SEBU6311-00
April 2007

Operation and Maintenance Manual

402D, 403D and 404D Industrial Engines

GG (Engine)
GH (Engine)
GJ (Engine)
GK (Engine)
GL (Engine)
GM (Engine)
GN (Engine)
GP (Engine)
GQ (Engine)

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404D-15 Engine

Table 14

404D-15 Engine Refill Capacities		
Compartment or System	**Minimum**	**Maximum**
Crankcase Oil Sump(1)	3.9 L (4.1211 qt)	5.6 L (5.9175 qt)
Total Lubrication System(2)		

(1) These values are the approximate capacities for the crankcase oil sump which includes the standard factory installed oil filters. Engines with auxiliary oil filters will require additional oil. Refer to the OEM specifications for the capacity of the auxiliary oil filter.

(2) The Total Lubrication System includes the capacity for the Crankcase Oil Sump plus the capacity of factory installed oil filters and other filters added to the lubrication system. Enter the value for the capacity of the Total Lubrication System in this row.

404D-22, 404D-22T and 404D-22TA Engines

Table 15

404D-22, 404D-22T and 404D-22TA Engines Refill Capacities		
Compartment or System	**Minimum**	**Maximum**
Crankcase Oil Sump(1)	8.9 L (9.4 qt)	10.6 L (11.2 qt)
Total Lubrication System(2)		

(1) More than one style of sump may be used on these engines. Use these values to estimate the refill capacity. Use the engine oil level gauge to fill the engine to the correct oil level. Record the result in this table. These values are the approximate capacities for the Crankcase Oil Sump which includes the standard factory installed oil filters. Engines with auxiliary oil filters will require additional oil. Refer to the OEM specifications for the capacity of the auxiliary oil filter.

(2) The Total Lubrication System includes the capacity for the Crankcase Oil Sump plus the capacity of factory installed oil filters and other filters added to the lubrication system. Enter the value for the capacity of the Total Lubrication System in this row.

Cooling System

To maintain the cooling system, the Total Cooling System capacity must be known. The approximate capacity is for the engine cooling system. External System capacities will vary among applications. Refer to the OEM specifications for the External System capacity. This capacity information will be needed in order to determine the amount of coolant that is required for the Total Cooling System.

402D-05 Engine

Table 16

402D-05 Engine Refill Capacities		
Compartment or System	**Liters**	**Quarts**
Engine Only	1.1	1.2
External System Per OEM(1)		
Total Cooling System(2)		

(1) The External System includes a radiator or an expansion tank with the following components: heat exchanger and piping. Refer to the OEM specifications. Enter the value for the capacity of the External System in this row.

(2) The Total Cooling System capacity includes the capacity of the Engine plus the External System. Enter the value for the capacity of the Total Cooling System in this row.

403D-07 Engine

Table 17

403D-07 Engine Refill Capacities		
Compartment or System	**Liters**	**Quarts**
Engine Only	1.2	1.3
External System Per OEM(1)		
Total Cooling System(2)		

(1) The External System includes a radiator or an expansion tank with the following components: heat exchanger and piping. Refer to the OEM specifications. Enter the value for the capacity of the External System in this row.

(2) The Total Cooling System capacity includes the capacity of the Engine plus the External System. Enter the value for the capacity of the Total Cooling System in this row.

403D-11 Engine

Table 18

403D-11 Engine Refill Capacities		
Compartment or System	**Liters**	**Quarts**
Engine Only	1.9	2.0
External System Per OEM(1)		
Total Cooling System(2)		

(1) The External System includes a radiator or an expansion tank with the following components: heat exchanger and piping. Refer to the OEM specifications. Enter the value for the capacity of the External System in this row.

(2) The Total Cooling System capacity includes the capacity of the Engine plus the External System. Enter the value for the capacity of the Total Cooling System in this row.

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Coolant Temperature Switch - Remove and Install (403D-11, 403D-15, 403D-15T, 404D-15, 404D-22, 404D-22T and 404D-22TA Engines)

Removal Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

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.

Dispose of all fluids according to local regulations and mandates.

1. Drain the coolant from the cooling system into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, "Cooling System Coolant - Drain" for more information.

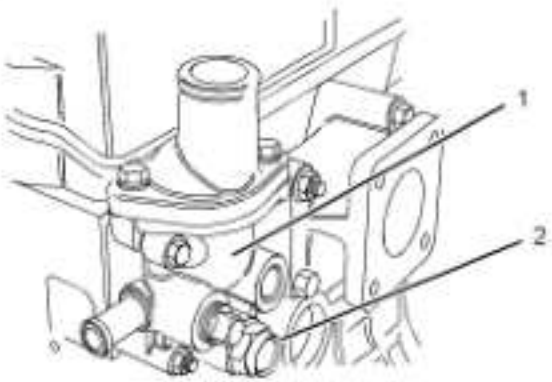


Illustration 168 g01326627
Typical example

2. Disconnect the harness assembly (not shown) from coolant temperature switch (2).

3. Remove coolant temperature switch (2) from water temperature regulator housing (1).

Installation Procedure

Table 31

Required Tools			
Tool	Part Number	Part Description	Qty
A	21820122	POWERPART Pipe Sealant	1

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Inspect the coolant temperature switch for damage and correct operation. Refer to Systems Operation, Testing and Adjusting, "Coolant Temperature Switch - Test" for more information. If necessary, replace the coolant temperature switch.

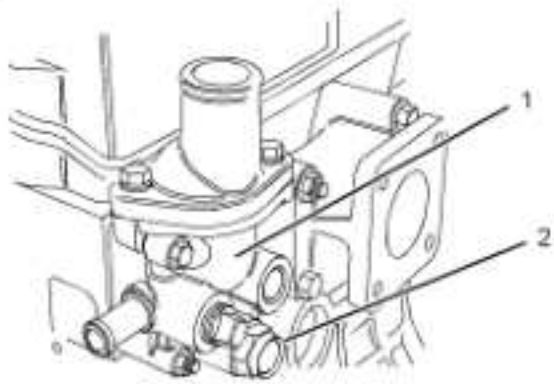


Illustration 169 g01326627
Typical example

2. Install coolant temperature switch (2) to water temperature regulator housing (1). Use a deep socket to tighten the coolant temperature switch to a torque of 27 N·m (20 lb ft).

Note: If a used coolant temperature switch is installed, apply a thin layer of Tooling (A) to the threads of the coolant temperature switch.

3. Connect the harness assembly (not shown) to coolant temperature switch (2).

4. Fill the cooling system with coolant to the correct level. Refer to Operation and Maintenance Manual, "Cooling System Coolant - Fill" for more information.

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Testing and Adjusting Section

Troubleshooting

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Troubleshooting

Introduction

Troubleshooting can be difficult. To make a repair to a problem, refer to the possible cause and the corrective action. The most common problems are identified in this troubleshooting manual. The symptoms, causes, and guidance for solving the problems are given.

The list of problems, causes and corrections will only give an indication of the location of a possible problem. There is also a list that shows some of the repairs that are required.

Sometimes additional repair work is required beyond the repair which is recommended. Frequently, a problem does not exist in isolation. The problem can be a result of wear or of damage to several parts which operate together as part of a system.

Service personnel may remember similar complaints which were corrected by a previous method of troubleshooting. A similar complaint can have a different cause.

Get a good description of the problem from the operator and/or the person that owns the vehicle. Knowing the details of the problem can save time. This will make the repair job faster and easier.

All possible problems and the probable causes cannot be listed. The technician must follow a logical process of eliminating possible causes and of identifying the specific causes of the problems.

Troubleshooting The Fuel Injection Nozzles On The Engine

Note: Be careful when you are handling the fuel injection nozzles in order to prevent damage to the orifices, the threads, and other surfaces. When a fuel injection nozzle is installed, make sure that all surfaces and threads are clean.

Only personnel that have the proper training should disassemble the fuel injection nozzles. Only personnel that have the proper training should perform repairs to the fuel injection nozzle.

Replace the fuel injection nozzle if the fuel injection nozzle cannot be adjusted in order to operate correctly.

Refer to Specifications, "Fuel Injection Nozzles" for additional information.

The engine is difficult to start or the engine runs rough.

Probable Cause

1. The fuel injection nozzle does not seal correctly in the cylinder head.

   Make sure that the gaskets, the insert and the mating surface of the cylinder head are clean. Make sure that the fuel injection nozzle is tightened to the correct torque in the threaded hole of the cylinder head.

2. There is debris on the mating surface of the cylinder head with the gaskets or the insert. Make sure that extra gaskets were removed from the threaded recess in the cylinder head for the fuel injection nozzle.

   Remove any extra gaskets or debris.

3. The connections of the high pressure fuel line leak.

   Tighten the fittings of the high pressure fuel line.

4. The fuel injection nozzle does not operate correctly.

   Make sure that the components of the fuel injection nozzle are tightened to the correct torques. Make sure that the gaskets and the insert are positioned correctly. Test the fuel injection nozzle on a nozzle tester in order to measure the pressure setting.

5. The incorrect fuel injection nozzle is installed.

   Make sure that all fuel injection nozzles are the correct replacement parts for the engine. Refer to the Parts Manual for the correct replacement part.

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