

**TAMROCK USA INC.**  
**POWER SYSTEM CHECK LIST**

for

SAFETY COMPONENT SYSTEM

USING AN ISUZU QD-100-306 (ALSO DESIGNATED MODEL # 4BD1PW) ENGINE

MSHA CERTIFICATION 31 D116

Items and functions used in this document must be maintained in order for the power system to be considered permissible. For a complete vehicle permissibility evaluation, this checklist must be used in conjunction with a vehicle permissibility checklist and, if so equipped an electrical system checklist.

(WEEKLY) WHERE SHOWN ON THE FOLLOWING PAGES DESIGNATES THOSE INSPECTION CHECKS THAT MUST BE PERFORMED DURING THE WEEKLY MAINTENANCE EXAMINATION IN ACCORDANCE WITH 30 CFR SECTION 75.1914.

ALL INSPECTIONS AND TESTS SHALL BE PERFORMED IN FRESH AIR.

1. ( ) It has been determined that the area in which the tests are to be performed is in fresh air.
2. ( ) This machine utilizes an ISUZU 4-cylinder diesel, engine,model QD-100-306,also designated 4BD1PW.

INTAKE SYSTEM

Figure 1 shows the assembled Intake System.

- (WEEKLY) 3. ( ) All components appear to be the same as those shown in Figure 1.

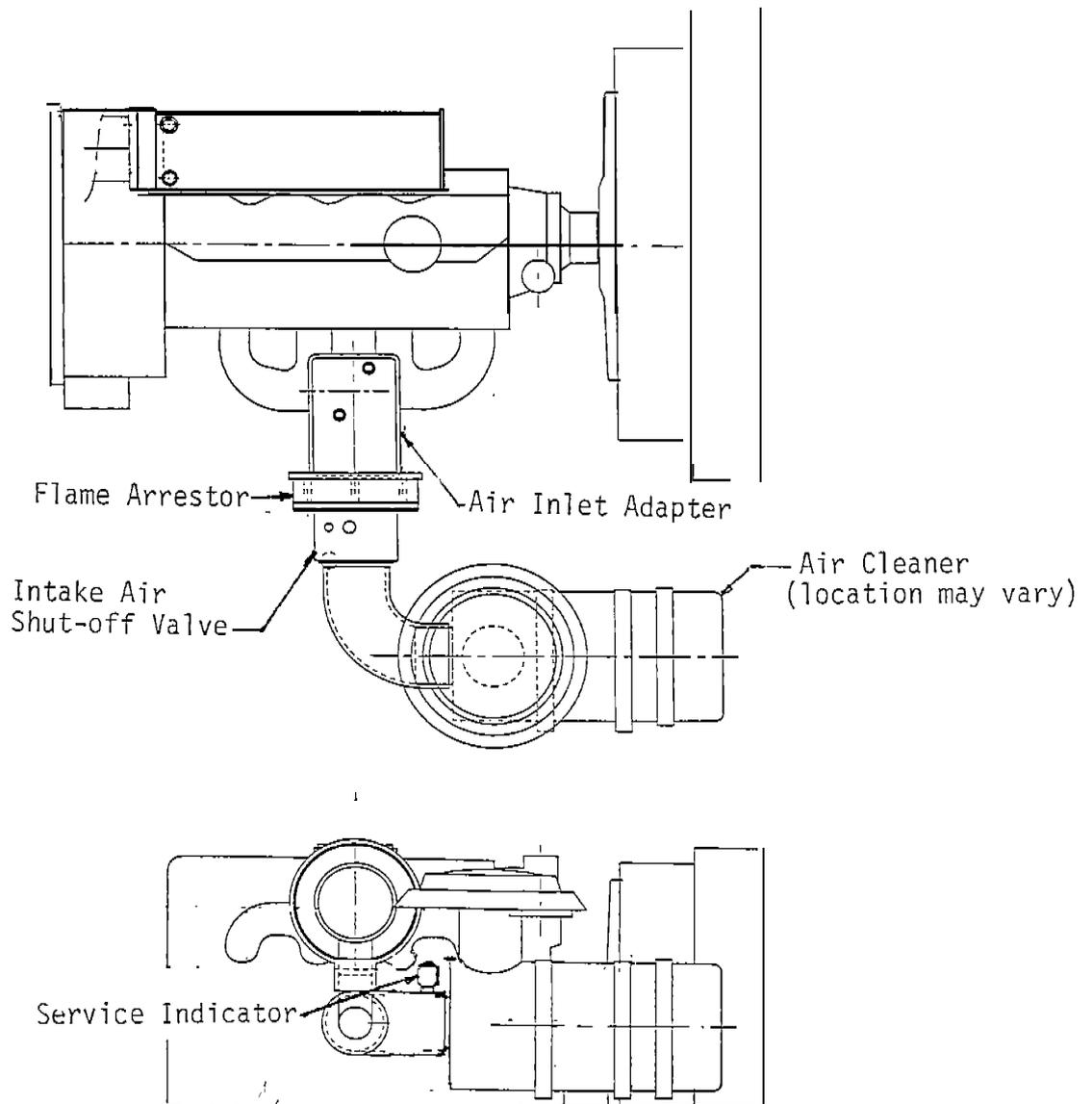


Figure 1. Assembled Intake System

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- (WEEKLY) 4. ( ) A copper gasket is installed between the Air Intake Adapter and the engine Intake Manifold as shown in Figure 2.

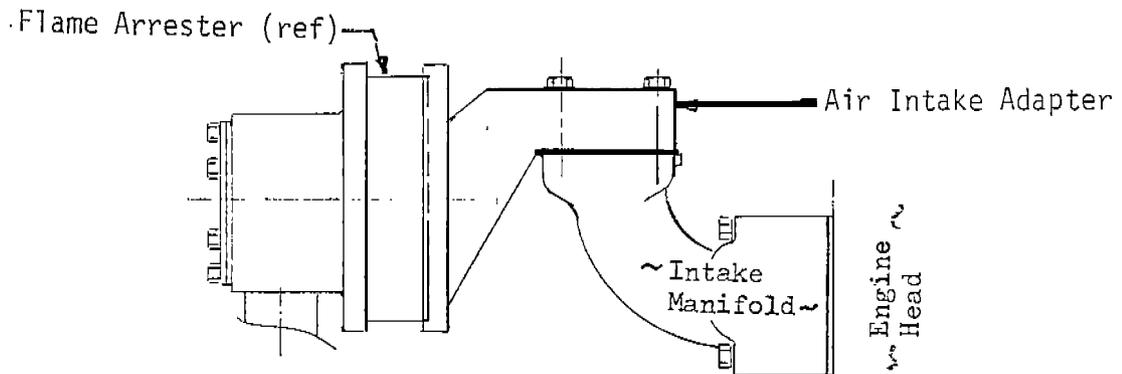


Figure 2. Gasket between Air Intake Adapter and Intake Manifold.

- (WEEKLY) 5. ( ) The fasteners securing the Air Intake Adapter to the Engine Intake Manifold are in place and tight.
6. ( ) Remove the Flame Arrester. The Intake Flame Arrester is shown in Figure 3. The Flame Arrester core is clean and has no apparent damage.

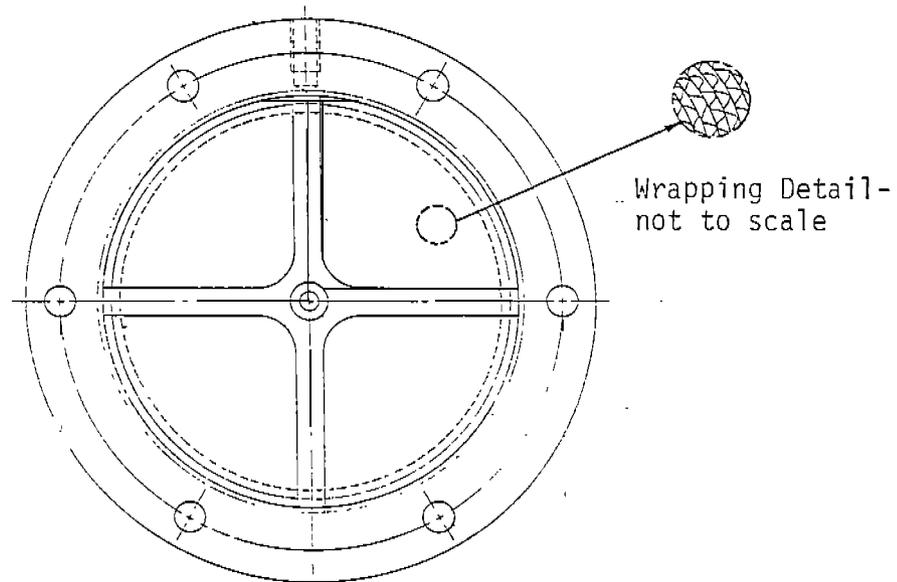


Figure 3. Intake Flame Arrester

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7. ( ) A 0.018 inch wire gauge cannot pass through the openings of the flame arrester core as shown in Figure 4. The procedure for making this inspection (dated August 5, 1985) is attached.

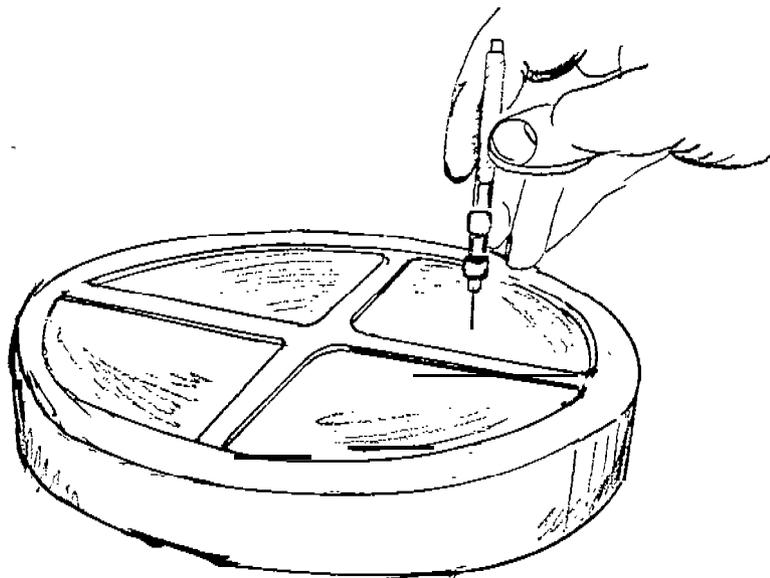


Figure 4. Wire Gauge Cannot Pass Through Flame Arrester

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EVALUATION PROCEDURES FOR INSPECTING CRIMPED-RIBBON TYPE  
INTAKE FLAME ARRESTERS ON DIESEL-POWERED EQUIPMENT

1. Remove flame arrester assembly from housing.
2. Place on flat surface with a contrasting background under the flame arrester such as, brattice cloth or a clean white cloth.
3. Adequate lighting is required; cap lamp lighting is not sufficient.
4. Visually inspect each side of flame arrester for openings or spaces, obviously greater than the triangular spaces of the core. These kinds of openings may have been caused by prying a screwdriver or other such objects against or through the flame arrester core during manufacturing or in mine maintenance. Flame arrester cores with such damage must not be permitted to be used on permissible equipment.
5. Visually insert each side of the core for places where the windings of the flame arrester core appear to be separating such that gaps can be seen. If such gaps exist they must be checked as follows:
  - a. The only measuring tool considered acceptable for performing this evaluation is an 0.018 inch calibrated plug gauge. (Sometimes called a wire gauge.) The plug gauge is to be mounted in a gauge holder (Figure 5) weighing 1 to 1.5 ounce and projecting at least one inch out of the end.



Figure 5

- b. Grasp the gauge holder lightly between the index finger and thumb. Place the wire tip at the point in question; making sure the plug gauge is vertical. Using only the weight of the gauge and holder see if it will enter the apparent gap. Do not attempt to force or wiggle the gauge through the opening.
    - c. If the plug gauge enters the opening, the flame arrester core must not be used on permissible equipment.
6. Visually inspect the triangles in the flame arrester core (both sides) for triangles that appear to be larger than the rest. If such conditions exist, these opening must be checked as previously described in Section 5 a, b, c.
7. Finally, if the flame arrester core passes all of the above evaluations, a final check should be performed on at least 5 triangles on each side of the core with the procedure described in Section 5 a, b, c. In performing this check, the tip of the plug gauge must be placed against a specific triangular opening. If this special care is not taken, the evaluation will be invalid.

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(WEEKLY) 8. ( ) A copper gasket is installed between the intake flame arrester and the air intake adapter as shown in Figure 6.

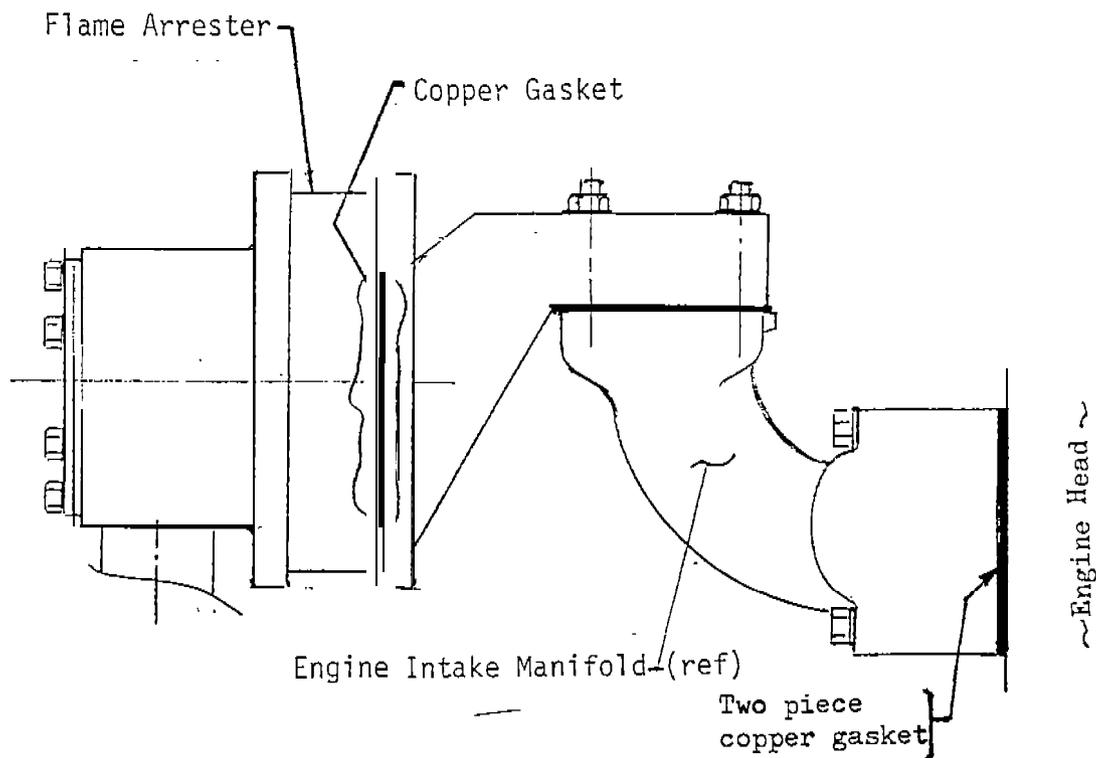


Figure 6. Flame Arrester Gasket

(WEEKLY) 9. ( ) The fasteners securing the intake air shut-off housing and flame arrester to the air intake adapter are in place and tight.

(WEEKLY) 10a. ( ) A 2-piece copper gasket is installed between the engine head and intake manifold as shown in Figure 6.

b. ( ) The fasteners securing the intake manifold to the engine head are in place and are tight.

c. ( ) The complete intake system has no signs of damage. There are no loose connections, cracks or missing port plugs or caps.

## EXHAUST SYSTEM

The exhaust system of the engine includes a water-cooled exhaust manifold, exhaust pipe, a waterbath exhaust conditioner and a make up water tank

- (WEEKLY) 11. ( ) The nuts and lockwashers securing the exhaust manifold to the engine are in place and tight as shown in Figure 7.

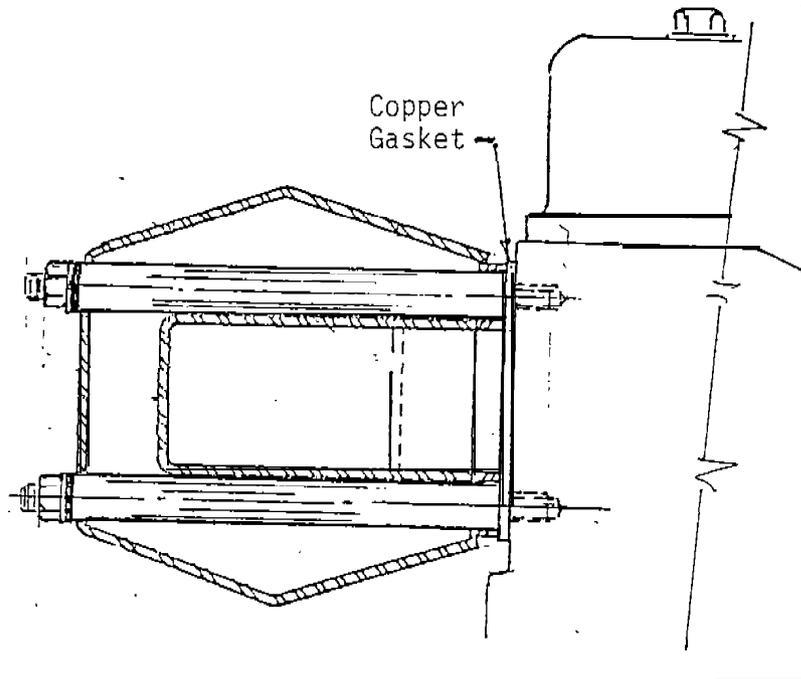


Figure 7. Water-Cooled Exhaust Manifold

- (WEEKLY) 12. ( ) A copper gasket - in two pieces - is installed between the exhaust manifold and the engine head, as shown in Figure 7.

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(WEEKLY) 13. ( )

A copper or bronze gasket is installed between the flange of the exhaust pipe and the flange of the exhaust manifold as shown in Figure 8.

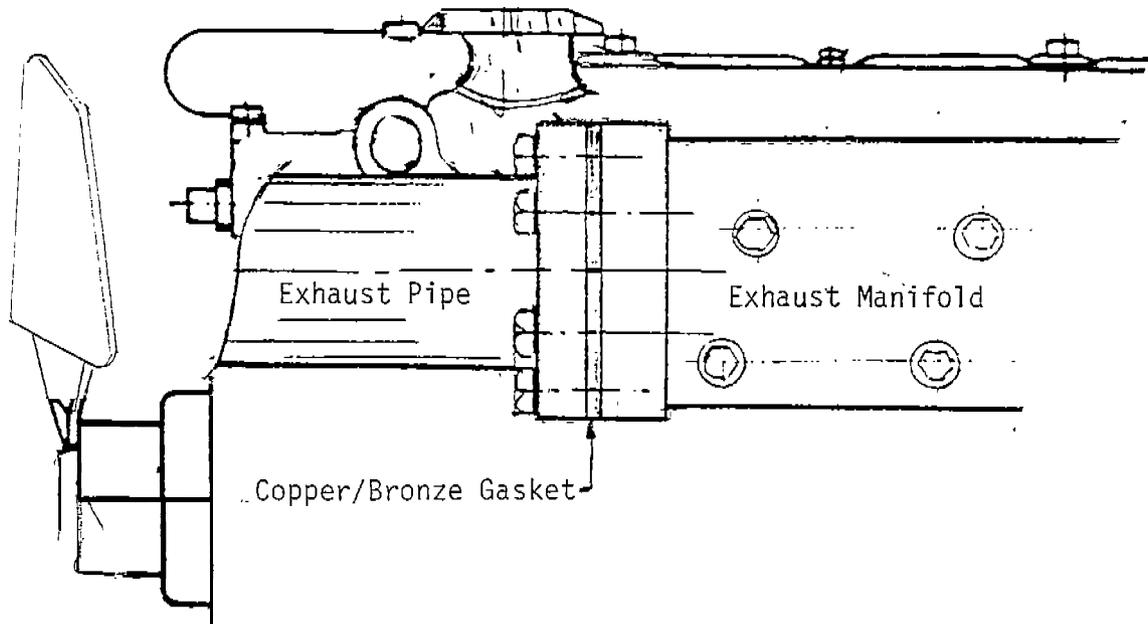


Figure 8. Gasket Between Exhaust Pipe and Exhaust Manifold Flange

(WEEKLY) 14. ( )

Fasteners securing the exhaust pipe to the flange of the exhaust manifold are in place and tight.

(WEEKLY) 15. ( )

A copper or bronze gasket is installed between the flange of the exhaust pipe and the flange of the exhaust conditioner as shown in Figure 9.

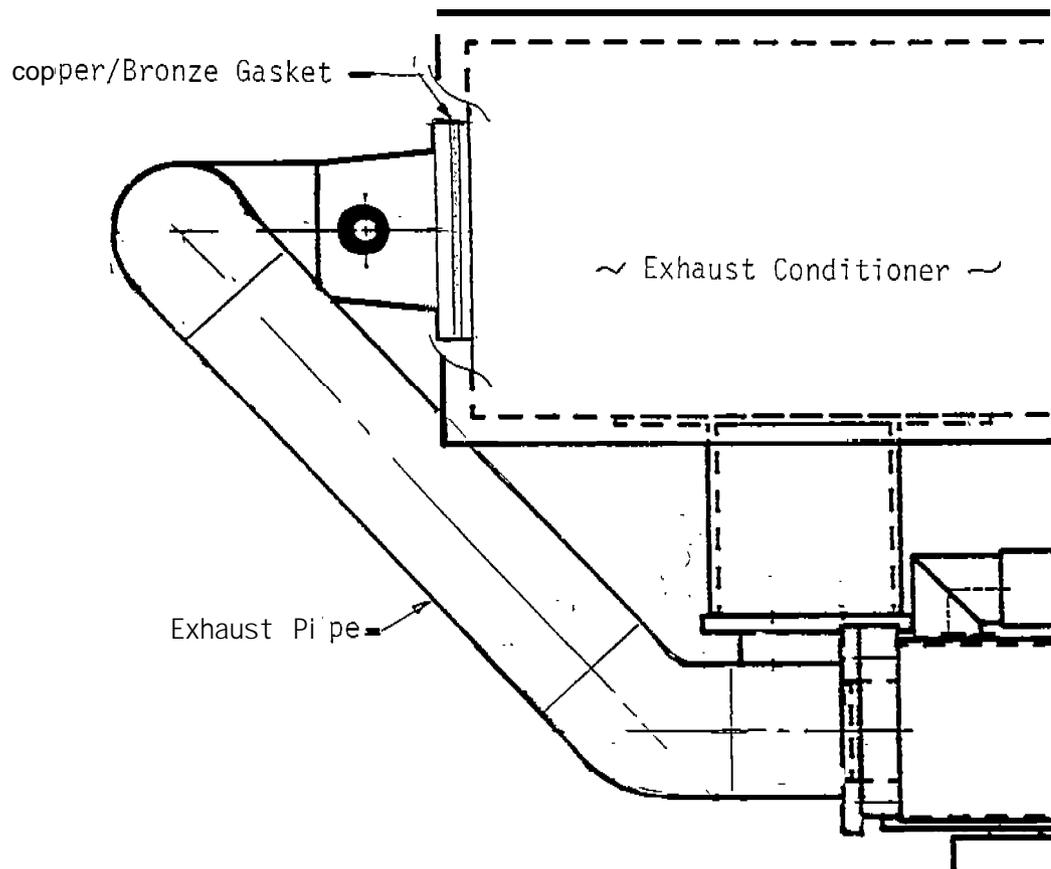


Figure 9. Gasket Between Exhaust Pipe and the Flange of the Exhaust Conditioner

(WEEKLY) 16. ( )

Fasteners securing the exhaust pipe to the flange of the exhaust conditioner are in place and tight.

17. ( ) Remove exhaust conditioner cover.
18. ( ) A bronze gasket is installed between the flange of the exhaust conditioner and the flange of the scrubber insert as shown in Figure 10.

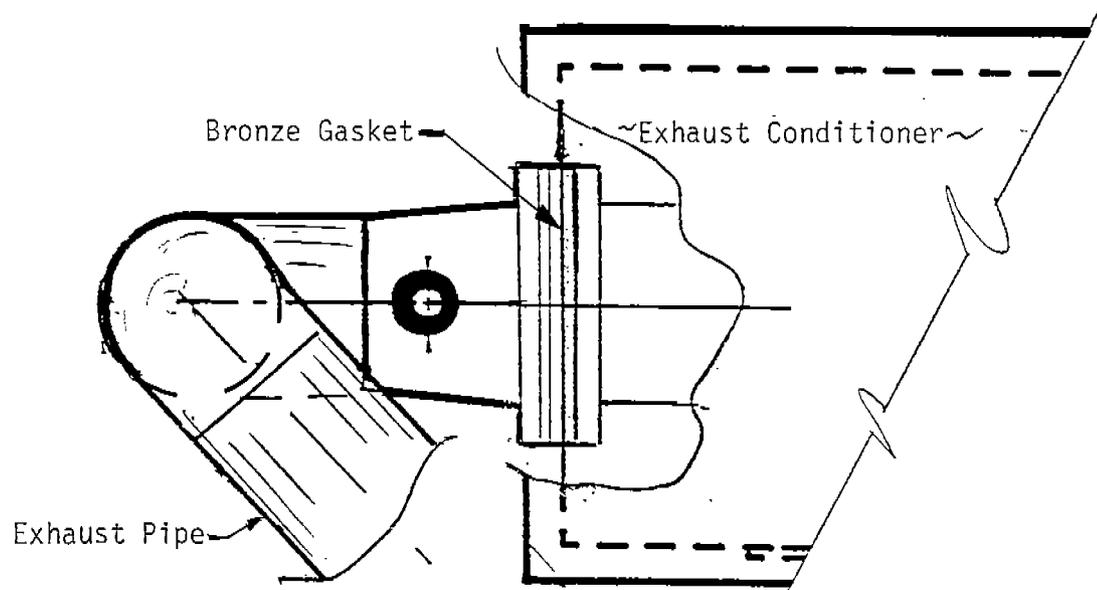


Figure 10. Gasket Between Exhaust Conditioner Flange and Scrubber Insert Flange.

19. ( ) Replace exhaust conditioner cover. All fasteners securing the cover are in place and tight.

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- (WEEKLY) 20. ( ) The exhaust conditioner is in good condition with no open holes or cracks due to corrosion, accidents, missing plugs, etc.

SYSTEM OPERATION

- (WEEKLY) 21. ( ) The engine shuts down when the “push to stop engine” button is held in.

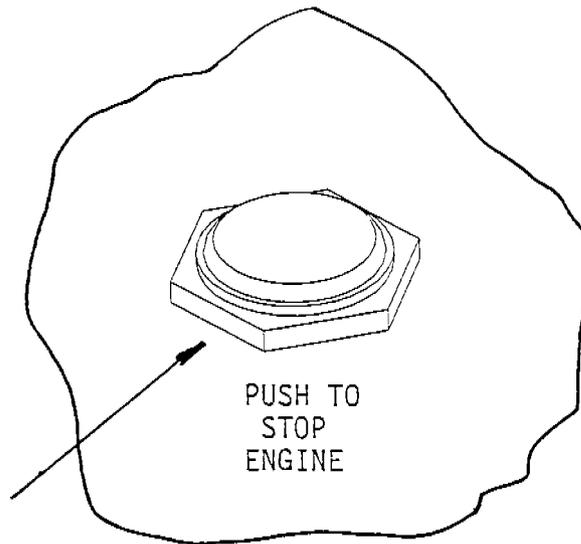


Figure 11. “Push To Stop Engine” Button

22. ( ) Connect a manometer or magnehelic (vacuum gauge) to the intake vacuum port shown in Figure 12. Run the engine at full throttle with no load. The intake vacuum does not exceed 25" of water.

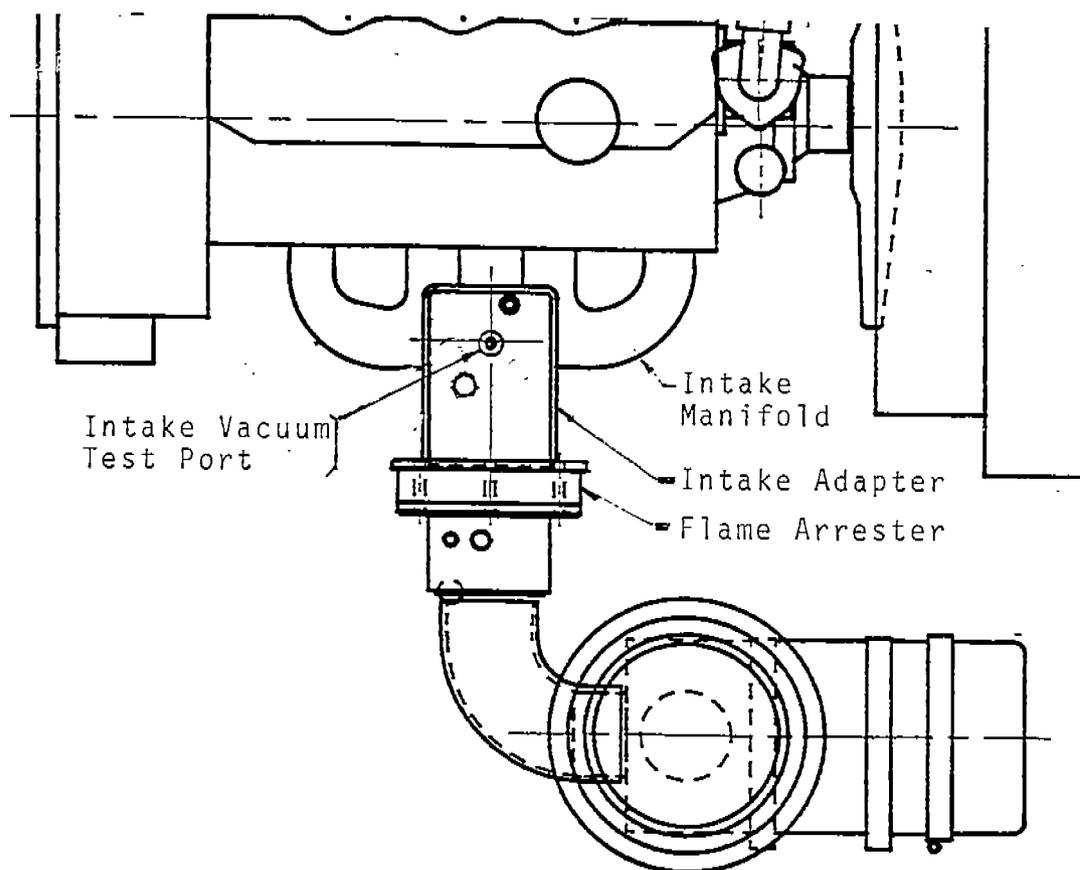
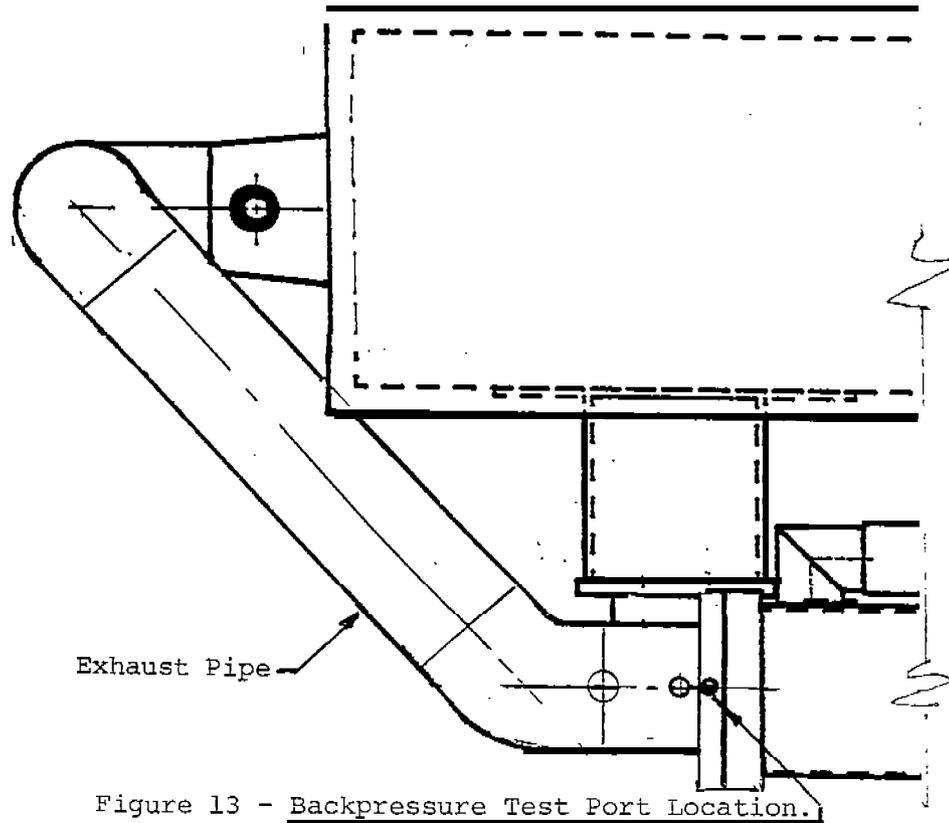


Figure 12. Intake Vacuum Location

23. ( ) Remove the manometer or magnehelic and securely reinstall the vacuum port plug.

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24. ( ) Connect a manometer or magnahelic to the test-port in the exhaustpipe upper flange shown in Figure 13. Run engine at full throttle/no load with exhaust conditioner filled to the normal operating level. The exhaust backpressure does not exceed 40 inches of water column.



25. ( ) Shut engine down and remove manometer or magnahelic and securely reinstall test plug.
- (WEEKLY) 26. ( ) With engine running, check the air system for leaks (i.e., hose connections, sensors, air tanks, air tank drain valves, filters, control valves, float valve, etc.) No leaks were found.

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(WEEKLY) 27. ( ) The Low Water Shut-down Valve operates properly, shutting the engine down at Exhaust Conditioner low water level.

To check for low water shut-down function, use the Test Port shown in Figure 14.

Close the valve in the water supply line between the Make-up Tank and the Exhaust Conditioner. Operate the engine at medium speed. Remove the Low Water Test Port Plug.

**CAUTION: THE EXHAUST CONDITIONER WATER MAY BE HOT!**

The engine must shut down before water ceases to flow from the Test Port.

If the engine does not shut down as described above, the Low Water Shut-down Valve must be adjusted and the test repeated until engine shut-down occurs before water ceases to flow from the Low Water Test Port.

(WEEKLY) 28. ( ) Replace and tighten the Low Water Test Port Plug and the Fill Port Plug - if not in place.

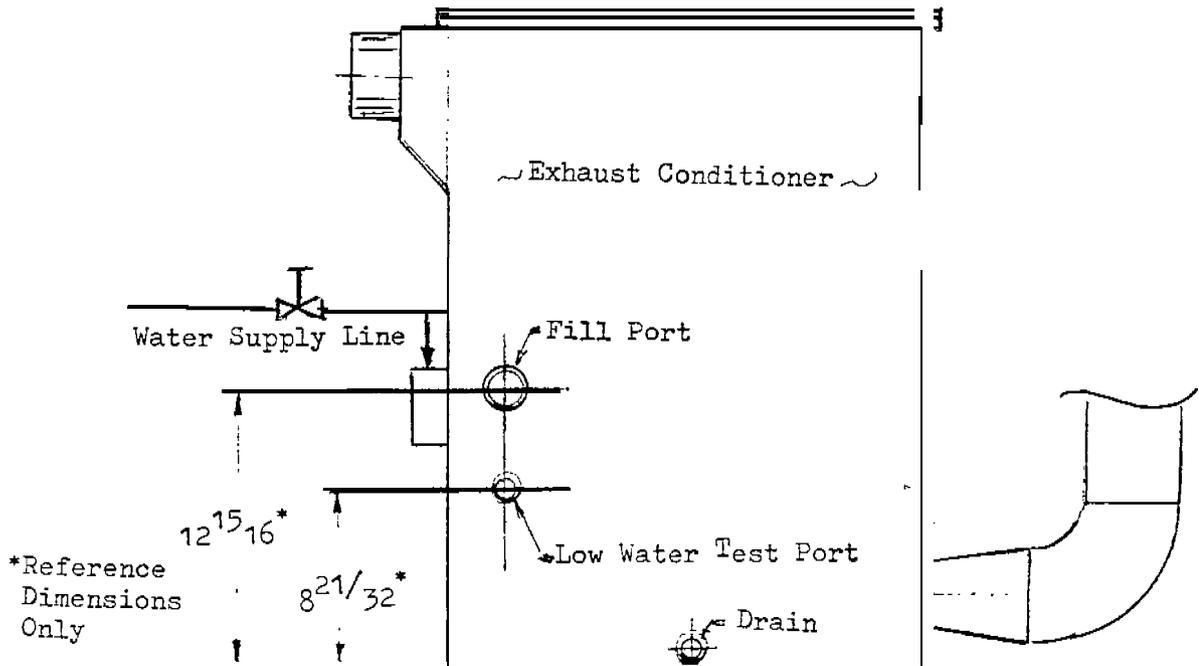


Figure 14. Location of Low Water Test and Fill Ports.

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(WEEKLY) 29. ( ) After the engine has automatically shut down due to, exhaust conditioner low water level, try restarting the engine prior to replenishing the exhaust conditioner water. The engine may turn over but must not start.

(WEEKLY) 30. ( ) Without refilling the exhaust conditioner, start the engine, operate it at high idle, and engage the emergency intake air shut-off valve. The valve handle is shown in Figure 18. The airshut-off valve closes immediately and shuts down the engine. To accomplish this test, it is necessary to have a helper keep the float in the exhaust conditioner in its upper most position (with exhaust conditioner cover off) for the endurance of the test.

(WEEKLY) 31. ( ) Reset the emergency intake air shut-off valve at the valve proper.

( ) Replenish the exhaust conditioner water through the fill port located 12-15/16 inches above the outside bottom of the conditioner tank as shown in Figure 16.

( ) Open the make-up water supply valve.

32. ( ) The Safety/Cooling Systems include coolant temperature sensing using a temperature sensing valve placed in the coolant circuit as shown in Figure 15.

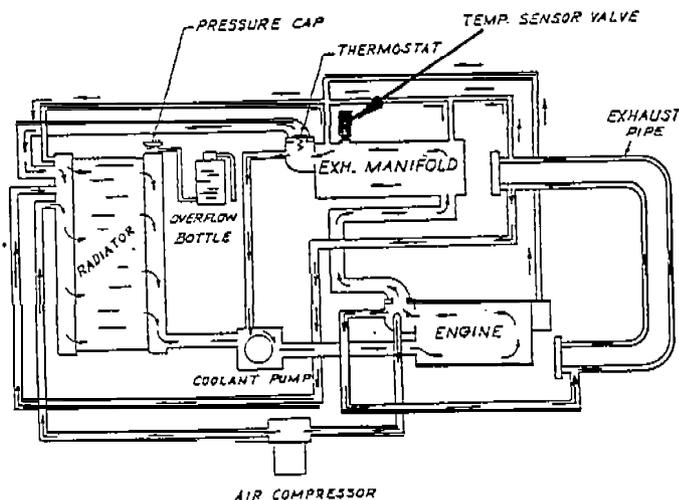


Figure 15. Safety/Cooling System

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To test the temperature sensor function, two test methods are offered. Either method is acceptable.

METHOD 1:

Unscrew the sensor valve and install a pipeplug in it's place. Reattach the safety system airhose to the sensor. Start the engine and immerse the end of the temperature sensor valve in a heated and agitated mixture of water and antifreeze. The sensor must open and exhaust the safety system air pressure and shut down the engine before the water/antifreeze mixture exceeds 212°F.

METHOD 2:

- a. With engine idling, slowly remove sensor hose , thus venting safety system air pressure. This must cause the engine to shut down.
  - b. Remove sensor and attach to low pressure shop air, then test as in Method 1 above. Sensor must vent air before temperature exceeds 212°F
33. ( ) Using either Method 1 or Method 2, the temperature sensor shuts engine down (opens) before the water/antifreeze mixture reaches 212°F.
34. ( ) The temperature sensor is reinstalled and the Safety System air hoses are securely and properly attached.