not be found where there is coolant leakage, check the accuracy

of the gauge for water temperature. Use the 9S9102 Thermistor Thermometer Group or the 2F7112 Thermometer and 6B5072 Bushing.

**CAUTION:** Be careful when working around an engine if it is running.



**2F7112 THERMOMETER INSTALLED**

Start the engine. The reading on the gauge for water temperature should be the same as the reading on the thermistor thermometer.

#### Pressure Cap

One cause for a pressure loss in the cooling system can be a bad seal on the pressure cap of the system. Inspect the pressure cap carefully. Look for damage to the seal or the sealing surface. Any foreign material or deposits on the cap, seal or sealing surface must be removed.

#### Temperature Regulator

Test procedure for water temperature regulators:

1. Remove the regulator from the engine.
2. Put heat to a pan of water. Get the temperature of the water to 197° F (92° C).
3. Hang the regulator in the pan of hot water. Put the regulator completely under the water. Do not let the regulator make contact with the pan.
4. Keep the temperature of the water at 197° F (92° C) for ten minutes. Make the water move around. This keeps all of the water at the same temperature.



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The specifications in this book are given on the basis of information that was current at the time the book was written. These specifications give the torques, operating pressures, measurements of new parts and other items. When the word "permissible" is used in the description, the specification value given is the "maximum or minimum" normally permitted before adjustment, repair and/or new parts are needed. Make a comparison of the measurements of a worn part with the specifications of a new part to find the amount of wear. The wear factor is not the only basis for the replacement of parts. The expected service life of the worn part is a factor. A part that is worn can be safe to use if an estimate of the remainder of its service life is good. When a disassembly is made for the purpose of reconditioning, the recommendation is the replacement of parts not completely worn out if a short service life is expected.

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**NOTE:** This engine uses bolts (3/8 inch size only) with washer heads in some locations. The washer head bolt does not need a plain washer, lockwasher or lockplate. Where these bolts are used on aluminum covers or housings, a plain washer is needed. If you are not sure a washer is used under a bolt head, use the Parts Book to see if a washer is needed.

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