

UNITED STATES MARINE CORPS
Logistics Operations School
Marine Corps Combat Service Support Schools
Training Command
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AOM 6404

STUDENT OUTLINE

MAINTAIN HMMWVA2 AIR INDUCTION AND EXHAUST SYSTEMS

LEARNING OBJECTIVES

1. Terminal Learning Objectives :

a. Given a HMMWVA2 vehicle, TM 9-2320-280-20-1&2, tools, and shop supplies, perform organizational maintenance on the air induction system, per information contained in the references. (6.4.3)

b. Given a HMMWVA2 vehicle, TM 9-2320-280-20-1&2, tools, and shop supplies, perform organizational maintenance on the exhaust system, per information in the references. (6.4.4)

2. Enabling Learning Objectives:

a. Given a HMMWVA2 vehicle, TM 9-2320-280-20-1&2, tools, and shop supplies, per information contained in the references:

(1) inspect the air induction system for serviceability, (6.4.3a)

(2) remove the air cleaner filter element, (6.4.3b)

(3) inspect the air cleaner filter element for serviceability, (6.4.3c)

(4) install the air cleaner filter element, (6.4.3d)

(5) test the air filter restriction gage for serviceability, (6.4.3e)

(6) reset the air filter restriction gage, and (6.4.3f)

(7) diagnose the cause of black exhaust smoke. (6.4.3g)

b. Given a HMMWVA2 vehicle, TM 9-2320-280-20-1&2, tools, and shop supplies, per information contained in the references:

(1) inspect the exhaust system for serviceability, and
(6.4.4a)

(2) diagnose the cause of engine will not develop full
power. (6.4.4b)

OUTLINE:

1. INTRODUCTION TO THE HMMWVA2 AIR INDUCTION SYSTEM

a. System Description. The air induction system filters outside air through a combination of tubing, hoses, and filter element that prevents foreign particles from entering the engine.

b. Identification and Location of Components in the Air Induction System

(1) The air intake stack and weather cap are the entry point for air flow into the air induction system. They are located on the right side of the vehicle, directly in front of the windshield.

(2) The air induction box is located underneath the air intake stack. It serves as a junction between the air intake stack and the air cleaner assembly. Since Marine Corps vehicles are all equipped with a deep water fording kit, the air induction box serves no functional purpose.

(3) The air cleaner assembly is located in front of the air induction box. It contains a filter element that filters impurities from incoming air.

(4) The elbow is mounted on the left side of the air cleaner assembly. It interconnects the air cleaner assembly and the air horn and is secured to each with strap-type clamps.

(5) The air horn is mounted on the air intake manifold on top of the engine. It funnels filtered air to the intake manifold from the air cleaner to the air horn elbow.

(6) The air restriction gage is mounted on the dash panel behind the steering wheel. It provides a quick and accurate indication of the serviceability or presence of a restriction in the vehicle air intake system. The gage is connected to the air cleaner with a flexible hose that extends from the back of the dash panel into a fitting on the air cleaner assembly.

2. INSPECT HMMWVA2 AIR INDUCTION SYSTEM

a. Inspect Air Horn

(1) The air horn is plastic; inspect it for cracks or other damage.

(2) The air horn is secured to the intake manifold with two screws having rubber washers.

(3) If the air horn is removed for service, replace the gasket between the air horn and intake manifold.

(4) When reinstalling the screws, coat the threads with sealant before installation and tighten them to 15 foot-pounds.

b. Inspect Air Horn To Air Cleaner Elbow

(1) The elbow is rubber. Inspect it for damage and deterioration such as cracks or brittleness.

(2) The elbow is held in place by two hose clamps. Inspect those clamps for security and completeness.

c. Inspect Air Cleaner Assembly

(1) Inspect the air cleaner body for dents, cracks, and other damage.

(2) Check the vent-line attachment on the air cleaner assembly for security and completeness.

(3) Inspect the air cleaner filter for dirt, dust, oil, or restriction of air flow. If the air filter is clogged, the engine will not develop full power, it may exhaust black smoke, or it may not start at all.

(4) The air cleaner assembly is secured to its mount by strap clamps. Inspect the clamps for tightness, rust and serviceability.

(5) Make sure the nut/washer assembly securing the air filter element to the stud is properly torqued and that the threads of the stud and nut are serviceable.

d. Inspect Rubber Cap

(1) A rubber cap is located on the bottom of the air cleaner assembly. The cap replaces a dump valve that is not used on vehicles equipped with deep water fording kits.

(2) Remove the cap to clean out any foreign material that may have settled in it during vehicle operation.

e. Inspect Weather Cap

(1) Check the weather cap to be sure it is tight and serviceable.

(2) Make sure the water drain is clear of debris.

f. Inspect Deep Water Fording Kit Intake Extension and Fuel Tank Vent Line

(1) Inspect the air intake extension and fuel tank vent tube for cracks, bends, deterioration, or restrictions.

(2) Check the mounting hardware for proper installation.

g. Inspect The Air Restriction Gage and Hose

(1) The air restriction gage is mounted on the dash, behind the steering wheel. The gage indicates restriction of air flow through the system.

(2) If a yellow band appears in the window of the air restriction gage, the air filter element may need servicing. If the yellow band rises high enough to contact the red band at the top of the indicator, shut down the engine and trouble shoot the air induction system. The gage has a reset button that returns the yellow band to its normal position.

(3) Test the air restriction gage for serviceability by disconnecting the air filter vacuum line from the air cleaner assembly and suck on the line. If the air restriction gage shows yellow, the gage is serviceable.

3. SERVICE THE HMMWVA2 AIR CLEANER FILTER ELEMENT

a. Remove Air Cleaner Filter Element

(1) Loosen the bolt securing the ring clamp to the air cleaner assembly and remove the cover.

(2) Remove the nut and washer assembly securing the filter element to the stud.

(3) Pull the filter element from the air cleaner assembly.

b. Inspect Air Cleaner Filter Element

(1) Inspect the filter element for tears and rips. If it is ripped or torn, replace the filter element.

(2) Inspect the gasket and replace it if defective.

c. Emergency Procedures for Cleaning the Air Filter Element

(1) Remove dust or sand from the filter element by holding it so either end faces the ground. Gently tap around the filter element to free dust and sand.

(2) Do not strike the ends of the filter element on a hard surface; damage to the filter element may result.

d. Clean Air Filter Element with a Non-Sudsing Detergent

(1) Remove oily dirt from the filter element by gently hand washing the element in warm water and a non-sudsing detergent.

(2) Gently rinse the filter element with warm water.

(3) Allow the filter element to air dry.

e. Clean Air Cleaner Filter Element with Air

(1) Compressed air used for cleaning an air cleaner element will not exceed a pressure of 30 pounds per square inch. Use compressed air only with personal protective equipment such as goggles/eye shields, and gloves.

(2) Remove oily dirt and dust from the filter element by directing a stream of compressed air from the inside to the outside of the filter element.

(3) Hold the nozzle at an angle and 6 inches away from the filter element and blow away loosened dirt or dust from outside of filter element.

f. Install Air Cleaner Filter Element

(1) Position the filter element into the air cleaner assembly and secure the filter element to the stud with the nut and washer assembly. Tighten the nut and washer assembly to 20-40 inch-pounds.

(2) When the cover clamp is secured to the end of the filter body assembly, make sure the clamp bolt is correctly positioned to prevent damaging the hood when it is closed.

(3) Position the cover on the end of the air cleaner assembly and secure it with the clamp as shown. Tighten the bolt to 35-40 inch-pounds.

4. INTRODUCTION TO THE HMMWVA2 EXHAUST SYSTEM

a. System Description

(1) The exhaust system channels exhaust gases from the exhaust manifolds out to the left rear side of the vehicle.

(2) Exhaust components are constructed of stainless steel for corrosion protection.

b. Description and Location of Components in the Exhaust System

(1) The exhaust manifold and heat shields are located on the right side of the engine.

(2) The crossover pipe is bolted to the exhaust manifolds and channels exhaust gases to a single pipe on the left side of the vehicle.

(3) The muffler is bolted to the crossover pipe and is mounted between the frame side rails for protection.

(4) The tail pipe routes exhaust gases in front of the left rear tire and out to the side of the vehicle.

5. INSPECT HMMWVA2 EXHAUST SYSTEM

a. General Instructions

(1) Inspect all exhaust components for rust, dents, breaks or other damage.

(2) When replacing exhaust system components, gaskets and locknuts must be replaced; do not reuse these parts.

(3) Make sure all mating surfaces are not distorted and are sealed correctly with a serviceable gasket.

(4) During engine operation, be alert for excessive noise or the presence of exhaust fumes in the crew compartment.

b. Inspect Exhaust Manifold and Heat Shields

(1) Inspect exhaust manifolds for rust, holes, damage, and cracks, especially at bends or welds.

(2) Make sure the socket head screws that secure the manifolds to the cylinder head are tight. Tighten to 25 foot-pounds, using a hex head driver.

(3) With the engine running, inspect for exhaust leaks and serviceability of the gasket between the cylinder head and manifold.

(4) Inspect the heat shields for rust, holes and damage.

c. Inspect Crossover Pipe

(1) Inspect the crossover pipe for rust, holes, damage and cracks, especially at bends and welds.

(2) Make sure the capscrews and locknuts on each side securing the crossover pipe to the left and right exhaust manifolds are tight. Tighten them to 37 foot-pounds.

(3) With the engine running, check for exhaust leaks and serviceability of gasket between the crossover pipe and exhaust manifold.

d. Inspect Muffler

(1) Inspect the muffler and exhaust pipe for rust, holes or damage.

(2) Make sure the capscrews and locknuts securing the muffler to the crossover pipe are tight. Tighten them to 37 foot-pounds.

(3) With the engine running, inspect for leaks and serviceability of the gasket between the muffler and crossover pipe.

e. Inspect Muffler Support Bracket and Muffler Insulator

(1) Inspect the rubber insulator for cracks, tears, deterioration, and security of mounting. Tighten the capscrews to 10 foot-pounds.

(2) Inspect the capscrews, locknuts, and the retaining plate securing the muffler to the insulator for correct assembly, rust, damage and serviceability.

(3) Inspect the locknuts and the U-bolt securing the muffler to the support bracket for security.

f. Inspect Tail Pipe

(1) Inspect the tail pipe for holes, rust, bends, or other damage.

(2) Check that the locknuts securing the tail pipe to the muffler are tight. Tighten them to 31 foot pounds.

(3) Inspect nuts, U-bolt, and the clamp securing the tail pipe to the exhaust hanger. Tighten them to 31 foot-pounds.

(4) With the engine running, inspect the exhaust system for exhaust leaks and serviceability of gasket between the tail pipe and muffler.

(5) When the deep water fording kit is installed, an exhaust extension replaces the tail pipe.

(a) Make the same basic inspections as you would for the tail pipe.

(b) Inspect the exhaust extension tube for cracks, bends, or restrictions.

(c) Check mounting hardware for completeness and security of installation.

6. DIAGNOSE HMMWVA2 EXHAUST SYSTEM MALFUNCTIONS

a. Diagnose Exhaust Fumes or Exhaust Noises

(1) Inspect exhaust manifold, crossover pipes, muffler, and tail pipe for rusted areas, cracks in welds, or other damage.

(2) Inspect exhaust manifold, crossover pipes, mufflers, and tail pipe for missing or loose fasteners or unserviceable gaskets. If the fasteners are loose, tighten them to 37 foot-pounds.

(3) Inspect all exhaust hangers or support brackets for completeness and security of mounting.

b. Diagnose Loss Of Power. A restricted or blocked exhaust system can result in a noticeable loss of engine power. Inspect the exhaust system components for restrictions or blockages.

REFERENCES:

TM 9-2320-280-20-1

TM 9-2320-280-20-2