

Power System Checklist

Safety Components System for a Caterpillar Model 3304 PCNA Engine.

Listed below are the items and functions that must be maintained in order for the power system to be considered permissible. For a complete equipment permissibility evaluation, this checklist must be used in conjunction with a machine checklist and, if so equipped an electrical system checklist.

All Inspections And Tests Shall Be Performed In Fresh Air.

Part 36 Machine Approval Nos. 31-93 -0,31-96-0

Manufacturer's Drawing No. T-1158

Revision A

Page 1 of 14

Do Not Change Without Approval From MSHA

- 1 . () It has been determined that the area in which the tests are to be Performed is fresh air.
- 2 . () This machine utilizes a Caterpillar four cylinder Model 3304 PCNA diesel engine.

Intake System

Figure 1 depicts the assembled intake system.

(Weekly) 3. All components appear to be the same as shown in the figure 1.

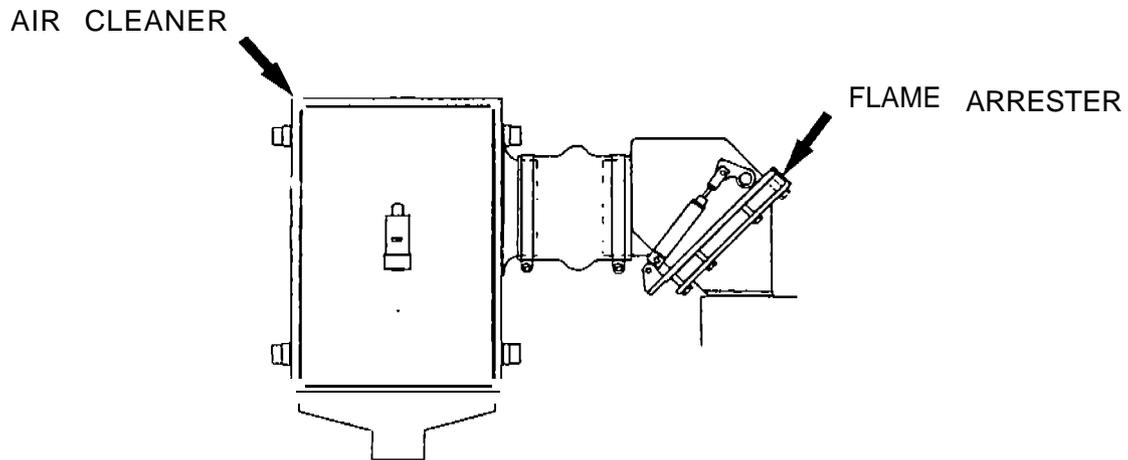


Figure No. 1: Assembled Intake System

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR Section 75.1914

- (Weekly) 4. () A copper gasket is installed between the air inlet adapter and the engine head as shown in figure 2.

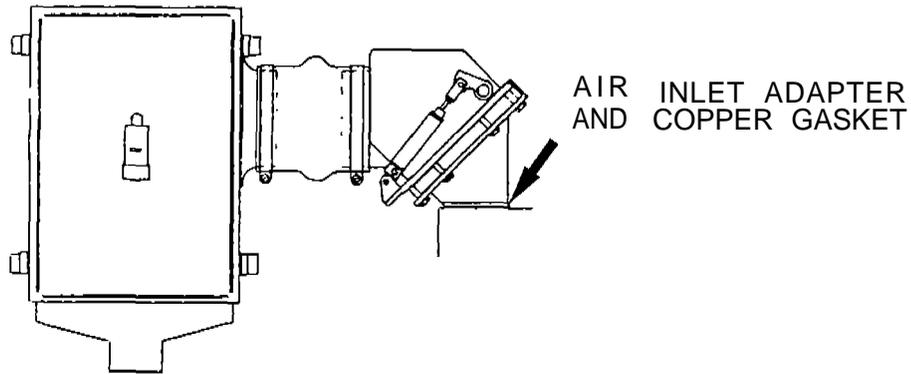


Figure No. 2: Air Inlet Adapter and Gasket

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR Section 75.1914

- (Weekly) 5. () The air inlet adapter is secured to the engine head with four bolts with lockwashers.
6. () The intake flame arrester is installed between the air inlet adapter and the intake shutoff valve. Remove the intake flame arrester. The arrester core is clean and has no apparent damage. Figure 3 is a picture of the flame arrester.

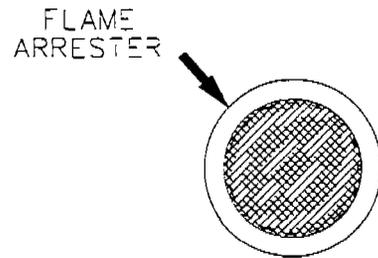


Figure No. 3: Intake Flame Arrester

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR, Section 75.1914

7. () Reassemble the intake system. A copper gasket is located between the flame arrester and the intake shutoff valve. An identical copper gasket is located between the flame arrester and the intake adapter. Figure 4 shows the locations of these gaskets.

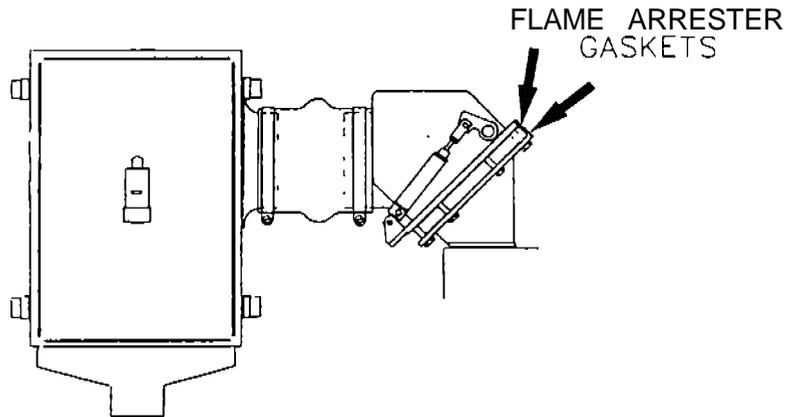


Figure No. 4: Flame Arrester Gaskets

- (Weekly) 8. () The bolts with lockwashers securing the intake shutoff valve and flame arrester to the air inlet adapter are in place and tight.
- (Weekly) 9. () The complete intake system shows no evidence of damage. There are no loose connection(s), cracks, or missing port plugs.

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR, Section 75.1914

Exhaust System

The exhaust system of the engine includes a water-cooled exhaust manifold, water-cooled exhaust pipe and a water bath exhaust conditioner (scrubber).

- (Weekly) 10. Figure 5 is a picture of a water-cooled exhaust manifold. The bolts securing the manifold to the engine head are in place and tight.

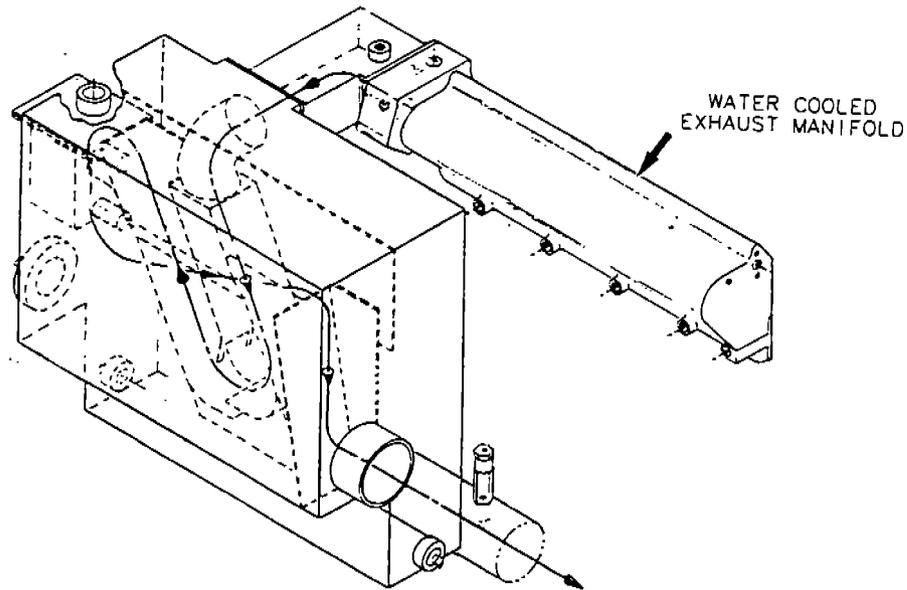


Figure No. 5: Water-Cooled Exhaust Manifold

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR, Section 75.1914

- (Weekly) 11. () There is a metal or metal-clad gasket between the flange of the exhaust manifold and the flange of the exhaust pipe as shown in figure 6.

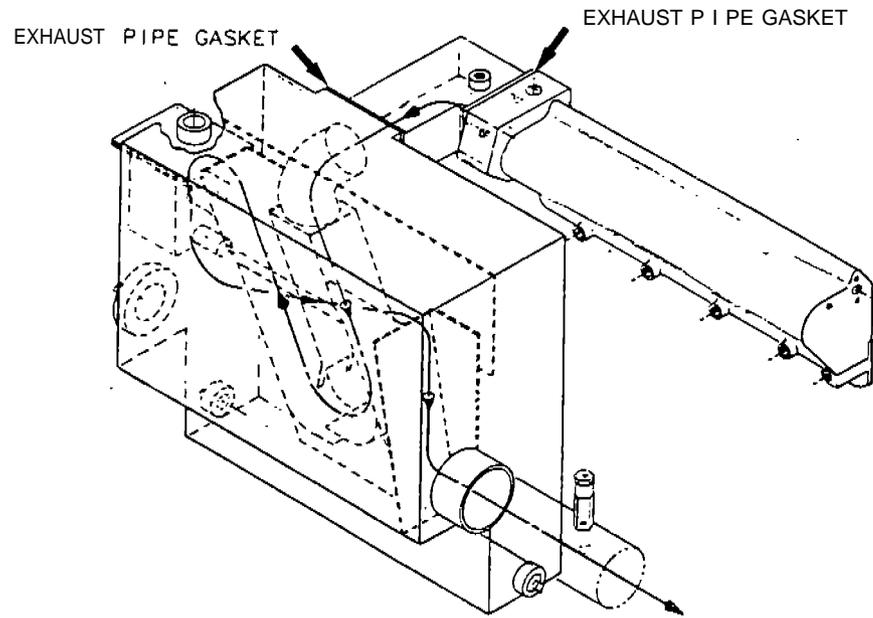


Figure No. 6: Exhaust Pipe Gaskets

- (Weekly) 12, () The exhaust pipe is securely fastened to the exhaust manifold. The four bolts with lockwashers are in place and tight.

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR Section 75.1914

- (Weekly) 13. () A copper gasket is installed between the exhaust pipe and the scrubber. The location is shown in Figure 6.
- (Weekly) 14. () The exhaust pipe is securely fastened to the scrubber with eight bolts with lockwashers.
- (Weekly) 15. () The scrubber is in good condition with no open holes or cracks due to corrosion, accidents, missing plugs, etc.

System Operatio

16. () Connect a manometer or magnehelic (vacuum gauge) at the intake port in the intake adapter shown in Figure 7. Run the engine at full throttle with no load. The intake vacuum does not exceed 30 inches of water.

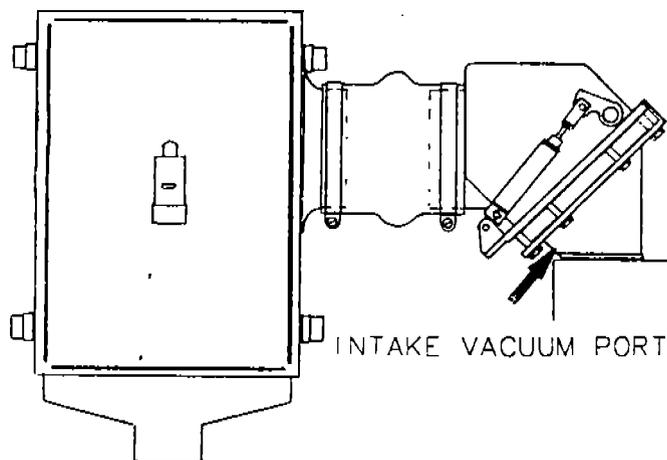


Figure No. 7: Intake Vacuum Port In Intake Adapter

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR, Section 75.1914

- (Weekly) 17. () The engine shuts down when the stop button located on the instrument panel is held in.
18. () The plug sealing the intake vacuum port is securely reinstalled.
19. () Connect a manometer or magnehelic (vacuum gauge) to the test port in the exhaust pipe shown in figure 8. Run the engine at full throttle and no load. The exhaust back pressure does not exceed 34 inches of water.

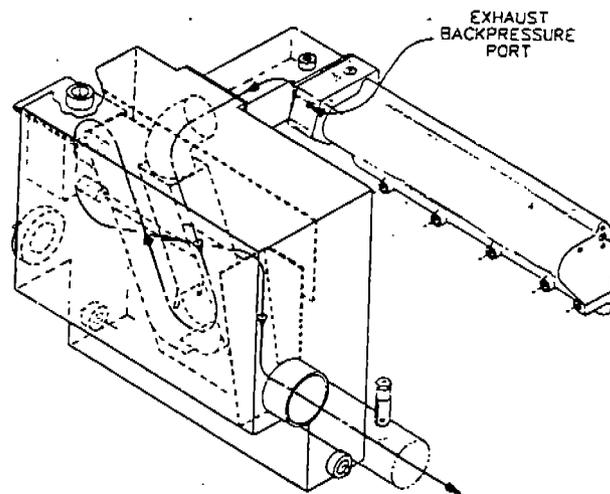


Figure No. 8: Exhaust Back pressure Port in Exhaust Pipe

20. () Shut the engine down and remove the manometer. Securely reinstall the pipe plug in the exhaust pipe.

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR, Section 75.1914

Test the temperature sensor valve that is installed in the outlet (top) of the exhaust pipe. Figure 9 shows the location of this sensor. Two test methods are offered for information. Either method is acceptable.

Method 1:

Block radiator with cardboard or brattice cloth. Start engine and run at high idle until shutdown of engine occurs. Note engine temperature gauge on panel at shutdown. This temperature should not exceed 202 °F.

Method 2:

Alternate Test - Remove the temperature valve and plug the hole in the water jacket. Place the probe (with engine air line attached in a water/antifreeze mix and heat until engine shuts down. This temperature should not exceed 212 °F.

21. () Sensor shuts engine down at correct temperature.

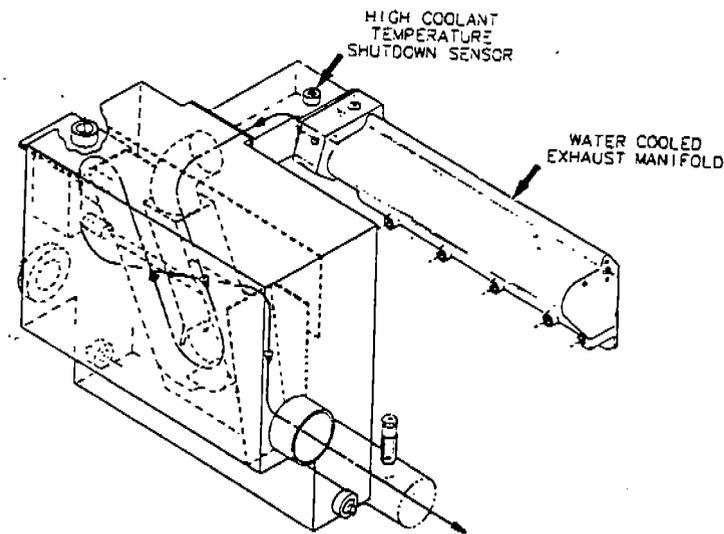


Figure No. 9: Location of High Coolant Temperature Shutdown Sensor Exhaust Pipe Outlet

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR Section 75.1914

22. () The temperature sensor valve in the scrubber outlet pipe shuts down the engine before the temperature exceeds 180 °F. Figure 10 shows the location of this sensor.

To test the temperature sensor valve, unscrew the sensor valve from the exhaust pipe and install a pipe plug into the port from which the sensor was removed. Keep the air line connected to the sensor. Start the engine and immerse the sensor element end of the temperature sensor valve into a heated water/antifreeze mixture. The sensor must open and exhaust the safety system air pressure and shut down the engine before the maximum temperature listed above is reached.

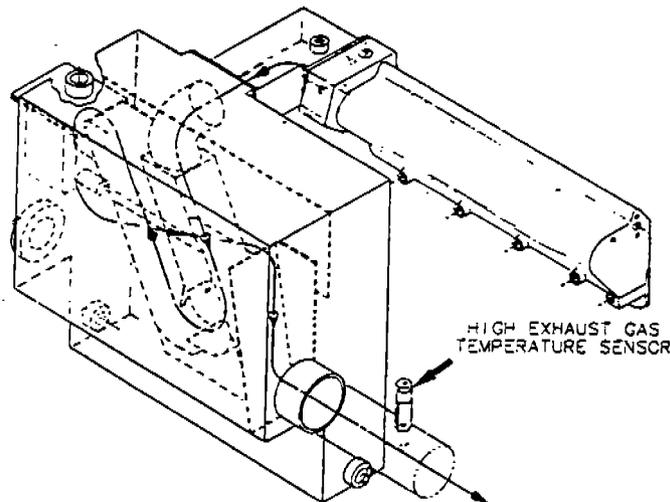


Figure No. 10: High Exhaust Gas Temperature Sensor Valve Location

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR Section 75.1914

(Weekly) 23. () Temperature sensors are reinstalled in their respective places and the engine air hoses are attached.

(Weekly) 24. () The operating water level of the scrubber is correct.

Run the engine for about five (5) minutes. Shut the engine off and remove the scrubber fill port shown in figure 11. (CAUTION: SCRUBBER WATER MAY BE HOT!) A small amount of water may drain from this port. The water must not be less than 1-1/2 inches below the bottom of this port.

Replace scrubber fill port.

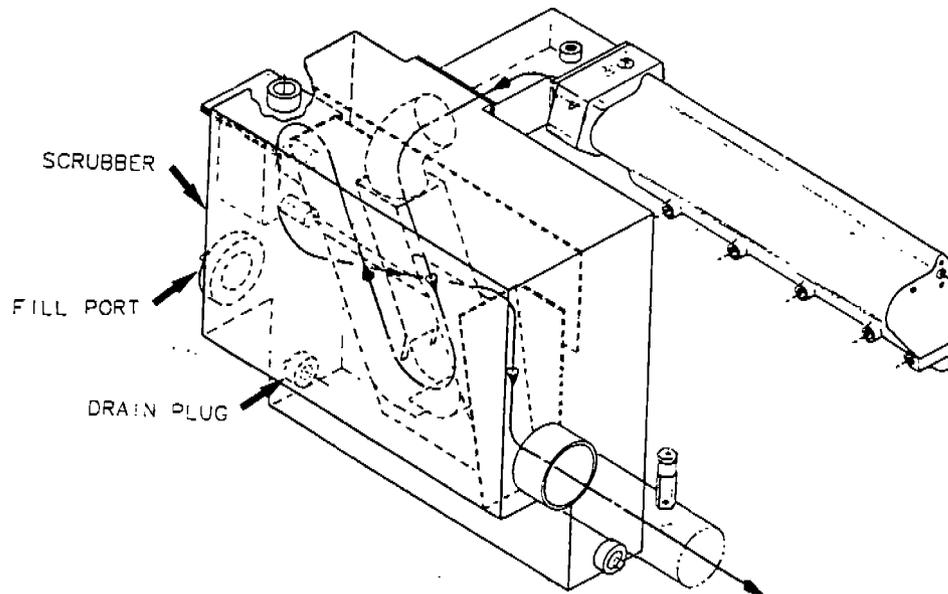


Figure No. 11: Scrubber Fill Port

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR Section 75.1914

(Weekly) 25. () The engine automatically shuts down at a safe minimum water level.

To test the low water shutdown sensor, run the engine and shut the manual water valve at the outlet of the water makeup tank. This will cause the engine to automatically shut down (this may take several minutes). The water level should be no lower than 4 inches below the bottom of the scrubber fill port. Verify that the operator panel indicates a low makeup water condition.

(Weekly) 26. () After engine has automatically shutdown due to low water, try restarting the engine prior to replenishing the water. The engine may turn over but must not start.

Reinstall scrubber fill port plug and reopen makeup tank water valve.

(Weekly) 27. () Start the engine and operate it at idle and engage the emergency stop button on the operator panel to close the intake air shutoff valve. The engine shuts down.

(Weekly) - Designates those inspection checks that must be performed during the weekly maintenance examination in accordance with 30 CFR Section 75.1914