

Section 12 – Adjustment, Repair and Replacement

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Overview

Coverage

This section of this manual addresses the Adjustment, Repair, and Replacement of Cummins NPower Fire Pump Engine components. Work this manual with the associated base engine troubleshooting and repair manuals.

Base engine components are addressed in Cummins Manual No. 4021418, ISC, QSC8.3, ISL, and QSL9 Troubleshooting and Repair Manual.

The electronic engine control module and associated components are addressed in Cummins Manual No. 3666271, ISC, ISCe, ISL, QSC8.3, and QSL9 Electronic Control System Troubleshooting and Repair Manual.

Refer to Service Literature Section 13 for additional information about these manuals.

Requirements

Satisfy all code requirements or local regulations necessary to remove the fire pump from service. This may require contacting the local fire department or other authority.

Obtain the required tools and supplies for the intended service. If fluids are to be drained, get appropriate containers. Dispose of any waste fluids or removed components in accordance with applicable environmental requirements.

Ensure that the area is prepared for the intended service.

When work is completed, ensure that the fire pump is operational and correctly aligned for service. As required, notify the local fire department or other authority.

Maintenance must be performed by trained, experienced technicians. Refer to Service Assistance Section 14 for qualified service assistance.

Belt Guard Removal/Installation

Prepare



Coolant is toxic. Keep away from children and pets. If not reused, dispose of in accordance with local environmental regulations.

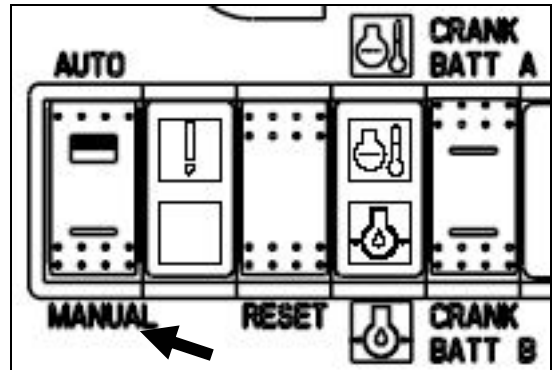


Do not remove the pressure cap from a hot engine. Wait until the coolant temperature is below 50°C [122°F] before removing the pressure cap. Heated coolant spray or steam can cause personal injury.

Place the fire protection system in a safe mode for engine service.



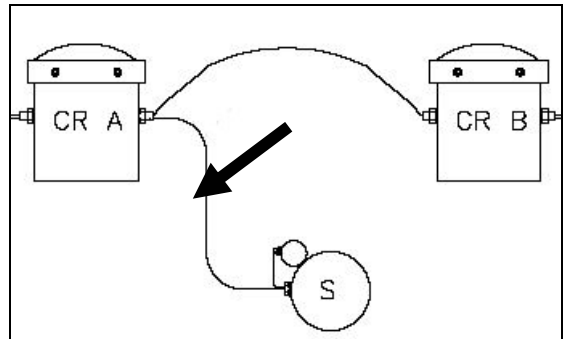
Place the AUTO/MANUAL rocker switch in the MANUAL position.



Disconnect or isolate the coolant heater power supply.



Disconnect and insulate the Contactor to Starter Cable (Cummins Fire Power Part No 9762) from the starter (Refer to [Drawing 9767](#) in Section 18).

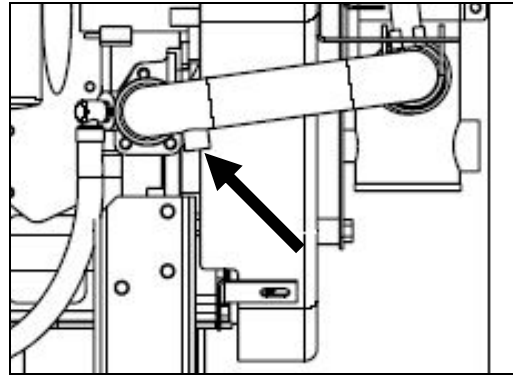


Belt Guard Removal/Installation (Cont)

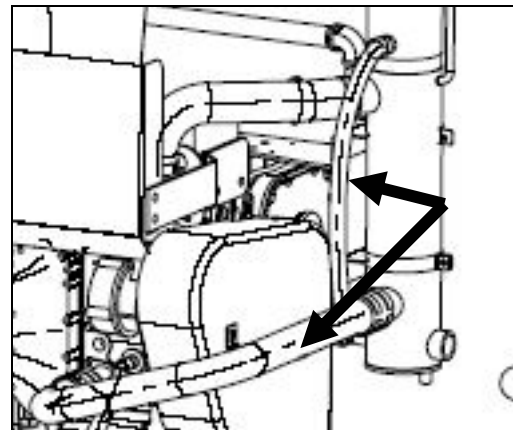
Ensure that the engine and engine coolant is cool in order to avoid burns.

Remove the engine coolant pressure cap.

Drain the engine coolant system. Refer to Drain and Flush Coolant System in Section 8.

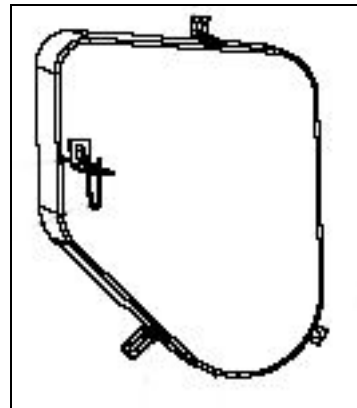


Remove the Lower Engine Coolant and Fill Hose from the heat exchanger.



Remove

Remove the three bolts and the belt guard.



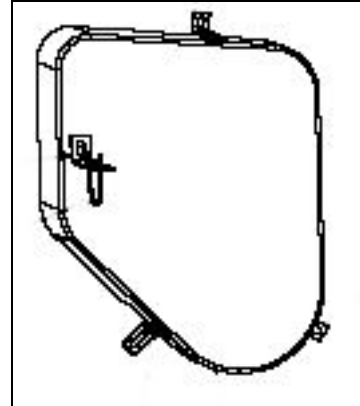
Belt Guard Removal/Installation (Cont)

Install

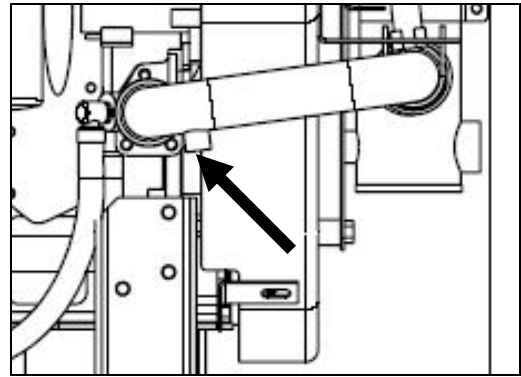
NOTE: Install only Cummins approved replacement belt guard (Cummins Fire Power Part No. 9820) or equivalent.

When other work is completed, install the belt guard using the three bolts.

Torque as per Capscrew Markings and Torque Values in Section 15.

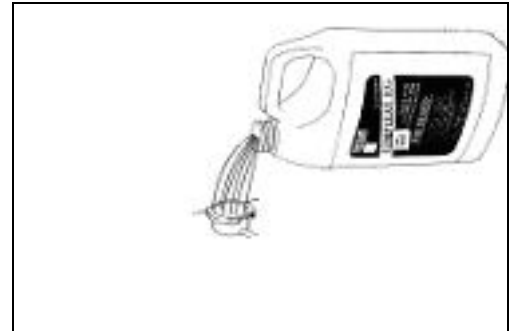


Close coolant drain valve.



Refill the engine coolant. Refer to Drain and Flush Coolant System in Section 8.

Install the coolant system pressure cap.

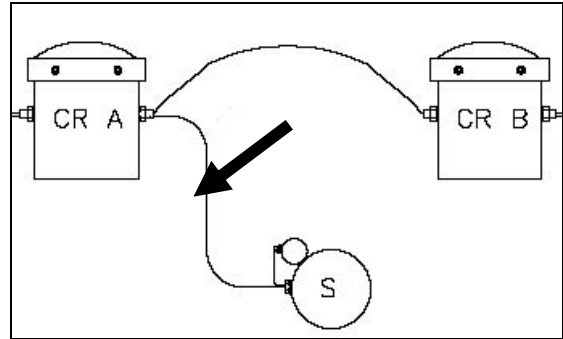


Reconnect the coolant heater power supply.



Belt Guard Removal/Installation (Cont)

Reconnect the Contactor to Starter Cable (Cummins Fire Power Part No 9762) at the starter (Refer to Drawing 9767 in Section 18).



NOTE: Start the engine and do a quick check for leaks. If any coolant leaks are observed, stop the engine, repair the leak, check coolant level, then restart the engine.



Start the engine. Refer to Normal Local Starting Procedure in Section 3.

Check for and repair any coolant leaks.

Ensure that repairs are completed satisfactorily.

Stop the engine.

Belt Removal/Installation

Prepare

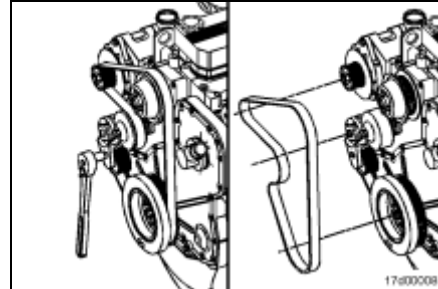
Do the preparatory steps and remove the Belt Guard. Refer to [Belt Guard Removal / Installation](#) in this section.



Remove

NOTE: The belt tensioner is spring-loaded and must be pivoted away from the drive belt. Pivoting in the wrong direction can result in damage to the belt tensioner.

Lift the tensioner to remove the drive belt.



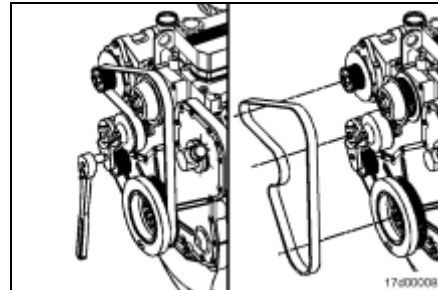
Install

NOTE: The belt tensioner is spring-loaded and must be pivoted away from the drive belt. Pivoting in the wrong direction can result in damage to the belt tensioner.

Service Tip: If difficulty is experienced installing the drive belt (i.e., the belt seems too short), position the belt over the grooved pulleys first then while holding the tensioner up, slide the belt over the water pump pulley.

NOTE: Install only Cummins approved replacement v-ribbed belts (Cummins Part No. 3289135) or equivalent.

Lift and hold the belt tensioner. Install the drive belt and release the tensioner.



Follow-Up

When work is completed, install the Belt Guard and do the listed follow up steps. Refer to [Belt Guard Removal/Installation](#) in this section.



Check that the drive belt operates without unusual noises.

Automatic Belt Tensioner Removal/Installation

Prepare

Do the preparatory steps and remove the Belt Guard. Refer to Belt Guard Removal/Installation in this section.

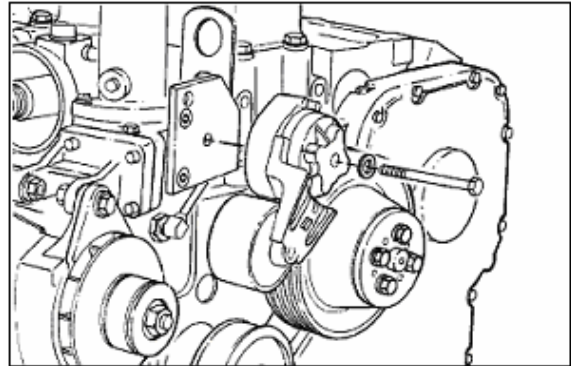


Remove the Drive Belt. Refer to Belt Removal/Installation in this section.



Remove

Remove the belt tensioner from the bracket.

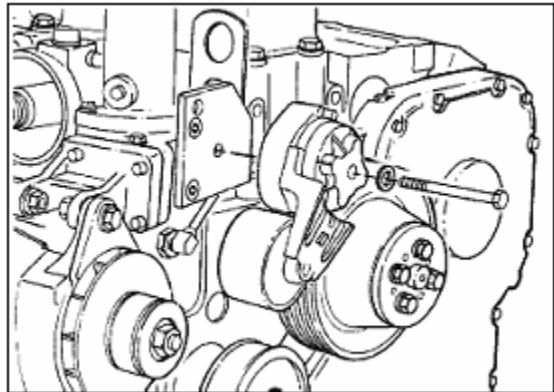


Install

NOTE: Install only Cummins approved replacement belt tensioner (Cummins Part No. 3936213) or equivalent.

Install the belt tensioner and cap screw.

Torque Value: 43 N•m [32 ft-lb]



Follow-Up

When work is completed, install the Drive Belt. Refer to Belt Removal/Installation in this section.



When work is completed, install the Belt Guard and do the listed follow up steps. Refer to Belt Guard Removal/Installation in this section.



Check that the drive belt operates without unusual noises.

Coolant Heat Exchanger Removal/Installation

Prepare



Coolant is toxic. Keep away from children and pets. If not reused, dispose of in accordance with local environmental regulations.

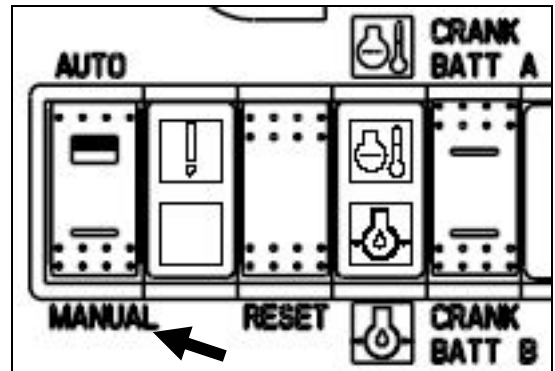


Do not remove the pressure cap from a hot engine. Wait until the coolant temperature is below 50°C [122°F] before removing the pressure cap. Heated coolant spray or steam can cause personal injury.

Place the fire protection system in a safe mode for engine service.



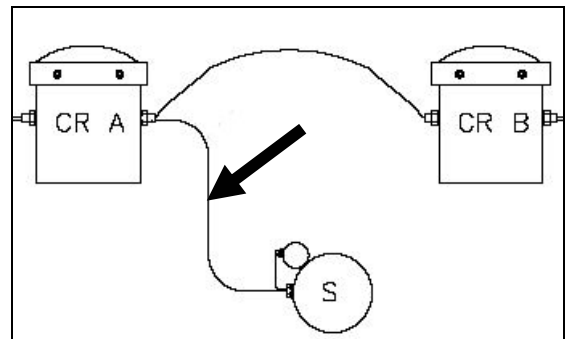
Place the AUTO/MANUAL rocker switch in the MANUAL position.



Disconnect or isolate the coolant heater power supply.



Disconnect and insulate the Contactor to Starter Cable (Cummins Fire Power Part No 9762) from the starter (Refer to [Drawing 9767](#) in Section 18).

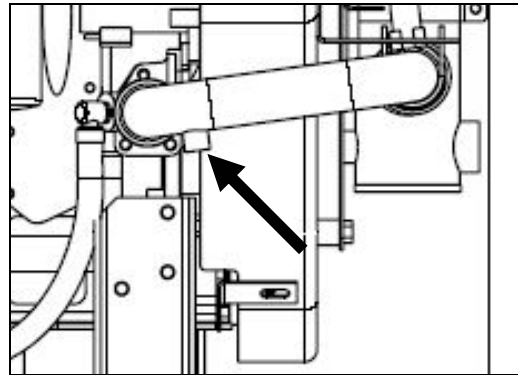


Coolant Heat Exchanger Removal/Installation (Cont)

Ensure that the engine and engine coolant is cool in order to avoid burns.

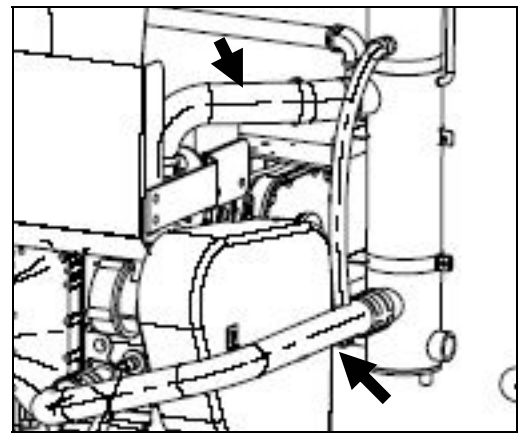
Remove the engine coolant pressure cap.

Drain the engine coolant system. Refer to Drain and Flush Coolant System in Section 8.



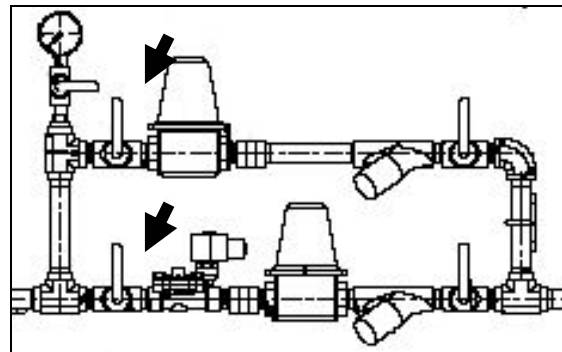
Remove the Upper Engine Coolant Hose from the heat exchanger.

Remove the Lower Engine Coolant and Fill Hose from the heat exchanger.



Close the Raw Water Manifold Bypass Line Outlet Isolation Valve.

Close the Raw Water Manifold Normal Line Outlet Isolation Valve.

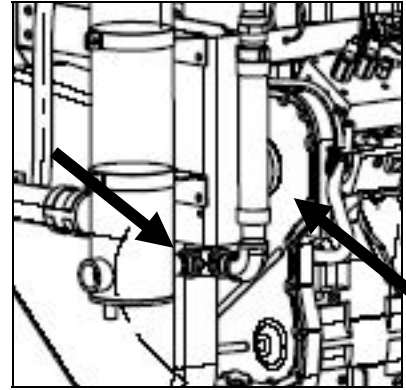


Coolant Heat Exchanger Removal/Installation (Cont)

Remove the 1" NPT raw water inlet piping from the charge air cooler to the heat exchanger. (Refer to [Drawing 9595](#) in Section 18 for raw water supply piping details.)



Also, remove any customer-supplied raw water outlet fittings. Save these components for reuse.



Pressure Test



NOTE: This test is required if internal leakage in the heat exchanger is suspected. It may be performed prior to the removal from the engine.

NOTE: Use teflon tape or other pipe sealant when installing the test setup in order to prevent leaks.

Install a 1-1/4" NPT pipe plug at the raw water outlet of the heat exchanger.

Install a pressure test setup with 700 kPa [100 psi] pressure gauge at the 1" NPT raw water inlet to the heat exchanger.

NOTE: There should be no detectable decrease in the pressure reading for the duration of the test.

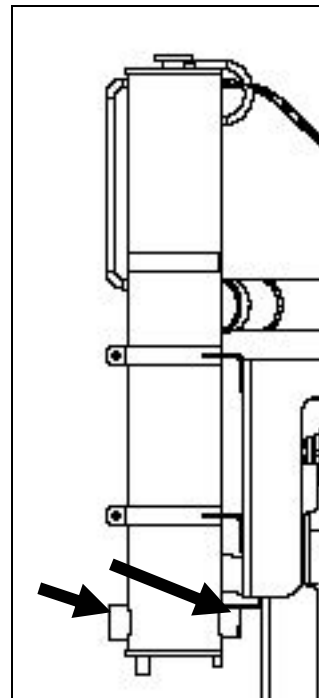
Apply air pressure at 621 kPa [90 psig].

Isolate the pressure source and monitor the pressure gauge for 5 minutes.

After testing, release the pressure.

Remove the pipe plug and the test setup.

If leakage is detected, the heat exchanger must be replaced.



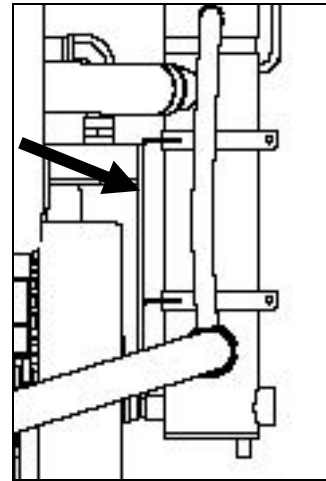
Coolant Heat Exchanger Removal/Installation (Cont)

Remove

Provide temporary support for the coolant heat exchanger in order to avoid dropping it.

Remove the four back sets of nuts, washers, and bolts at the heat exchanger mounting clamps.

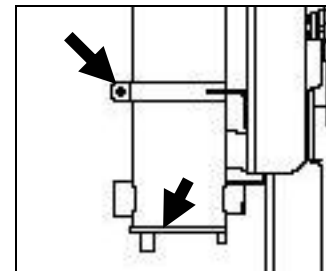
Remove the heat exchanger and clamps from the engine.



Disassemble

If required for replacement, remove the two front sets of nuts and bolts at the coolant heat exchanger clamps.

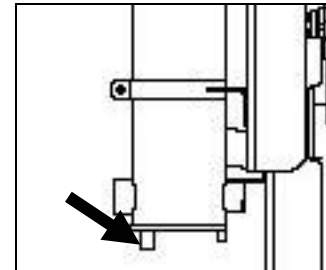
If required for replacement, remove the zinc plug and other pipe fittings from the heat exchanger.



Assemble

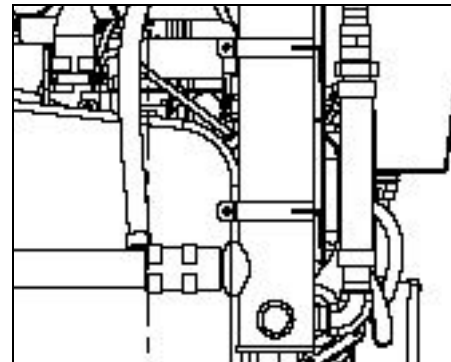
NOTE: Use teflon or other pipe sealant when installing threaded pipe fittings.

If missing, install the zinc plug (Cummins Fire Power Part No. 9750) and brass fitting (Cummins Fire Power Part No. 9751) in the bottom of the heat exchanger.



If missing, install the pipe fittings removed from the original heat exchanger. Refer to Drawing 8944 in Section 18 for component information.

If removed, position the two clamps on the heat exchanger and install the two front sets of nuts and bolts at the coolant heat exchanger clamps. Do not tighten at this time. Refer to Drawing 8944 in Section 18 for component information.



Coolant Heat Exchanger Removal/Installation (Cont)

Install

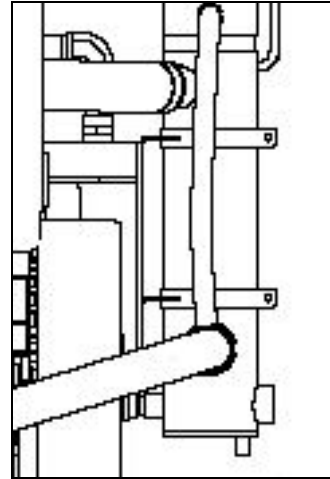
Provide support for the coolant heat exchanger in order to avoid dropping it.

Position the heat exchanger and clamps on the engine's mounting bracket and start the four bolts.

Start the nut and washers on the four bolts.

Align the heat exchanger with the required hose connections and tighten the four back sets of clamp fasteners.

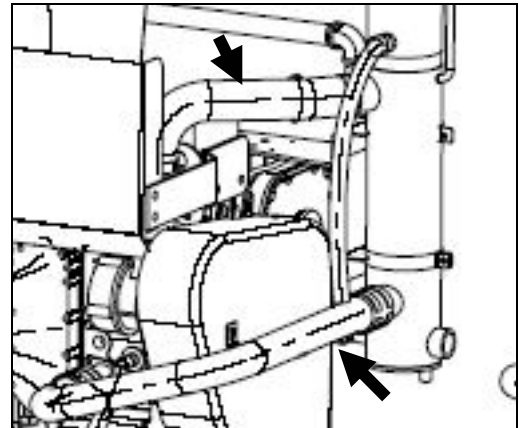
Tighten the two front sets of clamp fasteners.



Follow-Up

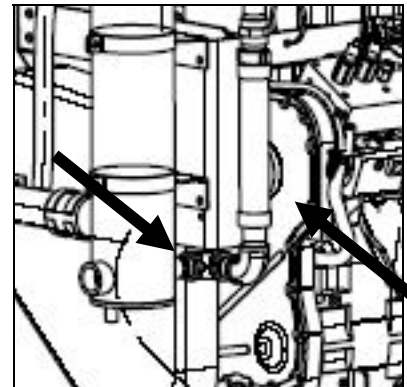
Install the Upper Engine Coolant Hose at the heat exchanger.

Install the Lower Engine Coolant and Fill Hose at the heat exchanger.



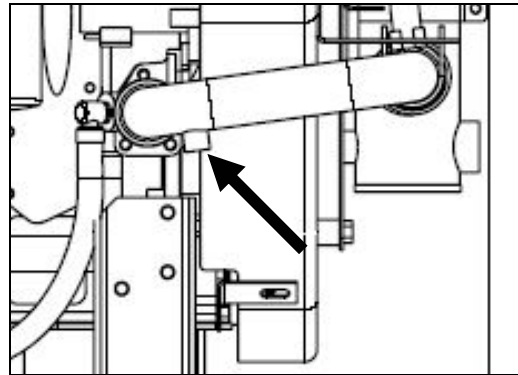
Install the 1" NPT raw water inlet piping from the charge air cooler to the heat exchanger. (Refer to Drawing 9595 in Section 18 for raw water supply piping details.)

Also, install any customer-supplied raw water outlet fittings.



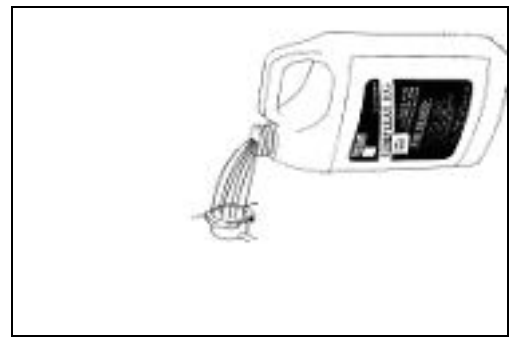
Coolant Heat Exchanger Removal/Installation (Cont)

Close coolant drain valve.



Refill the engine coolant. Refer to Drain and Flush Coolant System in Section 8.

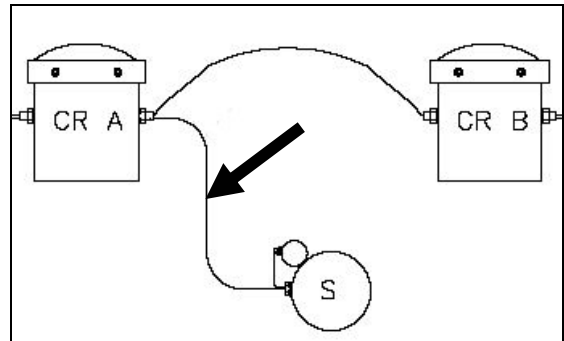
Install the coolant system pressure cap.



Reconnect the coolant heater power supply.



Reconnect the Contactor to Starter Cable (Cummins Fire Power Part No 9762) at the starter (Refer to Drawing 9767 in Section 18).



NOTE: Start the engine and do a quick check for leaks. If any coolant leaks are observed, stop the engine, repair the leak, check coolant level, then restart the engine. If no leaks are present, promptly establish raw water flow through the heat exchanger.



Start the engine. Refer to Normal Local Starting Procedure in Section 3.

Check for and repair any coolant leaks.

Coolant Heat Exchanger Removal/Installation (Cont)



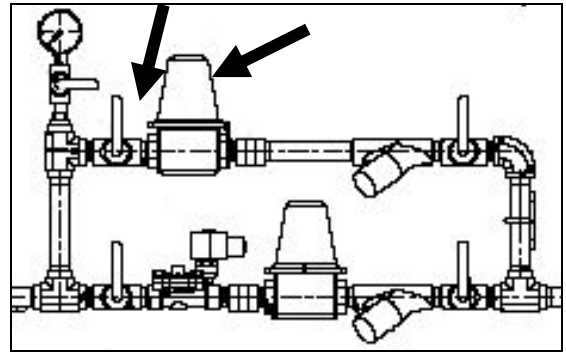
When establishing raw water flow, ensure that the raw water pressure does not exceed 414 kPa (60 psig) at the heat exchanger. Adjust the pressure regulators as required.

Slowly open the Raw Water Manifold Bypass Line Outlet Isolation Valve.

Observe raw water flow through the heat exchanger.

Adjust the bypass pressure regulator if required.

Close the Raw Water Manifold Bypass Line Outlet Isolation Valve.

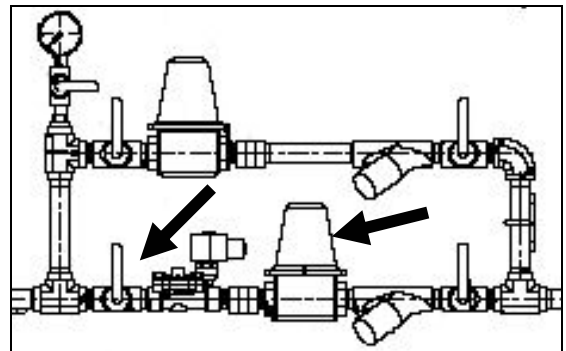


When establishing raw water flow, ensure that the raw water pressure does not exceed 414 kPa (60 psig) at the heat exchanger. Adjust the pressure regulators as required.

Slowly open the Raw Water Manifold Normal Line Outlet Isolation Valve.

Observe raw water flow through the heat exchanger.

Adjust the normal pressure regulator if required.



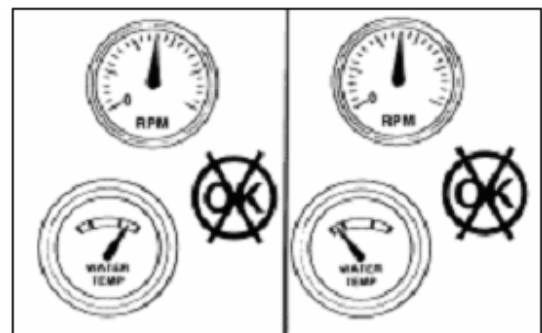
NOTE: If temperature does not stabilize, stop the engine and refer to Coolant Temperature Above Normal or Coolant Temperature Below Normal (Engine Running) in Troubleshooting Section 17.

Check that engine operating temperature stabilizes between about 82 and 93 °C [180 and 200 °F].

Check that no coolant hoses are collapsed.

When temperature has stabilized, stop the engine.

Ensure that repairs are completed satisfactorily.



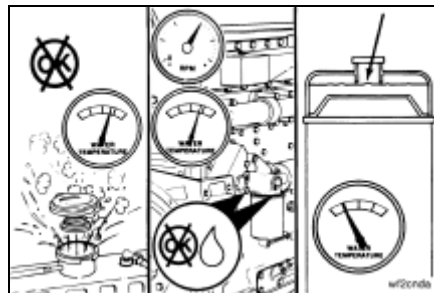
Coolant Heat Exchanger Removal/Installation (Cont)



WARNING

Do not remove the pressure cap from a hot engine. Wait until the coolant temperature is below 50°C [120°F] before removing the pressure cap. Heated coolant spray or steam can cause personal injury.

Check the coolant level. Refer to Check Coolant Level in Section 5. Add coolant if necessary.



Place the AUTO/MANUAL rocker switch in the AUTO position.

Return the fire protection system to operating status.

