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Training Command  
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AOM 6802

**STUDENT OUTLINE**

**PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

**LEARNING OBJECTIVES:**

- a. Terminal Learning Objective: Given a NAVMC form 10245, and references, complete motor transport forms and records without error.
- b. Enabling Learning Objectives: Given a NAVMC form 10245, TM 9-2320-280-10, TM 9-2320-280-20-1,2,3 complete NAVMC 10245 form without error.

**OUTLINE**

1. **ERO AND PMCS PROCEDURES**

a. Equipment Repair Order

(1) Table 2-1 of TM 9-2320-280-20-1 lists the scheduled Preventive Maintenance Checks and Services (PMCS) performed on M1123 vehicles by the organizational maintenance mechanic. Turn to page 2-2 of TM 9-2320-280-20-1 and read paragraph 2-8, "Intervals." Paragraph 2-8 informs us that unit maintenance personnel assisted by the operator or crew, will perform checks and services semiannually, biennially, and annually. The requirement for semiannual PMCS on tactical motor transport equipment not under a manufacturer's warranty has been deleted. Now, let's turn to page 2-4 of our TM and find out how this will effect our PMCS procedures.

(2) Before Semiannual PM's were deleted, we performed a Semiannual PM on our tactical vehicles every six months, an Annual PM every year, and a Biennial PM every two years. Now, we are only required to perform an annual and a biennial. In other words, the services prescribed for Semiannual PMCS will

now be performed annually. Remember, the Annual PMCS include all Semiannual PM services and the Biennial PM include both the Annual and Semiannual PM services.

(3) In a previous lesson, you were told the ERO is used to request maintenance on tactical ground equipment to include modification, calibration, corrective maintenance, limited technical inspection and preventive maintenance checks and services.

(4) Using the ERO you have been provided, enter "Perform APM 52" on the first line in the Description of Work Column. APM is annual preventive maintenance and the number 52 identifies the specific defect of the equipment.

(5) We are preparing the ERO to perform an "Annual" PM on a M1123 vehicle, so we need to use the number of the technical manual for that vehicle, which is TM 9-2320-280-20-1. At this time, enter the TM number on the second line of the Description of Work column.

(6) When using item numbers from a TM during the performance of scheduled maintenance, list only those tasks on the ERO where actual work is performed; for example, adjust, test, lubricate, remove, and replace.

(7) Do not list tasks such as checks and inspections. When a work task is performed that calls for observation; for example, "Replace the air filter when it is unserviceable," this task will be entered on the ERO only if the air filter is replaced.

(8) Labor hours will be recorded on the ERO to the nearest one-tenth of an hour. Cumulative time is the total time used to accomplish the entire task. For example; if two mechanics work on the same item for thirty minutes each, then the labor hours will reflect one hour.

(9) The mechanic performing the PMCS will sign his/her name in the Mechanic Signature Column of the ERO. When more than one mechanic performs the PMCS, the senior person will sign as the responsible individual.

b. General Service and Inspection Procedures

(1) Paragraph 2-10 informs us to make sure all items are correctly assembled, secure, not worn, serviceable, not leaking, and adequately lubricated.

(a) When an item is in the proper position and all parts are present, it is correctly assembled.

(b) When attaching hardware, wires, clamps, and hoses cannot be moved by hand or the light pressure of a wrench, they are considered secure.

(c) If an item is worn beyond repair and is likely to fail before the next scheduled inspection, it is unserviceable.

(d) An item is adequately lubricated if it meets the requirements specified by the lubrication instruction or lubrication order for the vehicle.

(2) Where the instruction "Tighten" appears in the procedures column, you must tighten the item to the prescribed torque value, even though the item appears to be secure. This task is recorded on the ERO.

c. Specific PMCS Procedures

(1) The item number column provides a logical order for PMCS performance and, as stated earlier, is used as a source number for the ERO upon which your PMCS will be recorded.

(2) I explained the interval column earlier, so let's look at the item to be inspected column. Here we have listed the system, common name, or location of the item to be inspected.

(3) Read and abide by all notes, warnings, and caution statements listed in the procedures column. The procedures column also provides instructions and in some cases references for servicing, inspection, replacement and adjustment procedures. For example, the procedures column for item number twenty-one instructs us to perform the preventive maintenance listed in TM 9-6140-200-14. This manual is for lead-acid storage batteries and

the material was presented to you in the instructional modules where you had the opportunity to inspect, test, service, and replace battery system components. The same holds true for all the items you are required to check and service during scheduled PMCS.

(4) The not fully mission capable column informs us that the vehicle is not mission capable if it meets the criteria listed.

## **2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES - HMMWV**

a. Operator's PMCS. Before the mechanic begins the annual PMCS, he would make sure the operator/crew of the vehicle has performed the PMCS listed in TM 9-2320-280-10.

b. Annual PMCS. We will assume that all PMCS listed in TM 9-2320-280-10 have been performed and a road test was conducted. No problems were noted.

### (1) Fuel System.

(a) First, inspect the fuel filter/water separator assembly for dents and cracks that could cause leaks.

(b) Next, inspect the fuel injection pump, nozzle lines, and fittings for leaks and damage.

(c) Then, inspect the rear fuel injector nozzle rubber cap for presence and condition.

(d) Next, inspect all fuel lines for loose connections, splits, cracks, and bends that could leak.

(e) Perform these tasks now. Allow the students time to inspect the fuel system components.

(f) Now, disconnect the leads from each glow plug and check for resistance between the glow plug terminal and ground. The procedures are located in paragraph 3-36 of page 3-68

(g) Next, check each glow plug for looseness and damage. If the glow plugs are not damaged, tighten each plug to 8-12 foot-pounds.

(h) Refer to the TM and perform these PMCS now.

(2) Serpentine belt.

(a) Check for missing, broken, cracked, and frayed serpentine belt.

(3) Protective control box.

(a) Inspect the four nuts securing the protective control box. If the nuts are loose, tighten them.

(b) Once the nuts are tight, make sure the cannon plugs are securely connected to the control box

(4) Cooling system. The warning in the procedures column instructs us to turn the radiator cap only one-half of a turn to allow pressure to be released. In reality, we turn the surge tank filler cap one-half of a turn.

(a) First, check to see if the coolant level is correct. If you are in doubt, the required information is located in TM 9-2320-280-10 that you have at your work site.

(b) Next, check the coolant condition and protection level. If the ERO indicated a coolant heating problem, you would pressure test the radiator cap and cooling system in an attempt to isolate the problem.

(c) Inspect the surge tank, radiator shroud, power steering cooler, oil cooler, and all hoses and fittings for security of mounting, leaks, and deterioration. Inspect the radiator and oil cooler cores and clean as necessary.

(5) Air-intake system.

(a) Inspect and clean the air cleaner element and housing. If the element is damaged, it must be replaced.

(b) Before semiannual PM's were deleted, we checked the CDR valve every six months. As stated earlier, this item is now checked annually.

1 Disconnect the CDR valve oil fill tube hose from the CDR valve and inspect the CDR valve and lines for leaks, cracks, and restrictions. Replace any damaged item.

2 If oil drips out of the CDR valve or hose, replace the CDR valve.

3 If oil does not drip from the CDR valve or the hose, clean any oil or carbon deposits from the CDR valve with a clean, lint-free cloth.

4 Do not clean the CDR valve with cleaning solvent. Cleaning solvent will damage the diaphragm inside the CDR valve.

(6) Alternator. For the purpose of this PM, we will assume the road test indicated that the charging system is functioning properly.

(a) Inspect the electrical wiring for broken strands, frayed, cracked, or worn insulation, and loose connections. Make any necessary repairs or replacements.

(b) Now, check the pulley for damage and make sure that the pulley nut is torqued properly in accordance with the technical manual.

(c) Next, check the alternator mounting bolts for security of mounting and tighten them in accordance with the technical manual.

(7) Accelerator linkage. Inspect the accelerator linkage for bends, excessive play, cracks, and damage that could cause failure.

(8) Suspension and steering systems.

(a) First, place the vehicle on jack stands. Then, remove the wheel and tire assemblies. Place the assemblies to the side of the vehicle.

(b) Next, check the front, rear upper, and lower ball joints for the proper torque.

1 Torque the upper ball joint to the upper control arm to proper torque.

2 Torque the upper ball joint to the geared hub to proper torque.

3 Torque the lower ball joint to the lower control arm to proper torque.

4 Torque the lower ball joint to the geared hub to proper torque.

(c) Also, check the locknuts. Elastic locknuts that can be turned onto a bolt or stud by hand are worn out and are not serviceable. If they are castellated nuts, they are serviceable even though you can turn them by hand. Castellated nuts are secured by cotter pins.

(d) Inspect the control arms, control arm bushings, springs, shock absorbers, and bracket for damage. The drawing in the procedures column identifies the suspension components that require inspection.

(e) Next, inspect the steering column U-joints, tie rods, pitman arm, center link, and idler arm for breaks, cracks, and wear. These components are also depicted in the procedures column for Item No. 10.

(f) Now, inspect the steering gear for mounting security and tighten the mounting bolts to proper torque.

(g) Then, inspect the power steering pump, power steering gear, hydraulic control valve, hoses, lines, and fittings for leaks or damage.

(9) Brake system.

(a) We will begin by inspecting the master cylinder, hydro-boost, lines, and fittings for leaks and damage. A drawing of these components is in the procedures column.

(b) Next, clean the exterior of the master cylinder and check the cylinder fluid level. Fill the cylinder if it is necessary.

(c) Then, inspect the service brake pads and rotor disks for wear. The procedures are located in paragraph 7-19 of TM 9-2320-280-20-2. As you can see, a drawing of the service brake pads and rotor disk are in the procedures column.

(d) Next, inspect the parking brake pads and rotor disks for wear. Inspect the parking brake cable, cable clips, lever, spring, and push rod/guide for binding and loose components.

(e) If your assigned vehicle is equipped with a single parking brake assembly mounted between the rear propeller shaft and rear differential, lubricate the parking brake lever, parking brake cam, parking brake guide pins with WTR lubricant.

(f) If you are performing PMCS on a vehicle equipped with a left and right parking/service brake assembly mounted between the rear axle half-shafts and rear differential, lubricate the parking brake lever with WTR lubricant. The parking/service brake assembly requires no lubrication.

(10) Engine and transmission mounts.

(a) First, inspect the engine mounts and insulators for loose, worn and damaged conditions.

(b) Then, check for loose or missing engine mount capscrews and locknuts. A drawing of the engine mounts and fastening hardware is in the procedures column.

(c) Next, using a 3/4-inch torque adapter, tighten the two capscrews securing the transmission mount to the adapter and tighten the two locknuts securing the transmission mount to the crossmember in accordance with the technical manual.

(11) Starter

(a) First, inspect the starter for mounting security. Tighten the mounting bolts in accordance with the technical manual.

(b) Next, inspect the starter cables and studs for loose nuts and damage.

(12) Transmission

(a) First, inspect the vent lines and connectors for security, cracks, and deterioration.

(b) Next, inspect the transmission shift linkage for bends, excessive play, cracks, and damage that could cause a failure.

(13) Transfer

(a) First, inspect the transfer case vent lines and connectors for security, cracks, and deterioration.

(b) Next, inspect the transfer case shift linkage for bends, excessive play, cracks, and damage that could cause a failure.

(c) Then, check the transfer case fluid level at the check and fill plug. If metal particles are found on the drain plug, notify your supervisor.

(d) Next, inspect the oil cooler lines for leaks and check for loose oil cooler line nuts.

#### (14) Driveline Components

(a) Inspect the geared hub vent lines and connectors for security, cracks, and deterioration.

(b) Next, inspect the geared hub for leaking seals and damage.

(c) Then adjust the spindle bearings. The procedures column informs us the required information is located in paragraph 6-13.

(d) After the bearings have been adjusted, inspect the differential vent lines and connectors for security, cracks, and deterioration.

(e) Next, inspect the front and rear differentials for leaking seals and cracks.

(f) Then, check the differential lubricant level. The level should be within 1/4 inch of the fill plug opening when the lubricant is cold, or the plug level when the lubricant is hot. The procedures column depicts the location of the fill plug.

(g) Next, inspect the U-joints for damage, free play, and missing or unserviceable lubrication fittings.

(h) Now, tighten the front propeller shaft mounting capscrews, tighten the rear prop shaft capscrews and the U-bolts in accordance with the technical manual. Also, tighten the halfshaft mounting bolts to proper torque.

(15) Exhaust Components, Frame and Crossmembers

(a) First, inspect the exhaust system for cracked and loose pipes muffler, and hangers. Also, check for evidence of exhaust leaks. To prevent injury, make sure the exhaust components are cool.

(b) Next, inspect the frame side rails for cracks, breaks, bends, wear, deterioration, and missing or loose fasteners.

(c) Then, inspect the crossmembers for cracks, breaks, bends, deterioration, and loose or missing fasteners.

(16) Tires

(a) Check the tread depth of the tires with a tire gage. Replace the tire if the tread depth is less than 2/32 of an inch.

(b) Next, inspect the tires for uneven wear.

(c) Then, check the wheels for balance.

(d) For normal tire wear, rotate the tires as shown in the rotation diagram in the procedures column for Item 19.

(e) After the tires have been rotated, tighten the wheel lug nuts in accordance with the technical manual. Follow the tightening sequence shown in the procedures column of Table 2-1. Remove the jack stands and lower the vehicle.

(f) Next, check the alignment of the front and rear wheels. Adjust as necessary. Alignment procedures are located in TM 9-2320-280-20-2.

(17) Engine

(a) Inspect the engine for leaks or damage that could cause engine failure.

(b) If the oil requires changing, inspect the oil pan drain plug for metal particles. If metal particles are found, notify your supervisor.

(18) Battery

(a) The procedures column refers us to TM 9-6140-200-14 for specific details on battery maintenance. Remember I addressed this earlier in the lesson when I introduced you to specific PMCS procedures.

(b) First, inspect the battery box for corrosion and debris.

(c) Next, clean the slave receptacle and coat it with corrosion preventive compound.

(d) Then, check and record on the ERO the specific gravity of each battery cell.

(e) Next, inspect the battery cables for frays, splits, or looseness.

#### (19) Deep Water Fording Kit

(a) Inspect the vent tubes for bends, cracks, breaks, deterioration, and restrictions.

(b) Inspect the vent tube mounting hardware for proper installation.

(c) Inspect the air intake and exhaust extensions for proper installation and leaks.

#### (20) Fuel System

(a) The fuel filter element is replaced every 6,000 miles or annually, whichever occurs first.

(b) Inspect the water separator for dirt, contamination, or damage.

(c) The maintenance procedures are located in TM 9-2320-280-20-2.

#### (21) Air Intake System

(a) Remove the engine oil dipstick from the oil dipstick tube and install a manometer in the dipstick tube.

(b) Connect STE/ICE-R to the DCA connector and start the engine.

(c) Allow the engine to idle and record the water pressure. The pressure should be zero or a slight vacuum.

(d) Increase the engine speed to 2,000 rpm and record the pressure. The pressure should be 2-5 inches.

(e) If the pressures are not within specifications, replace the CDR valve.

(22) Final Road Test

(a) To check the vehicle for proper operation and performance, the mechanic performing the PMCS would conduct a final road test.

(b) If the annual PMCS were performed correctly, the vehicle should be mission capable until the next scheduled PMCS.

**REFERENCES :**

TM 9-2320-280-10

TM 9-2320-280-20-1,2,3