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MANUAL PREVIEW

**Caterpillar**

**Service Manual**

**910 Wheel Loader**

**S/n 80U1 & up**

**Volume 1 of 2**

**Service Manual**

**JENSALES.COM**

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**CT-S-910WL80U1**

## INTRODUCTION

The specifications given in this book are on the basis of information available at the time it was written. The specifications torques, pressures of operation, measurements, adjustments and other items can change at any time. These changes can effect the service given to the product. Get the complete and most current information before you start any job. Caterpillar Dealers have the most current information which is available. For a list of the most current modules and form numbers available for each Service Manual, see the SERVICE MANUAL CONTENTS MICROFICHE REG1139F.

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.

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.

77200x2

**NOTE:** The "C" is an indication of a change from the former issue.

**NOTE:** For Systems Operation and Testing and Adjusting, make reference to the 3204 Vehicular Engine, Form No. REG01222.

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- c. Start the engine, and if engine starts to overspeed (run out of control) put a steel plate over the air inlet to stop the engine.

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

#### Tools Needed:

- 5P7307 Engine Turning Tool Group.  
3/8-16 NC Bolt.

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

1. Remove the valve cover.
2. Remove plug (1).

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

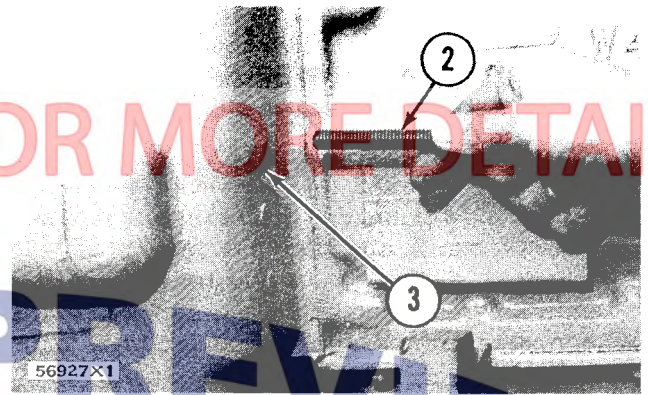
3. Remove the starter motor and install 5P7307 Engine Turning Tool Group.
4. Turn the flywheel clockwise approximately 60°.



LOCATION OF PLUG

1. Plug.

5. Now turn the flywheel counterclockwise until a 3/8" 16 NC bolt (2) can be put through hole (3) and installed in the timing bolt hole in the flywheel.
6. Look at the valves for No. 1 cylinder (the two valves at the front of the engine). The intake valve and exhaust valve for No. 1 cylinder must be closed. If they are closed, you will be able to move both rocker arms up and down by hand.
7. If the intake valve and exhaust valve for No. 1 cylinder are not closed, remove bolt (2). Turn the crankshaft counterclockwise 360° and install bolt (2). Both valves are now closed. This is top center (TC) compression position for No. 1 piston.



INSTALLING BOLT

2. Bolt. 3. Hole.

**NOTE:** If the flywheel bolt hole is turned beyond hole (3) and bolt (2) can not be installed, turn the flywheel clockwise approximately 60°. Then, turn it counterclockwise until bolt (2) can be installed. The reason for this step is to be sure the play is removed from the timing gears when the engine is put on top center.

### CHECKING ENGINE TIMING WITH 6V3100 DIESEL ENGINE TIMING INDICATOR GROUP

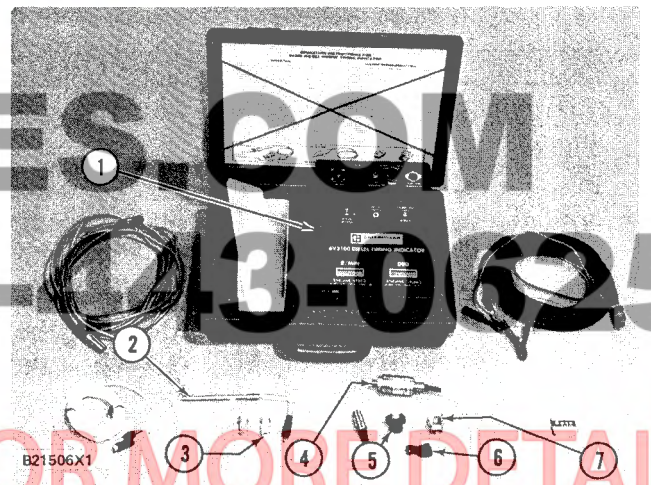
#### Tools Needed:

- 6V3100 Diesel Engine Timing Indicator Group. ®

Special Instruction Form No. SEHS7742 is with the tool group and gives instructions for the test procedure.

#### NOTICE

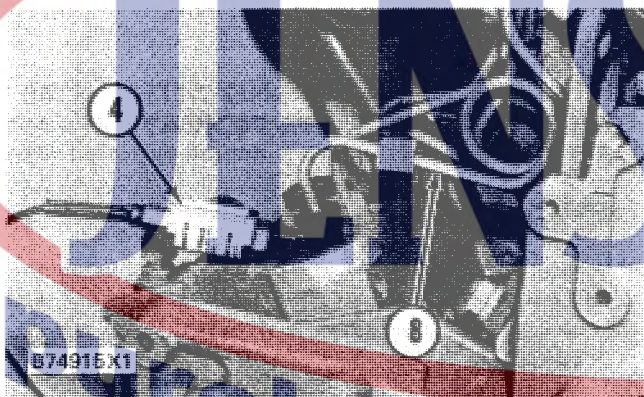
The engine must be stopped while the timing indicator is being connected.



6V3100 DIESEL ENGINE TIMING INDICATOR GROUP

1. Engine timing indicator. 2. TDC magnetic transducer.
3. Pipe adapter. 4. Injection transducer. 5. 5P7437 Adapter.
6. 5P7435 Tee Adapter. 7. 5P7436 Adapter.

1. Make reference to Operation Instructions inside the lid of the 6V3100 Diesel Engine Timing Indicator Group for complete instructions and calibration.
2. Loosen all fuel line clamps that hold No. 1 fuel injection line and disconnect fuel injection line (8) for No. 1 cylinder at the fuel injection pump. Slide the nut up and out of the way. Put 5P7436 Adapter (7) in its place and turn adapter (7) onto the fuel pump bonnet until the top of the bonnet threads are approximately even with the bottom of the "window" in the adapter.
3. Put the 5P7435 Tee Adapter (6) on the Injection transducer (4) and put the end of the 5P7435 Tee Adapter (6) in the "window" of the 5P7436 Adapter (7).
4. Put fuel injection line (8) on top of 5P7435 Tee Adapter (6). Install 5P7437 Adapter (5) and tighten to 30 lb. ft. (40 N•m).



TRANSDUCER IN POSITION  
(TYPICAL EXAMPLE)

4. Injection transducer. 8. Fuel injection line for No. 1 cylinder.

5. Remove the plug from the flywheel housing. Install pipe adapter (3) into the hole the plug was removed from. Tighten only a small amount.
6. Push the TDC magnetic transducer (2) into the pipe adapter (3) until it makes contact with the flywheel. Pull it back out 1.6 mm (.06 in.) and lightly tighten the knurled locknut.
7. Connect the cables from the transducers to the Engine Timing Indicator. Make a calibration check of the indicator. For calibration procedure, make reference to Special Instruction Form No. SEHS7742.
8. Start the engine. Get the engine to operating temperature. With the engine at low idle, check engine timing. Increase engine speed and check timing at 2100 rpm.



TRANSDUCER IN POSITION  
2. TDC magnetic transducer.

The TIMING CHART gives the acceptable dynamic (engine in motion) timing range as read on the Timing Indicator Group. The TIMING CHART is for the 3204 Engine with  $21 \pm 1^\circ$  static (engine stopped) timing.

| TIMING CHART |                   |
|--------------|-------------------|
| ENGINE rpm   | INDICATOR READING |
| 1000         | 15.7 to 18.2°     |
| 2100         | 16.9 to 19.3°     |

If the engine timing is not correct, make reference to CHECKING TIMING BY TIMING PIN METHOD for the procedure to change engine timing.

#### CHECKING TIMING BY FUEL FLOW METHOD

##### Tools Needed:

1P540 Flow Checking Tool Group  
5P6524 Engine Timing Indicator Group  
9S215 Dial Indicator  
3S3268 Contact Point, .25 in. (6.4 mm) long  
5P7266 Adapter  
3P1565 Collet  
8S2296 Rod, 5.25 in. (133.4 mm) long  
6V2023 Flow Checking Adapter

The distance of piston (7) from top center when inlet port (6) just closes can be determined by the use of the procedure that follows. Use the chart to find the conversion of dial indicator reading to crankshaft degrees.

pump housing off the engine. When an adjustment to the timing dimension is done correctly, fuel injection in the cylinder will be at the correct time. If the timing dimension is too small, fuel injection will be early. If the timing dimension is too large, fuel injection will be late.

The off engine setting makes an adjustment for wear of components in the injection pump housing and the camshaft of the injection pump.



**5P6600 OFF ENGINE LIFTER SETTING  
TOOL GROUP**

1. 1P7410 Timing Plate. 2. 1P7420 Pointer Assembly. 3. 2M5218 Shaft Assembly. 4. 2S6160 Washer. 5. S509 Bolt. 6. S1617 Bolt.

1. Use the 8S4613 Wrench and 8S2244 Extractor to remove the injection pumps.

2. Fasten the 1P7420 Pointer (2) to the pump housing using S1617 Bolt (6).



**INSTALLATION OF THE 1P7420 POINTER**

2. 1P7420 Pointer. 6. S1617 Bolt.

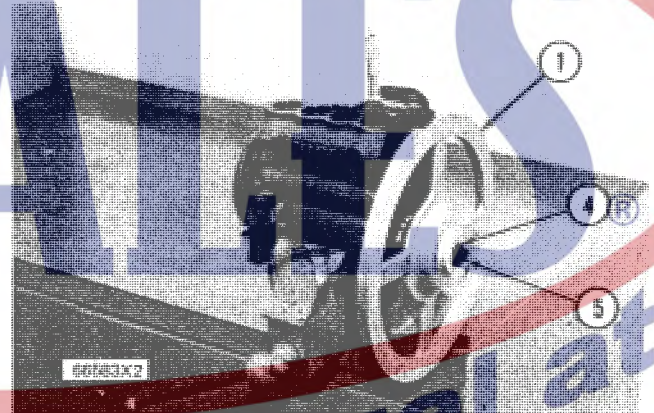
3. Put the 5P129 Sleeve (7) on the pump camshaft.



**INSTALLATION OF 5P129 SLEEVE**

7. 5P129 Sleeve.

4. Put 2M5218 Shaft Assembly (3) in 5P129 Sleeve (7) with the tang into the slot in camshaft.



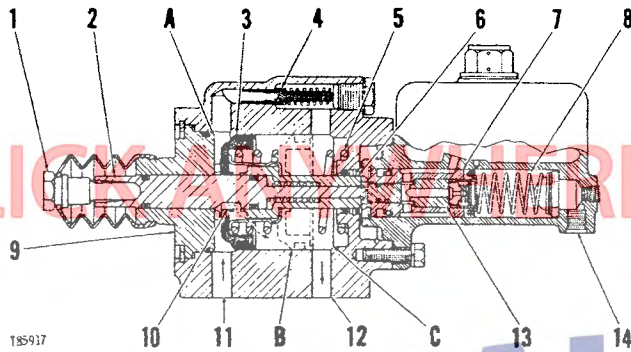
**MEASURING TIMING DIMENSION  
(8F6922 Depth Micrometer and 8S7167 Gauge shown)**

1. 1P7410 Timing Plate. 4. 2S6160 Washer. 5. S509 Bolt.

5. Put 1P7410 Timing Plate (1) in position on 2M5218 Shaft Assembly (3). Install 2S6160 Washer (4) and S509 Bolt (5).

6. When 5P4165 Indicator Group is used, the procedure that follows is necessary to adjust (calibrate) the dial indicator for the lifter measurements:

- Put the 5P4157 Gauge [4.00 in. (100.6 mm)] on the 5P4159 Gauge Stand.
- With contact point in gauge hole, put the dial indicator and base on top of 5P4157 Gauge.



CROSS SECTION OF POWER CYLINDER AND MASTER CYLINDER

1. Push rod. 2. Valve. 3. Power piston. 4. Relief valve. 5. Spring. 6. Connector. 7. Piston. 8. Spring chamber. 9. End Cap. 10. Passage. 11. Inlet. 12. Outlet. 13. Reaction Piston. 14. Outlet to the brakes. A. Chamber. B. Location of power piston with brake pedal pushed (when the engine is running). C. Chamber.

The linkage from the brake pedals is connected to push rod (1). When a brake pedal is pushed for brake application, the brake linkage moves pushrod (1) and valve (2). The movement of valve (2) into connector (6) closes passage (10). With passage (10) closed, the pump oil in chamber (A) moves power piston (3) against connector (6). The combination of the pump oil force on power piston (3) and the force on the brake pedal on valve (2) moves connector (6) against piston (7) in the master cylinder. When piston (7) is moved the brake fluid in spring chamber (8) is pushed through outlet (14) to the brakes which either stop or make a decrease in the speed at the wheels.

The operator can feel the application of the brakes because the pedal, pedal linkage, push rod (1) and valve (2) are mechanically connected and valve (2) is against both connector (6) and reaction piston (13). The operation of reaction piston (13) lets a small amount of the brake fluid in spring (8) chamber push on the end of the reaction piston when the brake pedal is pushed.

The pressure of the pump oil in chamber (A) gets an increase when passage (10) in valve (2) is closed. Relief valve (4) opens when the oil pressure is 290 psi (20.4 kg/cm<sup>2</sup>).

The maximum oil pressure on piston (3) pushes connector (6) against piston (7) and the pressure of the brake fluid moved by piston (7) to the brakes can be 1400 psi (98.4 kg/cm<sup>2</sup>).

When the engine is stopped or if there is no pump oil to the power cylinder the brakes can operate. More force is needed on the brake pedal to move the pedal linkage, pushrod (1), valve (2),

connector (6) and piston (7) to push the brake fluid in spring chamber (8) through outlet (14) to the brakes.

## WHEEL BRAKES

The brakes on the wheels are disc-type. The disc (5) is bolted to the wheel and turns with the wheel. The caliper (1) is bolted to the housing for the axle and is held stationary.



A TWO WHEEL BRAKE (RIGHT WHEEL)

1. Caliper, on axle housing. 2. Pin (four), to hold carrier and lining assemblies. 3. Oil lines to pistons on other side of caliper. 4. Brake fluid inlet for the pistons in the caliper. 5. Disc, on the wheel. 6. Screw valve (two), to let air out of the brake fluid when necessary. 7. Bolts (four), to fasten the position of pins (2).

The disc turns in the caliper when the wheel turns. Part of the disc is always in the caliper. Each caliper has two carrier and lining assemblies (9) with pistons (8) that are activated by brake fluid pressure when a brake pedal is pushed. The pistons push the carrier and lining assemblies against both sides of the disc either to stop or to slow the turning disc and wheel.



CALIPER PARTS

1. Caliper. 2. Pin (four). 3. Oil line. 4. Inlet in cap over piston. 6. Screw valves. 7. Bolts (four). 8. Pistons (four). 9. Carrier and lining assembly (two).

3. With the rotor core held in a vise, loosen the pulley lock nut with box wrench (FIG. 34).

**CAUTION**

When holding the rotor core in the vise, be careful not to deform the core by tightening the vise too much.



FIG. 34 LOOSEN PULLEY LOCK NUT

4. Remove the pulley and fan. Pull off the drive end frame from the rotor shaft.



FIG. 35 SEPARATE DRIVE ASSEMBLY

5. Remove the three screws of retainer plate. Remove the retainer plate and front bearing (FIG. 36).



FIG. 36 REMOVING THE FRONT BEARING