INCH-POUND
ATPD-2099E
21 January 2009

PURCHASE DESCRIPTION
HIGH MOBILITY MULTIPURPOSE WHEELED VECHICLE
(HMMWV)

This specification is approved for use by the U.S. Army Tank-automotive and Armaments Command and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This system specification identifies the physical, performance and inspection requirements for the A2 series and Expanded Capacity Vehicle (ECV) series of the High Mobility Multi-Purpose Wheeled Vehicles (HMMWV). Unless otherwise noted in this specification, the M1123 variant shall be included as part of the A2 series of vehicles. Also the M1151/M1152/M1165/M1167 shall be included as part of the ECV series of vehicles. In simple terms, the M1151 has the body of the M1025A2 and placed onto the chassis of the ECV; the M1152 has the body of the M1097A2 (2-man version) placed onto the chassis of the ECV; the M1165 has the body of the M1097A2 (4-man version) placed onto the chassis of the ECV; and the M1167 is the TOW/ITAS variant based off of the M1151. (See Addendum in rear.) The system specification establishes these requirements by identifying the following:

a. Technical data requirements from which the vehicle is to be produced.
b. Physical characteristics and performance requirements for the vehicles produced.
c. Identification of the performance and quality test requirements used to verify the vehicles meet the specified performance standards.

The technical data package provided as part of this system specification identifies specifications and installations at a component level. The TDP does not identify the performance requirements of the final assemblage of these components at the system level. The physical characteristics and performance requirements are identified by this specification. Therefore, this specification shall form the basis for establishing and evaluating the vehicle's physical characteristics and performance.

1.2 General Description. The A2 vehicles represent the third stage of HMMWV evolution. The ECV vehicles represent the fourth stage of HMMWV evolution. Like the basic HMMWV and A1 series, the A2 and ECV vehicles are comprised of many common components. The various models are defined by different body configurations designed to meet

Comments, suggestions, or questions on this document should be addressed to U.S. Army Tank-automotive and Armaments Command, ATTN: AMSRD-TAR-E/CM/DM/STND MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000 or emailed to dami_standardization@conus.army.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

particular mission roles. These roles include transport of materials, weapon systems, equipment, and personnel. While operating in these roles the vehicles are operated on primary and secondary roads, trails and off road terrain. The vehicles are also capable of fording water and operation in temperatures ranging from Basic Cold to Basic Hot conditions. With application of kits, the vehicles are also capable of arctic operation and deep water fording. Some major changes for the A2 and ECV vehicles include:

1. 6.5 Liter Engine (Turbo for ECV)
2. 4L80 Electronic Transmission
3. New Radiator
4. New Exhaust w/Catalytic Converter
5. Central Tire Inflation System Ready
6. Improved Air Cleaner
7. Dual Voltage Electrical System
8. Improved Collapsible Steering Column
9. Relocated Driver's Mirror
10. Higher Capacity Cargo Bed Tiedowns
11. Sun Visors
12. Improved Heater System
13. 3-1/2 Ton Jack
14. Improved Rear Seats
15. 10,500 Pound Hydraulic Winch Kit
16. Swing away oil cooler
17. Improved corrosion resistance
18. Reliability Enhancements

1.3 Vehicle Variants. The A2 and ECV vehicle variants are described as follows:

Model Number	Nomenclature
M997 A2	Truck, Ambulance, 4 Litters, Basic Armor
M1025 A2	Truck, Utility, Armament Carrier, Basic Armor
M1035 A2	Truck, Ambulance, 2 Litters, Soft Top
M1043 A2	Truck, Utility, Armament Carrier, Supplemental Armor
M1045 A2	Truck, Utility, TOW Carrier, Supplemental Armor
M1097 A2	Truck, Utility, Heavy Variant
M1123	Truck, Utility, Heavy Variant
M1113	Truck, Utility, Expanded Capacity
M1114	Truck, Utility, Expanded Capacity, Up-Armored, Armament Carrier
M1151	Truck, Utility, Expanded Capacity, Armament Carrier, 11,500 GVW, Base with AC
M1151A1	Truck, Utility, Expanded Capacity, Armament Carrier, IAP/Armor Ready, 12,100 GVW

M1151A1 w/B1 Kit	Truck, Utility, Interim Armored, Armament Carrier, 12,100 GVW, IAP W/B1 Armor Kit
M1152	Truck, Utility, Expanded Capacity, Enhanced, 11,500 GVW, Base with AC
M1152A1	Truck, Utility, Expanded Capacity, Enhanced, IAP/Armor Ready, 12,100 GVW
M1152A1 w/B2 Kit	Truck, Utility, Interim Armored, Enhanced, 12,100 GVW, IAP W/B2 Armor Kit
M1165	Truck, Utility, Command and Control / General Purpose Vehicle, 11,500 GVW, Base with AC
M1165A1	Truck, Utility, Command and Control / General Purpose Vehicle, IAP/Armor Ready, 12,100 GVW
M1165A1 w/B3 Kit	Truck, Utility, Interim Armored, Command and Control / General Purpose Vehicle, 12,100 GVW, IAP W/B3 Armor Kit
M1167	Truck, Utility, TOW Carrier, Armored, 13,100 GVW, IAP W/B1 Armor Kit

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification 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 requirements of documents cited in sections 3, 4, or 5 of this specification, 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 cited in the solicitation or contract.

INTERNATIONAL STANDARDIZAITON AGREEMENTS

STANAG 2040 - Stretchers, Bearing Brackets and Attachment Supports

(Copies of these documents are available from http://nsa.nato.int or from NATO Standardization Agency (NSA), North Atlantic Treaty Organization, HQ, 1110 Brussels, Belgium.)

COMERCIAL ITEM DISCRIPTION

A-A-50271 - Plate, Identification
A-A-52557 - Fuel Oil, Diesel, for Posts, Camps, and Stations

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-5624	-	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-46593	-	Projectile, Calibers .22, .30, .50 and 20 mm Fragment - Simulating
MIL-DTL-53072	-	Chemical Agent Resistant Coating (CARC) System Application Procedure and Quality Control Inspection
MIL-DTL-83133	-	Turbine Fuel, Aviation, Grades JP-8 , JP-5
MIL-PRF-2104	-	Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service
MIL-PRF-10924	-	Grease, Automotive and Artillery
MIL-PRF-46167	-	Lubricating Oil, Internal Combustion Engine, Arctic

DEPARTMENT OF DEFENSE STANDARDARDS

MIL-STD-193	-	Painting Procedures and Markings for Vehicles, Construction and Material Handling Equipment
MIL-STD-209G	-	Lifting and TieDown Provisions
MIL-STD-461D	-	Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility
MIL-STD-642	-	Identification Marking of Combat and Tactical Transport Vehicles
MIL-STD-662	-	V-50 Ballistic Test for Armor
MIL-STD-810	-	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-814	-	Requirement for Tiedown, Suspension and Extraction Provisions on Military Material for Airdrop
MIL-STD-889	-	Dissimilar Metals
MIL-STD-1180	-	Safety Standards for Military Ground Vehicles
MIL-STD-1261	-	Arc Welding Procedures for Construction Steels
MIL-STD-1366	-	Interface Standard for Transportability Criteria
MIL-STD-1472	-	Human Engineering of Defense Design Criteria Standards
MIL-STD-1474B	-	Noise Limits
MIL-STD-3003	-	Vehicles, Wheeled: Preparation for Shipment and Storage of

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-310	-	Global Climatic Data for Developing Military Products
MIL-HDBK-669	-	Loading Environment and Related Requirements for Platform Rigged Airdrop Material
MIL-HDBK-759	-	Human Engineering Design Guidelines
MIL-HDBK-1223	-	Non-tactical Wheeled Vehicles Treatment, Painting, Identification Marking and Data Plate Standards

MIL-HDBK-1791	-	Designing for Internal Aerial Delivery in Fixed Wing Aircraft

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or 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 of these documents are those cited in the solicitation or contract.

US ARMY TECHNICAL MANUALS

TM-9-2320-280-10	-	HMMWV Operator's Manual
TM-9-2320-280-20	-	HMMWV Technical Manual

(Copies of the above drawings are available from the U.S. Army Tank-automotive and Armaments Command, ATTN: AMSRD-TAR-E/CM/DM/STND MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000, or email DAMI_STANDARDIZATION@conus.army.mil.)

TACOM DRAWINGS

12340789	-	Accessory and Supplementary Kit List
12460153	-	Final Inspection Record
12472301	-	Ground Combat Vehicle Welding Code – Alum.
12479197	-	M1151, Truck, Utility, Expanded Capacity, Armament Carrier, Base w/AC
12479198	-	M1152, Truck, Utility, Expanded Capacity, Enhanced, 11,500 GVW, Base with AC
12479550	-	Arc Welding Procedures for Constructional Steels
13226E7102	-	Cargo/Troop Carrier Camouflage Pattern
13226E7106	-	Four Litter Ambulance Camouflage Pattern
13226E7108	-	Weapon Carrier Camouflage Pattern
8750309	-	M1025 A2, Truck, Utility, Armament Carrier, Basic Armor
8750310	-	M1043 A2, Truck, Utility, Armament Carrier, Supplemental Armor
8750311	-	M1045 A2, Truck, Utility, TOW Carrier, Supplemental Armor
8750312	-	M1035 A2, Truck, Ambulance, 2 Litters, Soft Top
8750314	-	M997 A2, Truck, Ambulance, 4 Litters, Basic Armor
8750315	-	M1097 A2, Truck, Utility, Heavy Variant
87T0014	-	M1113, Truck, Utility, Expanded Capacity
87T0080	-	M1123, Truck, Utility, Heavy Variant
87T0015	-	M1114, Truck, Utility, Expanded Capacity, Up-Armored, Armament Carrier

87T0145 - Truck, Utility: Expanded Capacity, Armament Carrier
87T0146 - Truck, Utility: Expanded Capacity Enhanced, 11,500 Lb GVW
87T0147 - Truck, Utility: Command and Control General Purpose Vehicle
87T0148 - Truck, Utility: Command and Control General Purpose Vehicle
87T0174 - Truck, Utility: Expanded Capacity, Armament Carrier

(Copies of the above drawings are available from the U.S. Army Tank-automotive and Armaments Command, ATTN: AMSRD-TAR-E/CM/DM/STND MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000, or email DAMI_STANDARDIZATION@conus.army.mil.)

13194972 - Transversing Unit
13195325 - Launcher, Tubular, Guided Missile: M220E3
13195325-0408 - Launcher, Tubular, Guided Missile: M220A4
13480670-1 thru -4 - Improved Target Acquisition System (ITAS)

(Copies of the above drawings are available from http://www.edis.redstone.army.mil/ or the U.S. Army Tank-automotive and Armaments Command, ATTN: AMSRD-TAR-E/CM/DM/STND MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000, or email DAMI_STANDARDIZATION@conus.army.mil.)

AMCOM DRAWINGS

13582782 - Traversing Unit (TU) for ITAS

(Copies of the above drawings are available from http://www.edis.redstone.army.mil/ or the US Army Aviation and Missile Command – AMCOM, Attn: AMSAM-CIO-E-A, Building 4722, Rideout Road, Redstone Arsenal, Al 35898-5000, or e-mail EDM-MEDALS@REDSTONE.ARMY.MIL)

DEPARTMENT OF TRANSPORTATION

Department of Transportation Regulations (part 325)
Federal Motor Carrier Safety Regulations

(Copies of these documents are available from the Superintendent of Documents, U.S. Government Printing Office, 710 North Capitol Street, NW, Washington, DC 20402, or at www.dot.gov)

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS

Threshold Limit Values for Chemical Substances in Work Air

(Copies of this document are available from ACGIH, 1330 Kemper Meadow Dr., Suite 600, Cincinnati, OH 45240, or at www.acgih.org).

FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS)

(Compliance with FMVSS requirements shall be as specified herein and in MIL-STD-1180. Copies of these documents are available from the Dept. of Transportation, Federal Highway Administration, Washington, D.C. 20591, or at http://www.gpoaccess.gov/cfr/index.html).

ENVIRONMENTAL PROTECTION AGENCY

Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines.

(Copies of this document are available from the US EPA Headquarters, 401 M Street SW, mail code 3204, Washington, DC 20460 or at http://www.epa.gov).

TACOM

TACOM Design Guidelines for Prevention of Corrosion in Combat and Tactical Vehicles

(Copies of the above drawings are available from the U.S. Army Tank-automotive and Armaments Command, ATTN: AMSRD-TAR-E/CM/DM/STND MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000, or email DAMI_STANDARDIZATION@conus.army.mil.)

Failure Definition and Scoring Criteria, HMMWV, Block II Detailed Test Plan, TECOM Project No. 1-VG-120-HMV-079

2.3 Non-Government Documents. The Following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be the issues in effect on the date of Request for Proposal.

ASTM INTERNATIONAL

ASTM D1149	-	Rubber Deterioration-Surface Ozone Cracking in a Chamber
ASTM D2000	-	Rubber Products in Automotive Applications

(Copies of these documents are available from the ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, or ordered online at www.astm.org).

SAE INTERNATIONAL

SAE J1100	-	Motor Vehicle Dimensions
SAE J2360	-	Oil, Lubricating, Gear Multipurpose (Metric) Military Use

(Copies of these documents are available from the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001, or at www.sae.org).

2.4 Order of Precedence. The following order of precedence shall be applicable in the event of conflict between the requirements of the Contract, this specification and the documents referenced therein:

1. Contract Document
2. ATPD 2099E
3. The Technical Data Package
4. Government standards, specifications or handbooks
5. Non-government standards, specifications or handbooks

2.4.1 Compliance with Laws and Regulations. The requirements and specifications contained in the above documents shall not be interpreted as a waiver or allowance to supersede any law or regulation unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Mission Profile. The mission profile for all variants is comprised of 30 percent primary roads, 30 percent secondary roads and 40 percent off road operation. Reliability, maintainability and durability requirements specified herein shall be based on this apportionment and a total accumulation of 20,000 vehicle miles. The mission profile and required mileage breakdown shall be as shown in Table I.

TABLE I. Mission Profile.

Mission Profile	Mileage
30% Primary Roads	6,000
30% Secondary Roads	6,000
40% Cross Country	8,000
Total Mileage	20,000

3.1.2 Vehicle Weights. Vehicle weights shall be in accordance with Table II.

TABLE II. Vehicle Weights.

Vehicle Model	Curb Weight	Gross Vehicle Weight (GVW)	Gross Combined Weight (GCW)
M997 A2	7,660	10,300	14,080
M1025 A2	6,780	10,300	14,080
M1035 A2	6,100	10,300	14,080
M1043 A2	7,230	10,300	14,080
M1045 A2	7,258	10,300	14,080
M1097 A2	5,900	10,300	14,080

TABLE II. Vehicle Weights - Continued.

Vehicle Model	Curb Weight	Gross Vehicle Weight (GVW)	Gross Combined Weight (GCW)
M1123	5,900	10,300	14,080
M1113	6,400	11,500	15,280
M1114	9,800	12,100	15,880
M1151	7,500	11,500	15,280
M1151A1	8,150	12,100	15,880
M1151A1w/B1 Kit	10,300	12,100	14,080
M1152	6,400	11,500	15,280
M1152A1	7,100	12,100	15,880
M1152A1w/B2 Kit	8,760	12,100	15,880
M1165	6,500	11,500	15,280
M1165A1	7,230	12,100	15,880
M1165A1w/B3 Kit	9,870	12,100	15,880
M1167	11,680	13,100	16,880

3.1.3 Curb Weight. Curb weight of the vehicle shall be defined as the weight of the vehicle, on vehicle equipment and full compliment of fuels, fluids and lubricants.

3.1.4 Gross Vehicle Weight. Gross vehicle weight shall be the curb weight plus the vehicle payload as defined in 6.7.

3.1.5 Gross Combined Weight. Gross combined weight shall be defined as the gross vehicle weight plus the weight of the towed load minus pintle weight.

3.2 Reliability. The A2 series of vehicles shall demonstrate a reliability point estimate of 1,425 Mean Miles Between Failure (MMBF), the ECV series of vehicles shall demonstrate a reliability point estimate of 1,170 Mean Miles Between Failure (MMBF). Both series shall demonstrate a reliability point estimate of 970 Mean Miles between Operational Mission Failure (MMBOMF). Vehicle reliability characteristics shall be calculated after completion of 20,000 miles operation in accordance with Table I. Data for unscheduled maintenance actions and mission failures shall be assessed and scored using the Failure Definitions/Scoring Criteria contained in the HMMWV, Block II Detailed Test Plan, TECOM Project No. 1-VG-120-HMV-079. The results of the scoring conference assessment will be used as the basis of compliance with the reliability requirements.

3.3 Maintainability. Vehicle maintainability characteristics shall be calculated after completion of 20,000 miles operation in accordance with Table I.

3.3.1 Maintenance Ratio. Maintenance Ratio (MR) is defined as the ratio of maintenance man-hours to engine operating hours. Maintenance man hours shall include the time required for all scheduled and unscheduled maintenance actions during the 20,000 miles of operation. The time required for daily crew checks and services will not be included in the maintenance ratio. The maintenance ratio shall be in accordance with Table III.

TABLE III. Maintenance Ratio.

	Overall	DS/GS	Organ/Crew
A2 Series	0 - 0.250	0.080	0.170
ECV Series	0 - 0.313	0.100	0.212

* Direct Support/General Support
** Organizational/Crew

3.3.2 Ease of Maintenance. Chassis components shall have direct and unrestricted access for inspection, servicing, repair and replacement. Maintenance provisions shall incorporate features insuring operating clearances and facilitate maintenance and service operations. There shall be an 0.80 probability that all pre-operational, during, and after operational vehicle checks, will be accomplished by operator/crew in 10 man minutes or less for all A2 series body styles and 15 man minutes or less for all ECV series body styles using On Vehicle Equipment (OVE) only.

3.3.3 Engine Accessibility. The vehicle shall have a 0.90 probability that the time required for removal and reinstalling the engine and transmission assembly shall be less than 10 man-hours for all A2 series body styles and less than 15 man hours for all ECV series body styles. Removal and reinstallation time is with all tools and parts readily accessible at the work site. Removal and reinstallation time shall not include time to remove and reinstall pre-equipment condition components.

3.3.4 Mean Time to Repair. The mean time to repair (MTTR) shall not be greater than 2.0 hours for any body style. Mean time to repair shall be defined as total actual maintenance clock hours divided by the total number of unscheduled maintenance actions.

3.3.5 Engine and Powertrain Durability. All body styles shall demonstrate a 0.5 probability of completing the 20,000 miles (32,187 km) of operation without replacement or overhaul of the engine, transmission, transfer case, differential.

3.4. (RESERVED)

3.5 General Specifications. Materials, components and their assembly and installation shall be as specified in the Technical Data Package. Material shall be free of all defects and imperfections that might affect the serviceability and function of the finished product. Material not specified shall be selected by the Contractor and shall be compatible with commercial engineering standards of the automotive and truck equipment industries. Selection shall also be commensurate with the intended end use and maintain the system performance and characteristics contained in this vehicle specification. In the event changes are required to the vehicle configuration, extensive effort shall be made to maintain commonality of components among the different vehicle models.

3.5.1 Fungus Resistance. Fungus resistance requirements shall be as identified on the drawings. In the event component or material changes are required, existing fungus resistance requirements shall be maintained as a minimum.

3.5.2 Rubber Components.

3.5.2.1 Rubber components shall be as specified on the drawings. In the event material or component changes are required the replacement or addition of rubber products shall be in accordance with 3.5.2.2, 3.5.2.3, 3.5.2.4 and 3.5.2.5.

3.5.2.2 Fuels and Lubricants. Components which will be in contact with fuels shall be compatible with and intended for use in contact with the fuels and lubricants identified in 3.5.8.

3.5.2.3 Low Temperatures. Rubber components which are subject to flexing, compression, tension or otherwise subjected to movement or change in shape shall satisfy the F-19 low temperature requirement as specified in ASTM D2000, except test temperature shall be -50 °F (-45.6 °C). All other rubber products not included in the above definition shall meet the F-17 low temperature requirement as specified in ASTM D2000.

3.5.2.4 Ozone Resistance. Exposed rubber components shall evidence no cracking after 72 hours of exposure in an ozone chamber per ASTM D1149, using Type B specimens with the ozone partial pressure maintained at 50 MPa.

3.5.2.5 Recycled, Virgin and Reclaimed Materials. All material shall be new and unused. Approved recycled material is acceptable when processed to make new material. When processing used or recycled polymeric materials, up to 20% regrind may be added to virgin materials.

3.5.3 Ozone Depleting Substances. No ozone depleting substances shall be used in the manufacture or the assembly of the vehicle.

3.5.4 Dissimilar Metals. Dissimilar metals shall be electrically insulated from one another in accordance with MIL-STD-889.

3.5.5 Corrosion Control. The vehicle has been designed for a total service life of 15 years which includes varying or extended periods in corrosive environments. These corrosive environments include high humidity, salt spray, road deicing agents, gravel impingement and atmospheric contamination. Current corrosion control techniques are compatible with Nuclear, Biological and Chemical (NBC) decontamination procedures. In the event a configuration, material or component change is required, such capability shall be maintained by a combination of design features (as found in but not limited to the TACOM Design Guidelines for Prevention of Corrosion in Combat and Tactical Vehicles), material selection (i.e. composites), production techniques, process controls, inspection and documentation. No action beyond normal washing, periodic inspection and repair of damaged areas shall be necessary to keep the corrosion protection in effect. Damaged areas are defined to mean any fault that is not a result of a deficiency in design, material, workmanship or manufacturing.

3.5.6 Finishing and Marking.

3.5.6.1 Painting. All vehicles shall be finished or painted to provide a low reflectance surface. The vehicle body and components shall be cleaned, treated, and painted in accordance with the TDP and MIL-STD-193. Chemical agent resistant coatings (CARC) systems, application procedures shall be in accordance with MIL-DTL-53072. In the event of a conflict between MIL-STD-193 and MIL-DTL-53072 the latter shall take precedence.

3.5.6.2 Camouflage Pattern. The vehicles shall be painted with the three color camouflage pattern as identified below:

MODEL	DRAWING
M997 A2	13226E7106
M1025 A2	13226E7108
M1035 A2	13228E1658
M1043 A2	13226E7108
M1045 A2	13226E7108
M1097 A2	13226E7102
M1113	13226E7102
M1114	13226E7108
M1123	13226E7102
M1151	13226E7108
M1151A1	13226E7108
M1151A1w/B1 Kit	13226E7108
M1152	13226E7102
M1152A1	13226E7102
M1152A1w/B2 Kit	13226E7102
M1165	13226E7102
M1165A1	13226E7102
M1165A1w/B3 Kit	13226E7102
M1167	13226E7108

3.5.6.3 Marking. Vehicle exterior markings shall be placed and sized in accordance with MIL-STD-642, except "U.S. Army" ("USMC" or "USAF") in 3 inch (7.62 cm) high letters shall be used where the 5 point star is specified. All vehicle markings shall be non-reflective.

3.5.7 Data Plates. All data plates, decals and safety related markings furnished with the vehicle shall be in accordance with MIL-HDBK-1223 and A-A-50271, composition C Type I Style I for identification plates and Type III (style not applicable) for all others. The size of the plates shall not exceed the surface on which they are mounted.

3.5.8 Fuels and Lubricants. In addition to the component manufacturers specification, the vehicles shall be capable of operation using the fuels and lubricants identified in Table IV without adverse impact on performance or reliability. Fuels and lubricant applicability shall be as shown in the HMMWV technical manuals TM 9-2320-280-20-1 and TM 9-2320-280-10.

TABLE IV. Fuels and Lubricants.

Fuels	Lubricants
A-A-52557, Grade DF-A	MIL-PRF-2104
A-A-52557, Grade DF-1	SAE J2360
A-A-52557, Grade DF-2	MIL-PRF-46167
MIL-DTL-5624, JP-5	MIL-PRF-10924
MIL-DTL-83133, JP-8	Dextron VI

3.5.9 Welding. Unless otherwise specified by the TDP:

a. All arc welding of steels shall be in accordance with drawing 12479550.
b. All welding of aluminum shall be in accordance with drawing 12472301.

3.5.10 Environmental.

3.5.10.1 Climatic Operational Conditions. The vehicle and its components shall withstand and operate under climatic condition design types "hot", "basic", and "cold" as defined by MIL-HDBK-310.

3.5.10.2 Climatic Operating Conditions. The vehicle, without any kit, shall start and operate within 10 minutes in a safe manner in ambient temperatures from –25 °F to +32 °F (-31.7 °C to 0 °C) and within 3 minutes in ambient temperatures from +33 °F to +120 °F (0.55 °C to 48.9 °C) in all altitudes from -500 feet (-152.4 m) through +1200 feet (366 m).

3.5.10.3 Climatic Design Type Cold. The vehicle, with arctic lubricants, coolants and kits, shall start within 45 minutes and be completely operable within 15 minutes after starting in ambient temperatures of -50 °F. Temperature shall be recorded 4 to 6 feet above ground level.

3.5.11 Production Qualification Test. When required by the Contract or order Production Qualification Testing shall be conducted in accordance with 4.4.

3.5.12 Secure Lighting. Light emissions shall be predominately in the visible spectrum (380 to 700 nanometers) for all lamps which can be illuminated in the blackout mode, with the exception of the blackout driving lamp. Emission peaks in the 700 to 1100 nanometer spectrum shall not exceed 1% of the peak emission in the visible spectrum.

3.5.13 Rail Impact. The vehicles at GVW shall meet the requirements of the American Association of Railroad Rail Impact Test and MIL-STD-810 Method 516.4 Procedure 8.

3.5.14 Cargo Tiedowns. Vehicles shall be equipped with cargo area tiedowns as identified in the Technical Data Package (TDP). Tiedowns shall meet the requirements of MIL-STD-209G except paragraph 5.1.4. The rated load of each tiedown location shall be 2500 pounds.

3.5.15 Electromagnetic Radiation. Except for the horn, the vehicle shall conform to the electromagnetic interference characteristics requirements for tactical equipment as prescribed in MIL-STD-461D Methods RE102, CS114, RS103, CE102 and CS101. RE and RS requirements are intended for the vehicle while the CS and CE requirements are for the component level.

3.5.16 DS2 Decontamination. The vehicle shall be capable of being decontaminated with DS2 decontaminating solution.

3.5.17 Transportability. The vehicles shall be transportable by highway, rail, marine, and air modes worldwide. Transportability criterion shall be as set forth in MIL-STD-209G, MIL-STD-1366, and MIL-HDBK-1791. Preparation for all modes of transportation and subsequent operation shall be accomplishable by two persons, one of which is a 5th percentile female. Preparation time for transport and subsequent preparation for operation shall not exceed 15 minutes each. Preparations for transportation and subsequent vehicle operation shall be accomplished using authorized Basic Issue Items (BII) and Additional Authorized List (AAL) items. All parts required to be removed and subsequently replaced shall have a place for stowage on the vehicle from which removed.

3.5.17.1 Helicopter Transport. All vehicle models, at rated GVW less the weight of personnel, shall be externally transportable by the CH-47 C & D, and the CH-53 D & E helicopters. Vehicles shall be externally transportable by the UH-60 within the performance envelope of the aircraft. The vehicle sling provisions shall comply with the design and performance criteria specified in MIL-STD-209G.

3.5.17.2 Air Transportability. The vehicle at rated GVW less the weight of personnel, shall be transportable by C5A, C141E, and C130 aircraft. The vehicles and cargo payloads carried by the vehicles during the air transport shall be equipped with tiedown provisions that meet the restraint criteria specified in MIL-HDBK-1791, and MIL-STD-209G.

3.5.17.3 Airdrop. The vehicle at rated GVW less the weight of personnel, shall be air-droppable in accordance with MIL-HDBK-669, MIL-STD-814, and MIL-HDBK-1791. Airdrop requirements are not applicable to the M997 A2 Ambulance. Airdrop requirements for the M1097 A2 and M1152 shall apply without the shelter installed.

3.5.18 Communications equipment. Provisions for mounting of the AN/GRC-160, TSEK/KY-57, C-2298/VRC, AM-1780/VRC and AN/VIC-1 communications equipment shall be maintained.

3.5.19 Ambulance Lighting. The ambulance shall provide for general internal lighting as well as focus type lighting for each litter position. Adjustable, focus type lights must provide a minimum of 30 foot candles of power on a horizontal plane to a point of six inches above and

centered for the entire length of the litter. The use of the general and/or focus type lighting shall be performed at night during blackout conditions without compromising blackout discipline. The white lighting shall also be automatically cut off when either of the back doors, crew step or passageway doors are opened. Blackout lighting shall consist of two incandescent lamp fixtures with blackout lenses located on the ceiling, one on each side of the aisle above the litter rack.

3.5.20 Litters. The ambulance shall accommodate the standard NATO litters in accordance with STANAG 2040.

3.5.21 Basic Armor. See Annex 2, stand alone classified document, "Ballistic Requirements for M997A2, M1025A2, M1043A2, M1045A2 and XM1167 without B Kit".

3.5.22 Supplemental Armor. See Annex 2, stand alone classified document, "Ballistic Requirements for M997A2, M1025A2, M1043A2, M1045A2 and XM1167 without B Kit".

3.5.23 IAP, B-Kits and Frag Kits. See Annex 1, stand alone classified document, "Ballistic Requirements for M1151A1, M1152A1, M1165A1, and XM1167".

3.6 Manpower and Personnel Integration (MANPRINT).

3.6.1 Human Factors Engineering (HFE). The vehicles shall be in conformance with MIL-STD-1472. Conformance shall be based on a 5th percentile female to 95th percentile male personnel wearing NBC and cold weather protective clothing. All vehicle configurations shall ensure functionality, ease and safety of operation for all functions performed by operational and maintenance personnel based on 5th percentile female through 95th percentile male. The crew station for TOW weapon operation and ambulance litter loading shall accommodate the range between 95th through 5th percentile male soldier.

3.6.1.1 Ride Quality. The vehicle shall demonstrate controllability by a 5th percentile female driver for a minimum of 15 minutes while sustaining 9 to 12 watts average vertical absorbed power during negotiation of a 1.0 inch (2.54 cm) RMS course at 30 mph (48 kph) and a 1.5 inch (3.81 cm) RMS course at 16 mph (26 kph). Ride quality testing shall be conducted with vehicle at GVW. The tires shall be at cross country pressures as identified in TM 9-2320-280-10.

3.6.2 Vehicle Safety Requirements. Vehicles shall comply with the requirements of MIL-STD-1180 for Type I vehicles and FMVSS Requirement 216 except as follows:

a. Requirement 208, Seat belt warning system is not required.
b. Requirement 101, Control Illumination shall be as provided for in the TDP.
c. Requirement 108, Identification lights shall be as identified in the TDP.
d. Requirement 108, Convoy warning light receptacles are not required.
e. Requirement 108, Blackout driving light provisions shall be as provided for in the TDP.
f. Requirement 111, Inside rearview mirrors are not required.

g. Requirement 108, Back-up lamp requirements are only applicable to the M997 A2 Ambulance.
h. Requirement 201, Occupant Protection shall be as provided in the TDP.
i. Requirement 204, Steering Control Rearward Displacement is not applicable.
j. Requirement 208, Vehicle Crash Tests will not be required, however, current performance levels shall not be degraded in the event a change to current vehicle configurations is required.
k. Requirement 219, Windshield Zone intrusion is not applicable, however, current performance levels shall not be degraded in the event a change to current vehicle configurations is required.
l. Requirement 216, Roof crush resistance requirements are not applicable to the M997 A2 ambulance model, however, current performance levels shall not be degraded in the event a change to the current vehicle configuration is required.

3.6.2.1 Radioactive Material. No radioactive material shall be utilized.

3.6.2.2 Air Pollution. Vehicle shall comply with Environmental Protection Agency regulations governing control of air pollution from New Motor Vehicles and New Motor Vehicle Engines in effect on the date of contract award.

3.6.2.3 Sound Levels. Exterior sound level shall conform to the Interstate Motor Carrier Noise Emission Standards of the Environmental Protection Agency when tested in accordance with the regulations of the Department of Transportation, Part 325. Steady-state noise limits specified in MIL-STD-1474B shall not be exceeded in the Driver's, Commander's and Rear passenger seating areas with single hearing protection being worn by the occupants. Vehicle posted speed for purposes of determining compliance is 55 mph (88 kph). Exterior noise shall comply with MIL-STD-1474B for 80 dB drive by. Sound levels in the patient areas shall not exceed noise category E, MIL-STD-1474B with the door to the crew area closed.

3.6.2.4 Temperature, Pressure and Electrical Hazards. Safeguards and insulating features for exposed components and subsystems which are subject to high temperatures, high pressures, electrically actuated or inherently hazardous shall be in accordance with MIL-STD-1472.

3.6.2.5 Toxic Gases.

3.6.2.5.1 Carbon Monoxide. Operating and maintenance personnel shall not be exposed to concentrations of Carbon Monoxide (CO) which will result in Carboxyhemoglobin (COHB) levels in their blood greater than 10%. The COHB levels shall be calculated from MIL-HDBK-759, using work effort level 3 for mission activities.

3.6.2.5.2 Other Toxic Gasses. Nitrogen dioxide, ether, ammonia, nitric oxide and sulfur dioxide shall be limited to concentrations not to exceed those specified in the Threshold Limit Values for Chemical Substances in Work Air by the American Conference of Governmental Industrial Hygienists.

3.7 Performance Characteristics.

3.7.1 Performance Test Weight. Vehicle weights for verification of the performance characteristics shall be as identified in 3.1.2, 3.1.3, 3.1.4, and 3.1.5 for the model being tested. Unless otherwise specified the requirements identified herein shall apply to vehicles at GVW. Tests requiring trailers shall be conducted with M101 or HMT.

3.7.2 Grade and Slope Operations.

3.7.2.1 40% Grade. The vehicle, at GCW shall be capable of ascending and descending grades up to 40% in a longitudinal direction. The vehicles, at GCW shall also be capable of continuing ascent/descent from a stopped position while on the 40% grade. The vehicle engine shall be capable of being turned off and restarted while on the 40% grade.

3.7.2.1.1 Park Brake Grade Operation. The parking brake shall hold vehicle motionless on a 40% longitudinal grade. This requirement shall apply to vehicle at GCW in both upgrade and downgrade directions with the transmission in the neutral position. Grade surface shall be dry, hard and free from loose material. The force required to set the brakes under these conditions shall not exceed 55 pounds.

3.7.2.2 5% Grade. The vehicles, at GCW, shall ascend a grade of 5% at 24 mph (38.6 kph).

3.7.2.3 30% Side Slopes. The vehicle, at GCW shall be capable of traversing side slopes up to 30% with either side of the vehicle facing up slope. There shall be no loss of stability, malfunction or degradation of stated requirements.

3.7.3 Acceleration. The vehicles shall be capable of accelerating from 0 mph to 30 mph within 9.4 seconds and from 0 mph to 50 mph within 26.1 seconds with exception of the M1167 variant. The M1167 shall be capable of accelerating from 0 mph to 30 mph within 11.8 seconds and from 0 mph to 50 mph within 37.4 seconds (with the fan locked on).

3.7.4 Speed. The vehicle shall be capable of maintaining a minimum speed of 60 mph (96.6 kph) in high gear and not less than 2.5 mph (4.1 kph) in low gear.

3.7.5 Vehicle Handling.

3.7.5.1 Turning Radius. The vehicle turning radius shall not exceed 25 ft (7.62 m) curb to curb.

3.7.5.2 Vehicle Stability. The vehicle shall be capable of sustaining 0.4 to 0.6 g lateral acceleration in a constant radius turn.

3.7.5.3 Vehicle Control. The vehicle steering and braking systems characteristics shall be capable of maintaining safe vehicle operation by a 95th percentile male through 5th percentile

female. This requirement shall be applicable to on and off road operations and under all conditions of vehicle loading.

3.7.6 Standard Obstacles.

3.7.6.1 Vertical Step. The A2 series of vehicles at GVW and with the winch kit installed, shall be capable of negotiating an 18 inch vertical step in forward and reverse directions. The ECV series of vehicles at GVW and with the winch kit installed, shall be capable of negotiating an 12 inch vertical step in forward and reverse directions. Both series at GCW, with the winch kit installed, shall be capable of negotiating a 12 inch vertical step in forward and reverse directions.

3.7.6.2 Simulated Load Ramp. The vehicle at both GVW and GCW shall be capable of negotiating a loading ramp with a 36% slope. The approach and departure surfaces shall be horizontal. The length of the inclined surface shall be greater than the overall length of the vehicle and trailer combination.

3.7.7 Fording. The vehicles shall be capable of fresh and salt water crossings to the depths specified herein. Vehicle shall be capable of continuing operation after fording without additional maintenance. Vehicles shall meet water recovery requirements of FMVSS 105. While the vehicle is immersed to the specified depth for a period of at least 15 minutes, the engine shall be capable of being stopped and kept inoperative for one minute. After the one minute period the engine shall be capable of being restarted and attaining normal operating capability within one minute from commencement of starting cycle. The engine shall be capable of being operated at idle speed during the remainder of the 15 minute period. All vehicular instruments, components, and accessories shall function normally before, during and after the fording cycle. Use of the vehicle fording kit, or any part thereof, shall not degrade vehicle performance, reliability or durability. Contamination by water and water borne contaminants shall not exceed 2% by volume in any lubricant or the fuel.

3.7.7.1 30 Inch Water Crossing. The vehicles at GVW shall be capable of hard bottom water crossings to a depth of 30 inches (76.2 cm) inclusive of the wave height. The vehicles shall be capable of such crossings without prior preparation.

3.7.7.2 60 Inch Water Crossing. The A2 and ECV series of vehicles at GVW and with deep water fording kits installed, shall be capable of hard bottom water crossings to a depth of 60 inches (152.4 cm) inclusive of the wave height.

3.7.8 Range. The vehicle at GVW shall operate on internally carried fuel for a distance of at least 275 miles at an average speed of 30 to 40 mph (48.3 to 64.4 kph) on hard-surfaced roads over rolling terrain.

3.7.9 Normal Operating Temperatures. For vehicle and engine operation at sustained road load conditions, the maximum allowable fluid temperatures for each propulsion system component in A2 series vehicles shall not exceed:

1. Engine oil sump: 250 °F (121 °C) measured at drain plug.
2. Engine coolant: 236 °F (112 °C) measured at top tank.
3. Transmission sump/Transmission oil to cooler: 275 °F (135 °C).
4. Transfer case oil sump: 275 °F (135 °C).
5. Front axle and rear axle differential sumps: 250 °F (121 °C).
6. Power steering reservoir: 275 °F (135 °C).
7. Wheel gear reduction: 300 °F (149 °C).

For vehicle and engine operation at sustained road load conditions, the maximum allowable fluid temperatures for each propulsion system component in ECV series vehicles shall not exceed:

1. Engine oil sump: 275 °F (135 °C) measured at drain plug.
2. Engine coolant: 250 °F (121 °C) measured at top tank.
3. Transmission sump/Transmission oil to cooler: 300 °F (149 °C).
4. Transfer case oil sump: 275 °F (135 °C).
5. Front axle and rear axle differential sumps: 300 °F (149 °C).
6. Power steering reservoir: 275 °F (135 °C).
7. Wheel gear reduction: 300 °F (149 °C).

3.7.10 Tractive Effort. While the vehicle is operating continuously at 0.61 Tractive Effort to Gross Vehicle Weight (TE/GVW), at maximum specified ambient temperatures, wide open throttle and with all fuels specified, the fluid temperatures for each propulsion system component of the A2 series vehicles shall not exceed:

1. Engine oil sump: 275 °F (135 °C) measured at drain plug.
2. Engine coolant: 236 °F (112 °C) measured at top tank.
3. Transmission sump/transmission oil to cooler: 300 °F (149 °C).
4. Transfer case oil sump: 300 °F (149 °C).
5. Power steering reservoir: 275 °F (135 °C).

While the vehicle is operating continuously at 0.61 Tractive Effort to Gross Vehicle Weight (TE/GVW), at maximum specified ambient temperatures, wide open throttle and with all fuels specified, the fluid temperatures for each propulsion system component of the ECV series vehicles shall not exceed:

1. Engine oil sump: 275 °F (135 °C) measured at drain plug.
2. Engine coolant: 255 °F (124 °C) measured at top tank.
3. Transmission sump/transmission oil to cooler: 330 °F (166 °C).
4. Transfer case oil sump: 300 °F (149 °C).
5. Power steering reservoir: 275 °F (135 °C).

3.7.11 Vehicle Cone Index. The single pass Vehicle Cone Index (VCI), fine grained, shall have a required value no greater than 25 for vehicles at GVW and tire inflation pressure that will permit speeds of up to 50 mph (80 kph) for continuous operation on roads, trails, and cross country.

3.7.12 Run Flat Requirements. The vehicle shall be capable of operating at least 30 miles with complete loss of air pressure in two tires. The two flat tires shall be on different axles. Accumulation of mileage shall be in accordance with Table V.

TABLE V. Run Flat Operation Mileage Accumulation.

Distance (Miles)	Terrain Type	Average Speed (mph)
12.0	Cross Country	12.0
9.0	Secondary Road	21.0
9.0	Paved Road	30.0

3.7.13 Braking. Under all conditions of loading, the service brake shall stop the vehicle from a speed of 20 mph (32 kph) in 25 feet (7.6 m), or less, when tested in accordance with MIL-STD-1180, requirement 105. Deceleration and stopping distance shall be demonstrated on a dry, hard, approximately level road surface that is free from loose material. The brake pedal force to achieve the above performance shall not exceed that which can be applied by a 5th percentile female driver. Vehicle service brakes shall be capable of stopping and holding vehicle stationary on a 40% grade. The vehicle brake system shall meet the requirements of the Jennerstown Test Operation Procedure Number 2-2-608.

3.7.14 Towing. Unless otherwise specified, the A2 series of vehicles shall achieve the performance characteristics in 3.7.2, 3.7.4, 3.7.7, 3.7.8, 3.7.9 while towing the following loads:

Model	Gross Weight of Towed Load
M997 A2	3,400 LBS
M1025 A2	4,200 LBS
M1035 A2	4,200 LBS
M1043 A2	4,200 LBS
M1045 A2	4,200 LBS
M1097 A2	4,200 LBS
M1123	4,200 LBS

Unless otherwise specified, the ECV series of vehicles shall achieve the performance characteristics in 3.7.2, 3.7.4, 3.7.7.1 and 3.7.7.2, while towing the following loads:

Model	Gross Weight of Towed Load
M1113	4,200 LBS
M1114	4,200 LBS
M1151	4,200 LBS
M1151 A1	4,200 LBS
M1151 A1 w/B1 Kit	4,200 LBS
M1152	4,200 LBS
M1152 A1	4,200 LBS
M1152 A1 w/B2 Kit	4,200 LBS
M1165	4,200 LBS
M1165 A1	4,200 LBS

M1165A1 w/B3 Kit	4,200 LBS
M1167	4,200 LBS

All vehicles shall also tow a like vehicle at GVW, minus crew and patient weights, for a distance of 50 miles (80 km).

3.7.15 Approach and Departure Angles. The approach and departure angles shall be determined in accordance with SAE J1100.

3.7.15.1 Approach Angle. The approach angle for all variants shall not be less than 60 degrees without winch and 45 degrees with winch.

3.7.15.2 Departure Angle. The departure angle for all variants shall not be less than 30 degrees.

3.7.16 Climate Control. The M1151A1 (with and without B1 kit) and M1165A1 with B3 kit shall be capable of lowering the crew compartment temperature from 120 °F to an average <89 °F at the center of cab while operating in a 120 °F ambient temperature environment. The temperature shall be achieved based on averages during the last 60 minutes of the 80 minute cycle listed below. There shall be a minimum of a 4-hour soak period prior to testing at 120 °F. The heat soak will be done with doors open. During the test the air inlet temperatures for the condensers inlets shall not be less than 115 °F or exceed 125 °F. with no air restriction to the condenser inlets. The temperature readings for the crew compartment shall be taken at the center of the vehicle. The center of the cab is located at 16-1/2” below the turret hatch, 37-1/4” aft of windshield, and 40” inboard of drivers B-pillar. The engine RPM for the first 20 minutes shall be set at idle, the second 20 minutes the engine RPM shall set at 1100 RPM; the third 20 minutes the engine RPM shall be set at 1800 RPM; and the final 20 minutes shall be set at 1100 RPM. RPM changes must be accomplished without opening vehicle in any way. Cooling requirements shall be met with the windows, turret, bulkhead, and loaders door closed. All air conditioning vents are to be set to the fully open position and the louvers facing vertically with the defroster vents closed.

3.8 Supplementary Items and Kits.

3.8.1 A number of special application kits have been designed for use on the HMMWV family of vehicles. These kits and their applicability to the A2 and ECV Series of vehicles are identified on Drawing 12340789, Accessory Supplemental Kit List. In the event that a configuration, component or other design change is required, the interface with these kits shall be maintained. Where requirements for kits exists, the kits shall be installed or over-packed on the vehicle as identified in the Contract Ordering Data (see 6.2).

3.9 Service and Adjustment Prior to Acceptance. Prior to government acceptance of the vehicle the contractor shall fully inspect, service and adjust each vehicle in accordance with the Vehicle Final Inspection Record (FIR).

4. VERIFICATION

4.1 Responsibility for inspection. The contractor shall be responsible for the performance of all inspection requirements as herein specified and may use his own or other facilities acquired unless otherwise specified in the contract. The Government reserves the right to perform and/or monitor any inspections required hereunder to assure that the supplies and services are complaint with all contract requirements.

4.1.1 Contractor's Quality Assurance System. The production contractor shall utilize the inspection and quality assurance system as specified in the contract.

4.1.2 Government Verification. All quality assurance operations performed by the contractor will be subject to government verification at unscheduled intervals. Verification will consist of a surveillance of the operation to determine that practices, methods, and procedures of the product inspection to measure the quality of the product offered for acceptance. Deviation from the prescribed or agreed upon procedures, or instances of poor practices which might have an adverse affect upon the quality of the product offered for acceptance shall be immediately called to the attention of the contractor. Failure of the contractor to promptly correct deficiencies shall be cause for suspension of acceptance until corrective action has been made and compliance with contract requirements has been demonstrated.

4.1.3 Parts and Components. The contractor when requested shall make available to the Government at the time of any Government inspection, legible drawings and printed specifications to which the end item or any of its parts/components were manufactured. Such drawings and specifications shall be annotated to reflect the latest revision incorporated therein. Upon completion of the inspection(s) by the Government, all drawings and specifications will be returned to the contractor. The Government reserves the right to inspect end items or any parts/components during all manufacturing processes and to advise the contractor of any material that does not conform to either Government or contractor drawings/specifications. All deficiencies detected during any contractor or Government inspection (end item or in-process) shall be corrected by the contractor at no cost to the Government. Failure of the contractor to remedy such non-conformance shall be cause for suspension of acceptance until corrective action has been taken and contract compliance is demonstrated. During any Government inspection, the contractor shall provide inspection assistance upon request.

4.1.4 Qualified Products. In the event that particular specifications referenced in this document require use of items on a Qualified Products List (QPL), the production contractor shall utilize items only from vendors specified in the applicable QPL in the manufacture of production vehicles. The production contractor shall document the acquisition of all QPL items with a listing of suppliers, quantity, and date of QPL of each purchase order. Such QPL documentation shall be made available for Government review upon request.

4.2 Classification of Inspection. The inspection requirements specified herein are classified as follows (reference Table VI):

a. First Production Vehicle Inspection (FPVI)
b. Production Qualification Test (PQT)
c. Quality Conformance Inspection (QCI)
d. Control Test (CT)
e. Follow-on Production Test (FPT)

The inspections/tests referenced in Table VI may be modified at the discretion of the Government by the deletion or addition of examinations to assure adherence to specifications and contract requirements.

TABLE VI. Classification of Inspections and Tests.

Title	Requirement	Method	FPVI	PQT	QCI	CT	FPT
First Prod. Vehicle Insp.		4.3	x				
Prod. Qual. Test	3.5.11	4.4		x			
Quality Conformance Insp.		4.5			x		
Control Test		4.6				x	
Follow-on Prod. Test		4.7					x
Reliability	3.2	4.4.1	x				
Maintainability	3.3		x				
Maintenance Ratio	3.3.1	4.4.2	x				
Ease of Maintenance	3.3.2	4.4.3	x				
Engine Accessibility	3.3.3	4.4.4	x				x
Mean Time to Repair	3.3.4	4.4.5	x				x
Engine and Powertrain Durability	3.3.5	4.4.6	x				x
Corrosion Control	3.5.5	4.4.7	x	x	x		x
Painting	3.5.6.1	4.4.8	x		x		x
Markings	3.5.6.3	4.4.9	x	x			x
Data Plates	3.5.7	4.4.10	x	x			x
Fuels and Lubricants *Fuel/Lubricant level checks only	3.5.8	4.4.11	x				x*
Climatic Operating	3.5.10.2	4.4.12	x				
Climatic Design Type Cold	3.5.10.3	4.4.13	x				
Secure Lighting	3.5.12	4.4.14	x		x		
Rail Impact	3.5.13	4.4.15	x				
Electromagnetic Radiation	3.5.15	4.4.16	x				
DS2 Decontamination	3.5.16	4.4.17	x				
Helicopter Transport	3.5.17.1	4.4.18	x				
Airdrop	3.5.17.3	4.4.20	x				

TABLE VI. Classification of Inspections and Tests - Continued.

Title	Requirement	Method	FPVI	PQT	QCI	CT	FPT
Communications Equip	3.5.18	4.4.21					
Illuminations	3.5.19 3.5.20	4.4.22	x				x
Human Factors Engineering (HFE)	3.6.1	4.4.23	x				
Ride Quality	3.6.1.1	4.4.24	x				
Safety Requirements	3.6.2	4.4.25	x				
Air Pollution	3.6.2.2	4.4.26	x				
Sound Levels	3.6.2.3	4.4.27	x				
Temperature, Pressure and Electrical Hazard	3.6.2.4	4.4.28	x				
Carbon Monoxide	3.6.2.5.1	4.4.29	x				
Other Toxic Gases	3.6.2.5.2	4.4.30		x			
Grade Operations	3.7.2.1 3.7.2.1.1 3.7.2.2	4.8.1		x			x
Side Slope Operation	3.7.2.3	4.8.1		x			x
Acceleration	3.7.3	4.8.2		x			x
Speed	3.7.4	4.8.3		x			x
Turning Radius *Turning radius only	3.7.5.1	4.8.4	x*	x		x*	x*
Vertical Step	3.7.6.1	4.8.5		x			x
Simulated Load Ramp	3.7.6.2	4.8.6		x			x
Fording	3.7.7.1	4.8.7		x			x
Range	3.7.8	4.8.9		x			x
Normal Operating Temperatures	3.7.9	4.8.10		x			x
Tractive Effort	3.7.10	4.8.10.1		x			x
Vehicle Cone Index	3.7.11	4.8.11		x			x
Run Flat	3.7.12	4.8.12		x			x
Braking **Gross vehicle weight ***Curb weight	3.7.13	4.8.13	x**	x	x	x**	x***
Towing	3.7.14	4.8.14		x			x
Approach Angle	3.7.15.1	4.8.15		x			x
Departure Angle	3.7.15.2	4.8.16		x			x
Climate Control Verification	3.7.16	4.8.17		x		x	x
Sup Items & Kits	3.8	4.8.18		x			x
Servicing and Adjusting	3.9	4.8.19	x	x		x	x
Preparation for Delivery	5	4.8.20	x		x	x	

4.2.2 Test Locations. Tests identified in Table VI shall be conducted at the following locations:

Test	Location
First Production Vehicle Inspection (FPVI)	Place of manufacture
Production Qualification Test (PQT)	Government Proving Ground
Quality Conformance Inspection (QCI)	Place of manufacture
Control Test (CT)	Place of manufacture
Follow-on Production Test (FPT)	Government Proving Ground

4.3 First Production Vehicle Inspection.

4.3.1 In-Process Inspection. During the fabrication of the First Production Vehicles in-process inspections will be performed by a Government representative to evaluate conformance of materials and workmanship to requirements of specified documents. These inspections shall be made at the contractor's or subcontractor's facility. Processing, painting, rust-proofing and welding procedures, quality systems and inspection records will be reviewed and evaluated during this inspection.

4.3.2 First Production Vehicle Inspection (FPVI). One vehicle of the First Production Vehicle quantity of each configuration produced shall be road tested and completely inspected by the contractor for conformance to the requirements of the contract and specifications. The applicable road test shall be in accordance with 4.6. Upon completion, the contractor shall submit the vehicle (and make available all inspection records and certifications) to the responsible Government inspection element at the contractor's plant for preliminary inspection.

4.3.2.1 Preliminary Inspection. The first vehicle produced shall receive a preliminary inspection by the responsible Government element. The preliminary inspection shall be complete except for road test requirements of 4.6 which will be conducted jointly during provisional inspection by representatives of the procuring Product Assurance Directorate (PAD) as specified in 4.3.2.2.

4.3.2.2 Provisional Inspection. The first vehicle produced shall be subject to provisional inspection at the contractor's plant by representatives of the procuring PAD.

4.3.2.3 Repair of Defects. Defects found as a result of the above inspections shall be corrected by the contractor at no cost to the Government. Failure of the contractor to promptly correct defects shall be cause for suspension of acceptance of vehicles until corrective action has been accomplished.

4.3.2.4 Vehicle Disposition. Upon completion of inspection and acceptance, in accordance with 4.3.2, 4.3.2.1, and 4.3.2.2 the vehicles shall remain at the manufacturing facility and the contractor shall update the current configuration and service and maintain the vehicles during the contract period in accordance with applicable drawings and documents for care and preservation while in storage. At the discretion of the Contracting Officer, the vehicles may be released for shipment.

4.4 Production Qualification Test. To determine conformance to Section 3 (inclusive), after completion of FPVI (see 4.3), production vehicles shall be randomly selected by the Government at the contractor's manufacturing facility. These vehicles will be subjected to a 20,000-mile (32,187-km) RAM test contained in Table VII, in addition to the tests referenced in Table VI (minimum). In the event the production contract delineates test mileage less than 20,000 miles (32,187 km), the mileage mix (i.e. Paved Roads-30%, Secondary Roads-30%, and Cross country Roads-40%) shall remain the same for the revised mileage. Quantity of test vehicles to be tested shall be delineated in the production contract. Such testing shall be conducted by the Government at a Government selected test site(s). The vehicles shall be tested with actual or simulated payload and towed load to reflect vehicle GCW. Unless otherwise specified by the Government procuring activity, the contractor shall refurbish vehicles after test completion.

TABLE VII. 20,000 Mile Per Vehicle Durability Test Scenario.

Test Course	%	Miles	Km	Vehicle Speed
Paved Roads	30	6000	9656	Varying up to maximum safe speed
Secondary	30	6000	9656	Varying up to maximum safe speed
Cross Country	40	8000	12875	Varying up to maximum safe speed

4.4.1 Reliability Verification. To determine conformance to the reliability requirements of 3.2, the vehicles shall demonstrate a 1425 mi (2295 km) Mean Mile Between Failure (MMBF) during Production Qualification Test (PQT) over the specified distances and test courses in Table VII.

4.4.2 Maintenance Ratio Verification. To determine conformance to requirements of 3.3.1, a Maintenance Ratio (MR) of less than, or equal to, those specified in 3.3.1 must be demonstrated during PQT. The MR will be calculated using the total cumulative maintenance man-hours divided by the operating hours (engine hour meter). Maintenance induced errors, crew errors, and operator/inspection times shall be excluded.

4.4.3 Ease of Maintenance Verification. To determine conformance to 3.3.2, a maximum time to service (pre-operational, during, and after operational vehicle check) shall be demonstrated by operator/crew at an 80% confidence (Binomial Distribution) for the automotive system only.

4.4.4 Engine Accessibility Verification. To determine conformance to 3.3.3, the engine accessibility requirement of 0.90 probability shall be verified during the PQT.

4.4.5 Mean Time To Repair Verification. To determine conformance to 3.3.4, during the PQT a Mean Time To Repair (MTTR) shall be calculated by dividing the vehicle maintenance time (clock hours) by the number of unscheduled maintenance actions and shall not exceed 2.0 hours.

4.4.6 Engine and Powertrain Durability Verification. To determine conformance to 3.3.5, the durability requirements meeting the 50% confidence (Binomial Distribution) shall be verified during PQT.

4.4.7 Corrosion Control Check/Test. To determine conformance to 3.5.4 and 3.5.5 all vehicle surfaces subject to corrosion shall be checked for proper paint, coatings, sealants and their adhesions, and for corrosion minimizing material and design features specified. At the Government test sites the vehicles shall be checked for water, mud, and debris accumulation and for effects of normal washing procedures on paint adhesion.

4.4.8 Painting Certification/Check. To determine conformance to 3.5.6.1 and 3.5.6.2 the vehicles shall be checked for proper metal preparation and application of primer and paint in accordance with referenced specifications. The contractor shall certify that paint conforms to the color, gloss, spectral reflectance and chemical agent resistance requirements specified.

4.4.9 Marking Check. To determine conformance to 3.5.6.3, the vehicle shall be checked to ensure that markings are applied in accordance with MIL-STD-642, except "U.S. Army", "USMC" or "USAF" in 3 inch (7.6 cm) high letters shall be used where the 5 pointed star is specified. All vehicle markings shall be non-reflective.

4.4.10 Data Plate Check. To determine conformance to 3.5.7, the vehicles shall be checked to verify that all data plates are in accordance with MIL-HDBK-1223 and A-A-50271, composition C Type I Style I for identification plates and Type III (style not applicable)for all others. The data plates shall be checked for proper application. The size of any data plate shall not exceed the surface they are mounted on.

4.4.11 Fuel and Lubricant Certification Check. To determine conformance to 3.5.8, the contractor shall provide to the Government prior to FPVI (see 4.3) certification that vehicle initial fill lubricates conform to the requirements of MIL-PRF-2104, SAE J2360, MIL-PRF-46167, and MIL-PRF-10924. The contractor shall certify that the vehicle shall be capable of operating using fuels in accordance with grades DF-A, DF-1, DF-2, JP-5, and JP-8 of A-A-52557, MIL-DTL-5624, and MIL-DTL-83133. The vehicle shall be checked for proper lubricant levels.

4.4.12 Climatic Operating Check. To determine conformance to 3.5.10.2, the vehicle without any kit, shall be tested for proper start operation. The vehicle shall start and operate within 10 minutes in ambient temperatures from (minus) -25 °F to +32 °F (-31.7 °C to 0 °C) and within 3 minutes in ambient temperatures from 33 °F to 120 °F (0.55 to 48.9 °C) in all altitudes from -500 feet (-152.4 m) through +1200 feet (366 m).

4.4.13 Climatic Design Type (Cold) Check. To determine conformance to 3.5.10.3, the vehicle with arctic lubricants, coolant, and kit shall be tested for starting and operating as specified. The vehicle shall start within 45 minutes in ambient temperatures of -50 °F (-45.6 °C) recorded 4 to 6 feet (1.22 to 1.83 m) above ground.

4.4.14 Secure Lighting. To determine conformance to 3.5.12, the contractor shall make available to the Government prior to FPVI (4.3), certification that the light emission of any lamp in the blackout mode conforms to the specified requirements.

4.4.15 Rail Impact Test. To determine conformance to 3.5.13, the vehicle shall be tested to transportation levels in accordance with the American Association of Railroads (AAR) Rail Impact Test and MIL-STD-810 Method 516.4 Procedure VIII.

4.4.16 Electromagnetic Radiation Test. To determine conformance to 3.5.15 the vehicle, except for the horn, shall meet the electromagnetic interference characteristics requirements for tactical equipment as prescribed in MIL-STD-461D Methods RE102, CS114, RS103, CE102, and CS101.

4.4.17 DS2 Decontamination. To determine conformance to 3.5.16, the vehicle shall be subjected to prescribed cycling of DS2 decontamination cleaning for this class of vehicle.

4.4.18 Helicopter Transport Test. To determine conformance to 3.5.17.1, the vehicle with specified exceptions at GVW shall be lifted and carried externally by a CH47 C and D, CH53 D and E, and UH60A helicopter. The vehicle sling provisions shall comply with the design and performance criteria specified in MIL-STD-209G.

4.4.19 Air Transportability Test. To determine conformance to 3.5.17.2, the vehicle with specified exceptions at GVW shall be loaded and transported by a C5A, C141E, and C130 aircraft. The vehicle loading and cargo payloads shall be in accordance with MIL-HDBK-1791, MIL-STD-209G, and Design Handbook DH 1-11.

4.4.20 Airdrop Test. To determine conformance to 3.5.17.3, the vehicle with specified exceptions at GVW shall be and air droppable in accordance with MIL-HDBK-669, MIL-STD-814, and MIL-HDBK-1791. The M997 A2 does not require to be Airdropped. The shelter shall not be installed on the M1097A2 and the M1152 during the Airdrop test.

4.4.21 Communications Equipment. To determine conformance to 3.5.18, the vehicle shall be checked for proper installation, completeness, and fit.

4.4.22 Illumination/Litters. To determine conformance to 3.5.19 and 3.5.20, the lights and litters shall be checked for proper installation, completeness, and functional requirements. Performance requirements specified shall be verified during Government testing only.

4.4.23 Human Factors Engineering (HFE). To determine conformance to 3.6.1, the vehicle shall be evaluated for soldier percentile requirements and specified standards. Conformance to service brake, parking brake, and ride quality requirements (see 3.7.13, 3.7.2.1.1, and 3.6.1.1) shall be demonstrated by using a 5th percentile female driver.

4.4.24 Ride Quality Check. To determine conformance to 3.6.1.1, the vehicle at operational GVW shall be tested for the ride quality requirements specified. Conformance to ride quality requirements shall be demonstrated using a 5th percentile female.

4.4.25 Vehicle Safety. To determine conformance to 3.6.2, vehicle systems and components shall be checked for safety related hazards. The vehicle will be checked for compliance to specified standards of MIL-STD-1180 for Type I vehicles. Rollover protection shall be checked for integrity and quality of assembly to include welding, riveting, and structured mounting.

4.4.26 Air Pollution. To determine conformance to 3.6.2.2, the contractor shall provide certification that the vehicle complies with the Environmental Protection Agency regulations governing control of air pollution from New Motor Vehicles and New Motor Vehicle Engines in effect on the date of contract award.

4.4.27 Sound Level Check. To determine the conformance to 3.6.2.3, the vehicle shall be tested for the sound level requirements specified. Test procedures shall be in accordance with MIL-STD-1474 and the Department of Transportation (DOT) Regulations Part 325.

4.4.28 Temperature, Pressure, and Electrical Hazard Check. To determine conformance to 3.6.2.4, the vehicle shall be checked for safeguarding and insulating features in accordance with MIL-STD-1472.

4.4.29 Carbon Monoxide Check. To determine conformance to 3.6.2.5.1, the vehicle shall be checked to verify that operating and maintenance personnel are not exposed to concentrations of Carbon Monoxide (CO) in excess of values which would result in Carboxyhemoglobin (COHB) levels in the blood greater than 10%.

4.4.30 Toxic Gas Check. To determine conformance to 3.6.2.5.2, the vehicle shall be checked for concentrations of toxic gasses and shall not exceed the limits specified in the Threshold Limit Values for Chemical Substances in Work Areas by the American Conference of Governmental Industrial Hygienists.

4.4.31 Ozone Depleting Substance Verification. To determine conformance to 3.5.3, the contractor shall certify that no ozone depleting substances are use during assembly or manufacture.

4.4.32 Test Failure. Failure of test vehicles to meet the minimum performance requirements, failure to comply with requirements of functional, workmanship of a materials nature, or failure to manufacture the vehicle in accordance with specified technical data as revealed during or as a result of this test shall be cause for rejection of these vehicles. Any defects found during or as a result of this test shall be prima facie evidence that all vehicles already accepted prior to completion of test are similarly defective unless satisfactory evidence to the contrary is provided by the contractor. Such defects on all vehicles shall be corrected by the contractor at no cost to the Government.

TABLE VIII. Classification of Quality Defects.

Defect No.	Components or Assembly	Defects Characteristics	Method of Inspection
MAJOR DEFECTS			
101	Engine	Malfunction, improper installation, leaks, unusual noise	Functional and visual
102	Steering System and Components	Leaks, malfunction, clearance	Functional and visual
103	Transmission	Malfunction, improper installation, leaks, unusual noise	Functional and visual
104	Transfer	Malfunction, improper installation, leaks, unusual noise	Functional and visual
105	Drive Train	Malfunction, improper installation, leaks, unusual noise, misalignment	Functional and visual
106	Cooling System and Components	Malfunction, leaks, improper clearance	Functional and visual
107	Fuel System and Components	Malfunction, leaks, improper clearance	Functional and visual
108	Electrical System and Components	Malfunction, damage	Functional and visual
109	Brake System and Components	Malfunction, leaks and adjustments	Functional and visual
110	Instrumentation Switches, Warning Indicating and Safety Devices	Malfunction, omission, improper installation	Functional and visual
111	Exhaust System	Damage, leaks	Functional and visual
112	Tires and Wheels	Damage, leaks, improper mounting/installation/operation	Functional, visual and gauges
113	Windshield and Windows	Malfunction, fogged, cracked, broken, delaminating, improper installation	Functional and visual
114	Prop shafts	Malfunction, misalignment, unusual noise	Functional and visual
115	Speed	Nonconformance	Functional
116	Engine lubricating System components	Leaks, malfunction	Functional and visual
117	Rivet and Welding Defects	Missing, improper, or broken welds/rivets	Visual

TABLE VIII. Classification of Quality Defects - Continued.

Defect No.	Components or Assembly	Defects Characteristics	Method of Inspection
118	Controls	Malfunction, improper clearance	Functional and visual
119	Misc. items or Accessories	Malfunction, damage, improper installation	Functional and visual
120	Suspension system and components	Malfunction, damage, improper installation	Functional and visual
121	Shock Absorbers	Damage, leaks	Visual
122	Fuel Tank	Damage, leaks	Visual
123	Aluminum Body	Nonconforming material or hardness	Visual and Gauge
124	Armor	Improper welds, material or assembly	Visual
MINOR DEFECTS			
201	Controls	Improper assembly or adjustments	Functional and visual
202	Coolant	Low or improper mix	Functional and visual
203	Lubricants	Improper types and levels	Visual
204	Pulley and Fan	Misalignment, improper mounting/clearance	Visual
205	Belts	Defective, improper tension	Visual and Gauge
206	Shock Absorbers	Improper installation or assembly	Visual
207	Wiring and Tubing	Defective, improper assembly/installation/coding	Visual
208	Brake System and Components	Improper assembly, installation or protection	Visual
209	Hood Items, Racks Bow, Flooring Seats, Hardware, Stowage, Brackets, and Boxes	Improper fit, installation, assembly, welds	Visual
210	Electrical System	Improper installation or assembly	Visual
211	Paint	Improper application or color	Visual
212	Suspension	Improper installation or assembly	Visual
213	Steering System Components	Improper installation or assembly	Visual
214	Exhaust System	Improper installation	Visual
215	Cooling System Components	Improper installation or assembly	Visual

TABLE VIII. Classification of Quality Defects - Continued.

Defect No.	Components or Assembly	Defects Characteristics	Method of Inspection
216	Fuel System Components	Improper installation or assembly	Visual
217	Lube Fittings	Defective, missing or improper installation	Visual
218	Sheet Metal Fabrication	Improper installation, Weld defects	Visual
219	Cushions, Upholstery, Canvas, Top and Curtains	Damage, missing, improper fit and installation	Visual
220	Misc. Items and Accessories	Missing, improper assembly or installation	Visual
221	Decals, Data and Instruction Plates	Missing, incomplete, painted over, improper location	Visual
222	Protective Coating	Improper application/coverage or materials	Visual
223	Record, Forms, Publications	Missing, improperly filled out	Visual
224	Veh Registration and Identification Marking	Missing or incorrect data	Visual
225	Workmanship	Loose, missing, damaged securing hardware, binding and interference of components	Physical and visual
226	Tires	Improper inflation	Gauge
227	Special Body Kits and Accessories	Improper installation or assembly	Functional and visual

4.5 Quality Conformance Inspection.

4.5.1 One Hundred Percent Final Inspection. Each manufactured vehicle shall be subjected to a complete final inspection by the contractor as described in 4.5.1.1 and 4.5.1.2 utilizing a Government approved Final Inspection Record (FIR) or its equivalent. A copy of the complete FIR shall be submitted to the Government with each vehicle offered for acceptance. Inspection shall consist of examinations and tests to verify conformance of manufactured vehicles to requirements of this specification and Government approved technical data. Vehicle requirements and methods of examination and tests, to be reflected in the FIR for the conformance inspection and control test, shall be as specified in 4.8 and Table VI.

4.5.1.1 Quality Conformance Examination. Each vehicle shall be inspected by the contractor for the characteristics/defects listed in Table VI and Table VIII as a minimum.

4.5.1.2 Quality Conformance Testing. Subsequent to examinations and corrections of deficiencies found during Quality Conformance Examination (see 4.5.1.1) each vehicle shall be started and operated for a minimum of ten miles to verify proper function, safety, servicing and

adjustment of vehicle systems listed in Table VIII. Operation of vehicles shall be demonstrated without payload at the place of manufacture or alternate location, approved by the Procuring Contracting Officer (PCO), on smooth relatively level hard surface roads. After test completion each vehicle shall be examined for instrument, engine, drive train axles, steering, exhaust, brake and suspension, leakage and malfunction.

4.5.2 Examination or Test Failure. If any vehicles fail to pass any examination or test specified herein, the Government shall withhold acceptance until evidence has been provided by the contractor that corrective action has been taken.

4.5.3 Unclassified Defects. All defects that have no effect on function, safety, interchangeability, or life, but that are considered departures from good workmanship shall be noted in writing. Workmanship deficiencies falling within this category and recurring in five (5) consecutive lots shall be added to the minor defects classification.

4.5.4 Recurring Deficiencies.

4.5.4.1 Recurring Major Deficiencies. A major deficiency is recurring when the defect occurs more than once. A major defect may be considered recurring when the historical inspection records ("p" chart or Government approved equivalent) reflect such a condition. Recurring major deficiencies shall be cause for the entire lot or lots to be inspected for the recurring deficiencies. The deficiencies shall be corrected by the contractor prior to acceptance by the Government.

4.5.4.2 Recurring Minor Deficiencies. A minor deficiency is recurring if it occurs more than twice. Recurring minor deficiencies shall be cause for the entire lot or lots to be inspected for recurring deficiencies. Corrective actions shall be accomplished by the contractor prior to acceptance by the Government.

4.6 Control Test. Prior to the start of the Control Tests, each vehicle selected shall be inspected in accordance with requirements of 4.5.1. The test vehicle shall be operated with actual or simulated rated payload for a distance of not less than 50 miles (80 km) by the contractor at the place of manufacturer or alternate location approved by the Procuring Contracting Officer. The vehicle shall be subjected to tests referenced in Table VI in accordance with control test requirements of the approved FIR. The test course shall be a smooth hard surface road, capable of safely accommodating the control test mileage and performance requirements. These tests shall be performed in the presence of a Government representative. After completion of test, the vehicle shall be inspected for component failure/malfunction and oil/fuel leaks. For the purpose of control test and FPVI, speed tests required by 4.8.3 shall be limited to 55 mph (88.5 kph) and no off road speed test required.

4.6.1 Payload. The Control Test vehicle shall be pay loaded in such a manner as to simulate the operational mode.

4.6.2 Frequency of Test. The Government shall select one vehicle random every 60 days for Control Test.

4.6.3 Failure. If the vehicle selected fails to pass any portion of the Control Tests, the Government representative shall stop acceptance examination and testing on subsequent vehicles until such time as conditions causing the failure have been remedied. Any defect found during or as a result of test shall be objective evidence that vehicles accepted subsequent to the previously acceptable control tests were similarly defective until the Contracting Officer is furnished evidence by the contractor that they are not similarly deficient. Such defects on all vehicles shall be corrected by the contractor at no cost to the Government. Another vehicle with corrective actions implemented shall be subjected to the control test to verify effectiveness of the corrective actions.

4.7 Follow-on Production Test. The Government may select vehicles at any time during the production contract period and subject these vehicles to all applicable tests referenced in Table VI (minimum) as well as a 5,000 mile test contained in Table IX. All tests shall be conducted by the Government at a site selected or approved by the Government. The vehicle(s) selected for FPT shall not include any vehicle previously tested for conformance to 4.6 by the contractor. The test vehicle(s), however shall be inspected/road tested by the contractor in accordance with 4.5. Unless otherwise specified by the Government procuring activity, the contractor shall recondition the test vehicle(s) to like new condition after test completion (see section 6).

TABLE IX. 5,000 Mile (8,000km) Per Vehicle FPT Scenario.

Test Course	%	Miles	Km	Vehicle Speed
Paved Roads	30	1500	2430	Varying up to maximum safe speed
Secondary	30	1500	2430	Varying up to maximum safe speed
Cross Country	40	2000	3240	Varying up to maximum safe speed

NOTE: Minimum of 50 % of the total mileage shall include towed loads.

4.7.1 Test Deficiencies. FPT vehicle(s) deficiencies found during or as a result of the FPT shall be cause for rejection of subsequent produced vehicles until evidence has been provided by the contractor that corrective action has been taken to eliminate the deficiency. Any deficiency found during, or as a result of the FPT shall be objective evidence that all vehicles currently or subsequently produced are similarly deficient, unless satisfactory evidence is furnished to the Contracting Officer by the contractor that they are not similarly defective. Such deficiencies shall be corrected on all vehicles by the contractor at no cost to the Government.

4.8 Method of Examination and Test. The examination and test depicted in 4.8 (inclusive) are the minimum required to determine conformance to the requirements delineated in Section 3 of this specification. Additional examinations and tests by the contractor may be required to determine conformance to specification requirements. The Government reserves the authority to conduct the inspections/tests depicted in 4.8 (inclusive) and additional inspections/tests at the discretion of the Government to determine conformance of end items or

components to specification requirements. Inspections and tests depicted in 4.8 (inclusive) pertain to all configurations as applicable.

4.8.1 40% Grade Operation. To determine conformance to the grade requirement contained in 3.7.2.1 thru 3.7.2.3, the vehicle shall be loaded to GVW. During operation on grades and slopes the vehicle shall be checked for evidence of stalling, slipping, overheating, or stability. During specified grade and slope operations the vehicle engine shall be shut off and restarted in each direction (ascending and descending and either side facing up) with a minimum of one minute between engine shutoff and restart. Oil pressure and equalization of the fuel tank shall be monitored. The vehicle shall be checked during and after testing for leakage of fuel, coolant, and lubricant. During grade and slope operations the vehicle shall be monitored for loss of oil pressure and fuel supply to the engine.

4.8.2 Acceleration Test. To determine conformance to 3.7.3, a fully equipped vehicle with payload shall be tested for acceleration from 0-30 mph within 9.4 seconds. The vehicle shall attain a speed of 50 mph (80.5 km/h) within 26.1 seconds. The exception to this is the M1167 vehicle which will accelerate from 0–30 mph within 11.8 seconds (with the fan locked on). The M1167 shall attain a speed of 50 mph within 37.4 seconds (with the fan locked on).

4.8.3 Speed Test. To determine conformance to 3.7.4, a fully equipped vehicle with payload shall be tested for achieving and maintaining a speed of 60 mph (96.6 kph) in high gear and maintain a speed not less than 2 ½ mph (4.1 kph) in low gear on level primary roads, without malfunction of any component. Over off-road cross country terrain the fully equipped vehicle, at GVW, shall obtain a cross country speed of 16 mph (25.6 kph) without malfunction of any component.

4.8.4 Turning Radius Test. To determine conformance to 3.7.5.1, 3.7.5.2, and 3.5.7.3, the vehicle shall be tested for achieving the constant radius turning requirement while sustaining a 0.4 g to 0.6 g lateral acceleration. Turning radius of the vehicle shall be tested for compliance with the requirement of 25 feet (7.62 m) from curb to curb in both directions with no adjustments of turning stops between directions. The turning test shall be conducted with the vehicle both fully loaded and without load. The vehicle steering and braking system characteristics shall be capable of maintaining safe vehicle operation by a 95th percentile male through the 5th percentile female.

4.8.5 Vertical Step Test. To determine conformance to 3.7.6.1, a fully equipped vehicle (without winch) but with payload shall negotiate 18 inch (45.7 cm) vertical step in the forward and reverse directions. The vehicle at GVW with the winch kit installed, shall be capable of negotiating a 12 inch (30.5 cm) vertical step in the forward and reverse directions.

4.8.6 Load Ramp Requirement. To determine conformance to 3.7.6.2, the vehicle at GCW shall be tested in both the forward and reverse directions on a simulated ramp that has a slope equal to 36 percent.

4.8.7 Fording Test. To determine conformance to 3.7.7.1, a fully equipped vehicle at GVW shall be operated without prior preparation at a depth of 30 inches (76.2 cm) inclusive of wave height and be observed for performance requirements including brake release time in accordance with FMVSS 105. After completion of the test the lubricants, brake fluids, and fuel shall be analyzed to determine that water or water borne contamination does not exceed 2% by volume.

4.8.8 Deep Water Fording. To determine conformance to 3.7.7.2, a fully equipped vehicle with the deep water fording kit installed, shall be capable of hard bottom water crossings to a depth of 60 inches (152.4 cm) inclusive of wave height. All vehicle instruments shall be monitored for proper operation during and after performance of the test. After completion of the test the lubricants, brake fluids, and fuel shall be analyzed to determine that water and water borne contamination does not exceed 2% by volume.

4.8.9 Range Test. To determine conformance to 3.7.8, a fully equipped vehicle at GVW shall be tested for achievement of the fuel range requirement specified at an average speed of 30 to 40 mph (48.3 to 64.4 kph) on hard surface roads over rolling terrain.

4.8.10 Normal Operating Temperature Test. To determine conformance to 3.7.9, a fully equipped vehicle with payload shall be tested at sustained road load conditions. Each propulsion system component shall be monitored for fluid temperatures exceeding those specified.

4.8.10.1 Tractive Effort. To determine conformance to 3.7.10, the vehicle shall be operated continuously at 0.61 Tractive Effort to GVW (TE/GVW) at maximum specified ambient temperature and at wide open throttle. Each propulsion system component shall be monitored for fluid temperatures in excess of those specified.

4.8.11 Cone Index Test. To determine conformance to 3.7.11, the vehicle at operational GVW shall be tested for the vehicle cone index (VCI) requirement specified.

4.8.12 Run Flat Test. To determine conformance to 3.7.12, the vehicle at GVW shall be capable of operating a distance of 30 miles at specified speeds and terrains with no air pressure in two of the tires. The deflated tires shall not be on the same axle.

4.8.13 Braking Test. To determine conformance to 3.7.2.1 and 3.7.13, the vehicle service brakes shall be tested for the ability to hold and control the vehicle loaded to the specified GCW on a 40% longitudinal slope in both the ascending and descending direction. The service brakes shall be tested for the ability to stop the vehicle from a speed of 20 mph (32 kph) within 25 ft (7.6 m) measured from point at which movement of the brake pedal begins on a dry, hard approximately level road surfaces that are free from loose material. The results of three consecutive stopping distances shall be averaged to determine conformance to the stopping requirements. During all braking tests the vehicle shall be monitored for excessive pulling to the left or right. During Preproduction Qualification and Follow-on Production Test the stopping requirements shall be demonstrated using the 5th percentile female driver.

4.8.14 Towing Test. To determine conformance to 3.7.14, the vehicle shall be tested for the ability to tow a maximum gross weight of 4200 lbs (1909 kg) with little or no degradation in performance. The vehicle shall also be tested for the ability to tow a like vehicle at GVW for a distance of 50 miles (80 km).

4.8.15 Approach Angle Test. To determine conformance to 3.7.15.1, the vehicle shall be tested for the requirements specified. The approach angle shall be defined in accordance with SAE J1100.

4.8.16 Departure Angle Test. To determine conformance to 3.7.15.2, the vehicle shall be tested to the requirements specified. The departure angle shall be defined in accordance with SAE J1100.

4.8.17 Climate Control Verification. To determine conformance to 3.7.16, the vehicle shall be tested as specified. Thermocouples or other measuring devices will be placed at the specified locations to determine that cooling performance has been met.

4.8.18 Supplementary Items and Kits. To determine conformance to 3.8.1, all vehicle kits shall be tested for operation and performance requirements. The kits shall be checked for proper fit and connection. When required fuel lines and connections shall be checked for tightness and leakage prior to start of tests.

4.8.19 Servicing and Adjusting. To determine conformance to 3.9, prior to government acceptance of the vehicle the contractor shall fully inspect, service and adjust each vehicle in accordance with the Vehicle Final Inspection Record (FIR). In addition, the windshield reservoir shall be filled to 3/4 of full capacity.

4.8.20 Preparation for Delivery. To determine conformance to 5.1 (inclusive), the vehicle shall be checked for processing and servicing requirements specified.

5. PREPARATION FOR DELIVERY

5.1 Vehicle Processing. Vehicle and equipment shall be processed for either Level A or Level B as specified for shipment and storage in accordance with MIL-STD-3003 to the extent indicated on the applicable equipment preservation data sheet or other implementation document, as specified by the procuring activity.

6. NOTES

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

6.1 Intended Use. The vehicle covered by this specification is intended for use by the United States Joint Services (Army, Marines, Air Force) in transporting personnel or cargo or in providing for special tasks (weapon carrier, reconnaissance vehicle, etc.) during tactical military operations in the forward area. The vehicle is intended for use under extreme conditions of

climate, weather, terrain, and military service. Such use includes ground, rail and air transportation and tactical air drop by parachute.

6.2 Ordering Data. Procurement documents must specify the following:

a. Title, number and date of this specification.
b. Vehicle Model Number and quantity
c. Kit Requirements, See 3.8.1

6.3 RESERVED

6.4 Fluid Leaks.

6.4.1 Classification.

a. Class I - Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
b. Class II - Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being inspected.
c. Class III - Leakage of fluid great enough to form drops that fall from the item being inspected.

6.4.2 Category of Defect.

a. Class I - Minor Defect
b. Class II - Major Defect
c. Class III - Major Defect

6.5 Mission. The mission order of precedence for the vehicle is combat, combat support and combat service support roles respectively.

6.5.1 Combat Roles. Configured as a weapon carrier to support anti-armor, reconnaissance, air defense, rear area combat operations, base defense and close air support.

6.5.2 Combat Support Role. Fire support team; target acquisition; command, control and communications; naval gunfire control; battlefield obscuration; Nuclear Biological Chemical (NBC) reconnaissance; electronic warfare; combat engineer reconnaissance; and, demolition and barriers installation teams.

6.5.3 Combat Service Support. Logistics, medical evacuation and cargo carrier.

6.6 Threat. See HMMWV J-MENS Paragraph 2 (Classified Secret).

6.7 Definitions.

6.7.1 Highway. Four or more lanes, often divided, all-weather primary roads used for heavy and high-density traffic usually with a limited access to/from other roads.

6.7.2 Primary Roads. Two or more lanes, all-weather, maintained, hard surface (paved) roads with good driving visibility used for heavy and high density traffic. These roads have lanes with a minimum width of 9 feet, road crown to 200 and the legal maximum Gross Vehicle Weight/Gross Combined Weight for the country or state is assured for all bridges. These roads are surfaces having a Root Mean Square (RMS) value of 0.1 inch.

6.7.3 Secondary Roads. Two lanes, all weather, occasionally maintained, hard or loose surface (e.g., large rock, paved, crushed rock, gravel) roads intended for medium-weight, low-density traffic. These roads have lanes with minimum width of 8 feet and no guarantee that the legal maximum Gross Vehicle Weight/Gross Combined Weight for the county or state is assured for all bridges. These roads are surfaces having a Root Mean Square (RMS) value varying between 0.3 and 0.6 inch.

6.7.4 Cross-Country. Vehicle operations over terrain not subject to repeated traffic and where no roads, routes, well-worn trails or man-made improvements exist. (This definition does not apply to vehicle test courses which are used to simulate cross-country terrain.) These are surfaces having a Root Mean Square (RMS) value varying between 0.8 and 1.5 inch.

6.7.5 Cone Index (CI). An index of the shearing resistance of a medium as measured at any depth by a cone penetrometer. The resistance of the medium to penetration by a 30° cone with a 0.5 sq. in. circular base is expressed in pounds of force on the handle per square inch of the base area. In the basic WES VCI system, the CI is considered as an index only and no direct meaning is aligned to its dimensions.

6.7.6 Vehicle Speed at 6W Absorbed Power Versus Surface Roughness (RMS Elevation) Relations.

TABLE X. Vehicle Speed Versus Surface Roughness.

Elevation RAMS. In.	Vehicle speed mph
0	70.0
0.3	70.0
0.4	70.0
0.5	70.0
0.6	64.0
0.7	57.0
0.8	50.0
0.9	42.0
1.0	35.0
1.1	29.0
1.2	23.0
1.3	19.5
1.4	17.6
1.5	16.2

6.7.7 Vehicle Payload. The vehicle payload shall include crew, passenger/patient and specified gear, cargo, armament and related hardware, basic issue items kits, and tongue weight of a towed load, (if applicable). Crew and passenger load shall be determined by using 200 lbs per person. Ambulance patient loads shall be determined by using 175 lbs per patient.

6.7.8 Ambulance GVW (4 Litter). The M997 A2 (4 litter ambulance) GVW is as shown in Table XI.

TABLE XI. Ambulance GVW.

Patient Load	GVW
4 Litter	8780 lbs
2 Litters & 4 Ambulatory	9130 lbs.
6 Ambulatory	9130 lbs
8 Ambulatory	9580 lbs

6.8 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.

ADDENDUM

M1151 and M1151A1 System Description

The M1151 HMMWV variant combines the M1025A2 body, an armor package, and the M1113 Expanded Capacity Vehicle (ECV) heavy chassis. The M1151A1 has an integrated air conditioning system and is equipped with new variable rate rear springs. The M1151 Base vehicle has a gross vehicle weight rating (GVWR) of 11,500 pounds, while the M1151A1 vehicle has a GVWR is 12,100 pounds. The M1151A1 armor kit is comprised of two parts; the Integrated Armor Protection (IAP or "A" kit) and "B" kit armor package.

- The IAP is a permanently mounted kit installed on the production line. It includes underbody panels, rocker panel, and a lower windscreen deflector.

- The B1 kit is an add-on-armor kit unique to the M1151A1 that provides removable armor for the doors, windows, roof, rear partition, rear seat armor plates, and turret hatch. The M1151A1 with B1 kit was developed to provide a level of protection equivalent to that of the M1114 Up-Armored HMMWV (UAH).

M1152 / M1152A1 and M1165 / M1165A1 System Description

The M1152 and M1165 HMMWV variants combine the M1097A2 2 door & 4 door bodies with the M1113 Expanded Capacity Vehicle (ECV) heavy shelter carrier chassis. The M1152 is a 2-door Shelter/Troop/Cargo Carrier HMMWV; the M1165 is a 4-door Command and Control HMMWV, both of which have a GVWR of 11,500 pounds. By transitioning to the M1152 & M1165, the impact of armor to payload is reduced and performance is aligned with a more current configuration. The M1152A1 & M1165A1 variants have an integrated air conditioning system with condenser assemblies above each of the rear wheel wells. The 2-door model has one (1) condenser located in the rear wheel well whereas the 4-door model has two (2) condensers located in each wheel well. The vehicles are also equipped with new variable rate rear springs. The M1152A1 & M1165A1 gross vehicle weight rating (GVWR) is 12,100 pounds. The M1152A1 & M1165A1 armor kit is comprised of two parts; the Integrated Armor Protection (IAP or "A" kit) and "B" kit armor package.

- The IAP is a permanently mounted kit installed on the production line. It includes underbody panels, rocker panel, and a lower windscreen deflector.

- The B2 kit (2-door) or B3 kit (4-door) is an add-on-armor kit unique to both the M1152A1 & M1165A1 that provides removable armor for the doors, windows, roof, rear partition, rear seat armor plates, and turret hatch. With the addition of the ballistic armor and crew, payload capacity is currently 3,200 pounds for the M1152A1 and 2,000 pounds for the M1165A1.

M1167 System Description

The M1167 HMMWV variant is a derivative of the M1151A1 HMMWV with B1-kit. The M1167 consists of the M1025A2 body; a full armor package known as the Integrated Armor Package (IAP) with B-kit; an air conditioning system; and the M1113 Expanded Capacity Vehicle (ECV) heavy chassis. The vehicle is equipped with a Tube-launched Optically-tracked Wire-guided (TOW) Gunner Protection Kit (TGPK), Far Target Locator (FTL), Improved Target Acquisition System (ITAS)/TOW Missile Launcher, 6 TOW Missiles, a secondary weapon, lithium batteries (to meet the dismounted requirements of the ITAS/TOW), a battery charging device and a cargo bed missile rack. The vehicle is used to transport and launch TOW missiles to defeat field fortified positions, Reinforced Urban Structures, and Main Battle Tanks. The weapons platform can be traversed 360 degrees and the launcher elevated to 20 degrees and depressed 10 degrees. The major components on the M1167 that are different from the M1151A1 HMMWV with B1-kit are the items added for the operation of the ITAS/TOW and described above. The M1167 gross vehicle weight rating (GVWR) is 13,100 pounds.

TOW ITAS System Description

The TOW ITAS System itself is a replacement to the current M966 HMMWV TOW2 launcher and fire control subsystems for first-to-deploy forces. ITAS significantly increases target acquisition and engagement ranges, while retaining the capability to fire all configurations of the TOW missile. The M220 Launcher has been replace in the Army active units and replacement is in process for National Guard units. USMC is also in the process of procuring and fielding the TOW ITAS.

The ITAS consists of a Target Acquisition (TAS), Fire Control System), Traversing Unit (TU), Lithium Batter Box (LBB), Vehicle Mounted Charger (VMC), Launch Tube and Tripod. The ITAS can be mounted on the HMMWV turret or dismounted and operated in a ground mount configuration on the tripod. The LBB supplies power to the ITAS in both ground mount and HMMWV mount configurations. The VMC, located on the rear fenderwell, is permanently mounted in the HMMWV and charges the LBB from HMMWV 28 VDC power.

The Far Target Locator (FTL) is an upgrade to the ITAS. It is a GPS based Precision Attitude Determination System (PADS) that attaches to the top of the TAS. A cable transmits bearing data from the PADS to the TAS. When the eye-safe Laser Range Finder (LRF) in the TAS is engaged, the TAS uses the LRF bearing data to calculate a 10-digit grid location/coordinate of the target. It is accurate to a 60 meter CEP at 8 Kilometers. The target's 10-digit grid coordinate is displayed to the gunner along with self positioning grid coordinates.

Custodians:
Army – AT
Navy – MC
Air Force – 99

Preparing Activity:
Army – AT

Review Activities:
Army – CR
Navy – AS, AV, CG, YD
DLA – IS