TAMROCK LOADERS INC.

POWER SYSTEM CHECKLIST

Safety Components System with a
Caterpillar 3306 PCNA Engine

MSHA Certification 31 D 101

Machine Approvals: 31-26-3, -103, -125

Items and functions in this document must be maintained for the Safety Component 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 fresh air.

2. ( ) This machine utilizes a Caterpillar six cylinder Model 3306 PCNA diesel engine.

INTAKE SYSTEM

Figure 1 shows the assembled intake system.

(WEEKLY) 3. ( ) All components appear to be the same as one of the diagams shown in Figure 1.

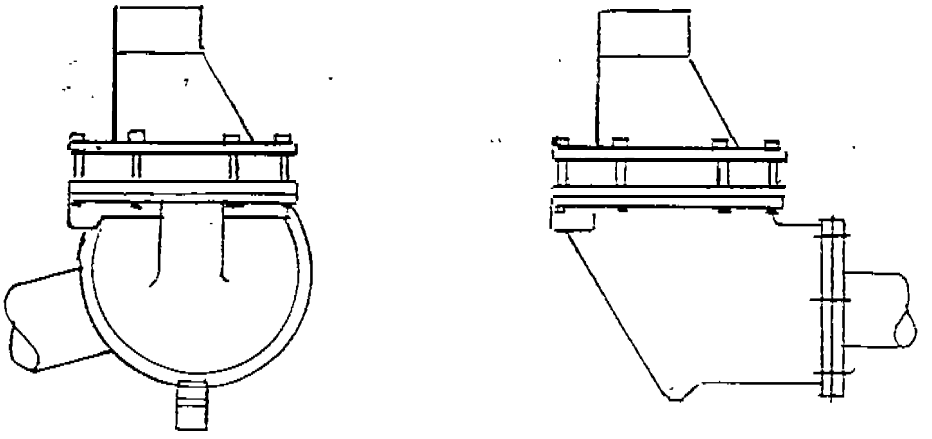

Figure 1. Assembled Intake System

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WITHOUT THE PERMISSION OF MSHA

(WEEKLY) 4.( ) A copper gasket is installed between the air intake adapter and the engine as shown in Figure 2.

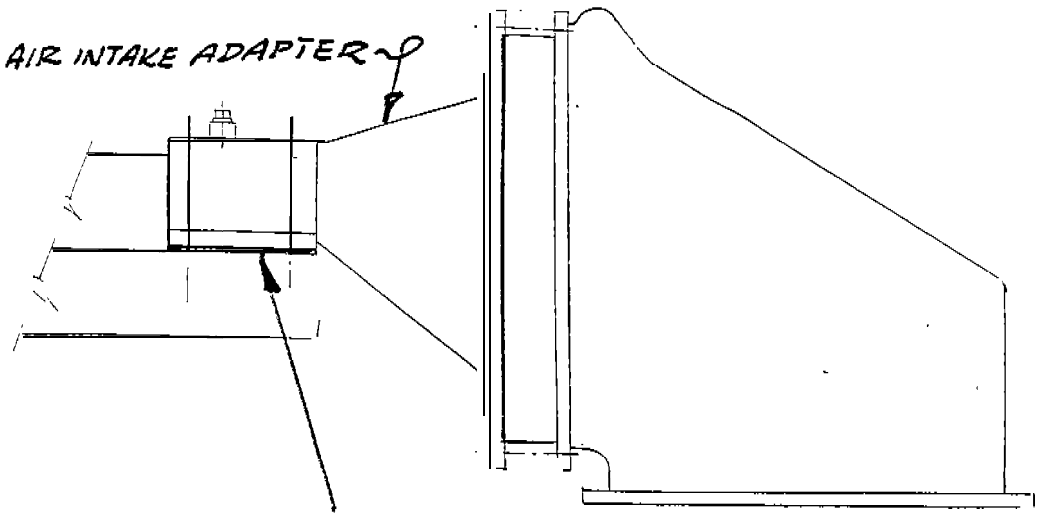

Figure 2. Gaskets Between Air Intake Adapter and Engine Cover Plate and Engine

(WEEKLY) 5. ( ) A copper gasket is installed under the cover plate for the Caterpillar optional intake port. Port located on opposite end of intake manifold.

(WEEKLY) 6. ( ) The fasteners securing the air intake adapter to the engine are in place and tight.

(WEEKLY) 7. ( ) The fasteners securing the coverplate for the optional intake port to the engine are in place and tight.

8. ( ) Remove the intake flame arrester. The intake flame arrester is shown in Figure 3. The flame arrester core is clean and has no apparent damage.

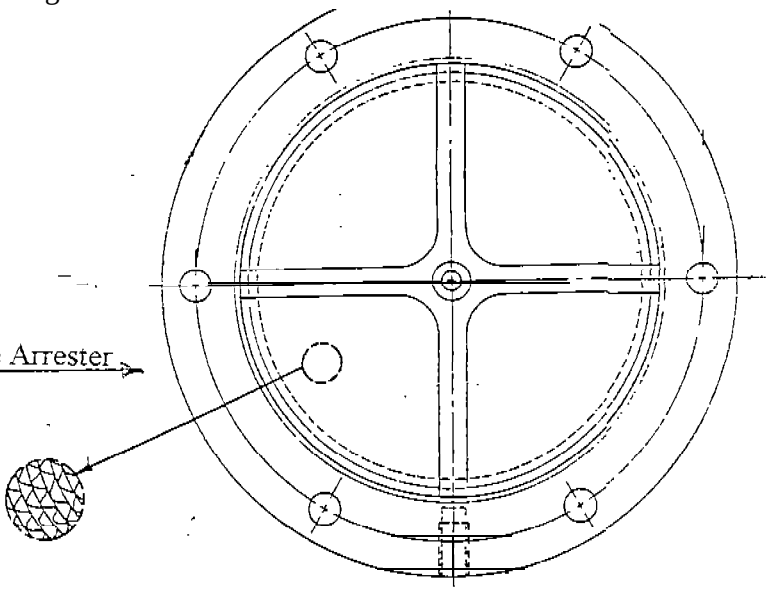

Figure 3 Intake Flame Arrester

9. ( ) 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.

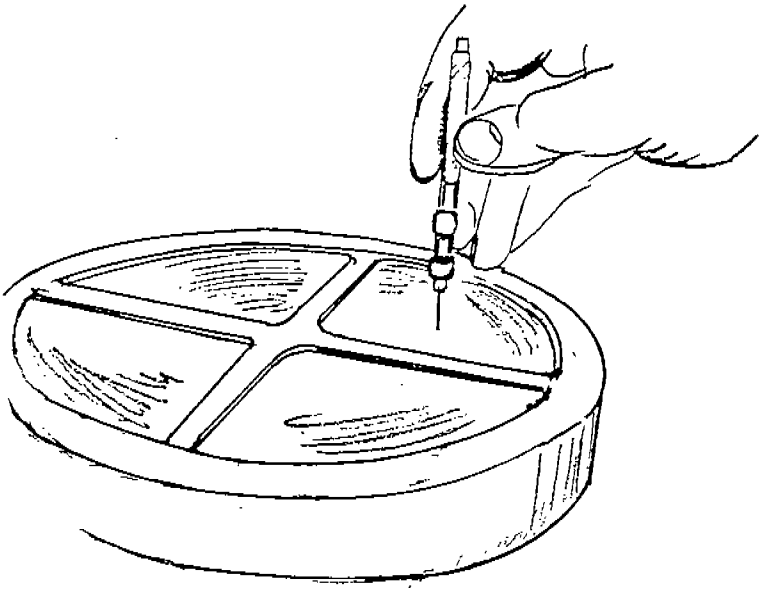

Figure 4. Wire Gauge Cannot Pass Through Flame Arrester

EVALUATION PROCEDURES FOR INSPECTING CRIMPED-RIBBON TYPE INTAKE FLAME ARRESTERS ON DIESEL-POWERED EQUIPMENT (AUGUST 5, 1985)

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 spaced, obviously greater than the triangular spaces of the core. The 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 are not permitted for use on permissible equipment.

5. Visually inspect 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 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 guage 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 may 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 openings 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.

(WEEKLY) 10. ( ) A copper gasket is installed between the intake flame arrester and the air intake adapter as shown in Figure 6.

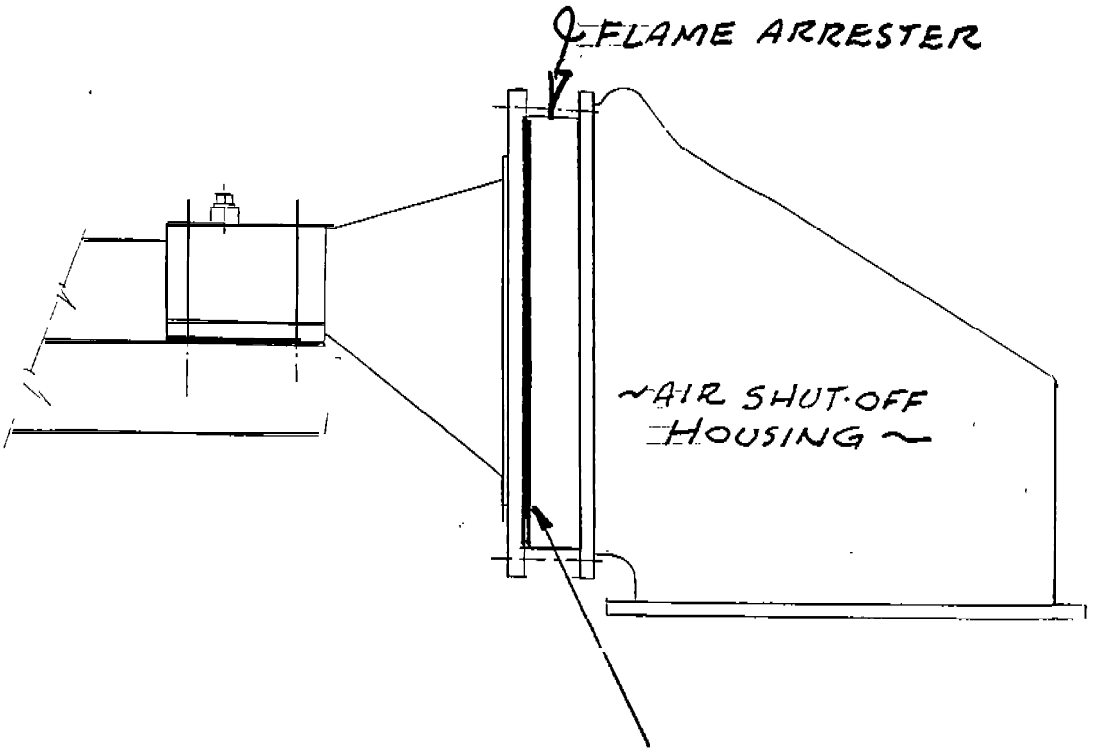

Figure 6. Flame Arrester Gasket

(WEEKLY) 11. ( ) The fasteners securing the intake air shut-off housing and flame arrester to the air intake adapter are in place and tight.

(WEEKLY) 12. ( ) 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 makeup water tank.

(WEEKLY) 13. ( ) The bolts and lockwashers securing the exhaust manifold to the engine are in place and tight as shown in Figure 7.

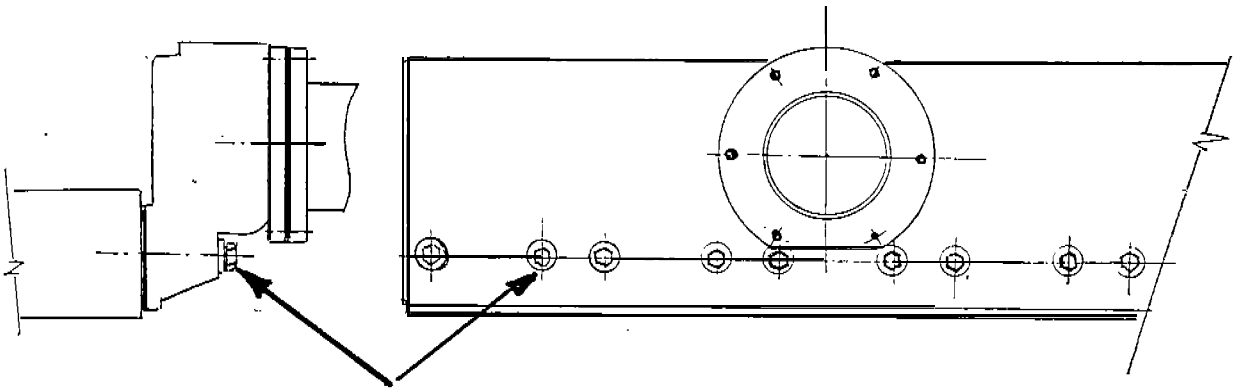

Figure 7. Water-Cooled Exhaust Manifold

(WEEKLY) 14. ( ) A steel gasket (3 pieces) is installed between the exhaust manifold and the engine head as shown in Figure 8.

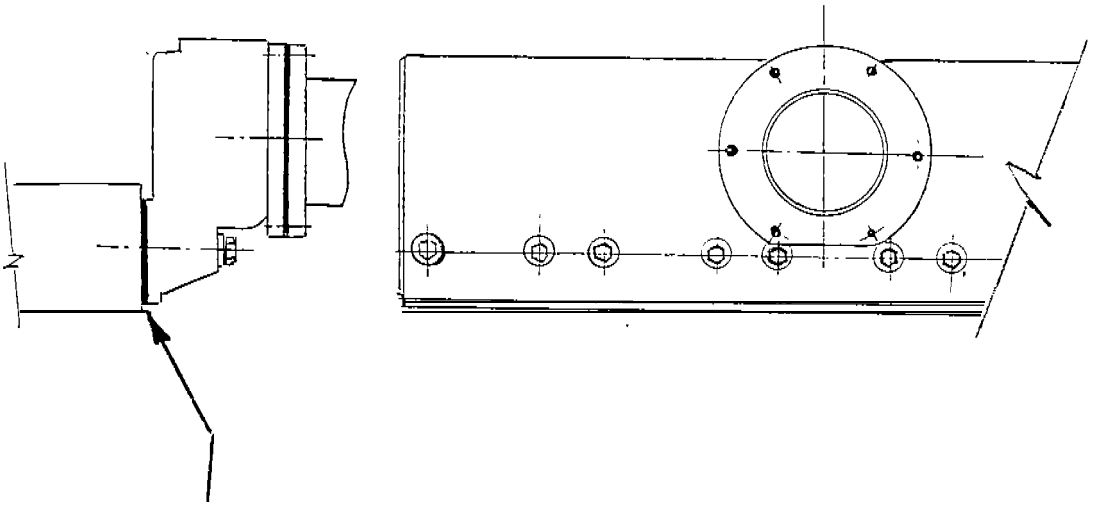

Figure 8. Gasket Between Exhaust Manifold and Engine

(WEEKLY) 15. ( ) 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 9.

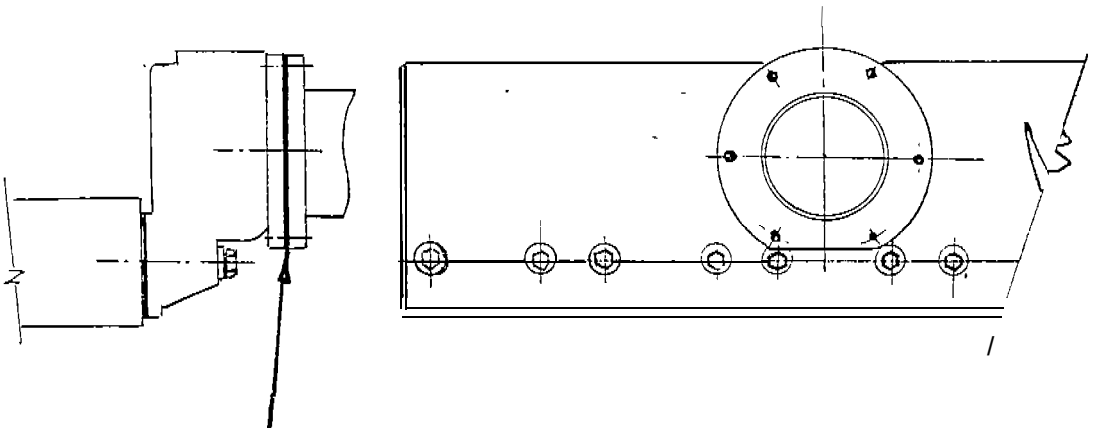

Figure 9. Gasket Between Exhaust Pipe and Exhaust Manifold Flange

(WEEKLY) 16. ( ) Fasteners securing the exhaust pipe to the flange of the exhaust manifold are in place and tight.

(WEEKLY) 17. ( ) A copper or bronze gasket is installed between the flange of the exhaust pipe and the flange of the exhaust conditioner as shown in Fire-e 10.

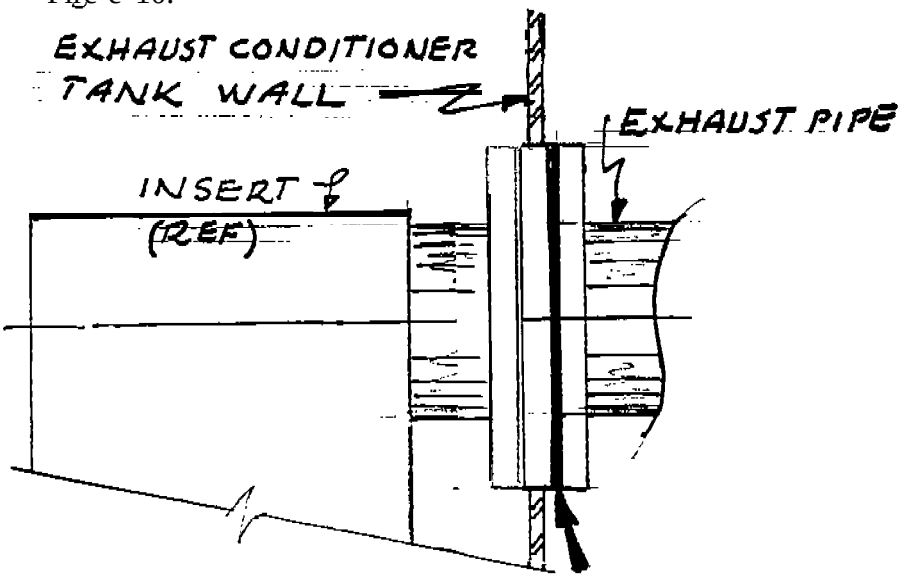

Figure 10. Gasket Between Exhaust Pipe and the Flange of the Exhaust Conditioner

(WEEKLY) 18. **( )** Fasteners securing the exhaust pipe to the flange of the exhaust conditioner are in place and tight.

19. **( )** Remove exhaust conditioner cover.

20. ( ) A bronze gasket is installed between the flange of the exhaust conditioner and the flange of the scrubber insert as shown in Figure 11.

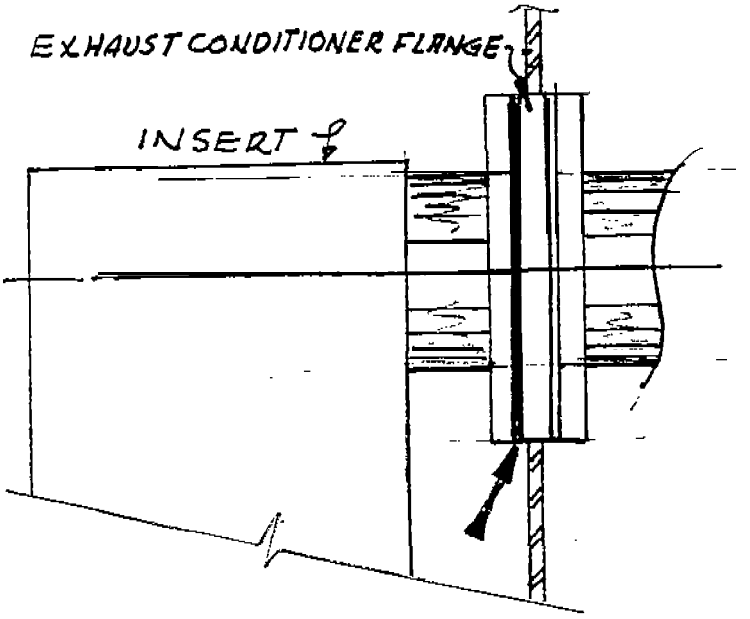

Figure 11. Showing Gasket Between Exhaust Conditioner Flange and Scrubber Insert Flange.

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

(WEEKLY) 22. ( ) The exhaust conditioner is in good condition with no open holes or cracks due to corrosion, accidents, missing plugs, etc.

SYSTEM OPERATION

(WEEKLY) 23. ( ) The engine shuts down when the "push to stop engine" button in the operator's compartment is held in.

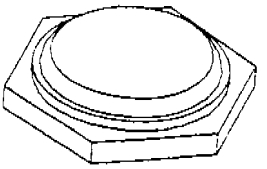

Figure 12. “Push to Stop Engine” Button

24. ( ) Connect a manometer or magnehelic (vacuum gauge) to the intake vacuum port show in Figure 13. Run the engine at full throttle with no load. The. intake vacuum does not exceed 25” of water.

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

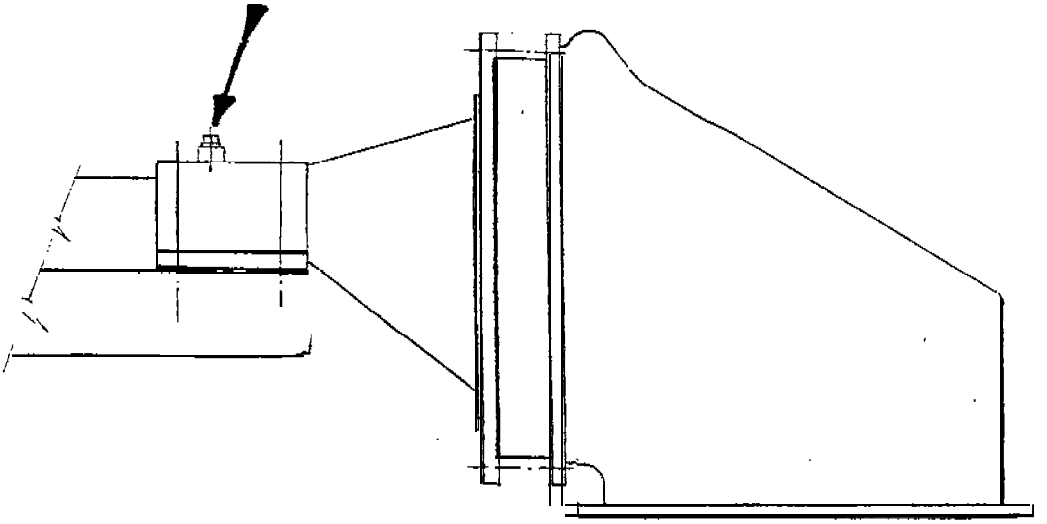

Figure 13. Intake Vacuum Location

26. ( ) Connect a manometer or magnehelic to the test port in the exhaust manifold flange shown in Figure 14. Run the engine at fill throttle, no load, with exhaust conditioner filled to normal operating water level. The exhaust backpressure does not exceed 34 inches of water.

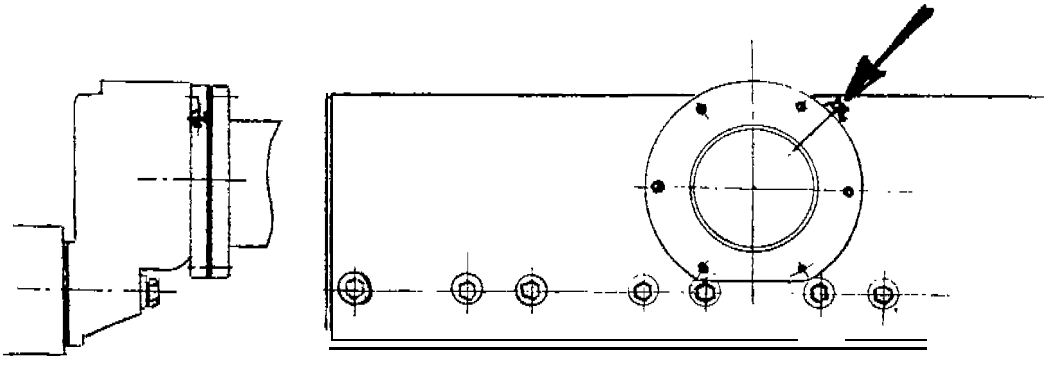

Figure 14, Location of Exhaust System Back Pressure Test Port

27. **( )** Shut engine down and remove manometer or magnehelic and securely reinstall test plug.

(WEEKLY) 28. **( )** 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.

(WEEKLY) 29. **( )** Test for appropriate exhaust conditioner normal operating level. Operate engine for minimum of 5 minutes. Shut engine down and remove 1 1/4 NPT plug (located 12 3/16 from outside bottom of tank). Water level should then be 2 inches below the bottom of the fill port. Checking may be accomplished by using a straight rod with a 2 1/4" portion bent 90 degrees. Location of operating level shown in Figure 15.

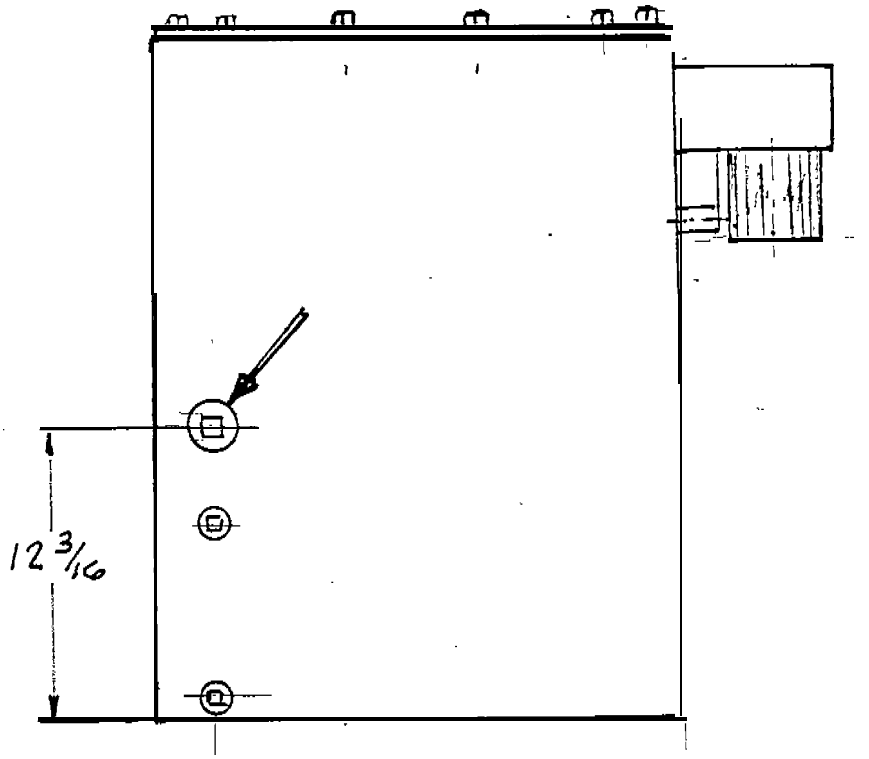

Figure 15. Location of Exhaust Conditioner Normal Operating Level Test Plug

30. ( ) The safety system includes two high coolant temperature shutdown sensors. One in the exhaust pipe outlet and one in the exhaust manifold as shown in Figure 16.

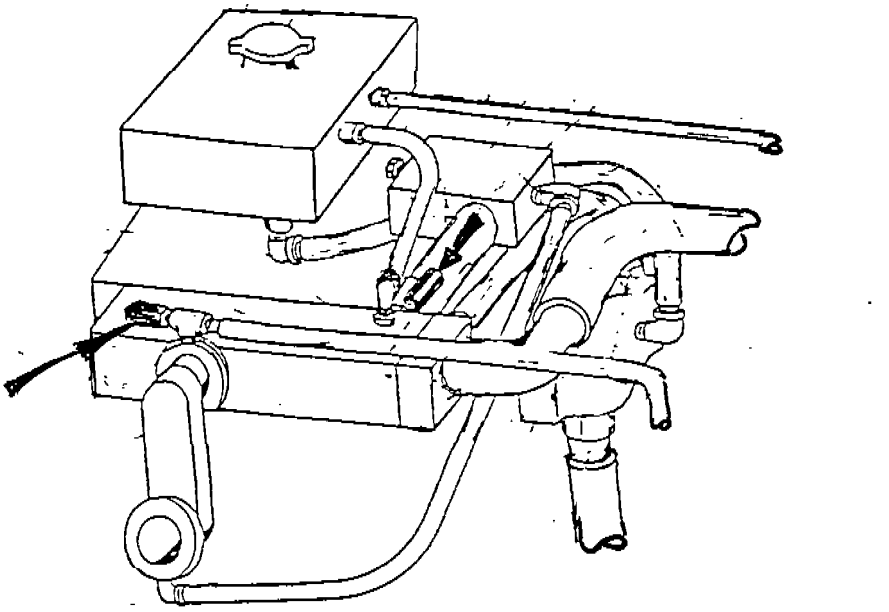

Figure 16. Location of High Coolant Temperature Sensors,

31. ( ) Test the temperature sensor valves. Two test methods are offered for information. Either method is acceptable.

METHOD 1:

Unscrew the sensor valve and install a pipe plug in its place, Reattach the safety system air hose to the sensor. Start the engine and immerse the end of the temperature sensor valve into heated and agitated water/antifreeze mixture. The sensor must open and exhaust the safety system air pressure and shutdown the engine before the temperature exceeds 212 degrees F.

METHOD 2:

a. With engine idling, slowly remove sensor hose venting safety system air pressure. This must cause the engine to shutdown.

b. Remove sensor and attach to low pressure shop air and test as in Method 1 above. Sensor must vent air before temperature exceeds 212 degrees F.

32. ( ) Exhaust manifold sensor shuts engine down before temperature exceeds 212 degrees F.

33. ( ) Exhaust pipe water outlet sensor shuts engine down before temperature exceeds 212 degrees F.

34. ( ) The temperature sensors are reinstalled and safety system air hoses are securely attached.

(WEEKLY) 35. ( ) Test for proper exhaust conditioner low water shutdown. The checkport on the exhaust conditioner for checking the proper low water shutdown level is shown in Figure 17. The bottom of the check port is 8 3/16 above the outside bottom of the exhaust conditioner.

Close the valve located in the water supply line between the make-up tank and the exhaust conditioner. Start the engine and operate it at medium speed. Remove the drain plug from the exhaust conditioner. CAUTION: EXHAUST CONDITIONER WATER MAY BE HOT! After the engine shuts down immediately replace the drain plug. Remove low water check plug, the water in the exhaust conditioner must be even with or above the low water checkport.

(WEEKLY) 36. ( ) Replace the low water check plug.

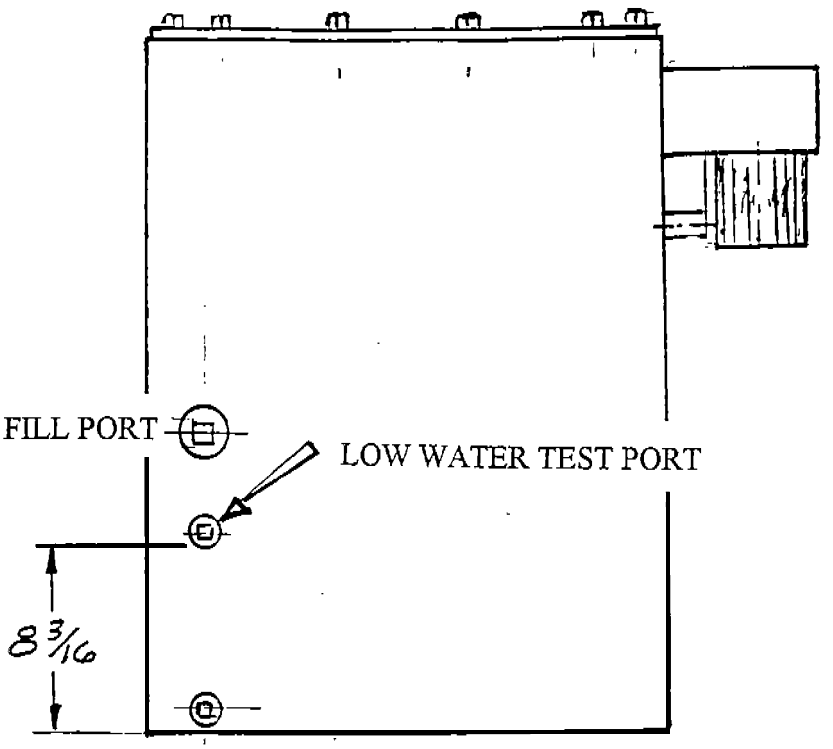

Figure 17. Location at Low Water Test Port and Fill Port

(WEEKLY) 37. ( ) After the 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.

(WEEKLY) 38. ( ) 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 air shut-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) 39. ( ) Reset the emergency intake air shut-off valve.

WEEKLY) 40. ( ) Replenish exhaust conditioner water through the fill port located 12 3/16 above outside bottom of exhaust conditioner as shown in Figure 17.

(WEEKLY) 41. ( ) Open the make-up water supply valve.

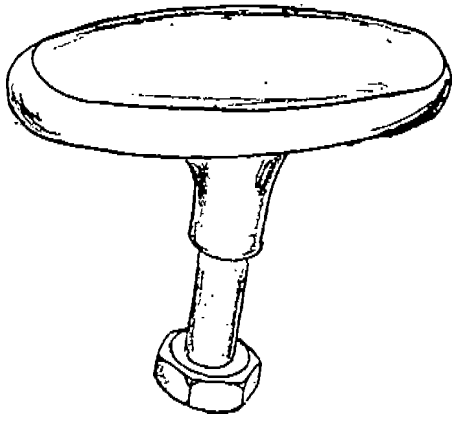

Figure 18. Air Shut-Off Valve Handle
Located in the Operator's Compartment