July 14, 1997

SYSTEM SPECIFICATION
DRAFT
Light Tactical Vehicle

1. SUMMARY. The Light Tactical Vehicle (LTV) is a Non-Developmental Item (NDI) acquisition program for the U. S. military. The LTV may consist of two chassis configurations. The light configuration will have a payload rating of 2600 lbs and the heavy configuration will have a payload rating of 4500 lbs (4,999 lbs desired). The light chassis will be capable of supporting the Light Utility Vehicle model. The heavy chassis will be capable of supporting the Heavy Utility Vehicle and Armored Vehicle models. The LTV will be transportable by C-130 and larger aircraft, rail and marine transport modes. The LTV shall operate on JP8; be capable of being towed, performing self-recovery, recovering equivalent vehicles and mounting a tow pintle. These vehicles shall be capable of operating under on-road/off-road conditions and withstand the strain, shocks, vibrations and other detrimental conditions incident to off-road travel and operation. The LTV shall be capable of meeting all characteristics specified herein throughout a life cycle mileage profile consisting of 30% primary roads, 30% secondary roads, and 40% cross country operations, while carrying specified loads.

2. APPLICABLE DOCUMENTS

2.1 Specifications, Standards, Drawings and Handbooks. Specifications, standards, drawings and handbooks cited herein form a part of this specification, to the extent indicated. Unless otherwise stated, the issue of the documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplements cited in the specification.

2.2 Order of Precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall constitute a waiver of compliance to applicable laws and regulations unless a specific exemption has been obtained. In those instances where terms of this specification are cited in both English and metric values, the English value constitutes the requirement, with the metric approximation as a convenience.

2.3 Documents

2.3.1 Government.

2.3.1.1 Specifications

A-A-870 Antifreeze/Coolant, Engine: Ethylene Glycol, Inhibited, Concentrated
A-A-52426 Hose and Hose Assemblies, Non-Metallic, Silicone, Polyester and Wire Reinforced
A-A-52432 Mirror Assembly, Rearview: Automotive Exterior Mounting
A-A-52464 Type III Coupler, Drawbar, Ring
QQ-S-571 Solder, Electronic
VV-F-800 Fuel Oil, Diesel

MIL-T-5624 Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-F-16884 Fuel, Naval Distillate
MIL-B-62346 Batteries, Storage: Lead-Acid (Low Maintenance)
MIL-T-83133 Turbine Fuel, Aviation, Kerosene Type, Grades JP-8

2.3.1.2 Standards

FMVSS 101 Controls and Displays
FMVSS 103 Windshield Defrosting and Defogging Systems
FMVSS 104 Windshield Wiping and Washing Systems
FMVSS 201 Occupant Protection in Interior Impact
FMVSS 206 Door Locks and Door Retention Components
FMVSS 208 Occupant Crash Protection
FMVSS 209 Seat Belt Assemblies
FMVSS 210 Seat Belt Assembly Anchorages
FMVSS 301 Fuel System Integrity
FMVSS 302 Flammability of Interior Materials

MIL-STD-209 Slinging and Tiedown Provisions for Lifting and Tying Down Military Equipment
MIL-STD-210 Climactic Information to Determine Design and Test Requirements for Military Systems and Equipment
MIL-STD-461 Requirements for the Control of Electromagnetic Interference, Emissions and Susceptibility
MIL-STD-462 Measurement of Electromagnetic Interference Characteristics
MIL-STD-514 Plates, Identification, Instruction and Marking, Blank
MIL-STD-642 Identification Marking of Combat and Tactical Transport Vehicles
MIL-STD-810 Environmental Test Methods and Engineering Guidelines
MIL-STD-1223 Nontactical Wheeled Vehicles Treatment, Painting, Identification Marking and Data Plate Standards
MIL-STD-1472 Human Engineering Design Criteria Military Systems Equipment and Facilities
MIL-STD-1474 Noise Limits for Army Materiel

2.3.1.3 Handbooks.

MIL-HDBK-759 Human Factors Engineering Design for Army Materiel

2.3.1.4 Drawings.

12342917
12446760

MS500048

2.3.2 Non-Government Publications

2.3.2.1 Society of Automotive Engineers

SAE-J163 Low Tension Wiring and Cable Terminals and Splice Clips
SAE-J366 Exterior Sound Level for Heavy Trucks and Busses Performance Requirements Trucks, Busses, and Multipurpose Vehicles
SAE-J645 Automotive Transmission Terminology
SAE-J839 Passenger Car Side Door Latch Systems
SAE-J902 Passenger Car Windshield Defrosting Systems
SAE-J903 Passenger Car Windshield Wiper Systems
SAE-J942 Passenger Car Windshield Washer Systems
SAE-J1292 Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring

(Application for copies may be addressed to the Society of Automotive Engineers, Inc. 400 Commonwealth Drive, Warrendale, PA, 15096).

2.3.2.2 American National Standards Institute (ANSI)

(Application for copies may be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018)

2.3.2.3 American Society of Testing and Materials

ASTM D396 Standard Specification For Fuel Oils
ASTM D975 Diesel Fuel
ASTM D1149 Standard Test Method for Rubber
ASTM D2000 Standard Classification System for Rubber Products in Automotive Applications
ASTM D3699 Standard Specification For Kerosene

(Application for copies may be addressed to the American Society for Testing Materials, 1916

Race Street, Philadelphia, PA 19103)

3. REQUIREMENTS

3.1 System Definition. The LTV shall be comprised of components, parts and accessories which meet or exceed the requirements of this specification. All requirements of this specification (unless otherwise noted) shall be met by all models. All requirements shall be met at Gross Vehicle Weight as defined in paragraph 3.1.2.2 unless otherwise specified.

3.1.1 General Description. The LTV shall have the capability to operate off-road, on level and hilly unimproved roads, highways and cross-country. The LTV shall be able to ford waterways and provide the required mobility, agility, flexibility and protection when operated in its mission role.

3.1.2 Definitions. The following definitions apply to this specification.

3.1.2.1 Curb Weight (CW). Curb weight is defined as the weight of the empty vehicle (no payload) plus the fuel, lubricants, coolant, Basic Issue Items, two person crew and their individual equipment and weapons.

3.1.2.2 Gross Vehicle Weight (GVW). Gross vehicle weight is defined as the curb weight plus the mission and equipment payloads.

3.1.2.3 Gross Combined Weight (GCW). Gross combined weight is defined as the gross vehicle weight plus the gross trailer weight.

3.1.2.4 Mission Payload. Mission essential cargo, personnel, and equipment that is not included in the curb weight. Payload capacities are 2,600 lbs for the light chassis models and 4,550 lbs (4,999 lbs desired) for the heavy chassis models.

3.1.2.5 Equipment Payload. LTV equipment and kits that are furnished by the vehicle manufacturer but which are not included in the curb weight or mission payload.

3.1.2.6 Gross Trailer Weight (GTW). The LTV shall have a towing capability for a gross trailer weight of 4,500 lbs and a tongue weight of 450 lbs.

3.2 System Characteristics.

3.2.1 Performance/Reliability Characteristics. . Test criteria cited in section 4 of this specification are to be considered minimum standards unless specifically cited as a desired level above minimum performance. Unless otherwise specified, performance/reliability shall be demonstrated on surfaces as specified in mission cycles percentages listed below:

a. 30 percent on primary (paved) roads
b. 30 percent on secondary roads
c. 40 percent on cross-country

3.2.1.1 Grade Operation. The LTV at GCW shall ascend and descend longitudinal grades on a dry hard concrete surface free from loose material up to 60 percent at a sustained speed not less than 4 mph (6.44 kph). The LTV at GCW shall stop on the 60 percent grade with the service brake holding the vehicle for not less than one minute, and then continue to ascend/descend the 60 percent grade without stalling, slipping, overheating, upsetting or hesitation. The LTV at GCW shall maintain a minimum speed of 60 mph while ascending a 5 percent grade indefinitely. There shall be no leaks of fuel, lubricants or coolants, no loss of mobility or stability, and no loss of fuel to the engine while performing these operations.

3.2.1.2 Side Slope Operation. The LTV at GVW shall be capable of traversing side slopes up to 40 percent on dry, hard concrete surface, free from loose material. These operations shall be performed with either side of the vehicle facing up slope and without loss of stability or malfunction/degradation of stated requirements.

3.2.1.3 Steering and Handling. Power assisted steering shall be furnished with capability to turn steered wheels to their limits on a stationary vehicle without leakage of power steering fluid. The power assisted steering system shall comply withthe criteria specified in MIL-STD-1472, paragraphs 5.4.2.2.5.7 and 5.4.2.2.5.8. A mechanical connection between steering wheel and axle steering mechanisms shall exist under all conditions which shall serve as a functioning backup in the absence of power assist. Under emergency steering conditions, a 5th percentile female soldier shall be capable to operate the LTV without power assisted steering. The steering wheel shall have a minimum rim diameter not less than 1 inch.

3.2.1.4 Acceleration. On hard level surfaced roads, the LTV, shall accelerate from 0 to 30 mph in no more than 7 seconds and from 0 to 50 mph within 22 seconds.

3.2.1.5 Speed. The LTV at GVW shall be capable of maintaining a speed of at least 75 mph on level roads.

3.2.1.6 Turning. The LTV shall be capable of sustaining a minimum of 0.4g lateral acceleration in a constant radius turn, while operating in fully loaded or unloaded modes. The turning radius shall be less than 25 ft curb-to curb.

3.2.1.7 Vertical Step. The LTV shall be capable of negotiating an 18 (24 desired) inch minimum vertical step on dry, hard concrete surface free from loose material, in both forward and reverse directions without any degradation on performance or any permanent deformation.

3.2.1.8 Fording. The LTV, without preparation or kits, shall be capable of fording hard bottom water crossings in fresh or salt water to a depth of 48 inches (60 inches desired) at a speed of 5 mph. A kit, installable at the organizational level, may be used to accomplish fording

at depths of 49 to 60 inches. Fording operation shall not degrade vehicle performance or require post fording maintenance service. Contamination of fuels and lubricants shall not exceed 2 percent by volume.

3.2.1.9 Range. The LTV at GCW shall be capable of operating on internally carried fuel for a minimum distance of 300 miles and at an average speed of 30 - 40 mph in accordance with the mission profile. The minimum distance with additional fuel reserves shall be 400 miles . These fuel reserves shall be externally carried in standard military containers.

3.2.1.10 Braking. The LTV shall be equipped with a 4 wheel Anti-Lock Braking System (ABS). Brake linings/pads shall be constructed from non-asbestos materials. The vehicle shall meet the requirements of the Jennerstown Test Operation Procedure number 2-2-608.

3.2.1.10.1 Service Brakes. The service brakes shall control and hold the vehicle at GCW on a dry hard surface 60 percent grade, when headed up or down slope. The vehicle, relevant to its GVW rating, shall meet or exceed the service brake test requirements outlined in FMVSS 105 and/or FMVSS 121.

3.2.1.10.2 Parking Brake. The parking brake shall be capable of holding the LTV at GCW on a 40 percent grade while facing up or down with the engine off and the transmission in neutral. An indicator light shall alert the crew when the parking brake is engaged. The parking brake system shall at all times be capable of being applied and released by a 5th percentile female soldier and shall be immediately available for re-application. Braking energy for parking brakes shall not be dependent on maintenance of air or hydraulic pressure or electrical energy.

3.2.1.10.3 Emergency Brakes. The emergency brake system (if air), in the event of a failure in the service brake system shall stop the vehicle at least once on a 30 percent slope and, after emergency applications per FMVSS and shall remain engaged until intentionally disengaged by operating personnel. The stopping distances shall be in accordance with FMVSS.

3.2.1.11 Tires/Wheels. The LTV shall be equipped with a tire/wheel assembly that enables satisfactory but safe operation after the loss of air pressure in any tire. The LTV shall be capable of operating for a total distance of 30 miles after loss of all air pressure in any two tires. The 30 mile run flat mission profile at average speeds shall be: 12 miles at 12 mph for cross country, 9 miles at 21 mph for secondary roads, and 9 miles at 30 mph for paved roads. Tire construction shall be a radial design with a minimum treadlife of 12,000 miles (18,000 miles desired) when used in accordance with the LTV performance mission profile. The LTV body and tires shall have sufficient clearance to allow use of tire chains. Stencil markings shall be applied to both sides of the vehicle specifying the maximum tire air pressure(s).

3.2.1.12 NATO Mobility. The LTV shall be capable of operating over cross country terrain, trails, secondary, and primary roads and for the appropriate mobility level specified herein and under the varied environmental conditions encountered. The mobility characteristics shall equal or exceed those quantified by the following NATO Reference Mobility Model

(NRMM, version 2.5.7):

GERMANY

	5520 On Road			5322 Cross Country		
	PV100	SV100	TV90	V80	% No Go	MRS
Dry Normal	43	34	14	14	12	24
Wet Normal	43	34	14	11	18	22
CRREL Snow (Dry, ISURF=1)	37	31	25	12	20	24

MID EAST

	MEDATA On Road				3254 Cross Country		
	PV100	SV100	TV90	TV80	V80	% No Go	MRS
Dry Normal	50	41	12		14	11	25
Sand	50	41		11	11	18	23

3.2.1.13 Vehicle Cone Index. The LTV single pass vehicle cone index (VCI1, fine grained) shall have a value no greater than 22 at the tire inflation pressure for cross-country. The calculated VCI1 shall employ the deflection ratio effect algorithms as defined in NRMM version 2.5.7. The cross country tire pressure will allow the vehicle to maintain speeds of at least 50 mph for continuous operation on secondary roads and trails. The sand/mud/snow tire pressure will allow the vehicle to achieve speeds of at least 15 mph and the emergency tire pressure will allow speeds of at least 5 mph.

3.2.1.14 Ride Quality. The LTV, at GVW and with CTIS in the off-road mode, shall attain no more than 6 watts average vertical absorbed power at the base of the seat at the drivers position for the following speeds and RMS elevations:

30 mph at 1.0 inches RMS 16 mph at 1.5 inches RMS

The ride courses utilized in the computer modeling will be _____and_____provided with the distribution of NRMM 2.5.7, Vehdyn II terrains.

3.2.1.15 Shock Performance. The LTV, at GVW and with CTIS in the off-road mode, shall attain no more than 2.5 g vertical peak acceleration at the base of the seat at the drivers position for the following speeds and half round obstacle heights:

45 mph at 4 inches 12.3 mph at 8 inches 7.1 mph at 10 inches 6 mph at 12 inches

3.2.1.16 Approach Angle. The LTV shall have an angle of approach of at least 70 degrees (50 degrees with winch installed). The approach angle shall be measured in accordance

with SAE J1100.

3.2.1.17 Departure Angle. The LTV shall have an angle of departure of at least 45 degrees (40 degrees with winch installed). The angle of departure shall be measured in accordance with SAE J1100.

3.2.1.18 Operating Temperatures. In the ambient temperature range of 120 degrees F (49 deg C) to -25 deg F (-32 deg C), the vehicle shall be capable of being started and operated in one minute or less without the need for aids external to the vehicle. In the ambient temperature range of -25 deg F (-32 deg C) to -50 deg F (-46 deg C), the vehicle shall start within 45 minutes and operated within 60 minutes, utilizing external aids (Arctic kit). The vehicle, when in storage, shall withstand a climatic extreme of -65 deg F (-54 deg C) without deterioration that may cause subsequent failure of any component part of the engine.

3.2.1.19 Emissions. It is required that the LTV comply with the Environmental Protection Agency (EPA) emission regulations and standards for new motor vehicles and new motor vehicle engines in effect at the time of contract award.

3.2.2 Transportability. The LTV shall be transportable worldwide by highway, rail, marine, and air (fixed wing) modes. Transportability criteria are set forth in MIL-STD-1366. If the LTV must be reduced for transport, such preparation (and return to the operational configuration) shall be accomplished by two persons in 15 minutes using BII tools and equipment.

3.2.2.1 Air. The LTV at GCW shall be air transportable by C-130, C-141, C-5, and C-17 aircraft. Aircraft loading/unloading shall be accomplished at all ramp angles without removal of mission payload (cargo/shelters) or equipment payloads. Air transport criteria is referenced in MIL-STD-1791. The vehicle shall be equipped with dedicated tiedown provisions required for internal air transport.

3.2.2.1.1 External Transport: The LTV at GCW, excluding personnel, shall be externally transportable by the CH-47D helicopter. Thelight chassis model at CW shall be externally transportable by the UH-60L helicopter. The vehicle shall be equipped with dedicated sling provisions required for external air transport.

3.2.2.1.2 Low Velocity Air Drop (LVAD): The LTV at GVW, excluding personnel and shelters, shall be LVAD deployable by C-130 and C-17 aircraft. The vehicle shall be equipped with dedicated suspension, tiedown, and extraction provisions required for LVAD rigging and deployment.

3.2.2.2 Marine. The LTV at GCW shall be transportable on break bulk (general cargo) and roll-on/roll-off (RORO) ships. The LTV shall also be transportable on LARC-LX, LCM-8 and larger vessels. The vehicle shall be equipped with dedicated lifting and tiedown provisions required for marine transport.

3.2.2.3 Rail. The LTV at GCW when loaded on a 50-inch high rail car shall meet the dimensional requirements of the Association American Railroads (AAR) Outline Diagram for Single Loads, Without End Overhang, on Open-Top Cars and the Gabarit International de Chargement (GIC) clearance diagram, which apply to standard-gauge rail lines in the United States and European countries. The LTV at GVW shall withstand, without damage or degradation, the Rail Impact Test in accordance with MIL-STD-810, para. I3.10. The vehicle shall be equipped with dedicated tiedown provisions required for rail transport.

3.2.2.4 Highway. The LTV at GCW shall meet U.S. and NATO country highway legal limits without permits.

3.2.2.5 Shipping Data Plate. An LTV shipping data plate shall be furnished. Data plates shall show LTV shipping (GVW) and axle weights. A vehicle side and end view shall be used to indicate overall locations. Procedures for lifting and rail tie down shall be depicted.

3.2.2.6. Tiedown and Slinging Provisions. The LTV shall be equipped with dedicated tiedown and slinging provisions that comply with the performance and design criteria specified in MIL-STD-209.

3.2.2.7 Airdrop Provisions. The LTV shall be equipped with dedicated suspension, extraction, and tiedown provisions that comply with the performance and design criteria specified in MIL-STD-814.

3.2.2.8 Cargo Tiedown Provisions. The LTV shall be equipped with dedicated cargo provisions that comply with the performance and design criteria specified in MIL-STD-209.

3.2.3 Towing Provisions.

3.2.3.1 Towing a Like Vehicle. The LTV shall be capable of towing and being towed from the front by a like vehicle at GVW for a distance of at least 100 miles (161 km) at a minimum speed of 35 mph, with all wheels on ground, on a paved level road, without preparation, without degradation, under all climatic conditions, using a standard Army Towbar, MS 500048. The LTV shall also be capable of towing any model configuration in the HMMWV fleet without damage to either vehicle.

3.2.3.2 Towing Device. The LTV shall have not less than four (4) tow lugs. The tow lugs are dedicated to towing and shall not be used as tie down anchor points. Two tow lugs shall be mounted to the front and two tow lugs mounted to the rear of the vehicle structure. The LTV shall be capable of being towed from the front end with the rear wheels on the ground, at least 100 miles, without damage to the vehicle or power train, by standard US military vehicles utilizing the standard towbar assembly MS500048A and standard US military recovery vehicles. Drive line components shall not require disassembly when the vehicle is towed.

3.2.3.3 Trailer towing provisions. Trailer towing provisions shall be provided on the

rear of the LTV with a swivel pintle. Two anchor points shall be provided and appropriately sized to accommodate the safety chain 7339458 and FMCRS 393.70. The LTV shall be capable of ascending and descending a 60 percent slope with no degradation to the requirements when towing a two-wheeled M1102 trailer with a GTW of 4200 lbs., the M1101 trailer with a GTW of 3400 lbs. the 3/4 ton M101 series cargo trailer and the L119 Howitzer with a GTW of 4500 lbs.. The LTV shall be equipped with an externally mounted electrical connector necessary to operate the electrical components of the M101 series cargo trailer, the M1101 and the M1102 trailer.

3.2.3.4 Front/Rear Mounted Pintle. The LTV shall be equipped with provisions for a front mounted pintle. This requirement may be satisfied by either furnishing a separate pintle kit for the front or providing the capability to relocate the rear mounted pintle. A pintle design that utilizes the winch front and rear mounting/reciever provisions is also acceptable.

3.2.3.5 Positive Control Braking. The LTV shall be equipped with provisions that enable positve control of trailer brakes for future towed systems that may require such an interface. The positive control system shall not degrade the LTV brake system under any operating conditions.

3.2.4 Winch Kit. The kit shall consist of the winch with wire rope, a chain, a shackle, and a snatch block. This kit is applicable to all LTV configurations.

3.2.4.1 Winch. The winch shall have sufficient capacity for self recovery of the LTV without stalling or overheating. The winch drum shall have a wire rope capacity that allows use of the snatch block at a distance of 75 feet from the vehicle. The winch shall be equipped with an automatic brake that holds the drum under load when the winch is powered off. A free spooling feature is required for paying out line without powering the winch. An overload protection feature is required to stall/stop winch operation when the line load is equal to 125+/-5% of the rated bare drum line load capacity.

3.2.4.2 Wire Rope. The wire rope shall be manufactured from extra improved plow steel (EIPS) and constructed with an independent wire rope core (IWRC). The number of strands and wires used in the construction shall be selected to promote a high degree of flexibility. The rated breaking strength shall be equal to or greater than 200+/-5% of the rated bare drum line load capacity. The length shall be sufficient to allow the minimum bare drum wraps when used with a snatch block over a distance of 75 feet. The working end shall be furnished with a clevis and hook.

3.2.4.3 Mounting. The LTV shall be equipped with a winch mounting/reciever provision at the front and rear of the vehicle. This provision shall allow two crew members to remove and reinstall the winch at either end using only tools contained in the BII. Any hydraulic/electrical connections that the crew must open shall have quick disconnect and self sealing fittings.

3.2.4.4 Fairleads/Rollers. Fairleads/rollers shall be furnished as either part of the winch

assembly or the mounting/reciever provision.

3.2.4.5 Operator Controls. The LTV with the winch installed shall allow a crew member the option of operating the winch from either sitting in the drivers seat or standing along side of the vehicle.

3.2.5 Manpower and Personnel Integration (MANPRINT).

3.2.5.1 Health Hazards and Human Factors Engineering (HFE). The LTV shall be designed to facilitate effective soldier-machine interface for ease of operations and maintenance by the designated user under all required operational conditions. Those aspects of the LTV design, that affect soldier performance to include, but not, limited to, crew station work space, controls and displays geometry, provision of acceptable crew accommodations, conditioned air to crew stations and stowage provisions shall meet the requirements of MIL-STD-1472 and MIL-HDBK-759. The system shall be operable (5th percentile female to 95th percentile male), consistent with soldier performance requirements by all MOS qualified personnel. The vehicle shall be operable and maintainable by personnel wearing Arctic clothing and/or MOPP IV gear.

3.2.5.2 Ride Quality A 5th percentile female soldier shall demonstrate controllability of the LTV while traversing terrain under conditions equivalent to the mobility parameters specified in paragraph 3.2.1.14.

3.2.5.3 Occupant Protection. Exposed components and systems which are subject to high temperatures, high pressures, electrically actuated or inherently hazardous, shall be provided with correct safeguarding and insulating features. Interior surfaces shall afford crew members occupant protection during rough cross country operation and shall meet or exceed the requirements of FMVSS 201. Interior materials shall meet or exceed the burn resistance criteria of FMVSS 302.

3.2.5.4 Crew Restraints. Each crew position shall be equipped with an integral seat/belt restraint system. This integral restraint system shall be composed of a belt assembly that and anchorages, for both the seat and belt assembly, that meet or exceed the requirements of FMVSS 209 and 210. The belt assembly shall be equipped with a single point quick release connector. The integral restraint system shall comfortably accommodate a soldier wearing full combat gear (to include LBE, personal body armor and protective mask) and individual MOPP IV protective gear without interfering with vehicle operations. The integral restraint system shall meet or exceed the occupant crash protection performance requirements of FMVSS 208 and shall enhance occupant protection for the crew while traversing off road terrain.

3.2.5.5 Rollover Protection. The LTV shall have rollover protection integrated into the vehicle body/armor structure. If the armored vehicle model is not equipped with a down link weapon system, then the primary weapon mount shall be equipped with a roll cage structure that protects the gunner in the event of a sudden rollover. All LTV configurations shall meet or exceed the rollover performance requirements of FMVSS 208.

3.2.5.6 Non-slip Surfaces. All vehicle surfaces used for walking, access or as working platforms during operation or maintenance tasks shall be of non-skid surfaces. Additionally, hand and foot holds shall be provided to facilitate crew operations, checks, and maintenance.

3.2.5.7 Toxic Gas Exposure. Under all conditions crew and maintenance personnel shall not be exposed to concentrations of Carbon Monoxide (CO) that shall result in blood concentration levels of carboxyhemoglobin (COHb) of greater than 10 percent in accordance with MIL-STD- 1472, paragraph 5.13.7.4.2. Other chemical exposures shall be limited to the applicable military-unique exposure limit or the most stringent of either OSHA PELs or ACGIH TLVs.

3.2.5.8 Whole Body Vibration. The LTV shall comply with the vehicular whole-body health and safety exposure limits and measurement procedures outlined in MIL-STD-1472, paragraph 5.8.4.

3.2.5.9 Noise. The LTV shall comply with the test procedures, equipment, and noise limits outlined in MIL-STD-1474.

3.2.5.10 Interior Steady State Noise. The interior steady state noise levels for the LTV shall not exceed 80 db (A) when measured in accordance with the test procedure cited in MIL-STD-1474, category D.

3.2.5.11 Exterior Noise. The vehicle (while idling) shall be inaudible to the uniaded ear at 50 Meters (15 Meters desired) in all directions under all conditions. The exterior noise shall not be greater than 80 db (A) at a distance of 15 meters from the centerline of the vehicle path when measured according to the procedure cited in SAE J 366. Vehicle posted speed for purposes of determining compliance is 35 mph (55 kph).

3.2.5.12 Safety. The LTV shall meet all Federal Motor Vehicle Safety Standards (FMVSS) for a vehicle in this weight class.

3.2.6 Environmental Characteristics. The LTV shall be serviced and equipped for climatic design types Hot, Basic and Cold as defined in MIL-STD-210. The LTV shall be capable of starting and operating continuously without external aids in temperatures from +120 degrees F to -25 degrees F. Operations for temperatures from -26 degrees F to -50 degrees F may be met by the installation of an arctic kit. The vehicle shall operate from 500 feet below sea level to 8000 feet above sea level without adjustments.

3.2.6.1 Personnel Heater. The LTV shall have a personnel heater capable of raising the crew compartment temperature from -50 degrees F to at least +41 degrees F within 60 minutes after the heater is turned on. Air temperature around any part of any crewmembers body shall not vary by more than + 9 degrees. In Cold conditions, if the heater is fuel fired, combustion gas products shall not be present in the vehicle interior. Heater controls shall regulate the

temperature, distribution, and amount of air provided.

3.2.6.2 Personnel Air Conditioner. The LTV shall be equipped with an air conditioner (A/C) system capable of maintaining crew comfort while operating in Hot climatic conditions. The A/C system shall not cause degradation in vehicle performance while operating under all mission profiles. A/C controls shall allow the crew to regulate the air flow temperature, distribution, and velocity. The refrigerant used for this system shall be accepted by the EPA as a part of their Significant New Alternative Policy (SNAP) program. Under full solar load, the A/C system shall reduce the interior temperature from 120 degrees F to 80+/-4 degrees F (75+/-4 degrees F desired) within 30 minutes at all crew locations, including the patient compartment for the ambulance.

3.2.6.3 Arctic Kit. The LTV shall have the capability to be equipped with an Arctic kit that permits the vehicle to be started within 45 minutes and operated within 60 minutes, without degradation in vehicle performance, down to -50 deg F (-45.5 deg C). At -50 deg F (-45.5 deg C), the kit shall assure that a cab reference temperature (as defined in MIL-HDBK-759) of 41 deg F (5 deg C) is attained within one hour after the heater is turned on; the cab reference temperature shall apply to all crew stations. Air temperatures around the operator's body shall be within the range described in MIL-HDBK-759. The Arctic kit shall assure that the requirements for defrosting described in FMVSS 103, are met when the ambient temperature is -50 deg F (-45.5 deg C); defrosting requirements apply to the vision blocks. The kit shall enable the operation of the vehicle by an Arctic-clothed individual. Each vehicle shall be prepared to accept the kit.

3.2.6.4 Ventilation. The LTV shall be provided with a ventilation system which complies with the performance requiremetns contained in MIL-STD-1472, paragraph 5.12.6.2.

3.2.6.5 Windshield Defrosting and Defogging System. The LTV windshield defrosting system shall meet or exceed the performance requirements recommended in SAE-J902 and shall meet or exceed the performance requirements of FMVSS 103.

3.2.7 Electrical Characteristics. The LTV shall be equipped with a nominal 24-volt DC. waterproof electrical system in accordance with FMCSR 393.27 through 393.33. The electrical wiring harnesses shall be so located, secured, and protected to assure that the wiring harness shall not be crushed, or chafed, by moving components and personnel or burned by the exhaust components, or otherwise damaged during operation. The wiring shall be in accordance with SAE J1292 and SAE J163. The LTV shall have standardized electrical wiring with numerically coded at points of connection, for ease of maintenance and to prevent incorrect connection of lines. All electrical connectors shall be of the waterproof variety, and be of such design as to be replaceable as a separate component, should they become defective or damaged. Solder shall conform to QQ-S-571. Acid or other corrosive soldering fluxes shall not be used for any electrical or electronic soldered connections. Crimped terminations shall conform to SAE J163. The electrical sub-system shall be protected from inter vehicle reverse polarity.

3.2.7.1 Circuit Protection. With the exception of the starting motor and starter solenoid

circuits, circuit overload protection shall be accomplished by the use of circuit breakers in the various circuits branching off of the main 24 Volt DC vehicle feed bus. The various circuit breakers shall be the manually resettable type, located for easy access to the operator of the vehicle. The head lighting circuit shall be protected by a single circuit breaker of the automatic resetting type. The current ratings of the circuit breaker in each electrical feed line shall not exceed the safe current carrying capacity of the wiring on the load side of that breaker.

3.2.7.2 Electromagnetic Emission/Interference (EMI). The LTV electrical components shall meet the EMI limits of RE102. CS114, RS103, CE102, & CS101 specified in MIL-STD-461 when tested in accordance with MIL-STD-462.

3.2.7.3 Batteries. The LTV shall be equipped with maintenance free storage batteries that have performance characteristics meeting the requirements of MIL-B-62346.

3.2.7.4 Power Supply. The LTV shall be equipped with a dual voltage (nominal 12/24 volt) alternator with temperature compensated voltage regulation. The minimum current output at engine idle shall be 50 & 25 amps for the 24 & 12 volt output terminals respectively. The minimum rated capacity at 5000 RPM shall be 200 & 100 amps for the 24 & 12 volt output terminals respectively.

3.2.7.5 Communications. The LTV shall have dedicated space allocation for SINCGARS radios, antennas & cables. Vehicle interface areas shall have predrilled mounting holes for MT-6352 & MT-6353 amplifier bases and AS 3900 antenna bases.

3.2.7.6 Driving Lights. The lighting sub-system shall include two main head lamp assemblies, with adjustable high and low beams; park, turn, and marker; tail, stop, turn, and marker lamps; blackout driving lights; instrument lights; wiring; switches, and controls. Lights shall be mounted in protected locations with stoplights, tail lights, and blackout marker lights separated to the maximum extent possible.

3.2.7.7 Interior Lights. The LTV shall be equipped with a switch that can render all interior lighting inoperable during blackout operation. All interior lights shall not emit more than 1% of the peak energy which is emitted in the visible spectrum (400-700 nanometers) at a single wavelength outside of the visible spectrum (700-1200 nanometers). Appropriate switches shall be included to allow interior vehicle lights to extinguish automatically when either doors or hatches are opened.

3.2.7.8 Slave Cable and Receptacle. The LTV shall be equipped with a slave receptacle conforming to ordnance drawing 12342917. The receptacle shall be externally mounted and easily accessible by the crew.

3.2.7.9 Land Navigation. The LTV shall have dedicated space allocation for the Global Positioning System (GPS) reciever, antenna, & cables. The GPS shall be viewable and operable by the vehicle commander.

3.2.7.10 Electrical Socket. The LTV shall come equipped with a 12 VDC , 15 amp receptacle controlled by its own on/off switch. The receptacle shall be on the interior of the vehicle and shall be accessible by the driver.

3.2.7.11 Diagnostics. The LTV shall have embedded diagnostics that permit interface for fault isolation.

3.2.7.12 High Altitude Electromagnetic Pulse. The LTV electronic components shall be survivable from exposure to a HAEMP. The vehicle design shall utilize electromagnetic shielding or electronic filtering to protect all susceptible circuits.

3.2.8 Fuel System. The fuel system shall meet or exceed the performance requirements of FMVSS 301.

3.2.8.1 Fuel Tank(s). The LTV shall be equipped with corrosion resistant fuel tank(s) of sufficient volume to permit vehicle operation for the range specified in para 3.2.1.9. When more than one tank is furnished it is desired that an automatic device be provided to assure equalized fuel level in both tanks. A shut-off valve between the tanks shall be furnished. Fuel tank(s) shall be provided with drain plug(s) and safety type tank filler caps that preclude the entrance of water while fording, captivity chained to filler neck strainers, which shall be easily accessible and removable. The fuel tank(s) shall be equipped with a drain plug.

3.2.8.2 Fuel Tank Port(s). Fuel tank ports must be a minimum of 2.25 in. (5.7 cm) inside diameter, and shall be compatible with NATO dispensing nozzles having a nominal outside diameter of 2 in. (5.1 cm). The fuel tank ports shall permit refueling at a rate of at least 20 gpm (188 liters per minute).

3.2.8.3 Fuel and Lubrication. The LTV shall meet the requirements of this specification with JP8 as the primary fuel. The LTV shall also operate with fuels complying with VV-F-800, MIL-T-5624, MIL-T-83133, and MIL-F-16884 without degradation of vehicle performance. components.

3.2.8.4 Fuel Filters. The LTV shall be equipped with easily accessible fuel filters and in-line water separators.

3.2.8.5 Fuel Access. The LTV shall be equipped with a fuel fitting and valve accessible as a fuel tap for generators and heaters in shelterized systems.

3.2.9 Exhaust System. The exhaust system shall conform to FMCSR 393.83. The exhaust system, as installed, shall be gas tight and leak proof to prevent the accumulation of exhaust gas in occupied areas. Exhaust mufflers and tail pipes shall be constructed of corrosion resistant steel with adequate guards to prevent personnel injury. The exhaust system shall be designed to disperse hot exhaust gases to minimize thermal signature. It is desired that the exhaust sub-system shall be entirely shielded from thermal detection viewing devices.

3.2.10 Drive Train Characteristics.

3.2.10.1 Transmission. The LTV transmission shall be automatic. The transmission in accordance with SAE J 645 shall include the following:

3.2.10.2 Downshift Inhibitor. A downshift inhibitor system that prevents driver shift control action from overspeeding which could damage the drive train components. The shifter control shall be operable with one hand.

3.2.10.3 Transfer Case. The LTV shall be equipped with a full time four wheel drive transfer case. The transfer case shall have an automatic torque biasing feature that can proportionately distribute power to the axle with the most traction. The transfer case shall have the means to manually engage either high or low gear ranges.

3.2.10.4 Road Load Conditions. The steady state fluid temperatures for the LTV operating at sustained road load conditions shall remain below the following fluid temperature limits:

a. Engine oil sump: 225 degrees F, measured at drain plug.
b. Engine coolant: 250 degrees F, measured at top tank.
c. Transmission sump/Transmission oil cooler: 250 degrees F.
d. Transfer case oil sump, 250 degrees F.
e. Power steering reservoir: 250 degrees F.
f. Front and Rear axle differential sumps: 250 degrees F.

3.2.10.5 Tractive Effort. The steady state fluid temperatures for the LTV operating at a continuous 0.61tractive effort to GVW and in a 120 degrees F ambient temperature shall not exceed the following fluid temperature limits:

a. Engine oil sump: 225 degrees F, measured at drain plug.
b. Engine coolant: 250 degrees F, measured at top tank.
c. Transmission sump/Transmission oil cooler: 250 degrees F.
d. Transfer case oil sump, 250 degrees F.
e. Power steering reservoir: 250 degrees F.
f. Front and Rear axle differential sumps: 250 degrees F.

3.2.10.6 Power Takeoff. A power takeoff attachment is desired to power/drive external hydraulic/electrical equipment.

3.2.11 Central Tire Inflation System (CTIS). If provided, the CTIS shall meet the requirements of annex A.

3.2.12 Drivers Position The driver’s controls shall be within reach of a properly restrained driver; and shall be in accordance with FMVSS 101. The driver's station shall have the

following instruments and controls:

a. Ignition switch and master power switch
b. Voltmeter and warning light
c. Fuel gage and warning light
d. Oil pressure gage and warning light
e. Engine temperature gage and warning light
f. Transmission temperature warning light
g. Speedometer with odometer
h. Tachometer
i. Headlight control and indicator light
j. Instrument light switch with dimmer control
k. Interior light switch
l. Master circuit breaker
m. Parking brake warning light
n. Windshield defrosting control
o. Windshield intermittent wiper control
p. Central Tire Inflation System control
q. Air pressure gage and warning light

3.2.13 Flashing Warning Beacon Kit. The LTV shall be equipped with mounting and electrical interface points for the flashing warning beacon kit.

3.2.14 Door Latches. The LTV side door latches shall meet or exceed the performance requirements recommended in SAE-J839 and shall comply with the requirements of FMVSS 206.

3.2.15 Windshield Wiper System. The LTV windshield wiper system shall meet or exceed the performance requirements recommended in SAE-J903 and shall meet or exceed the performance requirements of FMVSS 104.

3.2.16 Windshield Washer System. The LTV windshield washer system shall meet or exceed the performance requirements recommended in SAE-J942 and shall meet or exceed the performance requirements of FMVSS 104.

3.2.17 Airbags. The LTV equipped with airbags for the front seats is desired. Airbags shall be supplemental to all required crew restraint systems and must not inadvertently deploy during cross country operation.

3.2.18 Brush Guard. The LTV shall be equipped with a brush guard for front end protection of vehicle lights, hood/body, and engine compartment components. The brush guard shall have the structural integrity to survive impacts with three inch limbs at 30 mph without permanent deformation.

3.2.19 Vehicle Security. The LTV shall be equipped with a means to provide vehicle

security. The crew must be able to lock all doors from inside the vehicle without inhibiting their ability to exit quickly. The crew must also be able to lock all doors from the outside when the vehicle is left unattended.

3.2.20 Decontamination. The LTV design shall be compatible with decontaminating agents and shall utilize materials/coatings that minimize adsorption/absorption of chemical/biological agents.

3.2.21 High Idle. The LTV shall be equipped with an engine idle control mechanism that sets engine idle speed without using hand/foot throttle controls. The control shall automatically set engine high idle rpm when activated. Activation can only occur when the transmission is placed in the park or neutral position and will disengage if the shifter is moved to any other position. The idle control shall automatically set the high idle rpm for sufficient engine speed to sustain alternator output demands and operation of power take off equipment.

3.2.22 Night Vision. The LTV shall be compatible with the latest generation of night vision devices. Indicator/instrument lighting and windshield tinting shall not interfere with drivers ability to adjust/use night vision devices.

3.2.23 Fuel/Water Containers. The LTV shall have mounting/stowage provisions for fuel and water containers. Fuel containers will be mounted outside of the crew compartment and shall be sufficient to meet the specified range. The water container provisions furnished shall equal the crew size specified.

3.3 Reliability\Maintainability.

3.3.1 Reliability. The vehicle shall demonstrate a reliability point estimate of xxxx Mean Miles Between Failure (MMBF) and xxx Mean Miles Between Operational Mission Failure (MMBOMF). Vehicle reliability characteristics shall be calculated after completion of 20,000 miles operation in accordance with the mission profile.

3.3.2 Engine and Power train 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.

3.3.3 Maintenance Ratio: Maintenance Ratio (MR) is defined as the ratio of maintenance man-hours per operating mile. 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 the following:

	Total	DS/GS*	Org*
Standard	.004	.001	.003
Shelter	.005	.001	.004

Armament	.006	.002	.004

* Direct Support/General Support
** Organizational

3.3.4 Ease of Maintenance: Chassis components shall have direct and unrestricted safe 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 using On Vehicle Equipment (OVE) only. This requirement shall be applicable to all body styles.

3.3.5 Time to Replace. The removal and replacement of any single major sub assembly (engine, transmission, etc.) shall not require more than 14 (10 desired) hours using two maintainers at the appropriate maintenance level.

3.3.6 Time to Repair: The median time to repair (MTTR) for all essential unscheduled maintenance demands shall be less than or equal to 2.0 hours for any body style. The maximum time to repair for 90% of all essential unscheduled maintenance demands shall be less than or equal to 4.0 hours.

3.4 Painting, Marking and Data Plates.

3.4.1 Painting. All LTVs shall be painted in a NATO three color camouflage pattern or a desert tan color using Chemical Agent Resistant Coatings(CARC).

3.4.2 Priming. Primers compatible with CARC topcoats be utilized.

3.4.3 Marking. Vehicle exterior markings shall be placed and sized in accordance with MIL-STD-642, except "U.S. Army" in 3 inch (7.6 cm) high letters shall be used where the 5 pointed star is specified (ref MIL-STD-642). Markings, letters, and numbers on the vehicle shall be non-reflective.

3.4.4 Identification Plates. All data plates furnished with the vehicle shall be photosensitive metal for identification plates on mechanical equipment and plastic instruction plates for all other applications (ref MIL-STD-1223 and MIL-P-514). The size of the plates shall not exceed the surface they are mounted on.

3.4.5 Marking of Stowed Item Locations. All stowed on-vehicle equipment item locations shall be identified by stencils or decals.

3.5 Corrosion Control: The vehicle shall be designed for a total service life of 20 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. Corrosion control techniques shall compatible with Nuclear, Biological and Chemical (NBC) decontamination procedures. No action beyond normal washing, shall be necessary to keep the corrosion protection in effect.

3.6 Model Specific Requirements. Each model shall meet all performance requirements of this specification unless otherwise noted.

3.6.1 Light Utility Vehicle.

3.6.1.1 Crew Area. The Light Utility Vehicle shall incorporate provisions to transport a crew of four. All requirements of this specification shall apply to all four seating locations. The third and fourth crew seat shall be capable of being removed or folded out of the way for efficient utilization of space when the vehicle is operated with a two or three man crew. The crew of four shall be enclosed to provide protection from the environment. Adequate external vision shall be provided to perform all mission duties associated with each crew station.

3.6.1.2 Troop Seat Kit. The Light Utility Vehicle shall be capable of transporting a ten man squad and their individual equipment when a troop seat kit is installed in the cargo area. The troop seat kit shall accomodate eight combat equipped soldiers. The troop seats shall be capable of being raised and stowed in the vertical position.

3.6.1.3 Cargo Area Heater Kit. The cargo area heater kit shall be capable of raising the cargo area temperature from -50 degrees F to + 41 degrees F within 60 minutes after the heater is turned on. The temperature at any location within the designated cargo area shall not vary by more than +9 degrees F. The heater kit shall be installable with the troop seat kit; and, shall not interfere with transporting a ten man squad and their individual equipment.

3.6.1.4 Cargo Area Power. The cargo area shall be equipped with an electrical outlet rated for 15 amps at 24 VDC. The outlet shall be located/mounted without causing interference with the loading/stowage of cargo.

3.6.1.5 Crew Weapon Stowage. The Light Utility Vehicle shall be equipped with weapon stowage provisions. These provisions shall stow all weapons of a four man crew to include M-16, Squad Automatic Weapon, M4 Carbine, and M203. Stowage provisions shall have readily accessible quick release features and must not interfere with vehicle operation or crew entry/exit.

3.6.1.6 Hard Cargo Cover. The Light Utility Vehicle shall be equipped with mounting provisions for a hard wall cargo cover.

3.6.1.7 Soft Top Cargo Kit. The Light Utility Vehicle shall be equipped with mounting

provisions for a soft top cargo kit. The kit shall include tarps and bows that will interface with the mounting hard points to completely enclose the cargo area.

3.6.1.8. Ballistic Protection Kit. The Light Utility Vehicle shall be capable of accepting a Ballistic Protection Kit which will afford protection for the crew compartment and which meets the ballistic requirements of paragraph 3.6.3.1. The kit shall be installable at the organizational level within 2 man hours and shall be compatible with all other kits/features.

3.6.1.9 Underbody Protection Kit. The Light Utility Vehicle shall be capable of accepting an Underbody Protection Kit which will afford protection for the crew compartment and which meets the requirements of paragraph 3.6.3.2. The kit shall be installable at the organizational level within 2 man hours and shall be compatible with all other kits/features.

3.6.2 Heavy Utility Vehicle.

3.6.2.1. Ballistic Protection Kit. The Heavy Utility Vehicle shall be capable of accepting a Ballistic Protection Kit which will afford protection for the crew/patient compartment and which meets the ballistic requirements of paragraph 3.6.3.1. The kit shall be installable at the organizational level within 2 man hours and shall be compatible with all other kits/features.

3.6.2.2 Underbody Protection Kit. The Heavy Utility Vehicle shall be capable of accepting an Underbody Protection Kit which will afford protection for the crew/patient compartment and which meets the requirements of paragraph 3.6.3.2. The kit shall be installable at the organizational level within 2 man hours and shall be compatible with all other kits/features.

3.6.2.3 Alternator. The Heavy Utility Vehicle shall be capable of accepting a dual voltage 400 Amp Alternator conforming to ordnance drawing 12446760.

3.6.2.4 Shelter Carrier. The Heavy Utility Vehicle shall be capable of mounting the S250 shelter and the S-787/S-788 SICPS shelter with a shelter and payload weight of 4500 lbs.

3.6.2.5 Ambulance. The Heavy Utility Vehicle shall be capable of mounting an ambulance shelter that incorporates the following features:

3.6.2.5.1 Climate Control. Provision shall be made for heating and cooling the patient compartment to maintain an interior temperature above 75°F (24°C) throughout the hot, basic, and cold climatic design types. Heat shall be introduced near the lowest patient and exhausted near the ceiling. The temperature differential between inlet and exhaust must be no greater than 5.5°C. Capability for cold climatic design types may be obtained with kit application.

3.6.2.5.2 NBC Protection. Provision shall be made to provide ventilated face piece collective NBC protection for all crew positions, minimum of three. Provision will also be made to provide ventilated hood collective NSC protection for a minimum of four litter patients in the

patient compartment.

3.6.2.5.3 Communication. Provisions shall be made to permit visual and verbal contact between driver and personnel in the patient area. An extension capability of the vehicle radio communications shall be installed in the patient compartments.

3.6.2.5.4 Illumination. The patient compartment shall be equipped with general illumination 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 each litter. Lighting for blackout operation shall meet the requirements of paragraph 3.2.7.7.

3.6.2.5.5 IV Hook Ups. The patient compartment shall have provisions for IV hooks/hangers in the ceiling.

3.6.2.5.6 DC Power. The patient compartment shall be equipped with DC power outlets. A duplex three contact convenience outlet shall be provided in a location convenient to the attendant. A second three contact duplex convenience outlet shall be provided at the rear of the patient compartment convenient to the attendant on the ground with doors open. The receptacle shall be two-wire, two-prong, twistlock and furnished with a male plug compatible to the receptacle. The receptacle and the plug shall be rated for 15 amps and labeled for 24-volt usage. A power distribution box shall be wired to provide battery power with the vehicle ignition off.

3.6.2.5.7 Geneva Convention Markings. Geneva Convention (Red Cross) markings shall be removable without alteration of underlying camouflage paint.

3.6.2.5.8 Medical Supplies. The patient compartment shall be equipped with racks/cabinets for stowage of medical supplies and equipment.

3.6.2.5.9 Oxygen. The patient compartment shall be equipped with stowage racks for a minimum of four "D" size oxygen cylinders. These may be positioned into a central bank/location or located at the forward area of the patient compartment in close proximity to each of the litters. Breathing air provided to the patients shall be medical grade N, IAW ANSI/CGA G-7.1-1989.

3.6.2.5.10 Rear Doors. The rear of the patient compartment shall be equipped with two center opening doors. The doors must open wide enough to facilitate loading of litters onto side wall mounted litter racks.

3.6.2.5.11 Forward Access. Walk-through access shall be provided between the vehicle cab and the patient compartment.

3.6.2.5.12 Litters. The patient compartment shall accommodate four standard NATO

litters in accordance with STANAG 2040.

3.6.2.5.13 Ventilation. A ventilation system shall be provided for the patient area that provides a minimum of 12 air changes per hour with 25% being outside air changes. Air filtration shall be provided by filters which meet the efficiencies presented in MIL-HDBK-1191.

3.6.3 Armored Vehicle.

3.6.3.1 Ballistic Protection. The Armored Vehicle shall have an overall 0.95 probability of no penetration at a 90 percent confidence level against the 7.62 NATO Armor Piercing (AP) M61 round, fired horizontally over 0 to 360 degrees attack directions to the crew compartment at a 100 Meter equivalent velocity. Hit spacing shall be no more than three inches (center to center) required, 3 projectile diameters desired**.** It is desired that the Armored Vehicle have overall 0.95 probability of no penetration against 12.7mm AP M2 ammunition at a range of 250 meters, fired horizontally over 0 to 360 degrees attack direction to the crew compartment.

3.6.3.2 Underbody Protection. The Armored Vehicle shall provide protection for the crew against mine blasts of up to 12 lbs. TNT when detonated under the tires. The crew compartment shall remain unaltered after a 12 lbs TNT detonation under any wheel (desired, any location). The crew shall be 0 percent incapacitated when 12 lbs of TNT are detonated under any wheel. During the detonation of a 12 lbs TNT blast, the following requirements necessary for crew survivability shall apply at each of the four seating locations on the vehicle: a) The Head Injury Criteria (HIC) shall be IAW those specified in FMVSS 208, b) Neck shear moments shall be less than 190 N-m forward flexion, less than 57 N-m rearward extension and less than 105 N-m lateral bending, c) Chest accelerations shall be less than 40g and sustained for less than 7 msec, d) Lower spinal forward (longitudinal) accelerations shall be less than 40g sustained for less than 7 msec and upward (vertical) accelerations shall be less than 23g sustained for less than 7 msec, e) Lower spinal bending moments, forward flexion shall be less than 1,235 N-m, rearward extension shall be less than 370 N-m and lateral bending shall be less than 675 N-m, and f) lower extremity axial compressive forces shall be less than 1250 lbs for any length of time and less than 900 lbs acting for less than 10 msec.

3.6.3.3 Primary Weapon Mount. The Armored Vehicle shall be equipped with a primary weapon mount located on the roof. The weapon mount shall accomodate self defence weapons (M2, M60, M240, M249 Machine Guns or MK-19 Grenade Machine Guns) including ammunition can. The weapon mount shall have a positive travel lock and a mechanical traversing unit permiting a horizontal traversing range of 360 degrees. A 5th percentile female gunner must be able to operate the traversing unit and perform all weapon functions. A down link weapon control system that allows full operation of the weapon from within the crew compartment is desired.

3.6.3.4 Restraint System. A gunner restraint system shall be provided which shall allow the gunner 360 degrees of continuous operation while preventing ejection of the gunner in case of an accident. The system shall not hinder quick reentry into the vehicle. The gunner

restraint system is not required if a down link weapon control system is employed.

3.6.3.5 Overhead Protection. The Armored Vehicle shall provide protection for the crew, turret and ammunition storage area with an 80 percent chance of no penetration from 155mm fragments detonated at 60 meters radius of burst.

3.6.3.6 Gun Shield Kit. Protection shall be provided to the gunner against the threats identified in paragraphs 3.6.3.1. The kit shall not interfere with the functioning of the externally mounted weapons. The kit shall be installed by a crew of 2 within two hours using on vehicle equipment. The Gun Shield Kit is not required if a downlink weapon control system employed .

3.7 Workmanship. All details of workmanship shall be of the highest grade consistent with the intention of this specification. In addition to adherence to the physical and performance requirements of this specification, each vehicle shall have no evidence of cracks, dents, scratches, burns, sharp edges, loose parts, foreign matter, or any other evidence of poor workmanship that will render the vehicle unsuitable for the purpose intended.

3.8 Basic Issue Items.. The following items of equipment, shall be provided. These items and the other items specifically called out in other sections of this specification and those items identified in operator manuals required for vehicle operation and operator maintenance, shall be stored (combat loaded) on each LTV in spaces provided to assure that it will not interfere with the operation of the vehicle and equipment in any manner:

Annex A
Central Tire Inflation System

1.0 Central Tire Inflation System. This system shall allow the driver to adjust all vehicle tires to any preset tire pressures. System controls shall be mounted so that the driver may operate the system while continuing to operate the vehicle.

1.1 Installation. The CTIS shall be an integral element of the LTV.

1.2 Provisions and Storage of Air. The CTIS shall contain necessary compressor and/or stored air capability to meet the inflation and deflation time requirements as stated herein. The system shall provide infinitely repeatable selections of air pressure among those specified. System recovery time for this purpose is defined as the time between the deflation/inflation activity and return of the CTIS to the pre-operation state. Recovery time shall be such that the operation in para. 1.2.7 shall be accomplished within the time limits stated immediately subsequent to any other inflation/deflation activity.

1.2.1 Manual Tire Inflation/Deflation. The system shall provide for the isolation of any or all tires from the CTIS in the event of CTIS failure for any reason. Valves for manual inflation shall be readily accessible and compatible with the standard on-board manual inflation system.

1.2.2 Air-Priority System. The CTIS shall incorporate sufficient safeguards to assure that air pressure necessary to continue safe operation of the LTV shall be available at all times. Safe operation of the LTV for this paragraph is defined as continued use of brakes and windshield wipers if air powered/assisted.

1.2.3 Pre-set Tire Pressures. The LTV CTIS shall have established recommended tire air pressure settings for various driving conditions from highway to cross-country operations. There shall be four pre-set tire pressure settings which are:

a. Emergency
b. Mud/Snow/Sand
c. Cross Country
d. Highway

1.2.4 Speed/Pressure Control and Warning. The CTIS shall include sensing of the vehicle speed and comparing indicated speed to the maximum allowable speed for each control setting as established in para 1.2.3 of this annex. In the event, the vehicle's average speed

exceeds maximum allowable speed for that setting for a period of more than one minute, a panel-mounted flashing amber light shall activate to warn the driver of this condition. The flashing light shall not activate in blackout mode.

1.2.5 Maintenance of Tire Pressure. With the CTIS in operation, tire pressure shall be certified and adjusted at intervals necessary to ensure that no more than three (3) psi variation exists between selected pressure and actual pressure except during the inflation/deflation operation caused by the selection of a new tire pressure. With the CTIS not in operation and the vehicle engine not running after 24 hours, the tire pressure shall not drop below 98 percent of the pressure setting which existed before the vehicle engine stopped. No action shall be required of crew personnel beyond normal vehicle shutdown to meet this requirement.

1.2.6 Operating Environment. The CTIS shall be fully operational under all the operating conditions and environments described in para 3.2.4.

1.2.7 Time to Inflate/Deflate. The CTIS shall be capable of operating within the time constraints as listed below showing the maximum time allowed to complete the operation:

a. Desired time of inflation from emergency tire pressure to Highway tire pressure is 6 minutes.

b. Maximum time allowed for inflation from emergency tire pressure to Highway tire pressure is 10 minutes.

c. Desired time for deflation from Highway tire pressure to emergency tire pressure is 2 minutes.

d. Maximum time allowed for deflation Highway tire pressure to emergency tire pressure is 4 minutes.