NOTE: This draft, dated 25 OCT 1990, prepared by the U.S. Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000 has not been approved and is subject to change. Do not use for acquisition purpose.

ATPD

DRAFT

PROPOSED

PURCHASE DESCRIPTION

ARMORED GUN SYSTEM (AGS)

This purchase description is for use by U.S. Army Tank-Automotive Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This purchase description covers the requirements for the armored gun system (AGS).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, Standards, and Handbooks. The following specifications, standards and handbooks form a part of this purchase description to the extent specified herein. Unless otherwise specified, the issue of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

AMSC N/A FSC

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

DRAFT

SPECIFICATIONS

FEDERAL

ZZ-H-428 - Hose, Nonmetallic and Hose, Preformed (for the Coolant Systems of Automotive and other Liquid Cooled Engines)

O-A-548 - Antifreeze/Coolant, Engine, Ethylene Glycol, Inhibited, Concentrated

VV-F-800 - Fuel Oil, Diesel

Military

MIL-P-116 - Preservation, Methods of

MIL-B-117 - Bags, Sleeves and Tubing

MIL-B-121 - Barrier Material, Grease proofed, Waterproofed, Flexible

MIL-T-704 - Treatment of Painting of Material

MIL-L-2104 - Lubricating Oil, Internal Combustion Engine, Tactical Service

MIL-L-2105 - Lubricating Oil, Gear, Multipurpose (Metric)

MIL-G-10924 - Grease, Automotive and Artillery

MIL-B-11352 - Block, Vision, Bullet-Resistant

MIL-C-13486 - Cable, Special Purpose, Electrical: Low-Tension Heavy Duty Single-Conductor and Multi-Conductor

MIL-T-62314 - Test Equipment (Simplified) for Internal Combustion Engines-Reprogrammable (STE/ICE-R) Test Set

MIL-H-62217 - Hose and Hose Assemblies, Non-Metallic, Silicon, Polyester and Wire Reinforced (for Coolant and Heating System of Diesel and Gasoline Powered Engines)

MIL-A-62048 - Air Cleaners, Automotive: Heavy Duty, Dry-Type (for Internal Combustion Engines)

MIL-E-46736 - Filter Element, Intake Air Cleaner; Dry-Type

MIL-F-16884 - Fuel, Naval Distillate

MIL-H-46170 - Hydraulic Fluid, Rust Inhibited, Fire Resistant, Synthetic Hydrocarbon Base

MIL-P-53022 - Primer, Epoxy Coating, Corrosion Inhibiting, Lead and Chromate Free

MIL-P-53030 - Primer Coating, Epoxy, Water Reducible, Lead and Chromate Free

MIL-T-83133 - Turbine Fuel, Aviation, Kerosene type, Grade JP-8

MIL-N-87963 - Nozzle; Fuel, Aircraft, Overwing; Type MD-3

MIL-L-46167 - Lubricating Oil, Internal Combustion Engine, Artic

MIL-C-62122 - Cable Assembly, Intervehicle Power, Plug and Receptacle

MIL-C-46168 - Coating, Aliphatic Polyurethane Chemical Agent Resistant

MIL-C-22750 - Coating, Epoxy, Voc-Compliant

MIL-P-23377 - Primer Coatings: Epoxy, Chemical and Solvent Resistant

MIL-E-52031 - Extinguisher, Fire, Vaporizing-Liquid; CF3BR; 2-3/4-Pound, with Bracket

STANDARDS

MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference

MIL-STD-462 - Electromagnetic Interference Characteristics, Measurement of

MIL-STD-810 - Environmental Test Methods and Engineering Guidelines

MIL-STD-209 - Slinging and Tie Down Provisions for Lifting and Tying Down Military Equipment

MS 35000-3 - Battery, Storage, Lead-Acid, Waterproof (Type GTN) (NATO STANAG 4105)

MS 35342 - Filter, Fluid Pressure, Oil Heavy Duty, By-Pass Type, Senior Size (Base Mounted) (NATO STANAG 4016)

MS 51113 - Switch, Vehicular, Lights: 24 Volt DC (Waterproof)

MS 51318 - Headlight: Blackout, 24 Volt (Waterproof)

MS 52125 - Composite Light-Tail, Stop, Turn and Marker

MS 52126 - Composite Light-Front, Stop, Turn and Marker

MS 52129 - Connector, Plug, Electrical, Intervehicular Power Cable (24 Volt)

MS 75020 - Connector Plug, Electrical-12 Contact, Intervehicular, 28 Volt, Waterproof

MS 75021 - Connector, Receptacle, Electrical-12 Contact, Intervehicular, 28 Volt, Waterproof

MILITARY HANDBOOKS

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

MIL-HDBK-151 - Clothing, Equipage, and Footwear Components, Parts and Materials

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

2.1.2 Other Government Document, Drawings, and Publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

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DRAWINGS

U.S. Army Tank-Automotive Command

772811 - Harness Assembly Intervehicular

7961712 - Bag Assembly, Pamphlet

11682336 - Cable and Plug Assembly, Intervehicule Power Cable (NATO STANAG 4074)

11682345 - Vehicle Receptacle Assembly, NATO Intervehicular Power (NATO STANAG 4074)

U.S. AIR FORCE

DH 1-11 - AFSC Design Handbook 1-11, General Air Transportability

DEPARTMENT OF THE ARMY

DA PAM 700-21-1 - Preferred Items List

TECHNICAL MANUALS

TM 25-77

TM 8-79

TM 8-81

TM 3-220

TM 750-5-15

DEPARTMENT OF TRANSPORTATION

Federal Motor Vehicle Safety Standards (FMVSS)

Federal Motor Carrier Safety Regulation (FMCSR)

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington D.C. 20402)

ARMY REGULATIONS

AR 70-38 - Research, Development, Test and Evaluation of Materiel for Extreme Climate Conditions

AR 70-47 - Engineering for Transportability

(Copies of handbooks, drawings, publications, and other Government documents required by the contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity).

2.2 Non-Government Publications. The following document(s) form a part of this purchase description to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

NATO INTERNATIONAL STAFF-DEFENSE SUPPORT DIVISION

STANAG 2154

STANAG 2175

STANAG 2832

STANAG 4101

STANAG 4195

AD-8047979 - NATO Reference Mobility Model, Volume I

AD-D047980 - NATO Reference Mobility Model, Volume II

(Application for copies of NATO publications should be addressed to NATO, MIL Agency for Standardization (MAS), 35 Chesam Place, London SWI, England)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE J1100 - Motor Vehicle Dimensions

SAE J816 - Engine Test Code, Spark Ignition and Diesel

SAE J552 - External Electromagnetic Radiation Suppressors

SAE J 645

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

2.3 Order of precedence. In the event of a conflict between the test of this purchase description and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this purchase description shall take precedence. Nothing in this purchase description, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article.

3.1.1 Preproduction model. When specified (see 6.2), a preproduction model(s) of the complete vehicle to be furnished under this purchase description shall be produced prior to the manufacture or fabrication of vehicles in quantity. The vehicle(s) when completed shall be submitted to the Government for inspections to determine conformance to the requirements of this purchase description. Vehicle(s) submitted by the contractor shall be fully representative of vehicles proposed to be supplied by the vehicle manufacturer from production facilities and tooling under the supply contract.

3.2 Materials. Materials shall be as specified herein and in referenced specifications, standards, and drawings. However, when a definite material is not specified, a material shall be used which shall enable the vehicle to meet the requirements of this purchase description. Materials shall be free of defects which adversely affect performance or serviceability of the finished product.

3.2.1 Material Deterioration Prevention and Control. The vehicle shall be fabricated from compatible materials, inherently corrosion resistant or treated to provide protection for the useful life of the vehicle against the various forms of corrosion and deterioration that may be encountered in any of the applicable operating and storage environments to which the vehicle may be exposed.

3.2.2 Dissimilar Metals. Dissimilar metals shall not be used in intimate contact with each other unless protected against galvanic corrosion. Dissimilar metals and methods of protection are defined and detailed in MIL-STD-889.

3.2.3 Identification of Materials and Finishes. The contractor shall identify the specific material, material finish or treatment for use with component and subcomponent, and shall make information available upon request to the contracting officer or designated representative.

3.2.4 Qualified Products. With respect to all assemblies and component parts requiring product qualification in accordance with the pertinent specifications or drawings listed herein, the contractor shall be responsible for using only those products which are listed by part or drawing number as Qualified Products List(s) (QPL) items on the QPL in the referenced specification or which have been approved for inclusion on such lists.

3.2.5 Ozone Resistance. All rubber components which are under tension or which may be flexed shall be ozone resistant as specified in ASTM D2000.

3.3 MANPRINT

3.3.1 Human Factors Engineering (HFE). The AGS shall be designed to safely and effectively accommodate the full range of user operational and maintenance personnel (Table I) wearing the full range of protective garments including arctic and NBC. Further emphasis shall be placed on human needs and task performance after personnel and/or equipment losses during extended missions.

Table I. AGS Personnel

Operator	5-95th Percentile Male
Maintainer/Repairer/Supporter	5th Percentile Female Through 95th Percentile Male

3.3.1.1 Soldier-Machine Interface. All design features which impact vehicle operation and maintenance; i.e., crew station seating, personnel ingress/egress and operational controls, shall meet the requirements of MIL-STD-1472 and the guidance of MIL-HDBK-759. The

levels of complexity associated with operations and maintenance shall be minimized through complete system integration. It is desired that control and display redundancy in the turret and internal access between the crew stations be provided. The vehicle design efforts shall include but not necessarily be limited to the following areas:

3.3.1.1.1 Intentionally Not Used.

3.3.1.1.2 Crew Seats. The crew's seats shall be adjustable to facilitate the performance of all required crew tasks, including adjustment for open and closed hatch operations (as required). In order to reduce fatigue and maximize performance during extended closed hatch operations, the seats shall provide appropriate body support, especially for the buttock, back, arms and head. It is desired that two distinct closed hatch seating positions be provided (where the leg and back angles are significantly different in each position) in order to facilitate in vehicle-off duty rest during extended closed hatch missions. The material covering the seats shall provide drainage, shall not induce perspiration, and shall be durable, easy to clean and non-flammable. Crew seats shall be compatible with the occupant restraint system.

3.3.1.1.3 Crew Ingress/Egress. The full range of user personnel shall be able to move freely through their designated entrance/exit hatches/doors, with emphasis on rapid emergency egress from each station. All crewmen shall be able to exit the vehicle from their respective crew stations in not over 15 seconds.

3.3.1.1.4 Crew Movement. The full range of user personnel shall be able to move between crew stations during closed hatch operations to perform such functions as putting on NBC overgarments, elimination of body waste, administering first aid, and accessing stowed equipment, ammunition and supplies. This may be accomplished by rotating the turret (as applicable, to align passageways).

3.3.1.1.5 Intentionally Not Used.

3.3.1.1.6 Controls and Displays. All controls and displays shall be arranged for criticality of function, frequency of use, and sequence of operation. Crew stations which require both open and closed hatch operation shall have controls and displays which are accessible to the operator in either mode. All controls and displays shall be accessible to the operator in either mode. All controls and displays shall be

standardized to permit no more than one type and style of push button, toggle switch, rotary knob and selector switches. All lettering on panels and boxes shall be of similar graphic style. Color coding of indicator lights and instruments shall be limited to red, green, yellow, and white. All indicator lights shall meet secure lighting requirements specified herein.

3.3.1.1.7 Optical Viewing Devices. Optical sights, periscopes and vision blocks located in crew stations shall be located so as to minimize user head movement when shifting from one device to another. Viewing devices shall be located to provide sufficient head clearance during viewing by a helmeted operator during all vehicle operations (ref MIL-STD-1472).

3.3.1.1.8 Human Strength. Personnel tasks for operation of the vehicle shall not exceed the strength of the 5th percentile male. Maintenance tasks shall not exceed the strength of the 5th percentile female.

3.3.1.1.9 Human Performance. Limitations and requirements for vision, with and without NBC face masks, lighting, heating, ventilation, vibration, shock, noise, toxic fumes and safety shall be considered in all design aspects involving operator and maintenance personnel.

3.3.1.1.10 Subsistence and Potable Water Stowage. Internal stowage space shall be provided for rations and water accessible to each crew member at his station. Sufficient rations for a 48 hour mission with internal stowage of one case of meals ready to eat (MRE's) and 5 gallons of water shall be provided.

3.3.2 Safety/Health Hazards. The AGS shall comply with applicable safety and health design requirements throughout its life cycle.

3.3.2.1 Safety Considerations. The AGS shall include the following safety considerations.

3.3.2.1.1 Equipment Location. Locating equipment components so that access to them by personnel during operation, maintenance, or adjustment shall not expose personnel to hazards such as chemical or thermal burns, electrical shock, cutting edges, sharp points, or concentrations of toxic fumes above established threshold limit values of the American Conference of Governmental Industrial Hygienists.

3.3.2.1.2 Moving Parts. A means shall be provided to lock-out all moving parts, mechanical power transmission devices, pneumatic equipment and hydraulic equipment prior to personnel (maintenance or crew) coming in contact with such equipment. During normal operation all moving parts which are of such a nature or so located as to be a hazard to the crew (or maintenance personnel) shall be enclosed or guarded.

3.3.2.1.3 Protective Devices. Protective devices shall not impair operational functions. When personnel are moving from the turret basket (if equipped) to the chassis, a positive means of locking the turret shall be provided. A deadman switch (i.e. palm switch) on the gunner's and commander's hand controls shall allow firing of the weapons and motion of the turret system. Firing of the main and coaxial guns shall require activation of the deadman switch as well as the trigger. Manual backup systems shall be independent of the deadman switch.

3.3.2.1.4 Warning and Caution Notes. Suitable warning and caution notes in accordance with AR 385-30 shall be included in instruction for operation, maintenance, assembly or repair; and distinct markings shall be placed on hazardous components of equipment.

3.3.2.1.5 Safety Standards and Regulations. To the extent indicated in MIL-STD-1180, Safety Standards for Military Ground Vehicles, and elsewhere in this specification, design of the vehicle and components shall comply with Department of Transportation Federal Motor Vehicle Standards and Federal Motor Carrier Safety Regulations.

3.3.2.1.6 Occupant Protection. All interior surfaces shall be padded or arranged to insure crew members are adequately protected in crash or rough cross-country operations. Passenger restraints are required at all positions and shall be in accordance with MIL-STD-1180, requirements 208, 209, and 210. It is desired that these restraints be automatically retractable.

3.3.2.1.7 Non-Slip Surfaces. All vehicle surfaces used for walking, access or as working platforms during operation or maintenance tasks shall be non-skid material. Non-slip coverings, when used, shall be in accordance with MIL-W-5044 or MIL-D-2303. Additionally, hand/foot holds shall be provided to facilitate crew operations, checks and maintenance and ingress/egress.

3.3.2.2 Toxic Gas Exposure.

3.3.2.2.1 Carbon Monoxide. Crew and maintenance personnel shall not be exposed to concentrations of Carbon Monoxide (CO) in excess of values which shall result in carboxyhemoglobin (COHb) levels in their blood greater than 10% in accordance with MIL-STD-1472. The equation used to estimate the percent COHb blood levels shall be in accordance with MIL-STD-1472 using work stress level 4 for weapons firing and work stress level 3 for all other mission activities.

3.3.2.2.2 Other Toxic Gases. Nitrogen dioxide, ammonia and sulfur dioxide shall be limited to concentrations not to exceed those specified in the publication of the Threshold Limit Values by the American Conference of Governmental Industrial Hygienists.

3.3.2.2.3 Ventilation. When and if the main gun bore evacuator becomes ineffective, an adequate ventilation system shall be provided to expel toxic gases from the crew compartment of the vehicle.

3.3.2.3 Flammability of Interior Materials. The maximum burn rate of material within the crew compartments shall be less than 102mm (4 inches) per minute when tested in accordance with FMVSS No. 302.

3.3.2.4 Noise. The vehicle shall comply with the test procedures, equipment and noise limits outlined in MIL-STD-1474. Consideration shall be given to reducing track and suspension noise using the techniques described in USA HEL Technical Memoranda TM 25-77, TM 8-79 and TM 8-81.

3.3.2.4.1 Interior Steady State Noise. The vehicle shall comply with the test procedures, equipment and noise limits as outlined in MIL-STD-1474. For personnel occupied areas wherever electrically aided communication commands via attenuating headsets are required, the noise limits shall not exceed 100 db(A) (85db(A) desired) as stated in Category B of MIL-STD-1474.

3.3.2.4.2 Interior Impulse Noise (Guns Firing). The interior impulse noise levels shall not exceed the requirements of MIL-STD-1474 curve "Y" criteria with the hatches closed.

3.3.2.4.3 Exterior Noise (Static and Mobile). When operating in a static mode at rated engine rpm, the exterior noise levels shall not exceed the desired aural non-detectability requirements MIL-STD-1474.

In addition, when moving at 2/3 of posted vehicle speed on a straight smooth level hard surfaced road, in the highest gear, exterior noise levels shall not exceed the desired aural non-detectable requirement shown in Table 3 of MIL-STD-1474. Instrumentation specifications, measured procedures and test requirements documented in MIL-STD-1474 shall be strictly followed.

3.4 Design and Construction.

3.4.1 Dimensions. Vehicle dimensions (ref SAE J1100) are limited to transportability requirements of MIL-STD-1791.

3.4.1.1 Vehicle Silhouette. The vehicle shall be designed to minimize silhouette above the 1 meter line. Visual signature shall also be minimized by reduction of vehicle to background contrast/color /spatial frequency differences, edge effects, and cue features

3.4.2 Vehicle Weight. The combat loaded weight is derived from the air transportability requirements. Weight limits are to be established from the need to transport the AGS on C130, C141B, C17 and C5 aircraft and the requirement for Low Velocity Air Drop (LVAD) from the C130 and C141B (see 6.3).

3.4.3 Transportability. The AGS shall be transportable worldwide by highway, marine, and air modes without restriction, transportability criteria is established by AR 70-37, MIL-STD-1366, and MIL-STD-1791.

3.4.3.1 Highway. The AGS on a prime mover (i.e. lowbed trailer) shall be capable of unrestricted highway movement worldwide. Routine overwidth permits in CONUS shall not be considered to be a restriction. The AGS shall be highway transportable in NATO countries in accordance with STANAG 2154.

3.4.3.2 Rail. The AGS shall be transportable worldwide by rail without restriction. The vehicle, mounted on an open-top car, shall be within the limitations of: the Association of American Railroads (AAR) outline diagram for single loads, without end overhang; the Passe-Partout International Gauge (PPI); and shall be in compliance with NATO STANAGS 2175 and 2832. The AGS shall be operable and suffer no permanent deformation after exposure to transportation environment levels of MIL-STD-810 and MIL-STD-814.

3.4.3.3 Marine. The AGS shall be compatible with marine salt water environment (Ref MIL-STD-810). The vehicle shall be transportable by break bulk cargo ships, partial and full container ships, roll-on/roll- off (RO/RO) ships, lighter aboard ship (LASH), barge carrying ships (SEABEE), amphibious vessels, and Army barges and lighters.

3.4.3.4 Air Transportability. The primary methods for air delivery are low velocity air drop (LVAD) and roll-on-/roll-off (RO/RO). The AGS shall be transportable in accordance with MIL-STD-1791 and USAF DH1-11 by all MAC prime mission cargo aircraft, C-130, C-141B, C-17, and C-5.

3.4.3.4.1 Roll-On/Roll-Off (RO/RO). The AGS shall be transportable at the combat loaded weight in the C-130 (1 required) and the C-141B (1 required, 2 desired), C-17 (2 required, 3 desired) and C-5 ( ) in the RO/RO configuration. Shoring is permitted to protect aircraft floor.

3.4.3.4.2 Low Velocity Air Drop (LVAD). The AGS must be capable of LVAD from a C-130, C-141B and C-17 aircraft. The vehicle weight shall not exceed 35,500 lbs. and meet the dimensional limitations of MIL-STD-1791 (see 6.3).

3.4.3.5 Towing and Tie Down Characteristics.

3.4.3.5.1 Towing Devices. Not less than two tow rings conforming to MS51339 shall be mounted to both the front and rear of the vehicle structure. The vehicle shall be capable of being towed from either front or rear at least 16 km (10 miles) at a maximum speed of 32 kph (20 mph) without damage to the vehicle or power train, by standard US military vehicles utilizing the standard Army towbars (MS500048). The AGS shall incorporate the NATO standard recovery/towing system (rear mounted military standard towing pintle conforming to MS51118 and NATO STANAG 4101 to permit interface with recovery vehicles.

3.4.3.5.2 Lifting and Tie Down Provisions. The AGS vehicle shall have lifting and tie down provisions that conform to MIL-STD-209, MIL-STD-814 and MIL-STD-1791. Stencil or decal markings shall be applied to the AGS at each lifting and tie down point. The tie down procedures shall permit tie down to the floor (or deck) of the transport medium in such a manner to restrain the AGS from shifting or moving in any direction.

3.4.3.5.2.1 External Lift. Lifting devices for external lift utilizing standard cargo slings without spreader bars per MIL-STD-209 are required.

3.4.3.5.2.2 LVAD Extraction Provisions. The AGS shall have provisions for LVAD in accordance with MIL-STD-814.

3.4.4 Propulsion System.

3.4.4.1 Engine Candidate(s) Certification. Engines to be used for propulsion of U.S. Army ground military vehicles shall be certified as having successfully passed the 400 hour NATO Standard Engine Test, STANAG 4195 (1% sulfur fuel). The TACOM Propulsion Systems Division is the proponent for all engine certification activities, including maintaining records of certified engines, testing, post test inspections and issuance of Certification documents as appropriate. This test qualification is prerequisite to any additional engine/system test requirements that may be specified by the vehicle user/developer or necessitated by mission profile or application requirements.

3.4.4.1.1 Engine. The engine shall operate in the field in accordance with fuels and lubricants as specified in 3.4.4.10. The engine shall operate under all vehicle operating conditions without malfunction of engine cooling system, lubricants or fuel.

3.4.4.1.2 Governor. The engine shall be equipped with a min./max. governor which assures steady reliable idle speed and speed-limiting at or below the manufacturer's recommended maximum no-load speed. Driver command shall control the engine output at all intermediate speeds. If the engine is used to supply stationary ancillary power, in lieu of an APU, the speed required shall be assured by a setable speed control device which when engaged does not require the driver's presence.

3.4.4.2 STE/ICE-R. In accordance with the Commanding General's Memorandum No. 11-85 "Diagnostic Connector Assembly (DCA) Implementation into TACOM Controlled Vehicles for Interface with Tank-Automotive Test Systems" the Simplified Test Equipment/Internal Combustion Engine - Reprogramable (STE-ICE-R) DCA conforming to DWG 1225941 shall be incorporated in accordance with MIL-T-62314 A(AT). The minimum capabilities for the DCA are specified in the above memorandum.

3.4.4.3 Cooling System Capacity.

3.4.4.3.1 Cooling Over the Operational Envelope. The powerpack shall be capable of providing continuous cooling with a 30% margin. The required cooling shall be provided in all ambient conditions between -51 degrees C (-60 degrees F) and +49 degrees C (120 degrees F) at barometric pressure of 750 mm Hg:

a. Under all operating conditions within the tractive effort (TE) to weight vs speed envelope (figure 1) as defined by:

1. Maximum TE available at each speed from maximum speed at TE/projected vehicle combat weight ratio of 0.7. up to the maximum speed defined in 3.5.7.

2. Zero TE at each speed from zero speed to the maximum speed defined in 3.5.7.

3. Transmission engaged at idle.

4. From zero speed with transmission engaged linearly increasing to the maximum speed capability at TE/projected vehicle combat weight = 0.7

b. For all braking conditions specified under 3.5.

c. Included in the cooling system capacity are the ancillary vehicle power (hydraulic electrical, pneumatic, etc.) losses for the AGS application, as a minimum, while satisfying a. and b..

d. The 30% margin herein specifically refers to the size of all heat exchangers individually which exchange heat with the atmosphere and to the fan airflows. Individually, they shall be large enough to transfer 1.3 times the expected heat load at the most difficult heat rejection condition.

e. Idle cooling in cold ambient temperature: The cooling system shall be capable of permitting sustained (12 hours) operation at normal idle with minimum vehicle accessory loads under all climatic conditions described in 3.5.13. During such sustained operation, the engine operating temperature shall not fall to a point where there is inadequate lubrication and corrosion due to acid and water retention within the lubricant.

3.4.4.4 Deaeration Provisions. If liquid cooled, the engine, radiator top tank, and radiator core deaeration provisions shall comply with engine manufacturer's recommendations and provide 1/10 CFM per cylinder engine deaeration capability without reducing coolant flow rate below 50% rated flow.

3.4.4.5 Engine Coolant. If liquid cooled, the engine shall be serviced with a solution of ethylene glycol, Federal Specification O-A-548 and water in equal parts, by volume.

3.4.4.6 Engine Air Induction System. The engine combustion air induction system shall prevent entrance of foreign matter during all environmental conditions (see 3.5.13) including fording. The air induction system shall not require disassembly of vehicle for normal servicing. The air induction system shall include a graduated air cleaner restriction indicator, visible to the driver, which is capable of retaining its peak reading for 1/2 hour after engine shutdown. The air cleaner shall preclude water intake when the vehicle is washed/decontaminated.

3.4.4.7 Air Cleaners. The vehicle shall incorporate a heavy duty air cleaner(s) and an inertial type precleaner(s) Simple manual cleaning of air cleaners is required.

3.4.4.8 Oil Filter. A full flow oil filter system, as specified by the engine manufacturer, shall be furnished for maximum engine protection (ref MS 35342). The oil filter must be readily accessible and easily changeable.

3.4.4.9 Fuel System. The fuel system shall conform to MIL-STD-1180, requirement 301. The fuel line shall be equipped with an easily accessible, in-line water separator. The vehicle shall be capable of refueling (single port desired) at a rate of at least 189 lpm (50 gpm). Refueling rates shall be maximized. The fuel system design shall be such that fuel spilled during refueling shall not contact any part of the exhaust or electrical systems. Fuel leaks from the fuel system will not contact any part of the exhaust system. No part of the fuel system shall be located above the crew compartment. Fuel lines are to be routed and/or protected to preclude foreign object contact during operation. Fuel lines shall accommodate normal movement of parts, by being long enough and flexible enough, without incurring

damage or leaks. If pressure devices are used to force fuel from the fuel tank, a device which prevents the flow of fuel from the fuel tank, must be installed in the fuel system in case a fuel feed line is broken.

3.4.4.9.1 Fuel Cell(s). The AGS shall be equipped with corrosion resistant fuel cell(s) of sufficient volume to permit vehicle operation for the range specified in 3.5.9.1. When more than one cell is furnished, means shall be provided to assure equalized fuel level and draw in both cells. A shut-off valve between the cells shall be furnished. Fuel cell(s) shall be provided with drain plug(s). Fuel ports and filler caps shall be located to preclude mud build-up and captive chained to filler neck. Removable restrainers are required. A sealed filler cap and vent is required for fording requirements. The vehicle shall be able to operate under all conditions specified therein with 10% of the useable fuel remaining. Where practicable, the fuel cell(s) shall be equipped with purge system to drain excess water. The fuel cell shall be designed and constructed so that it cannot be filled, in a normal filling operation, with a quantity of fuel that exceeds 95% of the cell's liquid capacity. In the event of fuel leakage or spillage, the vehicle design shall prevent entry of the fuel into the crew compartment.

3.4.4.9.2 Intentionally Not Used.

3.4.4.9.3 Intentionally Not Used.

3.4.4.9.4 Fuel Cell Port. The AGS shall be capable of receiving the MD-3 dispensing nozzle (MIL-N-87963), and shall be a minimum of 5.1 cm (2 inches) in diameter. The internal fuel cells of the AGS must be capable of fast refueling when using this system.

3.4.4.10 Fuel and Lubrication. The AGS shall operate with applicable diesel fuel complying with Federal Specification VV-F-800, MIL-T-83133, and diesel fuel complying with MIL-F-16884; and lubricants and hydraulic fluids complying with MIL-H-46170, without adverse effect on engine and vehicle components. The lubrication intervals shall be in accordance with the component manufacturer's requirements. All initial and manufacturer's recommended fills of lubricants shall conform to MIL-L-2104, MIL-L-2105, MIL-G-10924, and MIL-L-46167. The engine oil shall meet analysis requirements of MIL-STD-1570. Any hydraulic fluid within the turret weapon and control system shall be in accordance with MIL-H-46170 and shall meet cleanliness level 200 of MIL-STD-1246. The lubrication requirements of this paragraph shall apply to all vehicle components, that the component manufacturer recommends or requires for lubrication.

3.4.4.11 Exhaust System. The exhaust system output shall minimize its thermal signature, and at the same time preclude exhaust gas intrusion into the crew compartment. Ducting shall be gas tight, segregated from flammable fluids, and shielded to minimize burn hazards to the crew. Exhaust system components shall be constructed of corrosion resistant material and provide sound attenuation in accordance with MIL-STD-1474.

3.4.5 Power Train.

3.4.5.1 Transmission. The transmission shall be automatic with a gear range capable of meeting the performance requirements as stated herein. The maximum tractive effort in forward and reverse at the sprocket at stall shall not be less than 1.2 times the maximum projected combat loaded weight. The transmission control system shall be such that the driver can feel what range has been selected, and shall provide appropriate detent action to preclude inadvertent shifting. If the transmission is the hydrokinetic type, it shall have a lock-up clutch for the torque converter. The transmission in accordance with SAE J645 shall include the following:

a. An inhibitor system which prevents driver control action from overspeeding the engine of causing damaging shift shock. This system shall allow reverse/forward and forward/reverse direction changes essentially without time delay.

b. The transmission oil filter (if provided) shall be readily accessible.

c. The transmission control for a tracked vehicle shall have a mode which completely precludes any sprocket power output, including steering (neutral). This mode shall be effective at all engine speeds, and shall require positive action by the driver to cancel. A pivot neutral position with steer capability shall also be provided which is located between forward drive and reverse drive positions. If the transmission includes a park mode, its position shall be located at the end, adjacent to the reverse position. Engine starting capability shall be available only in modes in which the engine is disengaged from the wheels or tracks.

d. Steer unit shall be a regenerative speed control system (desired).

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3.4.5.2 Transfer Case. (Mandatory for wheeled vehicles) A transfer case(s) shall be provided to drive all axles or only the single axle(s), as selected by the driver to provide required vehicle performance. If a continuous all-wheel driver transfer case is provided, it shall have provisions to lock-out differential action between front and rear axle(s). A multi-speed transfer case, if provided, shall allow for a maximum speed of at least 40 kph (25 mph) in low range. It is desired that the vehicle be capable of shifting to all-wheel drive while on the move. All axles shall be in power mode when multi-speed transfer case is in low range.

3.4.5.3 Differential (Wheeled Vehicles). All driveline differentials shall have lock-out devices which are engagable while the vehicle is in motion.

3.4.5.4 Drive Train Gearing (Wheeled Vehicles). The Drivetrain, including the propulsion function of the axles shall by design have sufficient static and fatigue strength as to sustain the full range of shock and maximum steady state tractive effort as may conceivably be encountered in a combat environment.

3.4.5.5 Final Drives. In the event of component failure, disconnection of final drives shall be possible within 15 minutes.

3.4.6 Suspension. The vehicle shall have a system with components having a rated capacity at least equal to or greater than the maximum load that can be imposed on each member at the ground. The suspension shall have sufficient wheel travel for the vehicle to negotiate a thirty (30) inch, thirty-six (36) inch desired, vertical obstacle. The vehicle suspension shall be able to endure a 30 g shock load associated with LVAD.

3.4.6.1 Tracked Vehicles. The vehicle shall have a "limp back" capability by "short tracking" when a section of the track is damaged. A manual means of track adjustment shall be provided as a minimum. The track shall have the capability to withstand the equivalent of a one (1) lb TNT mine blast. For a tracked vehicle fourteen (14) inch jounce and five (5) inch rebound is needed for vertical wheel travel. If a hydropneumatic suspension design is used, each wheel shall have a bump stop.

3.4.6.2 Wheeled Vehicles. If vehicle shall have a survivable tire with a run-flat capability that would allow the vehicle to complete thirty (30) miles in its mission profile terrain. The vehicle shall have the capability to tie up an axle or raise a wheel in degraded mode due to the equivalent of a one (1) lb TNT mine blast. The brakes shall be protected from sand and damage from mine blast. Leakage from one brake cylinder shall not degrade operation of other cylinders.

3.4.7 Electrical System Characteristics. The vehicle shall be equipped with a 24-volt (nominal) waterproof electrical system, complete with necessary items of equipment and wiring complying with MIL-STD-1275. The electrical wiring harness shall be so located and protected to assure that it shall not come in contact with fuel lines, be crushed or chafed by moving components or personnel, burned by the exhaust components, or otherwise damaged during operation. The wiring harness assembly shall conform to DWG 8722729. The AGS shall have standardized electrical wiring and use a color and number coding scheme to facilitate wiring identification, ease of maintenance and troubleshooting. It is desired that the starter motor be prevented from engaging the vehicle engine, when the vehicle engine is operational. It is desired that the AGS be protected against intervehicle reverse polarity. The vehicle shall be provided with a circuit breaker electrical system (desired).

3.4.7.1 Batteries and Carriers. The vehicle shall be equipped with batteries with a minimum capacity to start vehicle at -25 degrees F. conforming to MS51249-3 and MS51249-4 with the negative terminal grounded. Battery carrier location shall permit ready servicing of battery and be vented to prevent fumes from entering the crew compartment or other areas where the fumes could present a hazard. Batteries shall provide adequate capacity for current transients caused by the weapons firing all ammunition rounds. Battery capacity shall satisfy the silent watch periods identified in the mission profile. Low maintenance batteries shall be provided. The battery carrier shall have a means of draining excess liquids from the area. The drain path of these liquids shall not have a deterioration effect on other system components. The battery carrier shall not be located beneath fuel lines where fuel could drip on them. The battery carrier shall allow sufficient space to insure the battery cables can be connected and disconnected without short-circuiting the system. Battery carrier shall be insulated to prevent short-circuiting during maintenance or operation.

3.4.7.2 Generating System Voltage (Alternator). The vehicle generating system shall be a radio suppressed 24-volt military system with a military approved alternator, in accordance with MIL-STD-461 and MIL-STD-462.

3.4.7.3 Lighting System. The lighting system shall be in accordance with MIL-STD-1179. The lighting system shall include two quickly detachable main headlamp assemblies, with adjustable high and low beams; park, turn and marker lamps conforming to MS52126; tail, stop, reflectors, turn and marker lamps conforming to MS 52125, blackout driving lights conforming to MS51318; clearance lights; instrument lights; wiring; switches; and controls. Additional external utility outlet for power (1 required, 2 desired). Lights shall be mounted in protected locations with stoplights, tail lights, and blackout marker lights separated to maximum extent possible. Interior blue-green and white dome lights conforming to DWG 1091628, for each crew position, shall be provided. All controls and displays and their nomenclature shall be illuminated with variable intensity blue-green or white light. Blackout switch conforming to MS51113 shall be included; and shall inhibit accidental activation of service and interior lights during blackout operation. Brake lights shall override emergency flashers, if equipped.

3.4.7.3.1 Blackout Lighting. Blackout lighting shall be in accordance with MIL-L-1179 requirements.

3.4.7.4 Slave Receptacle. The vehicle shall have NATO Slave Receptacle (front and rear desired) in accordance with DWG 11682345 and MS52131; and shall be capable of being jump started by use of standard NATO military power transfer slave cable (DWG 11682336, MS52129, and MIL-C-62122).

3.4.7.5 Intervehicle Power Cable Receptacle. The vehicle shall be provided with intervehicle power cable receptacle, in accordance with MS75021; and shall be capable of being used with intervehicle power cable plug (MS75020) and harness assembly (DWG 7728811).

3.4.8 Driver Station. The AGS driving operations shall be controlled from the driver's station, in both the open and closed hatch modes, in all-weather and during day and night operation. The driver's station shall be equipped with vision devices in accordance with MIL-B-11352; and the vision devices shall provide a minimum of 120 degrees horizontal visibility in the frontal arc while operating with

the hatch closed and the driver's head in the normal position. The driver's station shall be equipped with a removable image intensification night driving vision device (comparable to the AN/VVS-2 (V)2A)) fitted in the front center of the driver's field of view. A thermal imaging capability is desired. It is desired that the driver's vision blocks shall be provided with a positive means of clearing, at least 95% of the viewing surface, of such things as water, mud and debris from the exposed surface. The driver's hatch shall have a positive means of preventing its accidental opening or closing to include the failure caused by dirt, mud, and debris accumulation in the locking or latching mechanisms and the failure induced by vibration between the hatch and the latching mechanism. The positive means of preventing accidental closing shall be applied in an automatic manner. The seat shall adjust to allow operation by, and essential controls shall be accessible to, the 5th - 95th percentile (in size) male dressed in tropic through cold-dry arctic clothing (ref MIL-STD-1472). The driver's station shall be equipped with an intercom station compatible with the standard combat vehicle crew (CVC) helmet. The driver controls shall be in accordance with MIL-STD-1180, requirement 101. Operation of the transmission shifter, and emergency brake control levers shall require one hand only (ref MIL-STD-1472). The driver's station shall have at a minimum the following instruments and controls:

a. Ignition switch/master power switch

b. Ammeter and warning light

c. Fuel Gage

d. Oil pressure gage and warning light

e. Engine temperature gage and warning light

f. Speedometer - If a mechanical speedometer is selected, use mechanical speedometer, Military Standard DS52150

g. Recording odometer

h. Headlight high-beam indicator light

i. Outside rearview mirrors (swing away/removable) complying with MIL-STD-1180, requirement 111

j. Instrument light switch with dimmer

k. Interior light switch (an additional switch shall be located in the turret if personnel are located in the turret)

l. Master circuit breaker

m. Parking brake warning light

n. Windshield or vision block clearing device control (desired)

o. Nonmagnetic compass (desired)

p. BITE display (if equipped)

q. Filter status warning (NBC and engine air)

3.4.9 Armament.

3.4.9.1 General. The turret system shall be capable of being operated by either the commander or the gunner. The commander and gunner shall both have access to all controls necessary to search for, detect, acquire, and track targets as well as select and fire the main gun and coaxial machine gun. The commander's control shall have priority (override) over the gunner's controls. The commander shall have the capability to view the gunner's sight picture.

3.4.9.1.1 Operator's Stations. The commander's and gunner's station shall include displays and sequential controls required to operate the turret, weapons, fire control, and autoloader (if equipped). The design of the operator's stations shall allow for ease of ingress and egress and allow for operations while wearing MOPP IV NBC overgarments and arctic clothing. The combined field of view with hatches closed for the commander and gunner shall be 360 degrees in azimuth without turret movement. It is desired that the commander's field of view be 360 degrees. A readout(s) of the main gun ready ammunition quantities by type, status of autoloader function (if equipped) and the most recent laser range finder information shall be provided for continuous viewing by the gunner and commander.

3.4.9.1.2 Weapon System Control. The Fire Control System shall govern all functions of the main gun, secondary armament (coax machine gun), Commander's weapon and autoloader (if equipped). The fire

control shall be capable of rapid (1 second or less) change of weapon selection, weapon system control, and meet the fire control requirements established in 3.4.9.3.

3.4.9.2 Armament Characteristics.

3.4.9.2.1 General. The armament system shall provide a rapid (8 rounds/ minute (required), 12 rounds/minute (desired)) rate of fire. It shall be capable of engaging dismounted troops, bunkers and weapon positions at ground level and from defilade over the frontal 180 degrees arc of the vehicle and elevated targets (windows/roof tops all around (360 degrees)).

3.4.9.2.2 Main Armament. The AGS Primary armament shall be a 105mm gun capable of firing all AEI munitions as well as all NATO standard ammunition (service and training).

3.4.9.2.3 Elevation/Depression. The primary armament shall be capable of -10 degrees depression over at least the 240 degree frontal arc of the vehicle, zero (0) degree depression is required for the remainder. Eighteen (18) degrees, twenty (20) degrees (desired), elevation is required for 360 degrees azimuth. It is required that a manual drive system for turret traverse and gun elevation be included per manual operations requirements of 3.4.9.3.2.4.

3.4.9.2.4 Main Gun Ammunition Storage. The AGS shall be capable of storing not less than 30 main gun rounds with at least half of these rounds readily accessible for loading and the remaining half shall be easily and quickly (within 15 minutes required, 10 minutes desired) transferable to the ammunition ready racks. The full complement of main gun ammunition shall be loadable onto the designated storage provisions of the vehicle in less than 20 minutes utilizing three (3) vehicle crew members. Rounds, if stored vertically, shall be in the base down configuration. The ammo stowage area shall be isolated from the bilge area, sealed from external water leakage and shall minimize/prevent condensation. All ready and stowed main gun rounds shall be compartmented from the crew (desired).

3.4.9.2.5 Secondary Armament. The secondary weapon system shall be one M240, 7.62mm coaxially mounted machine gun with a basic load of 3200 rounds (required), 3500 rounds (desired) of which 1000 shall be ready rounds. The coaxial armament shall be reloaded from within the vehicle, preferably without the crew moving from their stations. The

feed and storage subsystem for the coaxially mounted machine gun shall include a simple visual determination by the gunner or commander of the approximate numbers of rounds remaining. The secondary weapon system shall be controlled and fired by the gunner/commander utilizing the main armament fire control system. The vehicle shall have a spent case and link receptacle or provisions for expelling casings and links.

3.4.9.2.6 Commander's Weapon. A universal flexible mount for at least an M2, .50 caliber machine gun, 7.62 MK19, or 30mm ASP is required at the commander's station. The commander's weapon should be positioned so as not to interfere with his vision from that station. The machine gun should have a maximized field of fire and be capable of engaging targets as close as 20 meters. The commander's weapon shall be capable of being fired at 60 degree elevation by the commander positioned no higher than name tag defilade.

3.4.9.2.7 Loading.

3.4.9.2.7.1 Manual. The AGS shall be so configured as to allow the loader (crew member) to be able to select and load a ready round of ammunition in sufficient time to support the system firing rate of 8 rounds/minute required (12 rounds/minute desired).

3.4.9.2.7.2 Autoloader (optional). The AGS shall incorporate an autoloader that supports a continuous firing rate of 8 rounds/minute (12 rounds/minute desired) and shall be able to select, load, stow and reselect ready rounds of ammunition. The autoloader shall eject misfires and spent casings from the vehicle without requiring a crew member to move from his station. The autoloader shall be capable of unloading an unfired round from the gun chamber and restow it in the ready round magazine. The design of the system shall allow for manual/mechanical loading within armor protection. In degraded mode the manual/mechanical loading rate is 3 rounds/minute. The gun drive mechanism shall be immobilized during automatic and manual/mechanical loading to prevent loader injury or system damage. The autoloader shall provide a read-out of main gun ammunition quantities, by type, and status of autoloader function, at the gunner and commander positions. It is required that stowed main gun rounds be easily accessible for resupply of ready ammunition from within the vehicle, preferably from the gunner and/or commander's seated position. The autoloader shall have an emergency off, "panic," button allowing any of the vehicle crew members, from their position, to disable the autoloader during its operation to prevent injury or equipment damage.

3.4.9.2.8 Smoke Grenades. The turret system shall include provisions to launch twelve (12) L8 smoke grenades contained in two (2) launchers. The controls for launching the smoke grenades shall be located at the commander's station. The commander shall be able to fire the left launcher, right launcher or both launchers. The grenades shall be aimed to cover the turret frontal 90 degrees. The screen shall have no gaps. The turret system shall be compatible with multi-salvo grenade launcher.

3.4.9.3 Fire Control System.

3.4.9.3.1 Modes of Operation. The primary fire control system shall operate in a minimum of two modes; normal and degraded. The normal mode indicates that a fully operational fire control system exists; which includes as a minimum: the stabilization system, the primary sight (including laser rangefinder), and the ballistic computer system (if equipped). The degraded mode shall be used when one or more conditions exist that force the gunner to use degraded mode gunnery techniques. The fire control system shall be considered in the Degraded Mode when a component of the fire control system is not operational due to damage or failure. These conditions may be due to a fire control component failure and are not limited to: loss of either the primary daylight channel or forward looking infrared (FLIR) channel loss of ballistic computer sensors, loss of powered controls to the gun/turret drives, autoloader failure, or any combination of the above. Loss of ballistic computer sensors shall result in a fail-safe mode where a default value is automatically inputted to the Computer.

3.4.9.3.2 Turret Drives.

3.4.9.3.2.1 Azimuth. The armament system angular coverage in azimuth shall be 360 degrees continuous in either direction when up or down on 60% slope and shall be controllable by the gunner or commander. The commander shall have priority (override) over the gunner's powered controls. An interrupter(s) for deck and hatch clearance shall be provided.

3.4.9.3.2.2 Elevation. The gun elevation limit shall be a minimum of 18 degrees (required), 20 degrees (desired), and the depression limit shall be a minimum of -10 degrees for the frontal 240 degree arc. The commander shall have priority override over the gunner's powered controls.

3.4.9.3.2.3 Powered Operation. When the turret is under powered control the turret shall have a maximum turret slew rate of at least 750 mils per second in azimuth and 100 mil per second in elevation and depression. The turret controls shall be smoothly controllable and allow for fine adjustment for tracking from .25 to 40 mils per second in azimuth and from .10 to 20 mils in elevation with a tracking accuracy in accordance with the overall system accuracy requirements of 3.4.9.3.7.

3.4.9.3.2.4 Manual Operations. When the turret is under Manual Control the slew in elevation shall be at least 10 mils per handcrank revolution at a peak effort of less than 18 pounds. Manual slew in azimuth shall be at least 10 mils per handcrank revolution at a peak effort of less than 14 pounds on level ground and at least 5 mils per handcrank revolution at a peak effort of less than 18 pounds on sloped terrain.

3.4.9.3.2.5 Stabilization. It is required that the 105mm main gun weapon system be stabilized in two axes (azimuth and elevation) for operations over varying terrains. When firing the main gun during a stationary engagement the weapon and sight shall be capable of staying on target so that the deviation from aimpoint due to firing (and subsequent vehicle reaction due to firing) does not exceed a standard deviation of 1.0 mils to allow for increased next round accuracy. Drift shall be nulled or nullable so that it does not exceed 0.1 mils per second.

3.4.9.3.2.6 Azimuth and Elevation Readout. The turret azimuth shall be displayed in mils for viewing by the gunner (required) and commander (desired) and be capable of rapid zero reference adjustment. The gun elevation/depression angle, with respect to the cannon horizontal, shall be displayed in degrees for viewing by the gunner (required) and commander (desired). If the readouts are electronic, then manual backup readouts are required.

3.4.9.3.3 Target Acquisition/Engagement Sights. The Sighting System shall consist of a Gunner's Sight (primary sight), a gunner's primary sight extension or display for the commander, and a Gunner's Auxiliary Sight.

3.4.9.3.3.1 Sight Operations. The primary acquisition/engagement system shall have a sighting capability consisting of a Daylight and Forward Looking Infrared (FLIR) channels. The target

acquisition/engagement sights shall have the capability of detecting a 2.3 meter by 2.3 meter target at 4Km and recognizing at 2Km through all weather and battlefield obscurants. The sight shall be stabilized, as a minimum in elevation. The sight and main gun shall be linked either mechanically or electrically to allow for synchronized movement during target acquisition. The daylight channel and FLIR channel shall have a minimum of wide and narrow fields of view (low and high power magnification settings). The lower power setting shall provide a field of view of not less than 7 degrees in elevation and 15 degrees in azimuth and magnification level that provides the gunner with the capability to conduct surveillance and target acquisition. The higher power magnification setting shall provide the gunner with the capability to perform a detailed laying of the main gun for target engagement and destruction. The commander shall have the capability of viewing the gunner's sight picture. Unity power viewing from the gunner's station is required. The gunner shall have rapid control of the sight focus, diopter adjustment, magnification, and other adjustment controls. A brow pad shall be provided for head support and proper eye relief during use. All sights shall not emit light that can be visible to a dark-adapted observer at a distance of 50 meters. During main gun loading, the sight shall be controllable by the hand controls and shall function autonomously in elevation/depression, if necessary, to accommodate autoloading.

3.4.9.3.3.2 Primary Sight. The vehicle shall have a primary sight that incorporates both a FLIR and daylight channel. The primary sight shall meet the detection, recognition and sight specific requirements mentioned in 3.4.9.3.3.1 above. The primary sight shall accommodate a laser rangefinder to meet the system accuracy requirements established in 3.4.9.3.7.

3.4.9.3.3.2.1 Day Channel. The daylight sight shall meet the detection, recognition and sight specific requirements mentioned in 3.4.9.3.3.1 above.

3.4.9.3.3.2.2 FLIR Channel The FLIR or thermal sight shall meet the detection, recognition and sight specific requirements mentioned in 3.4.9.3.3.1 above.

3.4.9.3.3.3 Auxiliary Sight. The vehicle shall have a separately dedicated, manual back-up sight for use by the gunner when the primary Fire Control System is not operational. The back-up sight shall include a direct optical path with appropriate ballistic reticles to meet the

ammunition requirements established herein and shall meet the detection, recognition and daylight sight specific requirements mentioned in 3.4.9.3.3.1 above. The manual back-up sights shall operate without vehicle power.

3.4.9.3.3.4 Reticles. The sights, infrared and day, shall have reticles in both narrow and wide fields of view (NFOV and WFOV) to permit accurate acquisition and tracking of targets. The WFOV reticle shall be used for firing machine guns while the NFOV shall be used for firing the machine guns and accurately firing the main gun. Intensity of projected reticles shall be operator controlled. The reticle shall be on the target and the weapon system shall be pointed by the fire control (ballistic solution, lead and super elevation requirements). The day and thermal channels shall be provided with a reticle brightness control which shall allow the operator to adjust the brightness to accommodate scene brightness from full sun to total darkness or to accommodate viewer preference.

3.4.9.3.4 Fire Control Computer. The fire control computer shall be capable of providing the unique ballistic solution in azimuth and elevation to enable the system to achieve the required accuracies specified herein for the following main gun ammunition types: M833 and M900 Armor Piercing Fin Stabilized Discarding Sabot (APFSDS), M974 (TPDS), M456A2 High Explosive Anti-Tank (HEAT), M490A1 Target Practice (TP), M393A2 High Explosive Plastic (HEP),M494 Anti-Personnel (APERS) and M416 White Phosphorous (WP). The ballistic solution shall be used to automatically superelevate the 105mm main gun and introduce the appropriate lead angle, based on input values from sensors necessary to meet the established systems accuracy requirements in 3.4.9.3.7. The gunner shall have the capability of selecting the type main gun ammunition most appropriate for each chosen target. The fire control computer shall provide for the appropriate ballistic solution when the coaxial machine gun is used. The fire control computer shall be capable of accepting manual inputs, as a minimum, range inputs in the event laser range finder (LRF) failures exist or new battlesight ranges are necessary. The selection of Manual Range input shall automatically overide the LRF Range Data. If microprocessors and other solid state devices are used in the fire control computer it is required that they meet all appropriate specifications and be programmed using the DOD ADA language. The fire control computer shall be capable of withstanding the shock and vibration of a heavy parachute drop, main gun firing impulse, and shock and vibration as a result of exterior detonations resulting from both enemy munitions and the resulting detonation of reactive armor (if equipped).

3.4.9.3.4.1 Ballistic Computer Inputs. The ballistic computer shall compute the full fire control solution in azimuth and elevation based upon various automatic and manual inputs to the computer. The inputs to the computer shall be those necessary to achieve the specified accuracy requirements contained in 3.4.9.3.7.

3.4.9.3.4.1.1 Laser Rangefinder. The fire control system shall have a laser rangefinder (eye safe desired) operating at a rate required to provide specified weapon systems accuracies. The LRF shall be integrated with the sight and possess at least the same range, weather, and obscurant capabilities of the daysight. As a minimum, the LRF shall provide ranges between 500 meters and 7.5 Kms with accuracy of plus or minus 10 meters. The LRF shall discriminate between targets along the-line-of-sight where range separation is 100 meters or greater and shall give a visual indication for multiple target returns. The LRF shall be capable of matching the main gun firing rate for an indefinite period of time. A push button switch shall be incorporated with the controls for firing the LRF. The period between activating the ranging sequence and displaying of the target range shall not exceed one second. The target range shall be displayed in the sights until the operator ranges again or the system is deactivated.

3.4.9.3.5 Reaction Time. The maximum reaction time shall not exceed two seconds when measured as the amount of time between initially acquiring the target in the sight aim point and the system is ready to fire (trigger pull). The major components of reaction time are time to determine range (laser), time to compute ballistic solution, and time to implement the solution to the weapon system.

3.4.9.3.6 Fire Control System Back-up. The fire control system shall include back-ups for each electronic or electronically controlled subsystem; which include: gun/turret drive systems, main gun loading, primary sighting systems to include ranging, and main gun and coaxial machine gun firings. Manual traverse and elevate controls shall be at the gunner's station. A location for the Gunnery Firing Tables needed to superelevate the gun and introduce appropriate lead angles during manual back-up operations, shall be provided at the gunner's station. The fire control system shall be capable of withstanding the shock and vibration of a heavy parachute drop, main gun firing impulse, and shock and vibration as a result of exterior detonations resulting from both enemy munitions and the resulting detonation of reactive armor (if equipped).

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3.4.9.3.7 System Accuracy.

3.4.9.3.7.1 Total System Accuracy. The specifications discussed in the following paragraphs are based on the concept of total system accuracy. Total system accuracy is not to be confused as the individual subsystem errors, but is the total combined synergistic effects of all subsystems errors and their relationship to one another and to the vehicle system as a whole. The specifications discussed in 3.4.9.3.7 and elsewhere in this document should be considered total system accuracy performance specifications and the errors of not only fire control, but also other subsystem errors and their influence and contribution to the overall system accuracy. Some of the other subsystems to be considered include the influences of the track and suspension, mechanical disturbances of gun, projectile and turret and human factors.

3.4.9.3.7.2.1 Stationary Vehicle against Stationary Target (Based on Service Test Conditions). (see 6.4, Appendix A)

3.4.9.3.7.2.2 Stationary Vehicle Against Moving Target (Based on Service Test Conditions). (see 6.4, Appendix A)

3.4.9.3.7.3 Fire on the Move Engagements (Based on Service Test Conditions). (see 6.4, Appendix A)

3.4.9.3.8 Boresight Provisions. The fire control shall have provisions for boresighting (aligning) the Primary Sight (FLIR channel, daylight channel and LRF), auxiliary sight, and coaxial machine gun with the main gun. Time to boresight the entire system shall not exceed 15 minutes when accomplished by the vehicle crew using common tools and equipment stored on or in the vehicle.

3.4.9.3.9 Boresight Retention. After a Low Velocity Air Drop, the system shall maintain boresight with a boresight accuracy necessary to meet the overall system accuracy requirements stated in 3.4.9.3.7 but not exceeding 1.0 mil each for the Day sight, FLIR, and auxiliary sights. Once the AGS is boresighted or re-boresighted after LVAD then the system shall maintain boresight accuracy not to exceed .3 mils deviation for the above listed sights. All fire control components shall be capable of withstanding the shock and vibration of a heavy parachute drop, main gun firing impulse, and shock and vibration as a result of exterior detonations resulting from both enemy munitions and the resulting detonation of reactive armor.

3.4.9.4 Surveillance Mode - Silent Watch. In the surveillance mode and under silent watch the vehicle commander shall be able to configure the AGS via his controls to meet the following requirements:

3.4.9.4.1 Silent Watch Main Armament Controls. Power assisted main azimuth and elevation control capability shall be provided without the engine running. Azimuth and elevation gun control at variable rates from 0.25 mils/sec to 25 mils/sec in elevation and from 0.25 mils/sec to 75 mils/sec in azimuth is required in response to control handle signals. Slew rates of up to 300 mils/sec are required for 1,500 mil durations and tracking rates up to 30 mils/sec azimuth or 16 mils/sec elevation.

3.4.9.4.2 Silent Watch Duty Cycle. The capability for 1 hour silent watch duty cycle, representative of both day and night conditions, shall be provided. During the cycle, the following electrical equipment shall be on for the percent of the cycles indicated below:

Gunner's Primary Sight (day or FLIR channel)	100%
Gunner's Auxiliary Sight	100%
Laser Range Finder	100%
Fire Control Electrical Units	100%
Dome Lamps	5%
Auxiliary Hydraulic Pump (if equipped)	50%
Autoloader (if equipped)	100% (Standby)
Radio (receive function)	100%
Fire Detector	100%
Fuel Sensors	100%

The duty cycle must be preceded by sufficient engine operation to stabilize temperature and fully charge batteries. At the end of the duty cycle, there shall be sufficient battery power to provide for engine start at temperatures down to minus 50 degrees F.

3.4.10 Intentionally Not Used.

3.4.11 Intentionally Not Used.

3.4.12 Personnel Heater and Climate Control. The crew compartment(s) shall be provided with a heating system capable of maintaining temperatures above 20 degrees C. (68 F.) during occupancy at Basic-Cold (see 3.5.13) ambient condition. If heater is fuel-fired

poisonous gas shall be kept at safe levels (see 3.3.2.2). Heater and climatic controls shall regulate the temperature and amount of air provided. The heating system shall be designed to provide adequate heat without creating dangerous hot spots.

3.4.13 Communication. The vehicle shall have brackets, mounts, connectors and cables for the installation and operation of an AN/VRC-12/SINCGARS Radio Set and an Intercom System compatible with which includes the following equipment:

AV/VRC-12/SINCGARS - Radio

RT-246-VRC - Transmitter

R-442 - Receiver

AS-1729 - Antenna

TSEC-KY-57 - COMSEC

TRSEC-HYP-57

AN/VIC-1 Compatible - Intercom

Installation Harness

The intercom shall also allow for interconnection and operation of applicable radios from all stations. Sufficient filtering of the vehicle electrical system shall be installed to prevent electro-magnetic interference by activation of vehicle systems and/or radios installed. The communications system shall allow for space claim for two VRC-46 or Single Channel Ground Airborne Radio System (SINCGARS) radios. The AGS shall have an external phone and WD-1 wire hook-up and binding posts for interface with internal communications systems. The AGS shall have an environmentally protected external phone with a 10 to 15 meter cord.

3.4.14 Exterior Hatches. The hatches shall be quick opening type and of sufficient size to allow a 95th percentile (in size) male, in arctic combat gear to open the hatch and exit the vehicle. All hatches and doors when closed, shall restrict the entrance of water while fording, to less than 7.57 lpm (2 gpm) total. All hatches shall open and close manually without binding, interference or the use of

additional mechanical leverage to include the failure caused by dirt, mud, and debris accumulation in the locking or latching mechanisms and the failure induced by vibration between the hatch and the latching mechanism. The positive means of preventing accidental closing shall be applied in an automatic manner. Popped hatches shall be used as appropriate to the vehicle configuration. A means shall be provided for locking vehicle hatches and doors from the inside without a padlock.

3.4.15 Vision Protection. All vision devices shall provide protection capability matching overall protection value afforded by primary armor areas. All vision blocks shall conform to MIL-B-11352 with spall shield and crash pads. The vision devices shall have the capability to be "blacked-out" for night operating. Cleaning and defrosting of all vision devices is desired. Direct view optics shall have sufficient optical density (OD) of not less than 4.5 to protect against neodymium (near-infrared) lasers (1.06μm wavelength).

3.4.16 Combat Damage. To the extent feasible, the entire design of the vehicle should reflect the philosophy of ease of combat damage repair as close to the battle position as possible. Similarly, redundancies and modularity shall be used to the maximum extent possible.

3.4.17 Survivability. Special consideration shall be given to all aspects of vehicle survivability including, but not limited to, those items specifically required by other sections and subsections of this document. Survivability considerations shall exploit the existing state-of-the-art in minimizing the probabilities of being detected, hit, and killed. Prevention of incapacitation of personnel is of paramount importance. Consideration shall be given to survivability objectives in configuration, design provisions, and arrangement of components throughout the entire vehicle. Survivability design features, other than armor, shall be considered in all subsystem designs.

3.4.17.1 Ballistic Protection. The use of add-on armor shall be considered in order to meet the requirements within the combat loaded weight constraints of the AGS for C-130 and C-141 transportability. If this technique is used, convenient methods for removal, installation and transportation of the sections shall be included. The design shall include interchangeability considerations (from one AGS to another AGS). Use of reactive armor (energetic armor) is acceptable. (see 6.4, Appendix A)

3.4.17.1.1 Basic Protection. (See 6.4, Appendix A)

3.4.17.2 Intentionally Not Used.

3.4.17.3 Countermeasure. (see 6.4, Appendix A)

3.4.17.3.1 Smoke. The AGS shall incorporate both a quick reaction, lightweight, two shot smoke grenade launcher. The system shall provide screening from the visual through far infrared (8-14 micron) region of the EM spectrum, with the capability of expansion to the millimeter wave region as the technology provides the necessary advances. The smoke grenade system shall have a two shot capability without reload. The smoke grenade launcher shall not degrade the operational characteristics of the vehicle.

3.4.17.3.2 Painting. If specified, a three color camouflage pattern shall be painted on the exterior surface in accordance with MIL-STD-1473. External coatings shall be in accordance with MIL-C-46168. Interior surface color shall be gloss white, except surfaces (such as doors and hatches) which become exterior surfaces during tactical use shall be lusterless forest green in accordance with MIL-STD-1473. Interior coatings shall be in accordance with MIL-C-22750. CARC paint requirements are found in 3.4.17.5.1 of the NBC section.

3.4.17.3.3 Signature. The noise, thermal and electromagnetic signatures of the AGS shall be minimized to decrease the probability of detection. Leakage from interior lights shall be minimized. The thermal signature of the AGS shall be minimized by automotive design practices such as the use of insulation and shielding to reduce exterior temperatures and view of hot vehicle components/armor. It is desired that the maximum temperature of any exterior component not exceed 15 degrees centigrade above terrain background. Overall average vehicle delta temperatures from terrain background shall be minimized from all upper hemisphere viewing angles. Average vehicle delta temperatures from background for any view angle should also be minimized.

3.4.17.4 Fire Survivability.

3.4.17.4.1 Vehicle Design. The AGS shall be designed to minimize combat initiated and peacetime fires. Consideration in the overall design and locations of secondary ignition sources and ease of

maintenance concepts to preclude POL fires shall be addressed. Vehicle design (locations of combustibles, compartmentalization of fuel, ammunition, and hydraulics, material selections, fuel system design, etc.) shall be evaluated as part of the effort to maximize crew and vehicle survivability. The AGS shall have the capability to quick disconnect main batteries from the electrical distribution system by means of an electrical power relay in case of emergency or when the vehicle is not in use. All compartments shall have an automatic fire extinguishing system.

3.4.17.4.2 Crew Compartment. The crew compartment shall be equipped with an automatic fire extinguishing system (AFES) which detects and extinguishes hydrocarbon fires before burns greater than first degree are suffered by any crewmember. The system shall have two automatically activated extinguisher discharges with a 0.5 second time delay between shots. The system shall automatically activate a second shot extinguisher(s) if a first shot extinguisher(s) is non-operational. The system shall also be capable of being manually activated from inside and outside the vehicle. If equipped with Halon 1301 concentration levels shall not exceed the following Surgeon General approved human exposure limits:

7% and below	15 minutes
7-10%	1 minute
10-15%	30 seconds
Above 15%	Prevent exposure

3.4.17.4.3 Engine Compartment. The engine compartment shall be equipped with an automatic fire extinguishing system (AFES) that can detect and extinguish fires within 15 seconds to preclude operational mission failure of the engine due to fire. The system shall perform with the engine running or off and while the vehicle is stationary or moving. Engine shutdown shall be a conscious action of the crew. The first shot extinguisher(s) shall be automatically discharged upon large fire detection. The second shot extinguisher(s) shall also be capable of being manually activated from the interior (at the drivers station) and the exterior of the vehicle. An environmentally safe extinguishing agent shall be used.

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3.4.17.4.4 Portable Extinguishers. Two portable fire extinguishers utilizing an environmentally safe extinguishing agent shall be provided and mounted so that they are readily accessible to the crew for pan type fires within the vehicle and used, if necessary, when persons egress from the vehicle into a grass or ground fire.

3.4.17.4.5 Components. The AGS shall use components in accordance with MIL-M-62545, MIL-S-62546, MIL-V-62547, and MIL-F-7872 to the maximum extent possible, consistent with sound engineering practice. The components shall be designed to withstand the anticipated ballistic shock levels. The fire sensors shall be capable of discriminating against the initial flash caused by the perforation of a penetrator/jet into the vehicle which does not result in a POL fire. The sensors shall not respond to non-fire sources. The components shall have Built-In Test Equipment (BITE) (desired).

3.4.17.5 Nuclear, Biological, and Chemical (NBC) Protection. The crew shall have a Ventilated Face Piece (VFP) type of collective protection (CP) system. The system shall provide the crew with breathable quality air by using chemical warfare agent filters of a standard Army type, operated in accordance with the approved filter performance specifications. The VFP system shall provide to each crew station a minimum airflow of 1.4. to 2.1 standard liters per sec, at minimum pressure of 1.49 kilopascals (referenced to the crew compartment air pressure). The VFP shall interface and be compatible with Army standard protective mask. The AGS shall provide stowage for M8A1 chemical agent detector.

3.4.17.5.1 Chemical Agent Resistant Coating (CARC). In accordance with MIL-P-23377, MIL-C-46168, MIL-P-53022 and MIL-P-53030 shall be applied both inside and outside the vehicle to facilitate decontamination (ref TM3-220 and TM750-5-15). Approximately .28 M (1.0 ft) of internal stowage space shall be provided for expedient decontamination supplies (ABCA-M11 Decon Kit). It is desired that all NBC filters be changed external to the vehicle.

3.4.17.5.2 Nuclear Hardening. All mission-essential mechanical configurations, optical components, electronic assemblages, electronic equipment, electronic circuits and electronic pieceparts shall withstand nuclear environments. The equipment shall meet the operational requirements of Appendix B within the allotted downtime

after being subjected to the specified nuclear environments. This recovery in operations effectiveness shall include automatic or manual correction of nuclear environment-induced changes in the system but not the replacement of pieceparts or components.

3.4.17.6 Electromagnetic Radiation. Vehicle design shall provide for the satisfactory operation of communications equipment as well as all electronic, electrical and electromechanical systems by limiting the vehicular electromagnetic interference characteristics in accordance with MIL-STD-461. A capability shall be provided to eliminate electromagnetic static caused by the ignition system, alternator, regulator, fueling system , rubber tracks, slip rings and other emitting components.

3.4.17.7 Ammunition-Fuel Compartmentalization. Without substantial design or configuration change employ vulnerability reduction techniques to protect the crew from the inadvertent detonation of main gun ammunition and ignition of other materials such as fuel and hydraulic fluids. Considerations shall include but not be limited to explosion suppression shielding between the crew and the explosives as well, as adequate venting designs to vent an inadvertent explosion away from the crew compartment(s) and prevent over-pressurization of the volumes containing explosives.

3.4.18 Reliability and Maintainability. Definitions of Reliability and Maintainability terms in accordance with MIL-STD-721 shall apply except as otherwise specified herein.

3.4.18.1 Reliability. The AGS shall have a system reliability of at least 300 Mean Miles Between Hardware Mission Failure (MMBHMF) when operated under the condition listed in the Operational Mode Summary/Mission Profile . It is desired that the mature system requirement of 355 MMBHMF be achieved by the end of IOT&E testing. The Failure Definition/Scoring Criteria (FD/SC) shall be used to define mission failures for the calculation of the MMBHMF.

3.4.18.2 Maintainability. The maintenance shall not exceed a maintenance ratio (MR) of 0.55 maintenance man hour per operating mile. The AGS shall be designed for ease of maintainability with special emphasis on speed of powerpack removal and replacement. Critical accessories such as an alternator, hydraulic pump and starter shall be accessible and removable without powerpack removal. Provisions for

easily obtaining oil samples from all pertinent components shall be provided. Electrical cables, connectors, and conduits shall be designed and located for ease of access, diagnostic testing and repair.

3.5 Performance. The vehicle shall perform at combat vehicle weight at full level of armor protection. Unless otherwise specified, performance shall be on dry, level, hard surfaced roads.

3.5.1 Acceleration. With the auxilliaries on, and the engine at normal idle speed, service brake applied, the transmission selector set to "drive", the AGS shall be capable of accelerating in the forward direction on a dry level hard surface from zero to 32 Kph in 8.0 seconds (6.0 seconds desired) and in the reverse direction from zero to 16 Kph in 5 seconds, after the release of the service brake.

3.5.1.1 Dash Capability. The AGS shall be capable of traveling 200 meters from a standing start on a dry, level, hard surfaced road in a maximum of 22 seconds (19 seconds desired).

3.5.1.2 Speed on Grade. Under ambient conditions defined by NATO AEP-5 at 150 M and the NBC and Auxilliaries on, the AGS shall be capable of the sustaining a speed of 32 Kph on a 10 percent grade.

3.5.1.3 Maximum Tractive Effort. The maximum torque available at the sprocket or wheel hubs shall be sufficient to generate a tractive effort equal to 1.2 times the projected vehicle combat weight in both forward and reverse. Tractive effort to weight ratio shall not be less than 0.8 at 17 degrees C, 4500 M altitude (MIL-STD-210).

3.5.1.4 Sustained Low Speed. The powertrain shall provide for safe predictable performance for extended periods (three hours or more) at speeds below 4 Kph.

3.5.2 Braking.

3.5.2.1 Service Brakes. The AGS shall be capable of 25 stops with interspersed three minuter cooling periods, from 80% of maximum required speed at a deceleration of 0.4-0.6g with a lateral drift of less than 1.5 M from the point at which the brake pedal movement begins. The brake pedal forces required for the above shall be within the capability of a 5th percentile male driver (ref MIL-STD-1472).

3.5.2.2 Parking Brakes. With the engine on or off, the parking brake locked and the transmission in neutral, the vehicle shall remain stationary on a dry, hard surface, 60% grade, headed uphill or downhill. The force required to set and release the parking brakes shall not exceed the capability of a 5th percentile male driver (ref MIL-STD-1472).

3.5.2.3 Steering. The AGS shall be capable of pivot steer maneuver at a rate of seven revolutions per minute in both directions while remaining within a circle of 1.0 vehicle lengths in diameter desired. Steering maneuvers shall not require effort beyond the capability of a 5th percentile male driver. The single track torque capability of a tracked AGS at the sprockets shall be sufficient to generate a tractive effort of 0.90 times the projected vehicle combat loaded weight; differential capability between sides shall be equal to 1.0 times projected vehicle combat weight.

3.5.3 Slopes.

3.5.3.1 Longitudinal Slopes. The vehicle at combat loaded weight shall be capable of ascending and descending, dry hard surfaced longitudinal slopes up to and including 60% grade. This shall be demonstrated in both forward and reverse direction. Any operation under slope conditions shall not result in faulty lubrication, leakage or malfunction of any component.

3.5.3.1.1 Stability. The AGS shall remain stable while the turret is rotated 360 degrees and fired on 60% slope with the vehicle ascending or descending the slope.

3.5.3.2 Side Slope. The vehicle at combat loaded weight shall be capable of operating, firing up the slope and be stable while on dry, hard surfaced slope up to and including 40% with each side of the vehicle. Any operation under side slope conditions shall not result in faulty lubrication, leakage or malfunction of any component.

3.5.3.2.1 Engine Starting on Grades and Slopes. When standing on a 60 percent grade and 40% slope, for not less than one minute, with engine idling under no load, the engine shall be stopped for not less than one minute. The engine shall restart in not more than one minute when headed up and down slope and each side of the vehicle on side slope.

3.5.4 Ground Clearance. The vehicle at combat loaded weight shall be capable of negotiating a 15 inch, 18 inch desired, vertical obstacle, placed at any point under the vehicle without any damage to the vehicle.

3.5.5 Ditches and Vertical Obstacles. The vehicle at combat loaded weight, shall be capable of traversing a 30 inch vertical obstacle, 36 inch desired in forward or reverse direction and ditches equal to approximately one-third the length of the vehicle without damage to any part of the vehicle.

3.5.5.1. Obstacle Negotiation. The vehicle at a combat loaded weight, shall be capable of the following minimum speeds over a single obstacle, without exceeding 2.5 g's at the driver station.

Obstacle Height	Speed (Minimum)
8 Inches	20 mph
12 Inches	5 mph
12 Inches	15 mph desired

3.5.5.2 Vegetation and Obstacle Mobility. The vehicle shall be capable of overriding medium vegetation (5 inch in diameter) including common man-made structures such as fences and sheds without damage to the vehicle, mounted operating equipment, or installed on-vehicle equipment (OVE).

3.5.6 Fording. It is desired that the vehicle, at the combat loaded weight, shall be capable of fording to a depth of 40 inches without special preparations. As a result of the fording operation, no evidence of malfunction shall be found.

3.5.6.1 Bilge Pump. The vehicle shall be equipped with bilge pump(s) with a total minimum capacity of 378 l/min (100 gpm) with a discharge height of 5 ft (1.53m). The location of the output port shall exhaust water outside of the vehicle. The bilge pump(s) shall be mounted at the lowest point(s) in the vehicle, and controlled by the driver. The bilge pump(s) shall be self priming and capable of operating during a no flow condition for a minimum of 20 hours, or completely submerged, without damage.

3.5.6.2 Drain Plugs. Floor drains installed at low points in the vehicle are required. The floor drain plugs shall be removable and replaceable by vehicle crew, with on-vehicle equipment (OVE).

3.5.7 Speed. The vehicle at full combat loaded weight, shall on level hard surfaced roads be capable of forward speed of 64 kph (required), 80 kph (desired). The vehicle must be able to complete one combat mission day at a minimum speed of 32-42 kph without degradation to the crew members ability to perform operational tasks effectively.

3.5.7.1 Reverse Speed. The vehicle at full combat loaded weight, shall on level hard surfaced roads be capable of attaining and maintaining a reverse speed of 16 kph (required) and 32 kph (desired).

3.5.8 Turning. The vehicle shall be capable of sustaining a minimum of 0.5g lateral acceleration in a constant radius turn while fully loaded and while empty.

3.5.9 Range. It is desired that the vehicle at the combat loaded weight shall be capable of operating on internally carried fuel, for a minimum distance of 480 km (300 miles) at an average speed no less than 40 kph on secondary roads.

3.5.10 Mobility. The vehicle shall meet the criteria shown in Table II mobility criteria based on use of the NATO Reference Mobility Model (NRMM) (ref AD-B-047979 and AD-B047980 plus NRMM coding changes made since publication). The terrain data is Lauterbach Quad in West Germany and the Mafraq Quad in the Middle East.

Table II Mobility Criteria

Type of Terrain	V-80 Speed (kph)*		% No-Go**
West German - Dry	Normal	29	5
West German - Wet	Normal	21	12
Middle East - Dry	Normal	29	5
Middle East - Wet	Normal	21	5

*V-80 Speed. This represents the maximum speed of the AGS over the best 80% of the terrain.

**% No-Go. This represents the percent of terrain a vehicle cannot negotiate Memoranda TM 25-77, TM 8-79 and TM 8-81.

3.5.10.1 Cone Index. The AGS shall possess a VCI of at least 18. VCI shall be calculated by the Waterways Experiment Station (WES) method.

3.5.10.2 Ride Quality. The AGS shall be capable of travel at a minimum speed of 32 kph (42 kph desired) over a 1.5 inch RMS course with no more than 6 watts absorbed power at the driver's station. The AGS shall be capable of traveling at 42 kph over a 1 inch RMS course with no more than 6 watts absorbed power at the driver's station. In order to protect human health, whole body vibration should not exceed twice the acceleration values shown on Figure 42, MIL-STD-1472 for the time and frequencies indicated.

3.5.11 Approach Angle. The approach angle shall be 60 degrees or greater.

3.5.11.1 Departure Angle. The departure angle shall be 60 degrees or greater.

3.5.12 Shock and Vibration. The vehicle components shock and vibration levels shall comply with the shock and vibration limits specified in MIL-STD-810, when measured in accordance with the respective test procedures specified in MIL-STD-810. The vehicle components shall be subjected to sinuosity vibration test, resonance search, resonance dwell, random vibration test and other performance test specified in MIL-STD-810. The vehicle components shall be subjected to the shock procedures specified in MIL-STD-810.

3.5.13 Environmental Characteristics. The AGS serviced and equipped for existing climatic conditions, as defined in AR 70-38, and according to MIL-STD-810, shall be capable of starting and operating in Hot-Dry, Hot-Humid, and Basic-Cold without external aids. Cold weather kits will be provided as required for Cold C2. The AGS shall operate from sea level to 5,000 feet (1524M) without adjustments. The AGS shall be stored in Cold-Daily cycle (-35 to -50 F.) and in the Hot-Humid Cycle (90 to 120 F) without subsequent adverse impact on vehicle performance. Appropriate preservation (ref MIL-STD-281, MIL-P-116, MIL-B-117 and MIL-B-121) shall be applied to the vehicle for protection, when exposed to high sea-salt combined with hot-humid climatic conditions during prolonged storage. The AGS shall be capable of starting and operating without external aids and without damage or malfunction under environmental conditions of humidity, rain, and fungus as specified by MIL-STD-810. Material shall not be physically or chemically deteriorated as a result of exposure to these conditions.

3.6 Workmanship. All details of workmanship shall be of the highest grade consistent with the intention of this purchase description, each vehicle shall have nB evidence of cracks, dents, scratches, burrs, sharp edges, loose parts, foreign matter, or any other evidence of poor workmanship that render the vehicle unsuitable for the purpose intended. In addition, vehicle electronic components shall comply with the applicable requirements of MIL-STD-454.

3.7 LOGISTICS: The total logistic support package, derived from a Logistic Support Analysis and its record, will be provided to operate and maintain the AGS.

3.7.1 MAINTENANCE: The vehicle system shall provide maximum forward area self-sufficiency, supportability, maintainability and ease of servicing with the minimum use of personnel, material,parts,tools and support equipment. To capitalize on the concept of modular maintenance, the vehicle system shall be designed on a modular building block design technique that is within the state-of-the-art and cost effective. The module design shall take maximum advantage of incorporating quick disconnect technique in order to insure rapid and easy removal and installation of modules with limited skills and tools.

3.7.1.1 GENERAL: Maintenance performed by the crew, unit, direct support and general support shall be in accordance with LSAR.

3.7.1.2 CREW:

a. Maintenance. Crew maintenance shall consist of corrective and preventive maintenance to prevent or reveal malfunctions before a failure occurs.

b. Duties: Crew shall troubleshoot malfunctions or symptoms, determine probable causes and make minor repairs, adjustments or replacements using on-vehicle parts or tools and shall perform pre-operation and post-operation checks and servicing.

3.7.1.3 UNIT: Unit maintenance shall consist of performing preventive and scheduled maintenance services, such as visual inspection of external components, lubrication services, cleaning, tightening and mechanical adjustments which do not require complex special tools and test equipment. It shall also include diagnosis of equipment malfunction, where the malfunction can be readily detected by simplified STEICE-R or other equipment type classified in DA Pamphlet 700-20, and attributed to a module, component as assembly through use of built-in test equipment of go-no-go indicator devices and those repairs which can be effected only by replacement of those modules, components, or assemblies which can be readily detected as having failed.

3.7.1.4 DIRECT SUPPORT: Direct support maintenance shall consist of repairing line replaceable units by replacement of modules, components and subassemblies. The Direct Support Electronic Systems Test Set (DSESTS) will be employed (until the Integrated Family of Test Equipment is available) to diagnose faults and perform post repair check out of LRUs. On an exception direct support will perform on vehicle corrective maintenance consisting of extensive adjustment, alignment or calibration and associated replacement of mission critical internal or external parts. Use of direct support contact teams shall be minimized.

3.7.1.5 GENERAL SUPPORT: General support maintenance shall consist of providing back-up support to direct support maintenance or to the supply system. It shall include the repair of equipment, modules, components, or assemblies which require extensive adjustment, alignment or calibration of the replacement of internal or external parts. It shall also include the collection and classification of returned items as serviceable or unserviceable and the operation of a cannibalization point to augment the supply system.

3.7.1.6 SCHEDULED MAINTENANCE: With pre-operation and post-operation checks, services and monthly Army Oil Analysis Program checks, the vehicle will require scheduled unit maintenance and service no more frequently than every six months. The maintenance will be no more than four hours, using unit skills and tools.

3.7.1.6.1 PRE-OPERATION/POST-OPERATION OPERATOR/CREW CHECKS: Pre-operation and post-operation operator/crew checks and services will require no more than one man-hour, 95 percent of the time. The vehicle crew is defined as two members of the crew (driver, loader, gunner and commander).

3.7.1.6.2 PRE-OPERATION (PRECOMBAT) OPERATOR/CREW CHECKS: Pre-operation operator/crew checks for precombat will require no more than 20 minutes, 95 percent of the time.

3.7.1.2 MAINTENANCE TIMES:

3.7.1.2.1 MAXIMUM TIME-TO REPAIR: The following time limitations, unless otherwise specified apply when maintenance, except pre-operation and post operation operator and crew maintenance, is performed in a covered building, with a concrete floor, at room temperature, using only those hand tools listed in current supply catalogs for the assigned category of maintenance. The maximum time to repair (to include diagnosis, repair and verification) utilizing personnel normally employed at:

a. Unit maintenance will not exceed four hours, 95 percent of the time.

b. Direct support maintenance will not exceed 12 hours, 90 percent of the time.

c. General support maintenance will not exceed 12 hours, 90 percent of the time in a back-up direct support role.

3.7.1.2.2 LUBRICATION: Preventive maintenance lubrication, level checks shall be performed on the engine, powertrain, hydraulic systems and suspension and filled with lubricants to the correct level as post-operation operator/crew checks. Complete lubrication shall be performed semi-annually.

3.7.1.2.3 SUSPENSION SYSTEM: The suspension system shall not require crew servicing other than during post-operation operator/crew maintenance.

3.7.1.2.4 SUSTAINED OPERATION MAINTENANCE: The vehicle shall be capable of sustained operations for 96 hours without maintenance or servicing.

3.7.1.3 EASE OF MAINTENANCE: Vehicle design shall provide for ease of maintenance. The vehicle design shall provide for:

a. The components to be designed to prevent installation in the wrong manner.

b. The maximum use of all advanced design techniques, long life materials, sealed assemblies requiring little or no lubrication, quick disconnect devices, modular construction which permits "pull out-plug in" replacement.

c. The design and mounting of major assemblies and subassemblies to permit replacement or adjustment under all environmental conditions.

d. The minimum malfunctioning of and damage to controls and linkages.

e. The engine and powertrain to be capable of being ground hopped when removed from the vehicle, using only extension leads to the vehicle.

3.7.1.3.1 MAINTENANCE COMPLEXITY: The vehicle shall be so designed that the skill required to service the vehicle and perform maintenance and repair shall not exceed skill level one of the military occupational specialties at the maintenance category indicated. MOS descriptions are contained in AR 611-201.

3.7.1.3.1.1 COMMANDER AND CREW: TBD

3.7.1.3.1.2 UNIT MAINTENANCE: TBD

3.7.1.3.1.3 DIRECT AND GENERAL SUPPORT MAINTENANCE: TBD

3.7.1.3.2 MAINTENANCE DURING STORAGE:

3.7.1.3.3 MAINTENANCE AFTER STORAGE: Preservation procedures and vehicle design shall provide for:

a. A fully operational vehicle, when subjected to crew and unit level pre-storage, upon removal from storage of one to 90 days, to have a 90 percent probability of being restored to full operational capability within one hour, 95 percent of the time by crew or unit maintenance actions.

b. A fully operational vehicle, when preserved to level A specifications, upon removal from storage of a length of 90 to 365 days, to have a 90 percent probability of being restored to full operational capability within eight hours, 95 percent of the time by direct support maintenance actions.

3.7.1.3.4 DEPOT MAINTENANCE OVERHAUL CRITERIA: Independent of reliability and durability requirements defined elsewhere and for vehicle testing purposes only the vehicle shall be a candidate for depot maintenance overhaul based on the Combat Vehicle Evaluation Team findings.

3.7.1.3.5 MAINTENANCE AFTER AIR DROP:

3.7.1.3.6 TURN-AROUND TIME: The time required to replenish fuel, water, ammunition and to check out and service the AGS after a mission and be ready to return to battle shall not exceed ten minutes.

3.7.1.3.7 REACTION TIME: During sustained combat operations, the time to start the main engine, place all systems in operation and put the vehicle in motion shall be within 30 to 60 seconds. This time shall be met with the condition that the vehicle is completely serviced, ready to move and all personnel are in place in the vehicle.

3.7.1.3.8 COMPATIBILITY WITH STANDARD PETROLEUM OIL LUBRICANT (POL): Vehicle shall be operated on standard POL products. No other POL products shall be used where replenishment is required.

3.7.1.4 DESIGN CHARACTERISTICS FOR MAINTENANCE:

3.7.1.4.1 AIR CLEANERS: Air cleaners shall be accessible and elements shall be removable without removing or relocating any other components or assemblies. It shall also have an air restriction indicator, located on the drivers indicator panel.

3.7.1.4.2 BATTERIES: Batteries shall be mounted away from sources of heat, installed in such a manner as to be well ventilated, and shall be protected in exposed positions. Specific gravity and voltage testing must be possible with the hydrometer, voltage tester and electrolyte level indicator in a vertical position. Batteries shall be installed and protected to insure functioning within the operating ambient air temperature limits. Battery holders shall have clamping devices to hold the battery in position and prevent damage from traveling or gun fire vibrations or electrolyte. Batteries shall be capable of being serviced without their removal or the use of hand tools and without removing other components or assemblies.

3.7.1.4.3 FUEL SYSTEM: There shall be a 5% dead column below the effective level of draw-off of the fuel supply to the engine, to trap water or fuel/separator to reduce the size of dead column. A separate drain valve shall be provided to drain off this contaminated fuel. Fuel filter housings shall incorporate a simple and quick means to permit draining the fuel.

3.7.1.4.4 GREASE FITTINGS: All grease fittings used throughout the vehicle shall be identical in size. Fittings shall be so placed that they can

be totally serviced with standard military grease guns and without requiring movement of the vehicle or its components.

3.7.1.4.5 DRAIN HOLES: Drain holes shall be provided wherever water may accumulate.

3.7.1.4.6 DRAIN PLUGS: Standard magnetised drain plugs shall be used in oil sumps.

3.7.1.4.7 FLUID LEVEL INDICATORS: An area shall be shown on dipsticks representing "safe operating range" and with one boundary representing "full" and another boundary representing "add". Dipsticks shall be so graduated or marked as to indicate the amount of fluid required to be added when the "add" limit has been reached. Dipstick markings shall permit reading lubricant/ fluid levels before, and after operation of the vehicle or any subsystems. It shall not be required to operate the vehicle or any subsystem prior to reading dipstick. Where dipsticks or sight gazes are not provided, level plugs, accessible without removing or relocating other components, shall be incorporated.

3.7.1.4.8 DRIVE BELTS: Any drive belt shall be directly accessible for replacement without removal or relocation of any other parts or units, with the exception of quick access panels. Automatic self-adjusting devices shall be used.

3.7.1.4.9 OIL AND GREASE SEALS: Blind installation of oil and grease seals shall be avoided, if possible. Seal seatings and lands shall be provided with adequate openings for removal of seals. The requirement for special tools shall be avoided.

3.7.1.4.10 SAFETY CHAINS: Safety chains shall be replaced by hand or through the use of common hand tools.

3.7.1.4.11 INDICATOR PANEL: Indicator panels shall be designed to be readily accessible for removal of the indicators with common hand tools.

3.7.1.4.12 BOLTS AND NUTS: The bolts, or nuts, used in a single mounting application for single component, assembly or accessory, shall be of the same size, and removable with the same tool.

3.7.1.4.13 ADJUSTMENTS: Self-adjusting devices shall be used to maximum extent possible. Manually adjusted devices shall be capable of being locked without disturbing the adjustment. Critical adjustments shall be sealed.

3.7.1.4.14 INSERTS: Inserts shall be used in aluminum material where threads are required (1) to receive screws, bolts or studs which are removed

for scheduled maintenance services and/or (2) where parent material thickness is less than 1-1/2 times the diameter of the screw, bolt or stud, and (3) to attach armor applique.

3.7.1.4.15 INFORMATION PLATES: All labels, nameplates, or item identification data plates shall be in English and also visible without the need for item removal.

3.7.1.4.16 STRUCTURAL MEMBERS: Structural members shall not prevent removal or replacement of any component or assembly.

3.7.1.4.17 COLOR CODING: Individual cables, conduits, and components shall be identified and/or color coded in such a manner the disassembly will permit reassembly without recourse to schematics or other aids. Color coding need not be provided where other required marking methods achieve the same end result. Mechanical polarization to prevent physical assembly between improper parts shall exist wherever possible.

3.7.1.4.18 SIGHTS AND VISION: The vehicle design shall permit easy replacement of all sights and vision devices from the vehicle by the crew.

3.7.1.4.19 TORQUE SPECIFICATION: Torque specifications shall be eliminated at the crew maintenance category and shall be minimized at unit, direct and general support maintenance categories.

3.7.1.4.20 SAMPLING OF LUBRICANTS: Provisions shall be made for easily accessed valves to be installed for lubricant extraction for Army Oil Analysis Program (AOAP).

3.7.1.4.21 RECESSES: All exposed surfaces shall be shaped to minimize recesses that collect and retain dirt, water, servicing fluids, cleaning fluids and other foreign material.

3.7.1.4.22 TRACK/FENDER FLAPS: Track/fender flaps shall permit debris from the suspension to freely pass through without causing damage.

3.7.1.4.23 ENGINE/TRANSMISSION: The power unit shall have guides provided for ease of removal and replacement.

3.7.1.4.24 DRIVER'S PANEL INDICATORS: The vehicle shall be provided with accessible indicators that signal a maintenance action needs to be performed. The indicator shall utilize a quick go/no-go display. The indicator shall be located on the drivers indicator panel and near the item of maintenance. As a minimum, indicators shall be provided to signal:

a. Transmission/Engine oil filter condition.

b. Transmission/Engine oil temperature/low level.

c. Hydraulic system(s) oil level.

d. Air filter restriction.

e. Engine oil pressure.

f. Coolant level/temperature.

3.7.2 PERSONNEL AND TRAINING:

3.7.2.1 PERSONNEL: The number of personnel required to operate the the vehicle system shall not exceed two if the vehicle is equipped with an autoloader (three if the vehicle is not equipped with an autoloader), under all duty conditions. Servicing and operation shall be performed by the crew. An expansion and/or revision of the current POIs for the gunner MOS will be required to include the additional skills for the operations and maintenance of the turret, weapons, and selection of appropriate ammunition. Cross training of selected personnel, driver, gunner, and commander (and loader) will be required to provide depth of knowledge pertaining to operation and maintenance of vehicle armament.

3.7.2.2 OPERATIONAL PERSONNEL: All tasks to be performed by by individual crew members shall be within the capability of personnel possessing the appropriate MOS.

3.7.2.2.1 DRIVER: The driver must be knowledgeable in the operation, service and maintenance of vehicle and associated driving controls under all climatic and environmental conditions which the vehicle is to be employed. this includes, but is not limited to:

a. Operation of the vehicle while the driver is fully protected or partially exposed.

b. Operation of all controls, accessories, and switches located in the driver's compartment or use by the driver to include night vision driving devices.

c. Manual selection of proper driving ranges.

d. Preparation of the vehicle for fording operations.

e. Servicing and troubleshooting of automotive components, assemblies, kits and associated items.

f. Proper maintenance of vehicle and kits.

g. Preparation for LVAD and derigging after LVAD.

3.7.2.2.2 GUNNER: The gunner must be knowledgeable in selection, employment, service and maintenance of all weapons, fire control, power control/stabilization and instruments, including but not limited to:

a. Detection and evaluation of treat posed by enemy targets.

b. Selection of appropriate weapons, ammunition and engagement procedures to destroy enemy targets.

c. Electrical or manual operation of weapon stations and mounted weapons to include night vision devices.

d. Service and troubleshooting of weapons and related accessories.

e. Proper maintenance of the weapons station, weapons and associated equipment.

f. All driver tasks.

g. All loader tasks.

7.2.2.2.3. LOADER: (If not equipped with autoloader) The loader shall be knowledgeable in selection, employment, service and handling of all ammunition and ammunition handling equipment. The loader shall be capable of performing all driver tasks.

7.2.2.2.4 COMMANDER: The commander shall be able to detect targets, select appropriate weapons, aim, fire, issue necessary instructions to engage and to control firing, direct driver's action during mounted movement of vehicle and supervise the actions of all crew members during both combat and maintenance of vehicle, weapons and associated equipment.

3.7.2.3. MAINTENANCE PERSONNEL: In those applicable MOS's the vehicle shall be maintainable using skill level 1 personnel. Their skill levels shall not be considered in the maintenance task and skill analysis.

3.7.2.3.1 CREW MAINTENANCE: The number of personnel required to perform preventative maintenance shall not exceed two; driver and gunner. The tasks required to be performed shall be within the capability of personnel possessing MOS TBD.

3.7.2.3.2. UNIT MAINTENANCE: The number of personnel required to perform unit maintenance shall not exceed two for any task performed to keep or restore the vehicle to a serviceable condition in any duty situation. These tasks, to be performed at the organizational category, shall be within the capability of at least one of the two personnel possessing the following MOS:

3.7.2.3.3. DIRECT SUPPORT/GENERAL SUPPORT MAINTENANCE: The number of personnel shall not exceed two for any task performed to restore the vehicle to serviceable condition in any duty situation. These tasks shall be within the capability of the following MOS: TBD

3.7.2.4. TRAINING: Transitional, institutional, and sustainment training package shall be provided for AGS operation and all levels of maintenance. An initial test training package for operator and maintenance (unit and direct support) will be provided. This package shall be updated to reflect the production AGS in format for instructor and key personnel training to support New Equipment Training and to update POI's at TRADOC schools.

3.7.2.4.1. RESPONSIBILITY: Test player training shall be provided by the contractor technical testing and user testing. The contractor shall train a cadre responsible for training operational test players. A joint government/contractor team located at the contractor's facility shall update the test training package for use in institutional training programs. The updated test training package will be used by the contractor during production to provide instructor and key NET team and depot personnel training, and initial transfer of technical knowledge training.

3.7.2.4.2. TRAINING MEDIA: All training materials and data shall be in English. Training material shall be in electronic media to the extent possible. Embedded training will be employed to the extent possible within the systems current capability to minimize the need for training aids.

3.7.2.4.3. TRAINING COURSE DESIGN: All courses developed for transition training and test training shall provide the students with 70% hands-on time.

3.7.2.4.4. TRAINING AIDS:

3.7.2.4.4.1. VEHICULAR: With the exception of the training devices, the crew training items shall only consist of the vehicle, its components and appropriate training films, slides, literature and visual aids.

3.7.2.4.4.2. WEAPONS: Appropriate training films, slides, literature and visual aids to assist in instruction of nomenclature, disassembly, cycle of operation, installation, operation and gunnery techniques associated with the weapon system be required for any new armament and fir control system.

3.7.2.4.4.3. TRAINING DEVICES: Training devices for gunnery and engagement will be required to support AGS. Modifications to MILES will provide suitable engagement training capability. Gunnery simulation training devices similar to the Abrams/Bradley COFT and/or Videodisc gunnery simulation will be developed to support AGS during the first three years after AGS production contract award. Transfer of technical data to training device contractors is required.

3.7.2.4.4.4. ORGANIZATIONAL/DIRECT SUPPORT/GENERAL SUPPORT MAINTENANCE TRAINING ITEMS: Maintenance training shall require the following training items.

a. Appropriate training films, slides, literature and visual aids to assist in instruction of nomenclature, disassembly, cycle of operation, installation, maintenance and operation of the various subsystems of the vehicle.

b. Scope of training encompassing all tasks assigned to each category of maintenance and supporting MOS's based upon Logistic Support Analysis and MANPRINT analyses.

3.7.3. SUPPORT EQUIPMENT:

3.7.3.1. COMMON/SPECIAL/PECULIAR TOOLS AND EQUIPMENT: Requirements for common tool sets and kits; common Test, Measurement and Diagnostic Equipment (TMDE) and common maintenance (shop) equipment shall only be satisfied by selecting items available to the assigned MOS at the proper maintenance level, in accordance with supply catalogs for common tool sets and kits and with the current Tables of Organization and Equipment (TOE), future TOE and Tables of Distribution and Allowance (TDA) for the units that will employ and support the equipment being procured. Tools, TMDE and maintenance (shop) equipment that are not available to the assigned MOS at the proper maintenance level, not listed in the applicable supply catalogs and are not applicable to the TOE/TDA units that will support the equipment being procured shall be considered special. Requirements for recommended special tools, special TMDE and special maintenance (shop) equipment shall be satisfied by selecting items in the following order of preference: (1) items already in the Army supply system; (2) items already in the DOD supply system; (3) items already in the Federal/NATO supply system; (4) commercially available items not in the Federal/NATO supply system; (5) modification of existing items; (6) design and development of items specially to support the equipment being procured.

3.7.3.2. TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE): Provisions in the design of the AGS shall be made to facilitate use of TMDE, currently type classified in the DOD inventory, to permit rapid and simple fault isolation of defective components, assemblies, modules and to diagnose failures of the modules. To the extent possible, external TMDE shall be minimized via BIT/BITE and embedded diagnostics. The vehicle shall be designed to accommodate the use of Simplified Test Equipment/Internal Combustion Engine-Reprogrammable (STE/ICE-R) at maintenance. Test programmers for use in support of tasks at DS or GS categories of maintenance not presently in the DOD inventory, shall be developed concurrently with the AGS system to be compatible with the Direct Support Electronic Systems Test Set (DSESTS) and the Integrated family of Test Equipment.

3.7.3.2.1. STE/ICE-R DIAGNOSTIC CONNECTOR ASSEMBLY (DCA): The vehicle will provide (a) DCA(s) with direct and unrestricted access to the DCA(s) for STE/ICE-R. The Diagnostic Connector, TACOM Drawing 12258941, on the vehicle will interface with the STE/ICE-R test equipment.

3.7.3.2.1.1. VEHICLE TEST POINTS: The automotive portion of the AGS will be equipped with those test points enabling fault isolation to individual propulsion system LRU's and other automotive LRU's monitorable using test points and transducers with 90% confidence. As a minimum the vehicle will be

equipped with test points provided IAW Table C-2 of CR 82-588-033, Revision 1. A fuel shut off method will be provided for running compression unbalance tests.

3.7.3.2.1.2. TURRET, CANNON, AND FIRE CONTROL SYSTEM: Adequate test points integrated into (a) diagnostic connector(s) P/N 1225891, providing for fault isolation to each turret, cannon and fire control system LRU (monitorable via electronic means) individually with a 95% confidence level. No evidence of failure rate utilizing the diagnostic connector assembly and STE/ICE-R shall not exceed 5%. MIL-STD-2165 shall be employed as a design guideline for the diagnostic connector assembly test points.

3.7.3.3. TEST PROGRAM SETS: Test program sets shall be provided for off-vehicle DS repair of electronic LRU's. The TPS shall employ the C-ATLAS language to be initially fielded with DSESTS. The TPS's shall be provided such that they function on the IFTE Base Shop Test Facility when it is deployed.

3.7.4. TECHNICAL MANUALS: Technical manuals (TMs) will be provided to support AGS operation and maintenance. TMs provided shall either be authenticated commercial manuals or Department of the Army TMs. Depot Maintenance Work Requirements (DMWRs) and Battlefield Damage Assessment and Repair (BDAR) will be developed during production. The Transportability Guidance Technical Manual will be developed by the government.

3.7.5. SUPPLY SUPPORT: The AGS will be supported by the Army supply system in accordance with AR 700-18. The contractor shall provide a system support package to support all government testing. The first two years of production vehicles will be supported using Spares Acquisition Integrated with Production (SAIP) for AGS unique spare and repair parts.

3.7.6. INTERCHANGEABILITY: Insofar as performance requirements permit and to the degree which it is economically feasible interchangeability of parts between the AGS and other contemporary NATO materiel shall be attained. Components used in this vehicle shall be considered for a family of vehicles.

4. QUALITY ASSURANCE PROVISIONS

Section 4 of the AGS specification is not available at this time. Section 4 is currently undergoing final draft. Interested parties are hereby notified that Section 4, Quality Assurance Provisions, is a requirement of the AGS performance description and will be incorporated with the purchase description for the request for proposal (RFP). Section 4 is reflective of the requirements of Sections 3 and 5, and will include provisions for First Article Testing, Component Qualification, Control Testing, Comparison Testing, and Production Acceptance Tests and Inspections. Section 4 is being written and formated I.A.W. MIL-STD-961.

5. PREPARATION FOR DELIVERY

5.1 Level of Protection. The vehicle shall be processed to the specified level of protection, in accordance with the vehicle processing requirements, developed by the contractor and approved by the Government prior to delivery of the first vehicle (see 6.2).

6. NOTES

6.1 Intended Use. This vehicle is intended for use by the Armed Forces as a combat vehicle.

6.2 Ordering Data. Acquisition documents should specify the following:

a. Title, number, and data of this purchase description.

b. Vehicle nomenclature, drawing number and data.

c. If a three color camouflage pattern is required (see 3.4.17.3.2).

d. If responsibility for inspection shall be other than as specified.

e. If responsibility of test equipment shall be other than a specified.

f. If inspection conditions shall be other than as specified.

g. If preproduction inspection is required.

h. If initial production inspection shall be other than as specified.

i. The level of protection for vehicle processing (see 5.1).

6.3 Definitions.

6.3.1 AGS Configuration. The AGS shall consist of one vehicle. Survivability package(s) using Energetic armor are acceptable to meet the required ballistics protection.

6.3.1.1 Base Vehicle (LVAD Configuration). The base vehicle shall consist of the Low Velocity Air Drop (LVAD) weight, not to exceed 35,500 lbs. It shall have the base level of ballistics protection and be able to derig and fight upon landing. There shall be fuel for 160 km, ten (10) main gun, 1000 coax, and 100 .50 cal rounds of ammunition, and OVE included in the 35,500 lbs. The commander's weapon may be stored as well as antenna; but, all other equipment shall be in a ready fight mode.

6.3.1.2 RO/RO Configuration. The next vehicle level shall be the Roll-on/Roll-off (RO/RO) version (42,000 - 44,800 lbs). This verson provides the next level of protection and still be accommodated by the C-130 aircraft.

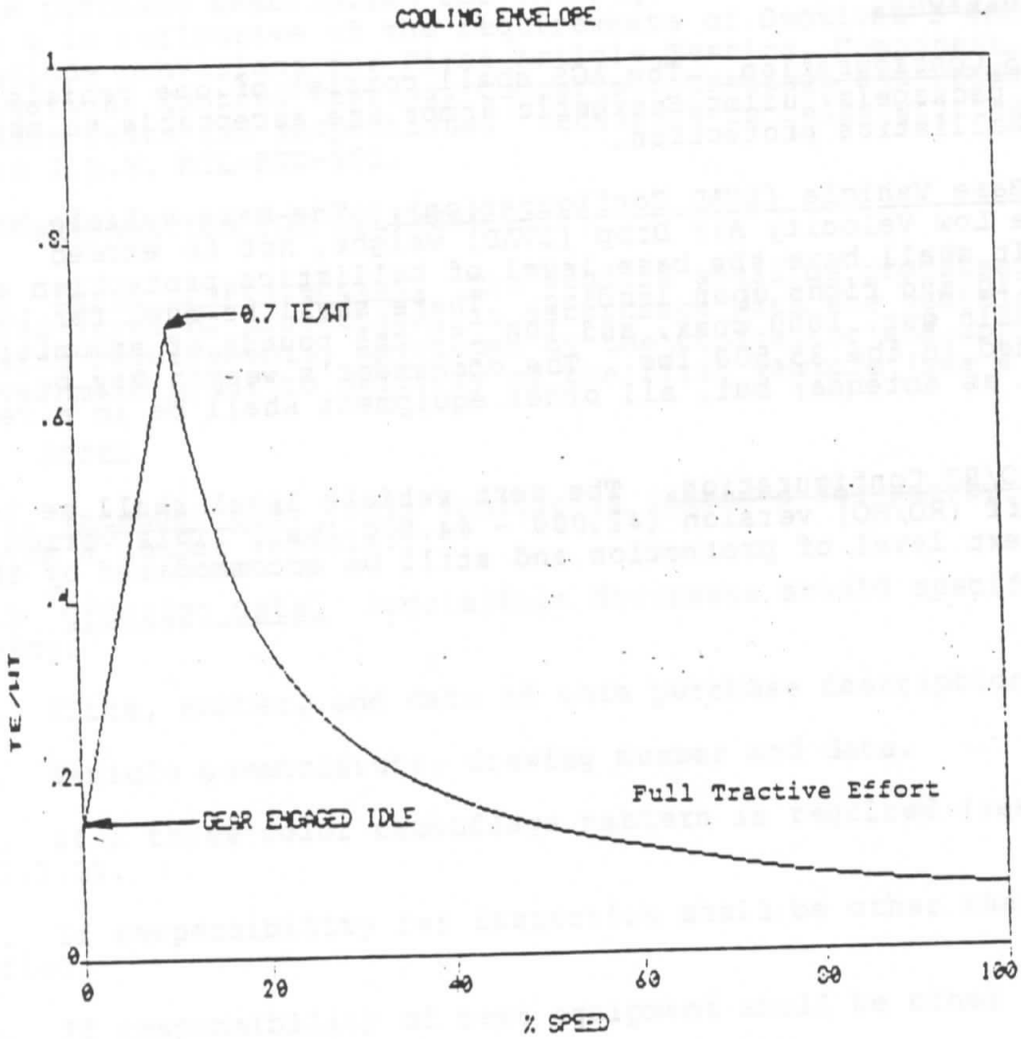

FIGURE 1. Cooling Envelope

APPENDIX A
(see 6.4)

APPENDIX B

Basic Issue On-Vehicle Equipment (OVE). Provisions shall be made for the storage of crew personal gear and of the following items of equipment on and outside the AGS:

Description	NSN	Qty
Ax, Single Bit	5110 00 293 2336	1
Mattock, Pick	5110 00 243 2395	1
Shovel	5120 00 293 3336	1
Handle, Mattock	5120 00 288 6584	1
Carrier, Wire Cutter	5140 00 261 4994	1
Wire Cutter	5110 00 595 8229	1
Grease Gun	4930 00 253 2478	1
Lube Gun, Extension	4930 00 288 1511	1
Hammer, 2 lbs.	5120 00 224 4047	1
Funnel, Flexible Neck, 18 inches		1
First Aid Kit	6545 00 922 1200	1
Oiler, Hand Pump	4930 00 262 9408	1
Lantern, Electric, 6V	6230 00 498 9408	1
Flashlight, Direction, Signaling	6230 00 926 4331	2
Bar, Crow, 24 inches		1
Bar, Pinch, 5 feet	5120 00 240 6040	1
Bar, Pinch	5120 00 526 6044	1
Can, Water, Plastic	7420 00 089 3827	3
Stove, Cooking w/case	7310 00 285 6155	1
Spout, Can, Flex	7420 00 177 6154	1

Flag Set M238	8345 00 375 0223	1
Mittens, Asbestos	8414 00 266 8843	1
Jack, Hydraulic, Hand (12 ton)	5120 00 224 7330	1
Machete, w/Sheath		1
Saw, Hand, Bow-Type		1
Reflector, Highway, Hazard		1
Cover, Engine Grille		1
Padlock, Key operated		as appropriate
Keys, f/padlock		as appropriate
Strap, webbing w/buckle		as appropriate
Periscope, Driver's (spare)		1
Cable, Slave	6150 01 022 6004	1
Cable, Intervehicle, 12 contact		1
Cable, Tow (Snatch Cable Desired)	4010 00 767 3149	1
Decontamination Apparatus	4230 00 720 1618	1
Bulbs & fuses (spares)		as required
Bag, spent cartridges		as appropriate
Bag, Tool	5140 00 473 6256	1
Weapon Tool		as appropriate
Lug Wrench, w/Bar		1
Gun Fluid, Direct Delivery		1
Weapons Covers, Canvas		as required
Cleaning Equipment, f/weapons		as required
Brush, Oval, Bristle		2
Extension, Socket Wrench		as appropriate
Handle, Socket Wrench, Ratchet, Reversable		as appropriate

Sockets		as appropriate
Screw Driver(s)		as required
Wrench, Box		as required
Wrench, Open End, fixed		as required
Wrench, Allen		as required
Wrench, Adj, Open End, 12 inches	5120 00 264 7967	1
Bag Assy, Pamphlet	2540 00 670 2459	1
Folder, Equipment Record	7530 00 065 0166	1
Tarpaulin, Cotten (Lt Wt) 17x12 ft.	8340 00 841 6456	1
Extinguisher, Fire, Moncbro	4210 00 555 8837	1
Binocular, M91A1	1240 11 930 3833	1
Cable Telephone, WD-1/TT on DR-9	61450 00 226	2
Goggles, Night Vision AN/PVS-5	5855 00 150 1820	1
Panel Marker, Aerial Liaison VS-17-GVS	8350 00 174 6864	2
Radio Set, AN/VRC-12 or its future replacement		1
Intercommunications Set AN-VIC-1 or its future replacement		1
Radio Set Accessory Kit		1
Speech Security Equipment		1
Reeling Machine, Cable, Hand, RL-39	3895 00 498 8343	3/Platoon
Box, Grenades	2540 00 996 0714	2
Telephone Set, TA-1	5805 00 521 1320	3/Platoon
Detection Kit, Chemical Agent, M256		1
Mask Chemical, Biological, Protection M25A1		1/Crewmember
Clothing Chemical, Biological, Protection		2
Muzzle boresight device for main weapon (TBD)		per crewmember