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Product: TRUCK ENGINE  
Model: C-12 TRUCK ENGINE 9SM03082  
Configuration: C-12 Truck Engine 9SM00001-UP

## Testing and Adjusting C-12 Truck Engine

Media Number -SEN9533-02

Publication Date -01/06/2004

Date Updated -07/06/2004

i01911798

## Fuel System Pressure - Test

SMCS - 1250-081; 1256-081

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### NOTICE

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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### NOTICE

**Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.**

**Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.**

**Dispose of all fluids according to local regulations and mandates.**

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## Low Fuel Pressure

Low fuel pressure can cause low power. Low fuel pressure can also cause cavitation of the fuel which can damage the fuel injectors.

The following conditions can cause low fuel pressure:

- Plugged fuel filters
- Debris in the check valves for the fuel priming pump
- Sticking or worn fuel pressure relief valve in the fuel transfer pump
- Severe wear on return fuel pressure regulating valve in the fuel filter base or adapter assembly
- Worn gears in the fuel transfer pump
- Pinched fuel lines or undersized fuel lines
- Old fuel lines that have a reduced interior diameter that was caused by swelling
- Fuel lines with deteriorating interior surfaces
- Pinched fuel line fittings or undersized fuel line fittings
- Debris in the fuel tank, fuel lines, or fuel system components that may create restrictions

## High Fuel Pressure

Excessive fuel pressure can cause fuel filter gaskets to rupture. The following conditions can cause high fuel pressure:

- Plugged orifices in the fuel pressure regulating valve
- Stuck fuel pressure relief valve in the fuel transfer pump
- Pinched fuel return line

## Checking Fuel Pressure

Table 1

Required Toolings			
Tool	Part Number	Part Name	Quantity
A	1U-5470 or 198-4240	Engine Pressure Group or Digital Pressure Indicator	1

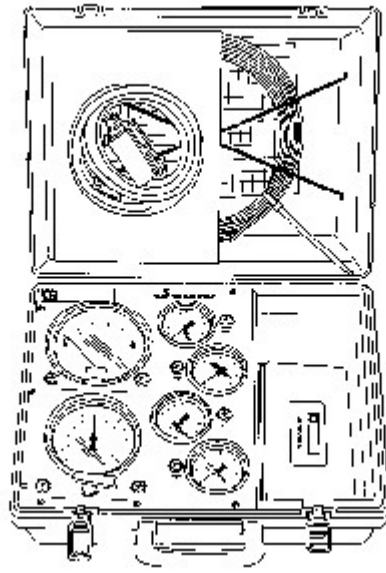


Illustration 1

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**1U-5470 Engine Pressure Group**

**Reference:** Special Instruction, SEHS8907, "Using the 1U-5470 Engine Pressure Group"

**Reference:** Operation Manual, NEHS0818, "Using the 198-4240 Digital Pressure Indicator"

## Fuel System Identification

Refer to the following illustrations in order to identify the fuel system for your application. Locate the pressure testing ports in order to measure the different fuel system pressures.

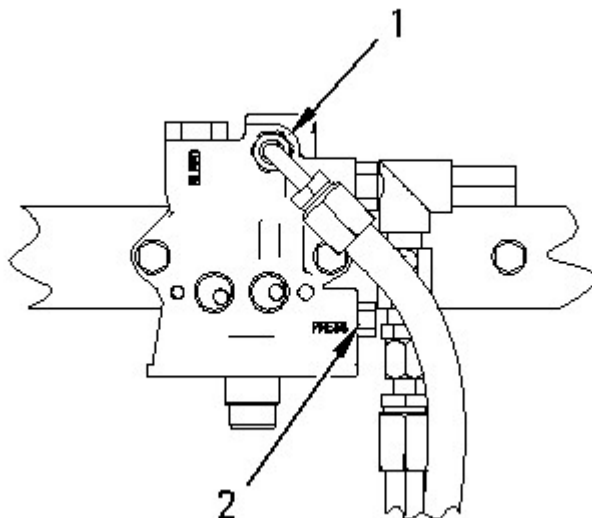


Illustration 2

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Fuel filter base that is mounted directly to the fuel manifold

Typical example

(1) Test location for unfiltered fuel pressure

(2) Test location for filtered fuel pressure

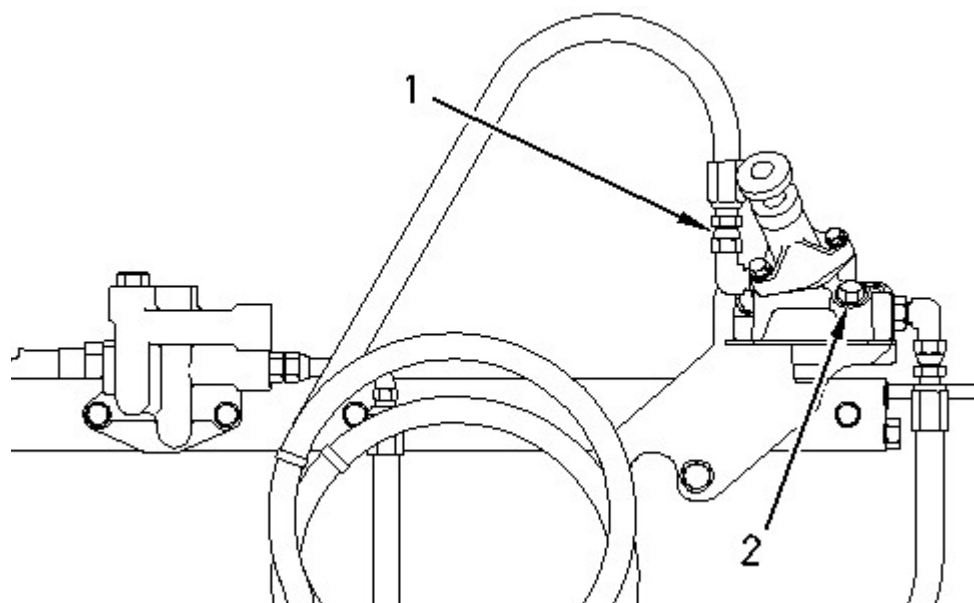


Illustration 3

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Applications with a fuel adapter

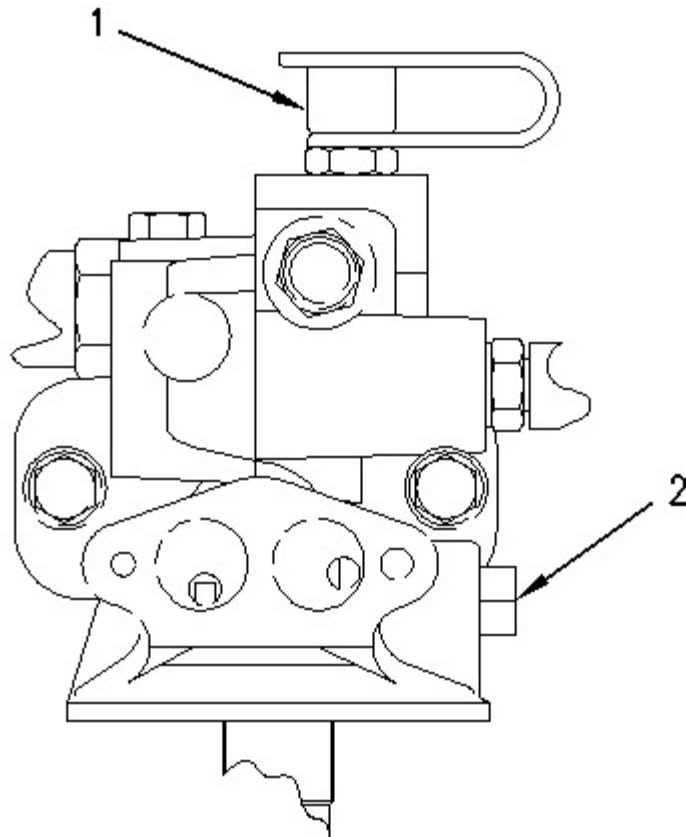
Typical example

(1) Test location for unfiltered fuel pressure

(2) Test location for filtered fuel pressure

### Applications with a Quick Connect Coupler

Some applications may be equipped with a quick connect coupler. Refer to these illustrations for the location and the purpose of the fuel pressure tap.



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Illustration 4

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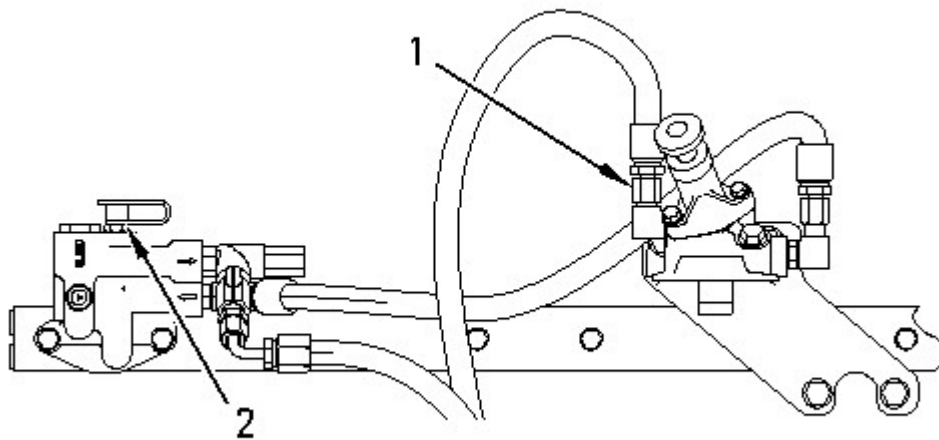
Fuel filter base that is mounted directly to the fuel manifold

Typical example

(1) Test location for unfiltered fuel pressure

(2) Test location for filtered fuel pressure

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Illustration 5

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Applications with a fuel adapter

Typical example

(1) Test location for unfiltered fuel pressure

(2) Test location for filtered fuel pressure

## Measuring Unfiltered Fuel Pressure



**Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. Clean up fuel spills immediately.**

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**A high pressure fuel line must be disconnected. To avoid personal injury or fire from fuel spray, the engine must be stopped before the fuel line is disconnected.**

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Use the following procedure to measure the unfiltered fuel pressure:

1. Refer to "Fuel System Identification" in order to identify the correct location for measuring the unfiltered fuel pressure. Install Tooling (A) into pressure test location (1) in order to measure the unfiltered fuel pressure.

**Note:** A fuel sensor may be installed in one of the ports that are indicated in the illustrations. If a fuel sensor is installed in the port, install a tee fitting into the port. Install the sensor and Tooling (A) onto this tee prior to operating the engine. Ensure that the tee and all fuel fittings are securely tightened. Failure to tighten all fittings could result in serious fuel leaks.

Clean any residual fuel from the engine components.

2. Start the engine.
3. Record the pressure reading that is on Tooling (A) for engine speeds of 1800 rpm and 2100 rpm. The test should be performed with no load on the engine.
4. Stop the engine and remove Tooling (A) from the fuel system.

## Measuring Filtered Fuel Pressure

**WARNING**

**Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. Clean up fuel spills immediately.**

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**WARNING**

**A high pressure fuel line must be disconnected. To avoid personal injury or fire from fuel spray, the engine must be stopped before the fuel line is disconnected.**

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1. Refer to "Fuel System Identification" in order to identify the correct location for measuring the filtered fuel pressure. Install Tooling (A) into pressure test location (2) in order to measure the filtered fuel pressure.

**Note:** A fuel sensor may be installed in one of the ports that are indicated in the illustrations. If a fuel sensor is installed in the port, install a tee fitting into the port. Install the sensor and Tooling (A) onto this tee prior to operating the engine. Ensure that the tee and all fuel fittings are securely tightened. Failure to tighten all fittings could result in serious fuel leaks.

Clean any residual fuel from the engine components.

2. Start the engine.
3. Record the pressure reading that is on Tooling (A) for engine speeds of 600 rpm and 1800 rpm. The test should be performed with no load on the engine.

**Note:** Excessive needle movement at the gauge may be present. Fuel pressure readings near the fuel supply manifold will be affected by pressure spikes. The pressure spikes are caused by excess fuel that is returning to the fuel system from the injectors. If the gauge is connected with a suitable length of hose, the air in the hose will absorb the spikes. This will give you an average reading and a steady needle. Ensure that the gauge is elevated above the pressure measuring port during the test.

4. Stop the engine and remove Tooling (A) from the fuel system.

## **Fuel Filter Differential Pressure**

Calculate the fuel filter's differential pressure by subtracting the filtered fuel pressure from the unfiltered fuel pressure. For best results, use the pressures that have been measured at an engine speed of 1800 rpm.

Typically, the differential pressure for a new fuel filter will not exceed the 35 kPa (5.0 psi).

As abrasive particles collect in the fuel filter, the pressure differential across the filter will increase. When a filter becomes plugged, the pressure differential may increase as much as 69 kPa (10.0 psi) before a significant power loss is detected by the operator. Low filtered fuel pressure will cause cavitation of the fuel and internal damage to the unit injectors. **The pressure differential across the fuel filter should not exceed 69 kPa (10.0 psi).**

If a high differential pressure exists, replace the fuel filter. Refer to Testing and Adjusting, "Fuel System - Prime" for information on priming the fuel system after you replace the fuel filter.

## Fuel Pressure Relief Valve

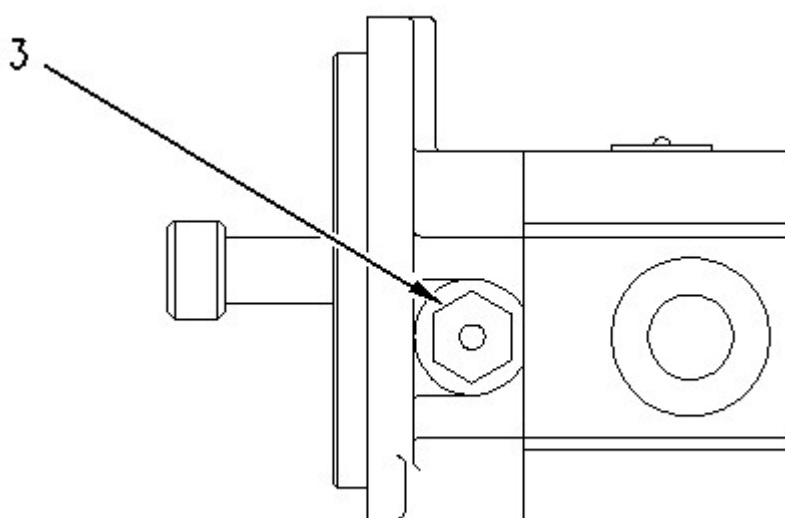


Illustration 6

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Fuel transfer pump

Typical example

(3) Fuel pressure relief valve

The fuel pressure relief valve (3) is an internal component that is located in the fuel transfer pump. The relief valve is used to regulate the maximum pressure for the fuel system. Refer to Illustration 6 in order to locate the pressure relief valve.

The maximum unfiltered fuel pressure at an engine speed of 2100 rpm ... 715 kPa to 785 kPa (103.7 psi to 113.9 psi)

The fuel pressure relief valve is not a serviceable component. If the operation of the fuel pressure relief valve is suspect, replace the fuel transfer pump.

## Fuel Pressure Regulating Valve

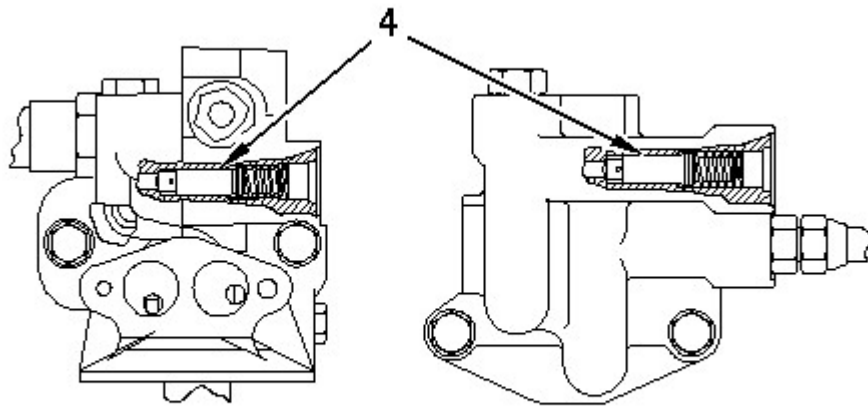


The pressure regulator valve is used in order to maintain an optimum operating pressure within the low pressure fuel system. If the filtered fuel pressure is low, the pressure regulator valve may be worn or stuck in the open position.

There are two types of fuel pressure regulating valves that are available for this engine. The integral pressure regulator valve has been replaced with the new pressure regulator assembly that is self-contained.

### Integral Pressure Regulator Valve

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Illustration 7

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Location of the fuel pressure regulator valve

Typical example

(4) Fuel pressure regulator valve

The integral pressure regulator valve (4) is an internal component that is located in the fuel filter base or in the fuel adapter. The pressure regulator valve is used in order to maintain an optimum operating pressure within the low pressure fuel system. Refer to Illustration 7 in order to locate the pressure regulator valve.

The filtered fuel pressure at an engine speed of 600 rpm ... 450 kPa to 600 kPa (65.3 psi to 87.0 psi)

If the filtered fuel pressure is not within specifications, remove the fuel pressure regulator valve and the valve spring. Inspect the components for wear or damage. If there is visible signs of wear or damage to the valve, replace the valve. Check the spring for distortion. Refer to Specifications, "Fuel Lines" for information that relates to the specifications for the spring. If necessary, replace the spring. Retest the filtered fuel pressure after the replacement of any components.

### Pressure Regulator Assembly that is Self-Contained

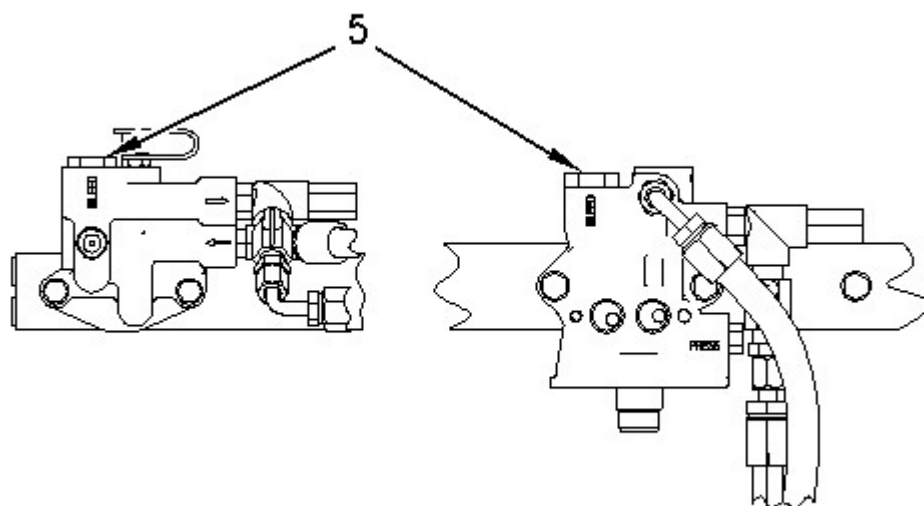


Illustration 8

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Location of the pressure regulator assembly

Typical example

(5) Pressure regulator assembly

This pressure regulator assembly (5) is a serviceable component. The pressure regulator valve is located in the fuel filter base or in the fuel adapter. This regulator valve is used in order to maintain an optimum operating pressure within the low pressure fuel system. Refer to Illustration 8 in order to locate the pressure regulator assembly that is self-contained.

The filtered fuel pressure at an engine speed of 600 rpm ... 450 kPa to 600 kPa (65.3 psi to 87.0 psi)

This type of fuel pressure regulator valve is a serviceable component. If the operation of the fuel pressure regulator valve is suspect, replace the pressure regulator assembly.

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