

INCH-POUND

ATPD 2234

9 January 1998

SUPERSEDING

MIL-F-62668A

30 October 1968

PURCHASE DESCRIPTION

FIGHTING VEHICLE, INFANTRY, M2, M2A1, M2A2, AND FIGHTING VEHICLE, CAVALRY, M3, M3A1, M3A2: PROCESSING FOR STORAGE AND SHIPMENT OF

This purchase description is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This purchase description covers the processing for storage and shipment of the M2, M2A1, and M2A2 Fighting Vehicle, Infantry and M3, M3A1 and M3A2 Fighting Vehicle, Cavalry (see 1.2 and 6.1).

1.2 Classification. Processing will be one of the following levels, as specified (see 6.2).

Level A

- Maximum military protection. Level A is the processing required for the protection of vehicle during the most severe worldwide shipment, handling, and storage conditions including effects of direct exposure to extremes of climate, terrain, and operational and transportation environments. This protection is designed to protect the vehicle in excess of 90 days from date of actual processing with periodic care and preservation applied during storage. This level does not provide for drive-on/drive-off capability, but does provide for domestic or overseas shipment, including open deck loading.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U. S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/BLUE, Warren, MI 48397-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

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Level B

- Moderate military protection. Level B is the processing required for the protection of vehicle during moderate worldwide shipment, handling, and storage conditions including effects of direct exposure to extremes of climate, terrain, and operational and transportation environments. This protection is designed to protect the vehicle for a period not to exceed 90 days from date of actual processing with periodic care and preservation applied during storage. This level does provide for drive-on/drive-off capability and for domestic or overseas shipment, excluding open deck loading.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this purchase description. This section does not include documents cited in other sections of this purchase description or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirement documents cited in sections 3 and 4 of this purchase description, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

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| A-A-203 | - Paper, Kraft, Untreated. |
| A-A-208 | - Ink, Marking, Stencil, Opaque (Porous and Non-Porous Surfaces). |
| A-A-374 | - Sodium Bicarbonate, Technical. |
| A-A-883 | - Tape, Pressure Sensitive Adhesive, Masking. |
| A-A-1800 | - Varnish, Oil: Spar. |
| A-A-50177 | - Paper, Lens. |
| A-A-52518 | - Tire Pneumatic: Retread and Repair Materials (Metric). |

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A-A-52624	- Antifreeze, Multi-Engine Type.
A-A-55057	- Panels, Wood/Wood Based; Construction and Decorative.
MMM-A-179	- Adhesive: Paper Label.
O-S-801	- Sulfuric Acid, Electrolyte (for Storage Batteries).
PPP-B-601	- Box, Wood, Cleated Plywood.
PPP-B-621	- Box, Wood, Nailed and Lock-Corner.
TT-E-529	- Enamel, Alkyd, Semi-gloss, Low VOC Content.
UU-T-81	- Tags, Shipping and Stock.
VV-L-800	- Lubricating Oil, General Purpose, Preservative (Water-Displacing, Low Temperature).

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MIL-B-117	- Bags, Sleeves and Tubing.
MIL-C-450	- Coating Compound, Bituminous Solvent Type, Black (for Ammunition).
MIL-C-5501	- Caps and Plugs, Protective, Dust and Moisture Seal.
MIL-B-11188	- Batteries, Storage: Lead-Acid, General Specification for (Metric).
MIL-PRF-16173	- Corrosion Preventive Compound, Solvent Cutback, Cold Application.
MIL-L-21260	- Lubricating Oil, Internal Combustion Engine, Preservative and Break-in.
MIL-T-22085	- Tapes, Pressure-Sensitive Adhesive, Preservation and Sealing.
MIL-B-22191	- Barrier Materials, Transparent, Flexible, Heat Sealable.
MIL-T-37402	- Tester, Antifreeze Solutions.
MIL-P-46002	- Preservative Oil, Contact and Volatile, Corrosion-Inhibited.
MIL-H-46170	- Hydraulic Fluid, Rust Inhibited, Fire Resistant Synthetic Hydrocarbon Base.
MIL-T-50036	- Talc, Technical T1 and T3.
MIL-A-53009	- Additive, Antifreeze Extender, Liquid Cooling System.
MIL-T-60394	- Tape-Pressure-Sensitive Adhesive Film Foam Double-Coated (For Use with Ammunition).
MIL-V-62038	- Vehicles, Wheeled: Preparation for Shipment and Storage of.
MIL-D-81298	- Dye, Liquid for the Detection of Leaks in Aircraft Fuel Systems.

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STANDARDS

DEPARTMENT OF DEFENSE

- MIL-STD-129 - Marking for Shipment and Storage (Part 1 of 4 Parts).
- MIL-STD-2073-1 - Standard Practice for Military Packaging.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

ARMY

- 12349601 - Vehicle Protective Closure Kit.

(Copies of these drawings are available from the U. S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/BLUE, Warren, MI 48397-5000.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI A135.4 - Basic Hardboard.

(Application for copies may be obtained from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D1974 - Methods of Closing, Sealing and Reinforcing Fiberboard Boxes, Standard Practice for (DoD Adopted).

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| ASTM D3950 | - Strapping, Plastic and Seals, Standard Specification for (DoD Adopted). |
| ASTM D3953 | - Strapping, Flat Steel and Seals, Standard Specification for (DoD Adopted). |
| ASTM D4675 | - Flat Strapping Materials, Selection and Use of (DoD Adopted). |
| ASTM D5118 | - Fabrication of Fiberboard Shipping Boxes, Standard Practice for (DoD Adopted). |
| ASTM D5330 | - Pressure Sensitive Tape for Packaging, Filament-Reinforced, Standard Specification for (DoD Adopted). |
| ASTM D5486 | - Pressure-Sensitive Tape for Packaging, Box Closure, and Sealing, Standard Specification for (DoD Adopted). |

(Application for copies of should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

ASSOCIATION OF AMERICAN RAILROADS (AAR)

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| Section No. 1 | - General Rules Governing Loading of Commodities on Open Top Cars. |
| Section No. 6 | - Rules Governing the Loading of Department of Defense Material on Open Top Cars. |

(Application for copies should be addressed to the Association of American Railroads, Publication Department, 50F Street NW, Washington, DC 20001-1564.)

DEPARTMENT OF TRANSPORTATION (DoT)

Federal Motor Carrier Safety Regulations (FMCSR).

(Application for copies should be addressed to the Department of Transportation, Bureau of Motor Carriers, Washington DC 20590.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3. REQUIREMENTS

3.1 First article. When specified (see 6.2), one of the first ten production processed vehicles shall be subjected to first article inspection in accordance with 4.2 and level of protection specified. All processed vehicles delivered shall conform to the first article sample in all pertinent, physical, and performance attributes.

3.2 Level A. Vehicles processed for level A shall be processed as specified in 3.2.1 through 3.2.10.2 and 3.4 through 3.6.2, and figures 1 through 6.

3.2.1 Materials. The materials shall conform to applicable specifications, standards, drawings, and patterns required herein (see 4.4.1).

3.2.1.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials shall be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs (see 4.4.1).

3.2.2 Government furnished equipment (GFE). Unless previously accomplished, GFE (other than installed) shall be packaged, packed, and marked in accordance with the individual document for the specific item. GFE shall be stowed with basic issue items (BII) (see 4.4.2).

3.2.3 Preservatives and atomized spray equipment. When atomized spraying of preservative oils is specified (see 6.2), compressed air supply lines shall be equipped with moisture separators every 50 feet (ft) or fraction thereof (see 4.4.2).

3.2.4 Processing records. Records of vehicle processing shall be maintained and shall be readily available for review by Government representatives (see 4.4.2).

3.2.5 Disassembly. Projecting parts whose removal will accomplish desired cube reduction, and parts susceptible to damage and pilferage, shall be removed from the vehicle. Removed bolts, nuts, screws, pins, and washers shall be placed in one of the mating parts and secured. Bare metal surfaces of removed parts shall be preserved, packaged, and packed in accordance with MIL-STD-2073-1, identified and stowed securely within the vehicle (see 4.4.2).

3.2.5.1 Match-marking. When necessary to facilitate reassembly, parts removed from the vehicle shall be matchmarked. Matchmarking information shall be put on cloth shipping tags conforming to type A of UU-T-81, or on metal tags using waterproofed ink or paint, and attached to mating parts. The marked cloth shipping tags shall be waterproofed with varnish conforming to A-A-1800 or adhesive conforming to MMM-A-179 (see 4.4.2).

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3.2.6 Record forms. Two copies of DD Form 2258 shall be completed with information that includes preservation accomplished and depreservation instructions. The Equipment Log Book Binder and one copy of DD Form 2258 (see 6.4) shall be placed in a bag conforming to type I, class B, style 2, 6 mil of MIL-B-117. The bag shall be closed by heat sealing and securely attached in the driver's compartment of vehicle. The other copy of DD Form 2258 shall be waterproofed with adhesive conforming to MMM-A-179, or sealed in a plastic bag, and securely attached in a conspicuous location on the exterior of the vehicle (see 4.4.2).

3.2.7 Cleaning and drying.

3.2.7.1 Interior of vehicle. Interior surfaces of vehicle shall be cleaned with a solution consisting of water and a commercially available, nonabrasive, general purpose detergent. Solution temperature shall not exceed 210 degrees Fahrenheit (°F), and pressure shall not exceed 5 pounds per square inch (psi) measured 4 inches (in.) from the nozzle. After cleaning, cleaned surfaces shall be rinsed with clean water and dried. Care shall be taken during cleaning and rinsing operations to assure that no solution or water enters instruments, connections, or other components susceptible to water damage. Solutions or water shall not accumulate and remain in cavities that cannot be drained. Vehicles with decals, markers, straps and floor plates installed shall be hand cleaned with care to prevent damage to these components. Cleaned surfaces shall be hand rinsed and dried (see 4.4.2.1).

3.2.7.1.1 Cleaning and drying of battery supports and retainers. Battery supports and retainers shall be cleaned with a solution of one-half pound of sodium bicarbonate conforming to A-A-374 per gallon of water. After cleaning, cleaned surfaces shall be flushed with clean water, then thoroughly dried. Dried surfaces shall then be preserved in accordance with 3.2.8.2 (see 4.4.2.1).

3.2.7.1.2 Cleaning and drying of backrests and seats. The backrest and seat cushions shall be cleaned with a solution consisting of a commercially available, nonabrasive, general purpose detergent, and warm water. After cleaning, the cushions shall be wiped with cloth saturated with clean water to remove cleaning solution. Care shall be taken not to saturate the cushions with cleaning solution or water. After rinsing, the cushions shall be dried, then protected in accordance with 3.2.9.3 (see 4.4.2.1).

3.2.7.2 Exterior of vehicle and weapon station. The exterior of vehicle and weapon station shall be cleaned with a solution consisting of a commercially available nonabrasive general purpose detergent, and warm water or steam. Cleaning shall remove all foreign matter. After cleaning, surfaces shall be rinsed with clean water or steam and thoroughly dried. Care shall be taken to avoid entry of water or steam into the driver compartment, engine compartment, or weapon system openings. Care shall be taken in the cleaning of the Integrated Sight Unit (ISU).

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Steam or high pressure water spray shall not be sprayed directly on any of the lenses. All exposed lenses shall be wiped clean and dry using lens tissue conforming to type I, class 4 of A-A-50177 (see 4.4.2.1).

3.2.8 Preservation.

3.2.8.1 Relubrication. If the vehicle has been operated more than 75 miles (mi) since lubrication, or after the vehicle has been cleaned in accordance with 3.2.7.2, the vehicle shall be relubricated using materials conforming to drawings, specifications or lubrication order applicable to the vehicle. All exposed oil can points such as, but not limited to, levers, locking levers, locking bars, locking pins, pintle pins, hinge pins, hinges, strikers, wing nuts, door locks, hand-operated locking knobs, latches, linkage, threaded ends of yokes and related clevis pins shall be coated with lubricant conforming to VV-L-800 and preservative material conforming to Grade 4 of MIL-PRF-16173. Excess lubricant shall be removed after coating (see 4.4.2).

3.2.8.2 Preservation of battery supports and retainers. Top battery supports and retainers shall be preserved with compound conforming to MIL-C-450 (see 4.4.2).

3.2.8.3 Transmission and final drives. Final drives shall contain lubricating oil conforming to Grade 30 of MIL-L-21260, and be at operating level. Transmission shall be drained of oil and refilled to operating level with lubrication oil conforming to Grade 10 of MIL-L-21260. Start engine, and after initial warm-up, drive vehicle until engine is at normal operating temperature (165 to 195 °F), then execute the following operations a minimum of two times:

- a. Operate the vehicle in 3rd range at a minimum speed of 30 miles per hour (mph).
- b. Execute full left turn and full right turn (pivot).
- c. Operate the vehicle in reverse.
- d. Apply the service brakes.

Recheck oil and fill to operating level. DD Form 2258 shall be annotated with the grade of preservation oil used (see 4.4.2).

3.2.8.4 Cooling system. The cooling system shall be protected by one of the following procedures (see 6.2 and 4.4.2.3):

- a. For shipment to, and storage in, areas where the temperature drops below -40°F, systems shall be protected as specified in 3.2.8.4.3.
- b. For shipment and storage within the bounds of 30 degrees (°) north latitude and 20° south latitude, except in the continental United States, systems shall be protected as specified in 3.2.8.4.2.

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- c. For all other shipments, cooling systems shall be protected as specified in 3.2.8.4.1.

NOTE: DD Form 2258 (see 3.2.6) shall be completed to indicated coolant used.

3.2.8.4.1 Water and antifreeze procedure. The cooling system shall be filled to operating level with a clean solution consisting of equal parts by volume of antifreeze (ethylene glycol) conforming to A-A-52624, and water. To assure complete mixing and distribution of antifreeze solution, the engine shall be operated until a temperature has been reached that causes the thermostat to open. A warning tag reading, "COOLING SYSTEM FILLED WITH WATER AND ANTIFREEZE SOLUTION (ETHYLENE GLYCOL) IN EQUAL PARTS BY VOLUME - DO NOT DRAIN", shall be securely attached to the radiator filler neck (see 4.4.2).

3.2.8.4.2 Water and corrosion inhibitor procedure. The cooling system shall be filled with clean water up to the "ADD" mark in the surge tank. A corrosion inhibitor conforming to MIL-A-53009 shall be added in the proportion of 5 ounces (oz) of the inhibitor for each 10 quarts (qt) of water. The inhibitor shall be dissolved in 2 qt of warm water and poured into the radiator while the engine is idling. If necessary, more water shall be added to fill the radiator to operating level. A warning tag reading, "COOLING SYSTEM DOES NOT CONTAIN ANTIFREEZE -- FILLED WITH WATER AND INHIBITOR", shall be securely attached to the radiator filler neck (see 4.4.2).

3.2.8.4.3 Antifreeze compound procedure. The cooling system shall be filled to operating level with antifreeze compound conforming to A-A-52624. The compound shall be used without dilution. A warning tag reading, "COOLING SYSTEM FILLED WITH ANTIFREEZE (ARCTIC-TYPE) - DO NOT DRAIN", shall be securely attached to the radiator filler neck (see 4.4.2).

3.2.8.5 Engine crankcase preservation. The engine crankcase shall be filled to operating level with lubricating oil conforming to MIL-L-21260 of the seasonal grade specified in the applicable drawing, specification, or lubrication order. DD Form 2258 shall be annotated with the type and grade of lubricant used (see 4.4.2).

3.2.8.6 Compression ignition engine. Compression ignition engine preservation shall be in accordance with 3.2.8.6.1 through 3.2.8.6.4 in an uninterrupted sequence (see 4.4.2).

3.2.8.6.1 Initial conditions. Prior to processing, engine shall be cooled to assure that the cylinder head temperature, measured at the injector nozzle flange surface of all cylinders, is not more than 100°F. Cooling shall be accomplished by induced air currents, circulation of engine coolant, or by waiting the period of time required to arrive at the above specified temperature (see 4.4.2.4).

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3.2.8.6.2 Fuel system and combustion chamber preservation. A portable auxiliary container with a filtering device and regulatory valve shall be filled with preservative oil conforming to grade 1 of MIL-P-46002 to which has been added an oil-soluble red dye conforming to MIL-D-81298, in a concentration sufficient to impart a marked coloring to the oil. Position container to allow gravity feed to the engine. Disconnect the fuel line between the primary fuel filter and the fuel pump at the filter end. Connect this line to the auxiliary container containing preservative oil. Disconnect vehicle fuel return line at quick disconnect coupling. Connect a transparent plastic fuel line to the end of the disconnected fuel return line. Place the other end of transparent fuel line into a recovery container to collect the return oil. Remove air duct at the intake air filter outlet and the turbocharger inlet. An air restrictor plug shall be installed into the air duct at the air filter end (see figure 1) and secured in position with the existing clamp. Return duct to its original position and secure it to the turbocharger and clamp. Do not reconnect duct to air filter outlet. The plug shall remain in place for processing, shipment and storage. A warning tag reading, "AIR INTAKE SYSTEM DISCONNECTED AND PLUGGED-REMOVE PLUG AND RECONNECT DUCT PRIOR TO STARTING," shall be prepared and secured in a conspicuous location with the drivers compartment. Place the engine fuel control to the "ON" position. Open the regulator valve on the auxiliary container. Crank the engine with the starter (NOTE: Engine may fire for approximately 5 seconds (s)) for not less than 30 s and not greater than 45 s. If the red-colored preservative oil is not observed within this time, rest the starter for a period of 3 min and repeat the procedure. CAUTION: Special precautions shall be taken to assure that the time limits specified are not exceeded. Damage to the starter solenoid or hydrostatic lock may result. Close the regulator valve on the auxiliary container and disconnect it from the fuel pump supply line and reconnect the fuel pump supply line to the primary filter. Remove the transparent fuel line, and reconnect the vehicle fuel return line at the quick disconnect coupling. Turn on the vehicle fuel supply system (see 4.4.2.4).

3.2.8.6.3 Preservation through exhaust system and air intake of turbocharger. Atomize 1 oz of preservative oil conforming to grade 1 of MIL-P-46002 into the external exhaust opening. Seal the opening with tape conforming to type IV of MIL-T-22085. Remove the exhaust tube between the turbocharger and left exhaust manifold. Atomize 1 oz of preservative oil conforming to grade 1 of MIL-P-46002 into the left exhaust manifold, then atomize 2 oz of grade 1 of MIL-P-46002 into the right exhaust manifold, and turbocharger, replace the left exhaust tube. Remove air duct at the intake air filter outlet and the turbocharger inlet. Atomize 1 oz of preservative oil conforming to grade 1 of MIL-P-46002 into the air inlet (toward engine) of the turbocharger. Reconnect air duct to turbocharger and secure with the clamp (see 4.4.2.4).

3.2.8.6.4 Preservation through oil level gage rod opening. Remove the oil level gage rod and atomize 6 oz of preservative oil conforming to grade 1 of MIL-P-46002 into the crankcase through the gage rod opening. An extension of sufficient length to permit the nozzle to be within the crankcase (but not submerged in the crankcase oil) shall be used. Reinstall the gage rod.

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All openings to engine interior, including oil level gage rod opening and the oil filler cap shall be sealed with tape conforming to type IV of MIL-T-22085.

WARNING TAG:

A red warning tag reading, "ENGINE PRESERVED WITH VCI-DO NOT CRANK", and, "BEFORE CRANKING, REMOVE TAPE FROM ALL SEALED AREAS (EXHAUST, OIL GAGE ROD AND FILLER CAP)", shall be placed in a conspicuous location within the driver's compartment (see 4.4.2).

3.2.8.7 Personnel heater and lines. Personnel heater shall have the fuel supply shut off valve turned to the off position. (The turret must be rotated to gain access to the valve.) The main fuel line supplying fuel to the heater shall be disconnected at a point closest to shut off valve. Fuel from the fuel line shall be allowed to drain. Seal ends of disconnected fuel line and shut off valve with plastic plugs/caps conforming to MIL-C-5501, with tape conforming to type II of MIL-T-22085. Two warning tags each reading, "HEATER FUEL LINES DISCONNECTED AND SEALED. PRIOR TO PLACING PERSONNEL HEATER IN OPERATION, REMOVE PLUGS/CAPS OR TAPE FROM FUEL LINE, AND SHUT OFF VALVE. OPERATE HEATER FUEL PUMP AND DRAIN A MINIMUM AMOUNT OF FUEL THROUGH THE FUEL LINE INTO A PORTABLE CONTAINER. RECONNECT HEATER FUEL LINE", shall be prepared. One tag each shall be secured to the personnel operating switch and one to the personnel heater (see 4.4.2).

3.2.8.8 Fuel tank preservation. Using the vehicle fuel pump, fuel tank shall be drained to the maximum extent possible. (Disconnect fuel line from the fuel pump to the fuel filter at the filter. Pump fuel into a recovery container.) The fuel tank cap and filler screen shall be removed and coated with lubricating oil conforming to type 1, grade 30 of MIL-L-21260. Three qt of lubricating oil conforming to type 1, grade 10 of MIL-L-21260 shall be added to residual fuel. The tank cap and filler screen shall be reinstalled (see 4.4.2.2).

CAUTION: Special precaution shall be taken to assure pump is turned off as soon as fuel stops flowing into recovery container.

3.2.8.8.1 Fuel tank security. After processing the fuel tank as specified in 3.2.8.8, the fuel cap cover shall be closed, and the combat lock shall be pulled to the lock position from inside of the vehicle (see 4.4.2).

3.2.8.9 Ramp lift assembly. All unpainted metal surfaces of the ramp lift assembly, excluding cylinder rod, shall be coated with preservative conforming to grade 4 of MIL-PRF-16173 (see 4.4.2).

3.2.8.9.1 Ramp hydraulic reservoir. The ramp hydraulic reservoir shall be filled with hydraulic fluid conforming to type I of MIL-H-46170 (see 4.4.2).

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3.2.8.10 Hatches, doors, and firing ports. Rubber seals around hatches and doors shall be coated with powdered talc conforming to type IV, class C of A-A-52518, or talc, technical, conforming to MIL-T-50036. Firing ports (M2, M2A1 and M2A2) shall have their plugs installed. For shipment, hatches and doors shall be closed and locked from the inside, with the exception of the driver's hatch. The driver's hatch shall be closed and secured from the outside with a bolt having a nut drawn up tight and exposed threads peened over to prevent easy removal, or a bolt having a nut drawn up tight with the nut tack welded to the bolt, or with a Government-issued padlock. For storage, hatches and doors shall be locked from the inside, except that the ramp door shall be secured in the open position for ventilation (see 4.4.2).

3.2.8.11 Turret position and travel lock. The turret and TOW missile launcher shall be in their travel positions. The turret travel lock shall be engaged (locked position), securing the turret from rotating (see 4.4.2).

3.2.8.12 Ventilation.

3.2.8.12.1 Drain plugs. Drains are located on the left front and right rear of vehicle. Drain plugs shall be removed, consolidated into a weather resistant corrugated fiberboard container, and securely stowed within vehicle. Install galvanized wire screens into each drain plug opening via friction fit. A warning tag reading, "DRAIN PLUGS OPEN: PRIOR TO OPERATION, CLOSE PLUGS", shall be secured within the driver's compartment (see 4.4.2).

3.2.8.12.2 Engine access compartment panel. Engine compartment access panel shall be removed and talc conforming to MIL-T-50036 shall be applied to rubber seal. Reinstall access panel after preserving engine (see 4.4.2).

3.2.8.13 Miscellaneous preservation. Unless otherwise specified herein, all exposed, unpainted metal surfaces on the exterior and interior of the vehicle, with the exception of track shoes, shall be coated with preservative conforming to Grade 4 of MIL-PRF-16173 (see 4.4.2).

3.2.9 Packaging.

3.2.9.1 Dry charged batteries and cables. Vehicle dry charged batteries and turret dry charged batteries shall be installed and secured in their battery carriers. Battery cables shall be secured to the battery carrier with 0.75 in. tape conforming to type IV of ASTM D5330. Battery filler cap openings shall be sealed by placing a 2 in. wide by 3 mil thick piece of film conforming to type II of MIL-B-22191 over each filler cap opening with the cap removed. The sheet shall be of sufficient length to allow it to be depressed into the opening to the same depth as the filler plug. Filler caps shall be screwed or inserted into openings to form a complete seal without damaging the sheet. If batteries have been processed in accordance with MIL-B-11188, they need not be reprocessed as above (see 4.4.2).

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3.2.9.2 Electrolyte. Electrolyte shall be packaged and packed in accordance with O-S-801, with the exception of the exterior container, which shall conform to PPP-B-621, class 2, or PPP-B-601, overseas type. Marking shall be in accordance with O-S-801 and MIL-STD-129 (see 6.5). The packed electrolyte shall be stowed in location near drains and secured independently to permit separate removal. A Material Safety Data Sheet (MSDS) shall be placed into a clear self adhesive envelope and shall be attached to exterior of container (see 4.4.2).

3.2.9.3 Backrests and seats. Cushions of backrests and seats (see 3.2.7.1.2) shall be covered with paper conforming to A-A-203 with a basis weight of not less than 60 lb. The paper shall be secured with tape conforming to type I of A-A-883 (see 4.4.2).

3.2.9.3.1 Backrest and seat positioning. Backrests and seats shall be placed in their stowed position. The rear center squad seat and pedestal on the M3 vehicle shall be removed and securely stowed within the crew compartment. Both of the rear center squad seats in the M2 vehicle shall be removed and securely stowed within the crew compartment (see 4.4.2).

3.2.9.4 Periscopes. Periscopes shall be left in place. Place tape conforming to type I of MIL-T-60394 on corners of glass surface (see figure 2). Over tape, place a piece of hardboard conforming to ANSI A135. 4, standard type, smooth two sides sealed surface, plain design, 0.13 in. thick size 2.75 in. x 0.75 in. (see 4.4.2).

3.2.9.5 Fire extinguishers. Fire extinguishers shall contain 90 percent (%) of rated full charge. All seals shall be intact. DA Form 253 shall be completed and securely attached to each extinguisher (see 6.3 and 4.4.2).

3.2.9.6 Secondary gun sight. Remove secondary gun sight, clean and package in a type CF, class Weather-Resistant box conforming to ASTM D5118 and ASTM D1974. Container shall be closed in accordance with type III of ASTM D5486, identified as to contents, and securely stowed within the crew compartment (see 4.4.2).

3.2.9.7 TOW launcher. TOW launcher shall be lowered to stowed position (see 4.4.2).

3.2.9.7.1 TOW launcher cover. The canvas cover on the rear of the launcher shall be in place and secured in position (see figure 3) with non-metallic strapping conforming to type II of ASTM D3950, 0.63 in. wide, and in accordance ASTM D4675 (see 4.4.2).

3.2.9.8 Integrated sight unit (ISU). Doors on ISU cover shall be closed and latched from the inside (see 4.4.2).

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3.2.9.8.1 Flag holder. Remove flag holder from rear of ISU cover. Reinstall mounting bolts and washers. Clean and package in a type CF, Class Water Resistant box conforming to ASTM D1974 and ASTM D5118. Box shall be closed with tape conforming to type III of ASTM D5486, identified as to contents, and securely stowed within crew compartment (see 4.4.2).

3.2.9.9 Backup sight. Backup sight shall be left in place. Place tape conforming to type I of MIL-T-60394, to glass surface as shown in figure 4. Over tape, place a piece of hardboard conforming to ANSI A135.4, standard type, smooth two sides sealed surface, plain design, 0.13 in. thick size 2.75 in. X 0.75 in. (see 4.4.2).

3.2.9.10 Grenade launcher openings. Seal grenade launcher openings with tape conforming to type IV of MIL-T-22085 (see 4.4.2).

3.2.9.11 Basic issue items (BII). Unless otherwise specified (see 6.2), BII shall be processed, packaged, and packed in accordance with MIL-V-62038. BII shall be stowed and secured in accordance with 3.2.9.11.1 (see 4.4.2).

3.2.9.11.1 Stowage and securement of BII. BII and items removed for shipment shall be identified to the pertinent vehicle by serial number. (NOTE: BII and items removed for shipment shall not be identified to the pertinent vehicle by serial number if vehicle has been rebuilt or revised at depot.) BII shall be stored inside buildings, except during shipment. Packed BII, receiver and feeder containers shall be placed inside the vehicle as shown in figure 6 and secured in place with a 1.25-in. wide strapping conforming to type I, class B of ASTM D3953, and in accordance with ASTM D4675. (NOTE: If BII and other containers are packed in fiberboard containers and it has been determined 1.25-in. wide strapping will cause damage to containers, strapping width shall be reduced to 0.75-in. wide). Strapping shall be secured to holding devices within crew compartment. Additional strapping may be required if 0.75-in. wide strapping is used. BII, receiver, feeder, impact tool kit, and removed item boxes shall be secured in such a manner as to prevent any movement during transit and to prevent damage to containers or vehicle interiors. Corner protectors shall be used under all strapping (see 4.4.2).

3.2.9.12 25mm barrel support and 7.62mm machine gun barrel support. The 25mm barrel support and the 7.62mm machine gun barrel support shall be covered (see figure 5) with barrier material conforming to MIL-B-117, style 1, type I, class E. The bags shall be secured to supports with tape conforming to type IV of MIL-T-22085 (see 4.4.2).

3.2.10 Vehicle closure.

3.2.10.1 Closure kit. Unless otherwise specified (see 6.2), each vehicle shall be provided with a vehicle protective closure kit. The closure kit shall be fabricated, assembled, and installed in accordance with Drawing 12349601 (see 4.4.2).

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3.2.10.1.1 Antenna guard. Remove antenna guard from turret. Reinstall mounting bolts and washers. Clean and package in a type CF, Class Water Resistant box conforming to ASTM D1974 and ASTM D5118. Box shall be closed with tape conforming to type III of ASTM D5486, identified as to contents, and securely stowed within crew compartment (see 4.4.2).

3.2.10.2 Depot BII box marking. The information "DO NOT DESTROY-USE FOR RETURN SHIPMENT OF VEHICLE CLOSURE KIT" shall be stenciled on the depot BII box in lettering no less than 0.75 in. high with a contrasting color of enamel conforming to TT-E-529. Do not mark BII box if it is determined the container will not accommodate the closure kit (see 4.4.2).

3.3 Level B. Vehicles shall be processed in the same manner as specified for level A (see 3.2), with the following exceptions.

3.3.1 Transmission and final drives. Transmission and final drives shall contain operational lubricant as specified on applicable drawings, specifications, or lubrication orders, filled to operating level. If, however, these units contain lubricating oil conforming to type I, grade 10 or 30, of MIL-L-21260, an additional amount of the same oil shall be added to attain operating level. Operating lubricants shall not be mixed with MIL-L-21260 except in an emergency. DD Form 2258 shall be annotated to indicate grade of lubricant or preservative oil used (see 4.4.2).

3.3.2 Engine crankcase. The engine crankcase shall contain normal operational lubricant as specified in lubrication order, filled to operational level. DD Form 2258 shall be annotated to indicate grade of lubricant used (see 4.4.2).

3.3.3 Engine preservation. The engine shall not require preservation for level B shipment and storage (see 4.4.2).

3.3.4 Personnel heater and fuel pump. The personnel heater and fuel pump shall be in ready-to-use condition (see 4.4.2).

3.3.5 Residual fuel. Unless otherwise specified (see 6.2), the vehicle shall be shipped without draining residual fuel from the fuel tank (see 4.4.2).

3.3.6 Backrests and seats. Cushions of backrests and seats shall not be covered. If cushions are received packaged, they shall be stowed as received in the crew compartment (see 4.4.2).

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3.3.7 Engine compartment access panels. Engine compartment access panels in the crew compartment shall not be removed (see 4.4.2).

3.3.8 Antenna guard. The antenna guard shall not be removed (see 4.4.2).

3.3.9 Vehicle closure. Vehicle closure kits shall not be provided for level B shipment and storage (see 4.4.2).

3.4 Loading.

3.4.1 Loading flat cars. Loading of vehicles on open top railroad cars shall be in accordance with the applicable requirements of section I, General Rules Governing the Loading of Commodities on Open Top Cars, and figure 79, section 6, Rules Governing the Loading of DoD Material on Open Top Cars, publication of the Association of American Railroads (AAR) (see 2.3 and 4.4.2).

3.4.2 Highway shipment. Loading of vehicles for shipment by haul-away and rules for shipment by drive-away or tow-away shall be in accordance with the Department of Transportation (DoT) publication “Federal Motor Carrier Safety Regulations”, and applicable military publications (see 2.3 and 4.4.2).

3.4.3 Reprocessing engine after loading.

3.4.3.1 Level A. If the engine is operated in connection with the moving of vehicle to the loading area or during the loading itself, the engine shall be reprocessed as specified in 3.2.8.6 through 3.2.8.6.4. The vehicle cover shall be rolled clear of the engine intake and exhaust to provide air circulation and to prevent damage to the cover. After reprocessing of engine, the vehicle cover shall be replaced in its original position (see 4.4.2).

3.4.3.2 Level B. If engine is operated in connection with the movement of vehicle for loading or unloading, there shall be no additional processing of engine (see 4.4.2).

3.5 Marking. In addition to any special marking required in the contract (see 6.2), the vehicle shall be marked in accordance with MIL-STD-129 (see 4.4.2 and 6.5).

3.5.1 Lifting points. The information “LIFT HERE” with an arrow pointing to the lifting eye shall be stenciled adjacent to each lifting eye using black ink conforming to A-A-208 (see 4.4.2).

3.6 Drive on/drive off capability. When the vehicle is to be operated for loading or unloading (see 6.2), the following provisions shall apply (see 4.4.2).

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3.6.1 Additional fuel. When specified (see 6.2), additional fuel shall be added, as required, to accomplish movement of vehicle (see 4.4.2).

3.6.2 Batteries and electrolyte. Batteries shall be filled with electrolyte, fully charged, and battery cables connected. After vehicle self-movement for loading or placement in storage. The vehicle negative ground cable shall be removed from the sponson behind and to the lower left of the driver's seat. Return bolt and washers to sponson. Wrap end of ground cable with tape conforming to type III of ASTM D5486, to protect against metal to metal contact. Secure loose cable to sponson with similar tape. A tag reading, "VEHICLE PRESERVED FOR DRIVEAWAY CONDITION. BEFORE CRANKING, CONNECT NEGATIVE GROUND CABLE TO SPONSON BEHIND DRIVER'S SEAT. ENGINE AND FUEL TANKS NOT shall be attached in a conspicuous location within the driver's compartment (see 4.4.2).

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2).
- b. Production processed vehicle inspection (see 4.3).

4.2 First article inspection. First article inspection shall be performed one of the first 10 production processed vehicles, when a first article sample is required (see 3.1). Samples shall be subjected to the inspection and tests specified in 4.4.1 through 4.4.4.

4.3 Production processed vehicle inspection. Unless otherwise specified (see 6.2), all production processed vehicles shall be subjected to the tests specified in 4.4.2 through 4.4.4.

4.4 Methods of inspection.

4.4.1 Materials. Unless Government inspected at the source, all materials to be used in processing of trainer shall be inspected in accordance with the material specification; or, certified inspection and laboratory test reports shall be furnished which show that materials, as furnished, conform to the detailed specification.

4.4.2 Processing. Trainer processing shall be inspected to determine conformance to this specification. Inspection of processing shall include all items specified in table I, and 4.4.1 through 4.4.4.

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TABLE I. Processing inspection.
(See indicated paragraphs for Level A, B requirements)

Component	Cleaning	Preservation		Packaging/Stowing	
	Levels A & B	Levels A	Levels B	Levels A	Levels B
Government furnished equipment (GFE)				3.2.2	3.2.2
Preservation and atomized spray equipment				3.2.3	3.2.3
Processing records				3.2.4	3.2.4
Disassembly				3.2.5	3.2.5
Matchmaking				3.2.5.1	3.2.5.1
Interior of vehicle	3.2.7.1				
Battery supports & retainers	3.2.7.1.1	3.2.8.2	3.2.8.2		
Backrests & seats	3.2.7.1.2			3.2.9.3	3.3.6
Exterior of vehicle & weapon station	3.2.7.2				
Relubrication inhibitor procedure		3.2.8.1	3.2.8.1		
Transmission and final drives		3.2.8.3	3.3.1		
Cooling system <u>1/</u>		3.2.8.4	3.2.8.4		
Water and antifreeze procedure		3.2.8.4.1	3.2.8.4.1		
Water & corrosion inhibitor procedure		3.2.8.4.2	3.2.8.4.2		
Arctic antifreeze procedure		3.2.8.4.3	3.2.8.4.3		

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TABLE I. Processing inspection- continued.
 (See indicated paragraphs for Level A, B requirements)

Component	Cleaning	Preservation		Packaging/Stowing	
	Levels A & B	Levels A	Levels B	Levels A	Levels B
Engine crankcase <u>1/</u>		3.2.8.5	3.3.2		
Compression ignition engine		3.2.8.6	3.3.3		
Preservation thru fuel system and combustion chamber		3.2.8.6.2	3.3.3		
Preservation thru air intake and exhaust system		3.2.8.6.3	3.3.3	3.2.8.6.3	
Preservation thru oil level gage red opening <u>1/</u>		3.2.8.6.4	3.3.3	3.2.8.6.4	
Personnel heater & lines		3.2.8.7	3.3.4		
Fuel tank		3.2.8.8	3.3.5		
Ramp lift assembly		3.2.8.9	3.2.8.9		
Ramp hydraulic reservoir		3.2.8.9.1	3.2.8.9.1		
Hatches & doors		3.2.8.10	3.2.8.10	3.2.8.10	
Turret position and travel lock		3.2.8.11	3.2.8.11		
Drain plugs				3.2.8.12.1	3.2.8.12.1
Engine compartment access panel				3.2.8.12.2	3.3.7
Miscellaneous preservation		3.2.8.13	3.2.8.13		
Dry charged batteries & cables		3.2.9.1	3.2.9.1	3.2.9.1	3.2.9.1
Electrolyte				3.2.9.2	3.2.9.2
Periscopes				3.2.9.4	3.2.9.4
Fire extinguishers				3.2.9.5	3.2.9.5
Record forms				3.2.6	3.2.6
Secondary gun sight				3.2.9.6	3.2.9.6
TOW launcher				3.2.9.7	3.2.9.7
TOW launcher cover				3.2.9.7.1	3.2.9.7.1
Integrated sight unit				3.2.9.8	3.2.9.8

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TABLE I. Processing inspection- continued.
(See indicated paragraphs for Level A, B requirements)

Component	Cleaning	Preservation		Packaging/Stowing	
	Levels A & B	Levels A	Levels B	Levels A	Levels B
Flag holder				3.2.9.8.1	3.2.9.8.1
Backup sight				3.2.9.9	3.2.9.9
Grenade launcher				3.2.9.10	3.2.9.10
Basic issue items (BII)				3.2.9.11	3.2.9.11
Stowage and securement of BII				3.2.9.11.1	3.2.9.11.1
25MM barrel support and 7.62mm machine gun barrel support				3.2.9.12	3.2.9.12
Vehicle closure kit				3.2.10.1	3.3.9
Antenna guards				3.2.10.1.1	3.3.8
Depot BII box marking				3.2.10.2	
Loading on flat cars				3.4.1	3.4.1
Highway shipment				3.4.2	3.4.2
Reprocessing engine after loading				3.4.3.1	3.4.3.1
Marking				3.5	3.5
Lifting points				3.5.1	3.5.1

1/ Inspect DD Form 2258.

4.4.2.1 Cleaning. To determine conformance to 3.2.7.1 and 3.2.7.2, the interior and exterior of vehicle shall be examined for cleanliness. Surfaces on which tape is to be applied shall be examined for cleanliness before application.

4.4.2.2 Fuel tanks. To determine conformance to 3.2.8.8, visual inspection of preservative application shall be accomplished to assure addition of the correct amount of oil, based upon a known amount of residual fuel.

4.4.2.3 Cooling system. To determine conformance to 3.2.8.4, one processed vehicle shall be selected at random from each day's production. The engine coolant shall be tested using a hydrometer-thermometer type tester, with a range of -60 to +160°F, conforming to MIL-T-37402.

4.4.2.4 Engine. To determine conformance to 3.2.8.6.1 through 3.2.8.6.3, the interior of the engine from 1 of the first 10 production processed vehicles shall be examined for surface coverage. The engine shall be disassembled to the extent necessary to permit visual examination

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of all surfaces within the combustion chamber. The combustion chamber is all surfaces within the cylinder from and including the surface of the head within the cylinder. All surfaces within the combustion chamber shall have a "wet" coating of preservative oil such as is obtained when an item is dipped or flushed with the oil.

5. PACKAGING

This section is not applicable to this specification.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. This specification covers processing of the M2, M2A1, and M2A2 Fighting Vehicle, Infantry and M3, M3A1 and M3A2 Fighting Vehicle, Cavalry, for storage outside of buildings, for immediate use shipment, and for domestic or overseas shipment.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Applicable level of processing (see 1.2).
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
- d. If first article inspection is not required (see 3.1).
- e. If atomized spraying of preservative oils is specified (see 3.2.3).
- f. If BII should be processed, packed, or stored other than as specified (see 3.2.9.11).
- g. If residual fuel should be drained from the fuel tank prior to shipping (see 3.3.5).
- h. Applicable procedure for protection of cooling system (see 3.3.6).
- i. If special marking is required (see 3.3.26).
- j. If inspection should be other than as specified (see 4.2).

6.3 Safety precautions. Caution should be exercised in handling carbon dioxide (CO₂) fire extinguisher cylinders. Cylinders should not be dropped, permitted to strike each other, or handled roughly. Extreme care should be exercised during the reinstallation operation to avoid tripping the fire extinguisher control trigger (see 3.3.18).

6.4 Forms. A copy of the "Equipment Log Book" and all required forms (see 3.3.3) will be furnished to the contractor by the Government at least 30 days before shipment of the vehicles required by the contract delivery schedule.

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6.5 Supplemental publications. MIL-HDBK-129 provides general information on military marking and should be used to provide guidance for the utilization of MIL-STD-129. Copies of MIL-HDBK-129 are available from Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.

6.6 Subject term (key word) listing.

- Engine
- Loading
- Packaging
- Preservation
- Processing
- Relubrication
- Reprocessing
- Shipment
- Storage
- TOW launcher

6.7 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

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PLUG: PLYWOOD, A-A-55057, TYPE A, 6 IN.
DIAMETER X 1 IN. THICK

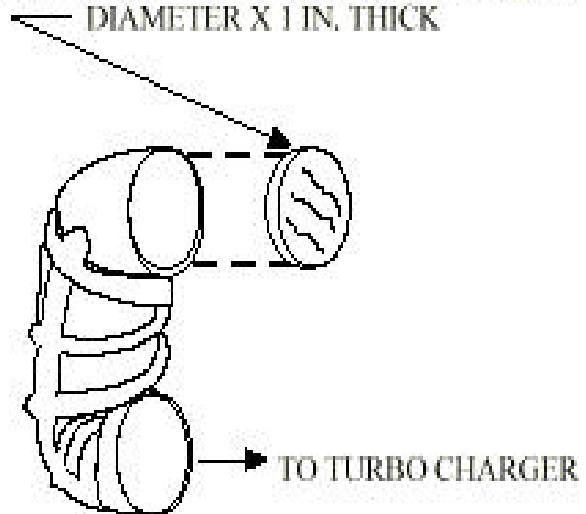


FIGURE 1. Air restrictor plug.

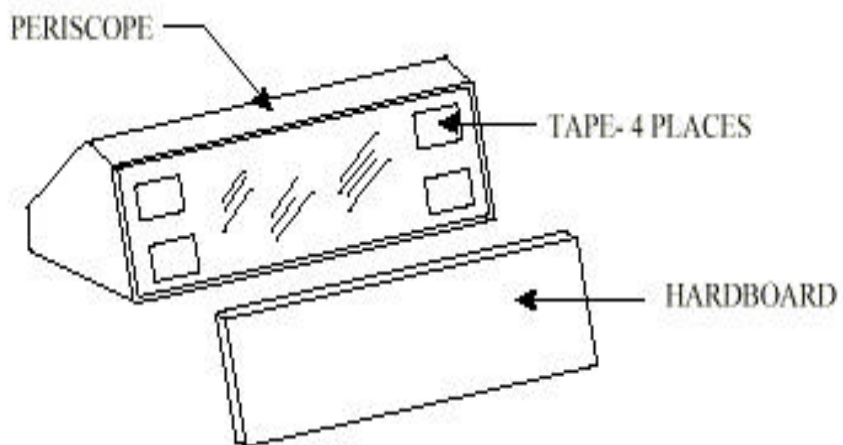


FIGURE 2. Periscope protector.

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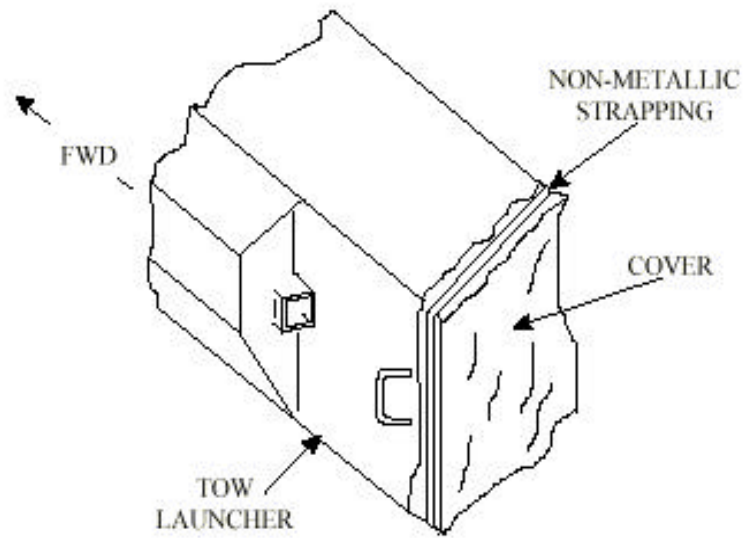


FIGURE 3. Launcher cover.

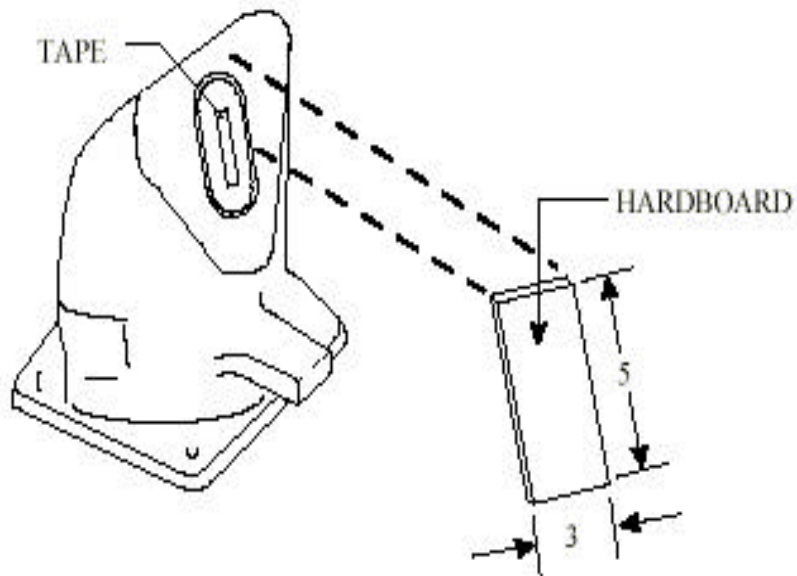


FIGURE 4. Backup sight protector.

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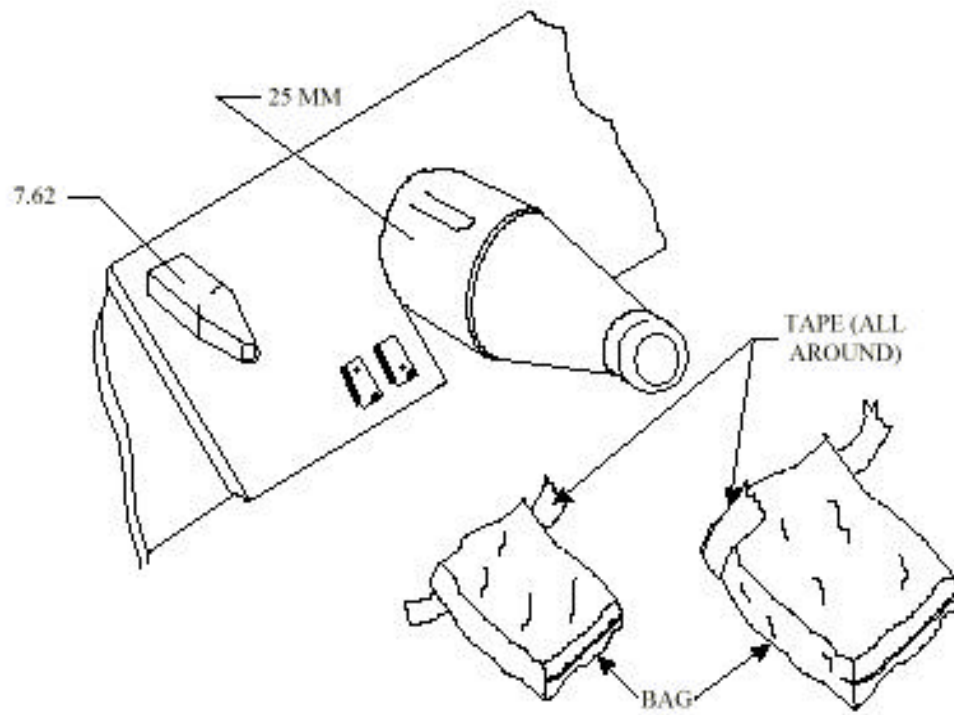


FIGURE 5. Barrel support closure.

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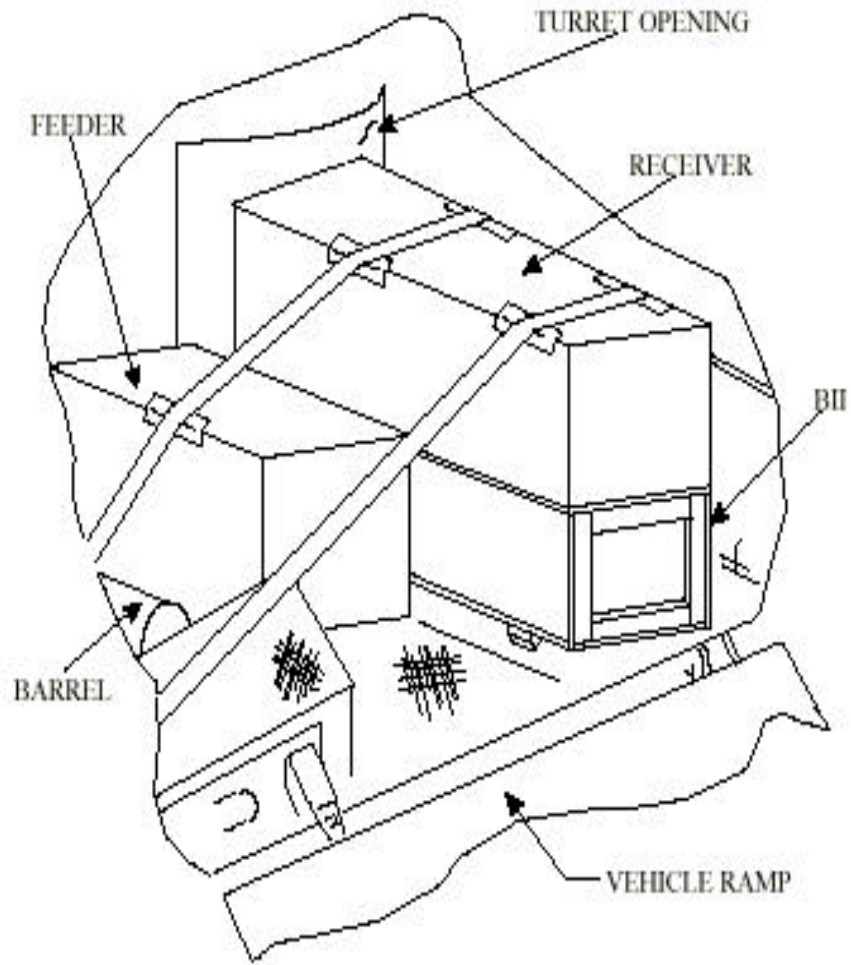


FIGURE 6. Interior stowage.

Custodian:
Army - AT

Preparing Activity:
Army - AT

Review Activity:
Army - SM

(Project PACK-A417)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:
1. DOCUMENT NUMBER
 ATPD 2234

2. DOCUMENT DATE (YYMMDD)
 980109

3. DOCUMENT TITLE

Fighting Vehicle, Infantry, M2... M2A2, and Fighting Vehicle, Cavalry, M#...M3A2: Processing for Storage

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*
5. REASON FOR RECOMMENDATION
6. SUBMITTER
a. NAME *(Last, First, Middle Initial)*
b. ORGANIZATION
c. ADDRESS *(Include Zip Code)*
d. TELEPHONE *(Include Area Code)*
7. DATE SUBMITTED
 (YYMMDD)

 (1) Commercial
 (2) AUTOVON
(If applicable)
8. PREPARING ACTIVITY
a. NAME
b. TELEPHONE *(Include Area Code)*

 (1) Commercial (810) 574-8745
 (2) AUTOVON 786-8745

c. ADDRESS *(Include Zip Code)*

 Commander
 U.S. Army Tank-automotive and Armaments Command
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 Warren, MI 48397-5000

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