

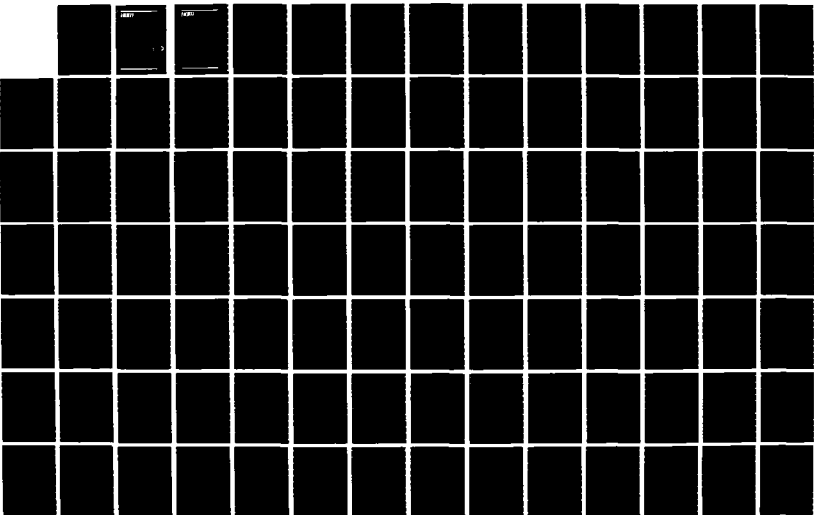
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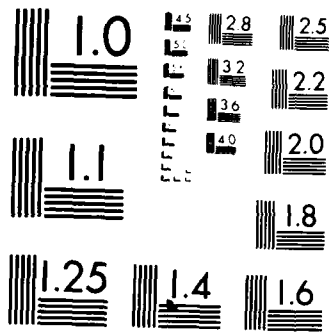
HUMAN FACTORS ENGINEERING DATA BASE DEVELOPMENT FOR
ARMORED COMBAT VEHICL. (U) BDM CORP ALBUQUERQUE NM
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Human Factors Engineering Data Base Development for Armored Combat Vehicles and Analyses of Three NATO Tank Systems

Volume I - Data Base Development and Methodology

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VOLUME I
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FOREWORD

This document, Human Factors Engineering Data Base Development for Armored Combat Vehicles and Analyses of Three NATO Tank Systems, BDM/ABQ-86-0608-TR, is presented to the U.S. Army by The BDM Corporation, 1801 Randolph Road, Albuquerque, New Mexico 87106.

This document was written by T. O'Brien and R. Smith of The BDM Corporation and L. Wascher of the U.S. Army Human Engineering Laboratory.

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Special recognition is extended to the personnel of the U.S. Army Patton Museum, Ft. Knox, KY (Mssrs. Steve Maxham and David Holt) and to those of the Ft. Knox maintenance and restoration shop (Mssrs. Larry Roederer and Bill Jenkins) for their outstanding cooperation and assistance. This effort could not have been accomplished without their cheerful help.

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CHAPTER I
INTRODUCTION

A. BACKGROUND

The U.S. Army Human Engineering Laboratory (HEL), located at Aberdeen Proving Ground, MD, provides human factors research and development support to all of the Army Commodity Commands and Project Managers in the Army Materiel Command (AMC). Among other tasks, the HEL performs human factors engineering analyses (HFEAs) on major materiel development items before the Army's decision to proceed with further development or production.

The U.S. Army Foreign Science and Technology Center (FSTC) is located at Charlottesville, VA, and provides all-source, worldwide, scientific, and technical intelligence to meet the requirements of the AMC, Defense Intelligence Agency, and others. Specific responsibilities of FSTC include identifying scientific and technological threats to the security of U.S. Army ground forces, forecasting foreign military trends and developments; identifying foreign equipment improvements that could benefit U.S. weapon and equipment systems, and pinpointing deficiencies in foreign military developments.

Recently, the HEL and FSTC identified a joint need to develop a human engineering data base for foreign combat vehicles. Initial efforts will concentrate on foreign friendly vehicle types. Later efforts may include threat combat vehicles.

The following report represents an initial three-phase effort to develop a human engineering data base for armored combat vehicles. In the first phase, the contractor developed a data base to include all possible soldier-materiel interface (SMI) characteristics of armored combat systems that would be useful in the HFEA. Soldier-materiel interface data included measurements in accordance with military standard human engineering criteria, subjective ratings by system evaluators, actual (although limited) human performance operational data, and information taken from open source literature.

For the second phase, human engineering contractor personnel conducted HFEAs on three foreign armored combat vehicles chosen by HEL. They are the French AMX-13 tank, and the British Centurion and Chieftain main battle tanks. The HFEA methodology (checklist) is founded on the data base developed in Phase One.

Finally, the third phase involved the generation of a technical report (this document) of the HFEAs. This report follows as closely as practicable the format described in HEL Memo 70-9 for the conduct of HFEAs. The HFEAs are presented as separate volumes with accompanying attachments of human engineering data.

The reader should note that the purpose of the HFEA, as originally intended, is to review the status of human factors engineering in an acquisition program to determine whether any SMI problems exist which would preclude the scheduled transition of the program into the next phase. The HFEAs reported herein serve to accomplish the same basic mission; that is, to identify salient human factors engineering and other MANPRINT (Manpower and Personnel Integration) problems as well as design advantages of the foreign combat systems being evaluated. The only difference is that instead of providing recommendations relative to decisions concerning materiel acquisition, the HFEA on foreign equipment may identify human engineering strengths and weaknesses of foreign designs which could be exploited in the future designs of U.S. combat vehicle systems. The HFEAs of foreign systems may also allow U.S. Army tacticians additional information when formulating engagement strategies for future combat scenarios.

B. ACCESS TO TARGET VEHICLES

The scope of the traditional HFEA, as outlined in HEL Memo 70-9, includes human performance and soldier-equipment interface data, health hazard assessments, system safety, manpower, personnel, and training characteristics as they apply to the design of equipment, facilities and procedures. The HFEA also includes an analysis of the impact of soldier performance on system reliability, effectiveness, and operational availability and maintainability, given that sufficient data are obtainable.

For this effort, evaluators were restricted to the type, quality, and amount of data that could be collected because of the limited access to the target vehicles. Of course, these same (or more severe) restrictions could be faced when evaluating any foreign system where access is difficult and the condition of the equipment may have resulted from neglect of maintenance, from age, or from combat.

Crews were not available to answer questions and point out operational/maintenance characteristics to evaluators.

For all the restrictions, data was collected on dimensional measurements of crew stations, including display/control distances, seating (where seats were available), viewing, and other measurements of this type. However, all of the systems lacked some of the equipment, such as seats, machine guns, main gun rounds, and IR devices, preventing a complete data collection effort. Because the systems were inoperable, operator/maintainer performance could not be measured. Only subjective evaluator ratings and comments could be considered. For example, evaluators attempted to rate the ease of ingress/egress to and from the turret area of the Chieftain without being able to actually traverse the turret to the necessary position. The engine, drive train, and other maintenance points normally considered in the HFEA could not be accessed for evaluation because of the storage conditions of the vehicles. Manpower, personnel, and training also were not addressed in the evaluation for the same reasons.

However, even with the severe restrictions and limitations imposed, evaluators were able to glean a considerable amount of information about the systems' human engineering design based on dimensional measurements and subjective ratings.

CHAPTER II
APPROACH

The overall effort consisted of three phases. Phase One required the development of a Human Factors Engineering Armor Data Base while Phase Two involved an actual Human Factors Engineering Analysis (HFEA) on-site at Ft. Knox, KY, based on the data generated in the first phase. This report concludes Phase Three, Documentation.

Briefly, during the first phase, the contractor developed a near-exhaustive list of human factors engineering (HFE) data elements applicable to armored combat vehicles. From an initial 300-plus possible human factors data points, approximately 100 were chosen for final inclusion in the checklist. The next phase required evaluators to access the three vehicles targeted by HEL for evaluation and, using the data elements in a checklist fashion, to collect on-site as much of the data as possible given the restrictions mentioned previously.

Appendix A contains the HFE data elements identified during the initial phase of the effort. The files were developed with two purposes in mind. First, human factors professionals would be able to employ the same data elements in a checklist methodology to conduct future evaluations of both foreign systems and materiel under development by the Army. Secondly, the data base was developed so that it could be modified or updated with additional information on SMI characteristics in the future as new sources of information become available.

The Human Factors Engineering Armor Data Base contains eight files. The Pre-analysis Profile consists of general information about the system to be evaluated. The file for Evaluator's Rating Scales and Abbreviations lists seven six-point subjective rating scales which are applied to the majority of subjective data elements. The file also contains a brief list of abbreviations found throughout the data file. The General Boarding and Movement file addresses data elements such as handholds/ footholds, boarding access, non-slip surfaces, and so on. The next four files contain data elements pertinent to each of the crew stations found in most combat vehicles. The files address stations for the driver,

gunner, commander, and loader. File elements include seating, viewing, controls/displays, personnel movement, anthropometry, and more.

Finally, the files on crew integration, safety, and health hazards include on-board stowage, toxic fumes hazards, ventilation, and other system-wide SMI considerations. Other health hazard considerations are included among the data lists for individual crew stations. These include steady-state and impulse noise levels and whole body vibrations.

The lists were also constructed to allow for input from developmental and operational testing conducted by the countries associated with each system. Data may also incorporate the results of human engineering testing of U.S. weapons systems as part of materiel acquisition programs.

Complete data bases for each of the target vehicles are included as attachments to Volumes I through IV. The remainder of this report describes briefly how the data were generated, provides a general description of each system subjected to the HFEA, and identifies the methodology used in the evaluation. A comparative analysis based on each system's strengths and weaknesses relative to SMI characteristics is also provided.

Also, Appendix B contains a further abbreviation of the data list found in Appendix A. The abbreviated version provides an example of how only subjective data may be selected for an evaluation in which objective information (i.e., toxic fumes, noise levels, etc.) would not be available for collection during access to target vehicles.

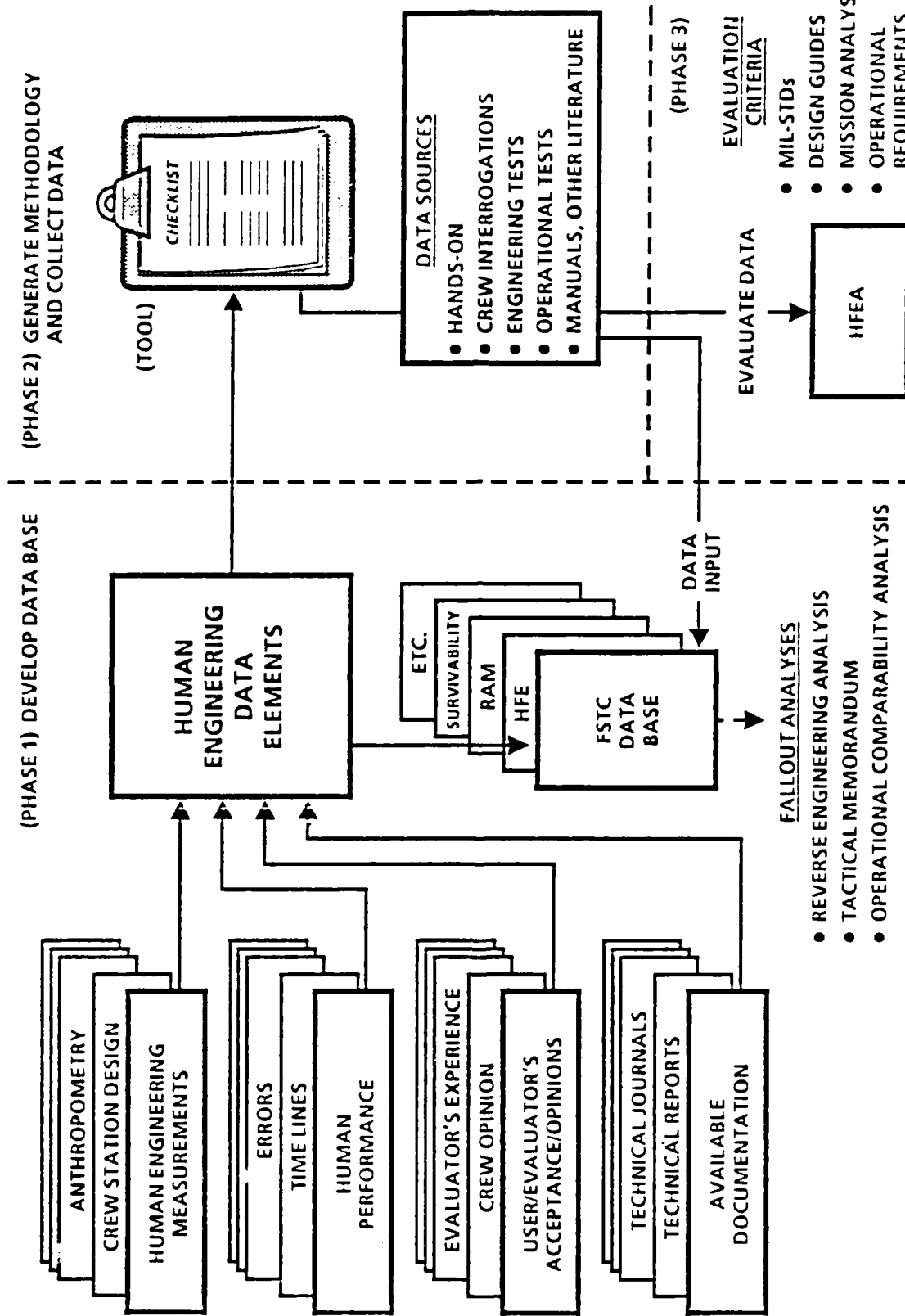
CHAPTER III
METHODOLOGYA. THREE-PHASE APPROACH

Figure III-1 shows graphically the three-phase effort to develop a human factors data base for armored combat vehicles, validate the data base/checklist methodology, and finally, to document the process and results in this report. As Figure III-1 depicts, the initial efforts are directed toward establishing soldier-system factors based on four sources: human engineering design standards and guidance documents, user comments and opinions, open literature describing armored combat vehicles, and human performance requirements (e.g., operational requirements, mission area analyses, etc.).

B. DATA BASE DEVELOPMENT

An IBM personal computer ("IBM PC") was used to construct the human engineering data files. This method of generating separate "libraries" of human factors engineering data for each type of weapon system was found to be inexpensive and easy to work with.

Human factors engineering data for armored combat vehicles were generated based on several sources. First, available documentation on human engineering design, such as MIL-HDBK-759A, was used to identify human engineering characteristics of systems as they apply to armored combat vehicles. Elements that the evaluator considered important to conduct a complete HFEA were included. Some elements, although relevant to the design of systems, were omitted. Examples of such "noncritical" data are contrast values between flags and backgrounds under varying ambient lighting conditions, letter and numeral height for large screen displays, etc. Also, only those data elements that could reasonably be expected to be measured or accounted for by some means during a field evaluation, or those elements which may readily be available through the developmental community, were chosen.



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Figure III-1. Human Engineering Data Base and Methodology Development

In addition to the subjective data elements generated by contractor personnel, a large number of elements were borrowed from a checklist provided by the HEL Combat Vehicle Team personnel for conducting evaluations of armored combat vehicles. HEL's checklist, or self-administered survey, was developed as a means for HEL's Human Engineering Armored Team (HEAT) team members to evaluate the SMI of foreign systems. Checklist items reflect human engineering elements of MIL-STD-1472C as well as other information useful in an evaluation of this type. Many items from the HEAT Team's checklist were selected and reformatted for use in the data base during Phase One. This type of data allows an evaluation team to contribute their own subjective impressions of the target vehicles based on personal experience. Subjective data can be highly valuable in judging a system's SMI, especially when measurements of human performance and fighting station design are not available or when circumstances preclude their measurement. Subjective items either were assigned a six-point rating scale or sufficient space next to the query for "YES/NO" and space for general "Comments" was provided. Ratings were tabulated as descriptive statistics to support the evaluation.

An abbreviated version of the data base is provided in Appendix B. Here, data requiring sophisticated instrumentation to measure characteristics such as noise, lighting, etc. were omitted. This shortened version (or one that may be modified in the same manner as Appendix B) may best be exercised as a tool for future HEL HEAT Team evaluations where such equipment may not be available or where access to systems may preclude measurement of characteristics mentioned above.

Other data base elements requiring measurements of soldier-system factors were drawn directly from military standard criteria and design guidance documentation. This included data concerning seating and workspace dimensions, noise, toxic fumes, anthropometry, and more. Because of restricted access to the vehicles, the state of repair and operability, only a portion of these measurements could be made during the evaluation in Phase Two. Evaluators were able to perform crew station measurements simply with the use of a tape measure. Also, some outside visibility estimates were made at stations provided with periscopes.

All other data not referenced by military standards or other documentation came from the evaluator's personal experiences in systems human engineering design, test and evaluation.

C. INSTRUMENTATION

The HFEA was conducted at Ft. Knox, KY. The following are tools and material used to perform the evaluation:

- (1) Tape measure
- (2) Drop light with 50 feet of extension cord
- (3) Clip boards
- (4) Evaluation checklists
- (5) 35mm Camera with flash
- (6) 400 Speed color print film
- (7) 100 Speed color print film.

D. ACCESS TO VEHICLES

The British Centurion Tank was on display in the U.S. Army Patton Museum, located on post at Ft. Knox, KY. Access to the system was provided during the weekday morning hours and on the weekend.

The British Chieftain and French AMX-13 tanks were located in maintenance buildings 1531 and 1539 on post. Access was provided during the weekday, normal working hours.

All three vehicles were in various states of repair at the time of the evaluation. The systems were inoperable, except for the manual traverse and elevation controls. However, because the vehicles were housed in buildings, evaluators were restricted to only partial turret manual operation. Outside viewing was restricted for the same reasons. A separate light source was provided for working inside vehicles.

Crews were not available to answer questions and point out operating and maintenance characteristics to evaluators.

CHAPTER IV
SUMMARY AND CONCLUSIONS

Volumes I through IV with attachments are the results of the human factors engineering analyses conducted on the British Centurion and Chieftain Main Battle Tanks and the French AMX-13 Light Tank. Salient soldier-materiel interface characteristics discovered during the evaluation proper at Ft. Knox, KY are reported. The evaluation identifies overt strengths and weaknesses of each system relative to its human engineering design. Finally, each evaluation provides a brief discussion of British versus French design preferences, in as much as the limited crewstation design and anthropometric data allowed from Phase Two efforts.

One of the original goals of this effort was to develop a human factors engineering data base for armored combat vehicles. Several hundred data items were gleaned from a variety of human factors sources including human engineering design standards, Army noise limits, design guidance, test procedures, and input from experts in the field of armor. From the many potential data items, only those were selected that might contribute significantly to the HFEA.

Referring again to Figure III-1, Phase One, Data Base Development, demonstrated the feasibility of constructing a meaningful and manageable set of soldier-system interface data to satisfy both the requirements of the Army Foreign Science and Technology Center and the Army Human Engineering Laboratory for a human factors engineering armor data base. The data generated in the first phase were used during Phase Two in a checklist fashion to conduct HFEAs on three foreign tank systems at Ft. Knox, KY. Phase Three is completed with the documentation (this report) of the human engineering data base and the results of the HFEAs conducted on the NATO tank systems.

The true test of a system's human engineering design is the demonstrated efficiency, safety, and effectiveness with which the soldier can perform tasks critical to system operation and maintenance. Unfortunately, with but a few exceptions, the evaluation did not allow direct

observation and measurement of human performance. Nonetheless, evaluators learned a great deal about British and French design practices relative to soldier-materiel interface characteristics. Evaluators can only predict in general terms the expected levels of soldier performance based on static data until the opportunity presents itself to gather dynamic performance data on tasks such as target servicing, surveillance, noise levels, maintenance times, and other soldier-system factors.

This effort also demonstrated an efficient, low-cost use of contractors to augment the expert capabilities of Government human factors engineering personnel. Future efforts to develop additional human engineering data bases in other mission areas and to conduct human factors engineering analyses could rely on contractor technical services, provided funding is made available for such purposes.

The effort showed that soldier-system factors could be developed into a data base addressing at least one mission area, that of armored combat vehicles. Using the same approach as seen in Phase One of this effort, it is possible to construct additional human factors engineering data bases in artillery, air defense, C3, individual combat, combat support, and other mission areas.

Finally, with newer computer technologies available, it is now possible to include photographic, high-resolution images in this type of data base system. Here, photographs of crewstations or weapons components can be digitized, stored, and retrieved along with the other human factors data. This microcomputer-based method would facilitate the analysts's job by providing the "picture worth a thousand words."

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LIST OF ACRONYMS

HEL	Human Engineering Laboratory
FSTC	Foreign Science and Technology Center
AMC	Army Materiel Command
HFEA	Human Factors Engineering Analysis
HFE	Human Factors Engineering
SMI	Soldier-Materiel Interface
HEAT	Human Engineering Armor Team
MBT	Main Battle Tank
MOPP	Military Oriented Protective Posture
RMG	Ranging Machine Gun
NBC	Nuclear, Biological, Chemical
SRP	Seat Reference Point
CVC	Combat Vehicle Crewman

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APPENDIX A
HUMAN FACTORS ENGINEERING DATA BASE
FOR ARMORED COMBAT VEHICLES

Human Factors Engineering Data Base
File Name: AMR6
Crew Integration, Safety, Health Hazards

- 7000 CVC helmet, effectiveness to protect against injury, rating scale 6 (1-6)
- 7002 CVC helmet, effectiveness of helmet communications device, rating scale 6 (1-6)
- 7006 Crew, feasible to cross-train crewmembers in all functions of the vehicle? (Yes/No; comments)
- 7010 Crew, effectiveness of operation of vehicle in degraded mode, 3 man crew, rating scale 6 (1-6)
- 7012 Crew, effectiveness of operation of vehicle in degraded mode, 2 man crew, rating scale 6 (1-6)
- 7020 Crew, workload, probability of workload breakdown during combat operations, rating scale 7 (1-6)
- 7022 Crew, driver workload, simulated combat, (numerical score on SWAT)
- 7024 Crew, cmdr workload, simulated combat, battle management, (numerical score on SWAT)
- 7026 Crew, gnr workload, simulated combat, (numerical score on SWAT)
- 7028 Crew, ldr workload, simulated combat, (numerical score on SWAT)
- 7040 NBC/Arctic gear, considering design of vehicle, probability of NBC/arctic gear degrading crew performance of critical tasks, rating scale 7 (1-6)
- 7042 NBC/Arctic gear, probability of NBC/arctic gear interfering with emergency egress from vehicle, rating scale 7 (1-6)
- 7044 NBC/Arctic gear, probability of NBC/arctic gear interfering with emergency egress, rating scale 7 (1-6)
- 7046 NBC/Arctic gear, adequacy of workspace to permit efficient donning/doffing of NBC/arctic garb, rating scale 1 (1-6)
- 7048 NBC decontamination, effectiveness of procedures, rating scale 6 (1-6)
- 7050 NBC decontamination, type of decontamination agent in use, (text)

- 7052 NBC decontamination, probability of damaging exposed, sensitive instruments/equipment w/decon agent, rating scale 7 (1-6)
- 7056 Water stowage, capacity, (liters; gals)
- 7058 Water stowage, accessibility to stowed water, rating scale 4 (1-6)
- 7064 Water stowage, effectiveness of stowage to avoid interference with crew activities, rating scale 6 (1-6)
- 7066 Water stowage, accessibility to each crewmember, rating scale 4 (1-6)
- 7068 Water stowage, ease of refilling water stowage container, rating scale 2 (1-6)
- 7070 Water stowage, time to refill water stowage container, (seconds)
- 7072 Water stowage, probability of damage to stowage container from vehicle motion, crew handling, etc., rating scale 7 (1-6)
- 7074 Water stowage, adequacy of insulation of water supply against extreme heat/cold, rating scale 1 (1-6)
- 7076 Ventilation, location of fresh air intake, distance from engine/other exhausts, (text; mm; in.)
- 7078 General, adequacy of interior space for extended ops; crew work/rest cycles, rating scale 1 (1-6)
- 7080 General, probability of crew injury from turret traversal, elevation/depression of main weapon, rating scale 7 (1-6)
- 7082 General, adequacy of padding of protruding objects to protect crew from injury, rating scale 1 (1-6)
- 7090 Toxic fumes, probability of task degradation because of CO, NH3, NO2, or SO2 concentrations, rating scale 7 (1-6)
- 7092 Toxic fumes, health hazards imposed on crew, rating scale 5 (1-6)
- 7094 Toxic fumes, level of CO, turret, automotive, closed hatch, (PPM; COhB)
- 7096 Toxic fumes, level of CO, turret, main gun firing, closed hatch, 6 rnds, (PPM; COhB)
- 7098 Toxic fumes, level of CO, turret, main gun firing, closed hatch 10 rnds, (PPM; COhB)

- 7100 Toxic fumes, level of SO₂, turret, main gun firing, closed hatch, 6 rnds, (PPM)
- 7102 Toxic fumes, level of SO₂, turret, main gun firing, closed hatch, 10 rnds, (PPM)
- 7104 Toxic fumes, level of NO₂, turret, main gun firing, closed hatch, 6 rnds, (PPM)
- 7106 Toxic fumes, level of NO₂, turret, main gun firing, closed hatch, 10 rnds, (PPM)
- 7108 Toxic fumes, level of NH₃, turret, main gun firing, closed hatch, 6 rnds, (PPM)
- 7110 Toxic fumes, level of NH₃, turret, main gun firing, closed hatch, 10 rnds, (PPM)
- 7112 Ventilation, bore evacuator provided? (Yes/No; comments)
- 7114 Ventilation, ventilator fan in turret provided? (Yes/No; comments)
- 7116 Ventilation, emergency ventilation system provided? (Yes/No; description/comments)
- 7120 Fire suppression, automatic fire suppression system provided? (Yes/No; description)
- 7122 Fire suppression, overall adequacy of system, rating scale 1 (1-6)
- 7124 Fire suppression system, automatic activation time (milliseconds)
- 7126 Fire suppression, accessibility to system for repair, manual activation, rating scale 4 (1-6)
- 7128 Fire suppression, probability of inadvertent activation, rating scale 7 (1-6)
- 7130 Fire suppression, portable fire extinguisher provided? (Yes/No; comments)
- 7132 Fire suppression, quick accessibility to fire extinguishers, rating scale 4 (1-6)
- 7140 Maintenance, automotive, accessibility to drain valves, rating scale 4 (1-6)
- 7142 Maintenance, automotive, accessibility to oil filters, rating scale 4 (1-6)

- 7144 Maintenance, automotive, accessibility to air filters, rating scale 4 (1-6)
- 7146 Maintenance, automotive, accessibility to engine adjustments, rating scale 4 (1-6)
- 7148 Maintenance, automotive, accessibility to batteries/terminals, rating scale 4 (1-6)
- 7150 Maintenance, interior, accessibility to weapons, rating scale 4 (1-6)
- 7152 Maintenance, interior, accessibility to hydraulics, rating scale 4 (1-6)
- 7154 Maintenance, interior, accessibility to electrical systems, rating scale 4 (1-6)
- 7156 Maintenance, ease of identifying maintenance checkpoints, rating scale 2 (1-6)
- 7158 Maintenance, general adequacy of workspace for performing checks, maintenance services, rating scale 1 (1-6)
- 7160 Maintenance, ease of reading dipsticks, gauge levels, etc, rating scale 2 (1-6)
- 7166 Maintenance, automotive, average time to perform routine maintenance checks, (no. trials; min/sec)
- 7168 Maintenance, automotive, average time to replace oil filter, (no. trials; min/sec)
- 7170 Maintenance, automotive, average time to replace air filter, (no. trials; min/sec)
- 7172 Maintenance, effectiveness of caution/warning labels/placards for PMCS considering size, location, color-coding, etc., rating scale 6 (1-6)
- 7174 Maintenance, special tools required (Yes/No; comments)
- 7178 Maintenance, special tools stowed on-board vehicle? (Yes/No; comments)
- 7180 Maintenance, adequacy of maintenance procedures in terms of complexity, training requirements, etc., rating scale 1 (1-6)
- 7182 Maintenance, specialized diagnostics required? (Yes/No; comments)
- 7184 Maintenance, built-in test/diagnostic equipment provided? (Yes/No; comments)

- 7186 Maintenance, average time to diagnose faults, (no. trials; seconds)
- 7188 Repairs, interior, accessibility to electrical cables/hydraulic lines, rating scale 4 (1-6)
- 7190 Repairs, quality of protection afforded to cables, indicators, etc. against inadvertent damage during repairs, rating scale 3 (1-6)
- 7192 Repairs, cables/indicators, etc., adequacy of labels, color-coding, etc. for easy identification, rating scale 1 (1-6)
- 7196 Stowage, adequacy of design for stowage of replacement items (i.e., road wheels, track blocks, firing pins, etc.) for transport into combat, rating scale 1 (1-6)
- 7198 Battle damage assessment/repair, capability/probability of crew being able to assess/repair damage during combat, rating scale 7 (1-6)
- 7206 Maintenance, ease of removing/replacing power pack, rating scale 2 (1-6)
- 7208 Maintenance, ease of breaking track (consider workspace and linkage assemblies), rating scale 2 (1-6)
- 7210 Maintenance, average time to break track, replace new linkage, (no. trials; min/sec)
- 7214 Refueling, ease of accessing fuel inlet, manipulating with arctic handwear, rating scale 2 (1-6)
- 7218 Stowage, adequacy of space for personnel equipment, NBC garments, individual weapons/ammunition, inside vehicle, rating scale 1 (1-6)
- 7220 Stowage, personnel gear/weapons stowed outside vehicle? (Yes/No; comments)
- 7222 Stowage, adequacy of stowage of combat rations, rating scale 1 (1-6)
- 7224 Stowage, amount of personnel combat rations stowed on-board, (days)
- 7226 Stowage, quick access of personnel weapons/ammunition/grenades, rating scale 4 (1-6)
- 7228 Stowage, accessibility of main gun ammunition, uploading, rating scale 4 (1-6)

- 7230 Stowage, accessibility of coax/cmdr's weapon ammunition, rating scale 4 (1-6)
- 7232 Stowage, adequacy of design to protect against inadvertent ignition/explosion of main gun rnds, rating scale 1 (1-6)
- 7234 Stowage, adequacy of design to protect against inadvertent ignition/explosion of coax/other ammunition, rating scale 1 (1-6)
- 7236 Stowage, method of uploading vehicle, through turret, other means, (text)
- 7238 Stowage, ease of uploading/downloading, main gun ammunition, consider hatches, hull obstructions, etc., rating scale 2 (1-6)
- 7240 Stowage, average time to upload, main gun rnds, (no. trials; min/sec)
- 7242 Stowage, average time to upload, coax, other ammunition, water, rations, (no. trials; min/sec)
- 7244 Stowage, relative difficulty uploading main gun rnds, NBC MOPP-4/collective protection system, rating scale 2 (1-6)
- 7246 NBC, type of individual ensembles (text)
- 7250 Combat operations, pre-combat systems checks required?(Yes/No; comments)
- 7252 Combat operations, average time to conduct pre-combat systems checks, (no. trials; min;sec)
- 7254 Combat operations, ease of boresighting/zeroing main gun, rating scale 2 (1-6)
- 7256 Combat operations, average time to boresight/zero main gun, (no. trials; min;sec)
- 7258 Combat operations, effectiveness of procedures for rapid, logical sequence of firing commands, rating scale 6 (1-6)
- 7566 Combat operations, multiple concurrent tasks required during target acquisition, tracking, firing, reloading main weapon? (Yes/No; comments)
- 7568 Combat operations, probability of system exceeding physical and/or mental capabilities of crew during combat, rating scale 7 (1-6)
- 7570 Combat operations, probability of vibrations/accelerations causing adverse effects on vehicle, rating scale 7 (1-6)

- 7576 Combat operations, effectiveness of battle management operating within platoons, rating scale 6 (1-6)
- 7578 Training, system design accommodating to training aids, instructional devices, NET?(Yes/No; comments)
- 7586 Extended operations, method provided for waste elimination? (Yes/No; comments)
- 7594 Smoke grenades, ease of reloading, rating scale 2 (1-6)

Human Factors Engineering Data Base
File Name: AMR5
Loader's Station

- 6000 Ldr sta, seat back dimensions, l x w, (mm; in.)
- 6001 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, seat pan dimensions, l x w, (mm; in.)
- 6004 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, seat padding thickness, (mm; in.)
- 6006 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, back-rest-to-seat angle, (degrees)
- 6008 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, seat slope, (degrees)
- 6010 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, distance from seat front, top of padding, to floor, (mm; in.)
- 6012 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, vertical adjustability, (range in mm: in.)
- 6014 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, forward-rearward adjustability, (range in mm; in.)
- 6016 Ldr sta, seat, seat pan material, (text)
- 6018 Ldr sta, seat, seat back material, (text)
- 6020 Ldr sta, seat, restraint system provided (Yes/No/ comments)
- 6022 Ldr sta, seat, adequacy of restraint system with vehicle in motion, rating scale 1 (1-6)
- 6030 Ldr sta, seat, MIL-STD-1472C, Table 28 dimension A, Elbow, dynamic, (mm; in.)
- 6034 Ldr sta, seat, MIL-STD-1472C, Table 28 dimension B, Elbow, static, (mm; in.)
- 6036 Ldr sta, seat, MIL-STD-1472C, Table 28 dimension C, Shoulder, (mm; in.)
- 6038 Ldr sta, seat, MIL-STD-1472C, Table 28 dimension D, Knee width, minimum, (mm; in.)
- 6040 Ldr sta, seat, MIL-STD-1472C, Table 28 dimension E, Knee width, maximum, (mm; in.)
- 6042 Ldr sta, seat, MIL-STD-1472C, Table 28 measurement 1, closed hatch, SRP to underside of hatch, seat adjusted fully down, (mm; in.)

- 6044 Ldr sta, seat, MIL-STD-1472C, Table 28 measurement 2, abdominal, seat back to nearest forward object, (mm; in.)
- 6046 Ldr sta, seat, MIL-STD-1472C, Table 28 measurement 4, seat depth, SRP to front edge of seat pan, (mm; in.)
- 6054 Ldr sta, seat, MIL-STD-1472C, Table 28 measurement 7, boot, front of seat pan to nearest object forward, (mm; in.)
- 6056 Ldr sta, seat, effectiveness of ldr's seat, considering adjustability, cushioning, size, and back angle, rating scale 6 (1-6)
- 6058 Ldr sta, seat, adjustable vertically? (Yes/No; comments)
- 6060 Ldr sta, seat, stowable to facilitate standing during loading operations? (Yes/No; comments)
- 6062 Ldr sta, seat adjustable to provide platform for standing and outside viewing/firing ldr's weapon? (Yes/No; comments)
- 6064 Ldr sta, adequacy of seat configured to provide standing platform for open hatch viewing/weapons operation, rating scale 1 (1-6)
- 6066 Ldr sta, seat, material covering seat promote excessive sweating? (Yes/No; comments)
- 6068 Ldr sta, seat, material covering seat become excessively hot during operation in warm/hot climates? (Yes/No; comments)
- 6072 Ldr sta, seat, effectiveness of seat design/placement for seated loading/firing operations, rating scale 6 (1-6)
- 6074 Ldr sta, seat, distance from SRP to nearest main gun round stowed in ready rack, (mm; in.)
- 6076 Ldr sta, seat, distance from SRP to most distant main gun round stowed in ready rack, (mm; in.)
- 6077 Ldr sta, main gun ammo, projectile separate from propellant? (Yes/No; comments)
- 6078 Ldr sta, ease of access and loading of main gun ammo, rating scale 2 (1-6)
- 6090 Ldr sta, objects present preventing free interface with main gun/access to main gun ammo?(Yes/No; comments)
- 6092 Ldr sta, main gun provided with stub case deflector? (Yes/No; comments)

- 6094 Ldr sta, main gun provided with stub case box? (Yes/No; comments)
- 6096 Ldr sta, distance from SRP to stub case box, (mm; in.)
- 6099 Ldr sta, main gun provided with stub/casing retractor tool/device? (Yes/No; comments)
- 6102 Ldr sta, probability of injury during loading/firing operations due to design of workstation, rating scale 5 (1-6)
- 6104 Ldr sta, probability of striking inadvertently the main gun round nose against bulkhead or objects within turret during loading process, rating scale 3 (1-6)
- 6110 Ldr sta, adequacy of workspace to perform rapid loading operations, rating scale 1 (1-6)
- 6112 Ldr sta, danger posed by sliding doors of main gun ammo bustle when accessing ammo, rating scale 5 (1-6)
- 6114 Ldr sta, adequacy of workspace to allow a "safe area" to stand or sit to avoid injury from gun recoil, spent brass, etc, rating scale 1 (1-6)
- 6116 Ldr sta, ease of access to main gun ammo and operation of mechanisms to stow or release ammo, rating scale 2 (1-6)
- 6120 Ldr sta, average time to access main gun ammo, load, lock into breech, (no. trials; type ammo; seconds)
- 6122 Ldr sta, ease of uploading main gun ammunition from semi-ready rack to ready rack, rating scale 2 (1-6)
- 6126 Ldr sta, ease of main gun ammunition resupply through cmdr's hatch, rating scale 2 (1-6)
- 6128 Ldr sta, ease of main gun ammunition resupply through ldr's hatch, rating scale 2 (1-6)
- 6130 Ldr sta, average time to resupply main gun ammunition through cmdr's hatch, full stowage, non-NBC clad, (no. trials; no. rds; min./seconds)
- 6132 Ldr sta, average time to resupply main gun ammunition through ldr's hatch, full stowage, NBC MOPP-4, (no. trials; no. rds; min./seconds)
- 6136 Ldr sta, ease of access to stowed main gun ammunition, rating scale 2 (1-6)
- 6138 Ldr sta, coax, ease of access to load, charge, clear jams as required, non-NBC clad, rating scale 2 (1-6)

- 6140 Ldr sta, coax, ease of access to load, charge, clear jams as required, NBC MOPP-4, rating scale 2 (1-6)
- 6142 Ldr sta, coax, average time to load, non-NBC clad, (no. trials; seconds)
- 6144 Ldr sta, coax, average time to load, NBC MOPP-4, (no. trials; seconds)
- 6450 Ldr sta, coax, ease of dismounting coax for maintenance, rating scale 2 (1-6)
- 6452 Ldr sta, coax, ease of installing coax, rating scale 2 (1-6)
- 6454 Ldr sta, ease of access and operation of all ldr's controls without being subjected to main gun recoil, rating scale 2 (1-6)
- 6460 Ldr sta, ease of loading secondary weapon (i.e., 7.62 MG, .50 Cal MG, etc.), rating scale 2 (1-6)
- 6462 Ldr sta, ease of installing secondary weapon (i.e., 7.62 MG, .50 Cal MG, etc.), rating scale 2 (1-6)
- 6464 Ldr sta, ease of dismounting secondary weapon (i.e., 7.62 MG, .50 Cal MG, etc.), rating scale 2 (1-6)
- 6468 Ldr sta, ease of mounting, loading, dismounting secondary weapon (i.e., 7.62 MG, .50 Cal MG, etc.) with arctic mittens/NBC gloves, rating scale 2 (1-6)
- 6470 Ldr sta, average time to mount secondary weapon from stowed position, (no. trials; seconds)
- 6472 Ldr sta, average time to load secondary weapon, (no. trials; seconds)
- 6474 Ldr sta, accuracy, secondary weapon, average scores, (no. trials; no. rds per trial; percent rds on target)
- 6478 Ldr sta, effectiveness of ldr's periscopic vision, rating scale 6 (1-6)
- 6480 Ldr sta, outside horizontal visibility, ldr's periscopic/vision block system, (degrees, 0-360)
- 6482 Ldr sta, outside visibility, blind spots (text)
- 6484 Ldr sta, outside visibility, vertical viewing, (degrees from horizen)
- 6486 Ldr sta, means provided to clear periscopes/vision blocks

- of frost, dust, etc. without exiting vehicle? (Yes/No; comments)
- 6488 Ldr sta, step (other than seat) provided for ingress to and egress from station? (Yes/No; comments)
- 6490 Ldr sta, location of step for ingress/egress, (text)
- 6492 Ldr sta, dimensions of step for ingress/egress, l x w, (mm; in.)
- 6494 Ldr sta, adequacy of controls/displays for critical tasks, rating scale 1 (1-6)
- 6496 Ldr sta, accessibility of controls, rating scale 4 (1-6)
- 6498 Ldr sta, ease of operation of controls, rating scale 2 (1-6)
- 6510 Ldr sta, quality of visibility of controls/displays for day/night operations, rating scale 3 (1-6)
- 6512 Ldr sta, viewing distance from design eye to nearest display, (mm; in.)
- 6514 Ldr sta, viewing distance from design eye position to most distant display, (mm; in.)
- 6516 Ldr sta, viewing angle from design eye position to worse case primary display, (degrees)
- 6518 Ldr sta, display functions grouped together? (Yes/No; comments)
- 6520 Ldr sta, displays readable, closed hatch? (Yes/No; comments)
- 6522 Ldr sta, displays illuminated? (Yes/No; comments)
- 6524 Ldr sta, displays color-coded efficiently IAW MIL-STD-1472C? (Yes/No; comments)
- 6526 Ldr sta, display color, primary display, (red, blue-green, etc.)
- 6528 Ldr sta, display color, secondary display, (red, blue-green, etc.)
- 6534 Ldr sta, control provided with primary display for variable luminance? (Yes/No; comments)
- 6536 Ldr sta, range of luminance for primary display, (display description; range in lx; ft-L)

- 6538 Ldr sta, control provided with secondary display for variable luminance? (Yes/No; comments)
- 6540 Ldr sta, range of luminance for secondary display, (display description; range in lx; ft-L)
- 6544 Ldr sta, indicator lights grouped together, close to ldr's line of sight? (Yes/No; comments)
- 6566 Ldr sta, indicator lights correctly color-coded IAW MIL-STD-1472C? (Yes/No; comments)
- 6568 Ldr sta, indicator lights testable? (Yes/No; comments)
- 6570 Ldr sta, indicator lights dimmable? (Yes/No; comments)
- 6574 Ldr sta, range of luminance for indicator lights, (indicator light discription; range in lx; ft-L)
- 6576 Ldr sta, direction of control movement for all controls IAW MIL-STD-1472C? (Yes/No; comments)
- 6578 Ldr sta, for instrument panels, indicators, displays/controls, nomenclature used of appropriate size, contrast with background, and readable? (Yes/No; comments)
- 6580 Ldr sta, decals/placards readable, understandable, properly located? (Yes/No; comments)
- 6584 Ldr sta, overall ease of control actuation for all ldr's controls, rating scale 2 (1-6)
- 6586 Ldr sta, force required, worse case, ldr control actuation, (N; lbs)
- 6588 Ldr sta, protective covers/guards placed over controls or switches where appropriate? (Yes/No; comments)
- 6590 Ldr sta, NBC collective protection provided? (Yes/No; description; comments)
- 6592 Ldr sta, if NBC collective protection not provided, describe system, (text)
- 6594 Ldr sta, NBC collective protection, location of interface point with which to hook into hose of individual vest/NBC suit (text)
- 6596 Ldr sta, NBC collective protection, air temp/humidity at mask, full cooling (ambient outside temp/humidity; temp/humid measured at mask, degrees C, degrees, F; Rh)
- 6598 Ldr sta, NBC, type of mask, (text)

- 6600 Ldr sta, NBC collective protection, air flow rate/volume at mask (ft/min; cu ft/min)
- 6640 Ldr sta, general adequacy of NBC collective protection, (mask and vest, bulk dump, etc.), rating scale 1 (1-6)
- 6642 Ldr sta, NBC collective protection, effectiveness of overpressure, rating scale 6 (1-6)
- 6644 Ldr sta, NBC effectiveness of NBC system to strain dust, other non-NBC particulates from outside, rating scale 6 (1-6)
- 6646 Ldr sta, hatch provided? (Yes/No; comments)
- 6648 Ldr sta, hatch, ease of opening/closing from inside vehicle, rating scale 2 (1-6)
- 6649 Ldr sta, hatch, ease of unlocking/opening from outside, rating scale 2 (1-6)
- 6650 Ldr sta, time to egress, from closed hatch position to outside of vehicle, non-NBC clad, (seconds)
- 6651 Ldr sta, hatch, locking mechanism vulnerable to damage by enemy fire? (Yes/No; comments)
- 6654 Ldr sta, time to egress, from closed hatch position to outside of vehicle, NBC MOPP-4, (seconds)
- 6656 Ldr sta, adequacy of hatch in size for 95th percentile arctic garbed male, rating scale 1 (1-6)
- 6658 Ldr sta, hatch dimensions, l x w x d, (mm; in.)
- 6660 Ldr sta, hatch, combat lock provided? (Yes/No; comments)
- 6662 Ldr sta, force required to unlock combat lock, (N; lbs)
- 6664 Ldr sta, adequacy of hatch entry padding, rating scale 1 (1-6)
- 6666 Ldr sta, ease of releasing hatch from secured, open hatch position, to closed hatch position, rating scale 2 (1-6)
- 6668 Ldr sta, force required to release lock-back latch mechanism, (N; lbs)
- 6670 Ldr sta, average time to emergency egress ldr sta, from closed hatch position, non-NBC, (no. trials; seconds)
- 6672 Ldr sta, average time to emergency egress ldr sta, from closed hatch position, NBC MOP-4, (no. trials; seconds)

- 6674 Ldr sta, effectiveness of ldr's unity periscope/vision blocks for surveillance, w/o NBC mask, rating scale 6 (1-6)
- 6676 Ldr sta, effectiveness of ldr's unity periscope/vision blocks for surveillance, w/NBC mask, rating scale 6 (1-6)
- 6680 Ldr sta, location of communications equipment, (text)
- 6682 Ldr sta, ease of operation of com box w/arctic handwear, rating scale 2 (1-6)
- 6684 Ldr sta, speech intelligibility, ldr com equip, CVC helmet, non-NBC, MRT, (percent correct)
- 6686 Ldr sta, speech intelligibility, ldr com equip, CVC helmet, w/NBC mask, MRT, (percent correct)
- 6688 Ldr sta, com equip, space between connector and bulkhead or nearest object, (mm; in.)
- 6690 Ldr sta, quality of speech intelligibility, CVC helmet, non-NBC, rating scale 2 (1-6)
- 6692 Ldr sta, quality of speech intelligibility, CVC helmet, w/NBC mask, rating scale 2 (1-6)
- 6700 Ldr sta, chance of handedness or eye glasses interfering with operations, rating scale 3 (1-6)
- 6702 Ldr sta, general adequacy of interior lighting, rating scale 1 (1-6)
- 6704 Ldr sta, accessibility of controls for interior lighting, rating scale 4 (1-6)
- 6706 Ldr sta, safeguard provided against inadvertent activation of interior lights? (Yes/No; comments)
- 6708 Ldr sta, heater, temperature at ldr's station, (degrees C: degrees, F)
- 6710 Ldr sta, heater, station designed for equal distribution of heat? (Yes/No; comments)
- 6714 Ldr sta, ventilation, non-NBC; effectiveness of fresh outside air ventilation system, rating scale 6 (1-6)
- 6716 Ldr sta, ventilation, non-NBC; air flow rate/volume at station, (ft/min; cu ft/min)
- 6718 Ldr sta, ventilation, non-NBC; proportion fresh outside air provided to station, (percent)
- 6720 Ldr sta, ventilation, non-NBC; variable control provided

for ventilation? (Yes/No; comments)

- 6722 Ldr sta, ventilation, non-NBC; accessibility to ventilation control, 4 (1-6)
- 6728 Ldr sta, steady-state noise hazards, any frequency/condition, rating scale 5 (1-6)
- 6730 Ldr sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 125 HZ, (dBA)
- 6734 Ldr sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 500 HZ, (dBA)
- 6738 Ldr sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 2000 HZ, (dBA)
- 6740 Ldr sta, impulse noise hazards, main gun/coax, rating scale 5 (1-6)
- 6742 Ldr sta, impulse noise, main gun firing, closed hatch, gun pos forward, (A duration; B duration; peak pressure-dBA)
- 6750 Ldr sta, seat vibration, prob of degrading task performance, rating scale 7 (1-6)
- 6752 Ldr sta, whole body vibration, at SRP IAW TECOM TOP 1-2-610, X-axis, (RMS, 30 HZ; RMS, 50 HZ; RMS, 80 HZ)
- 6754 Ldr sta, whole body vibration, at SRP IAW TECOM TOP 1-2-610, Y-axis, (RMS, 30 HZ; RMS, 50 HZ; RMS, 80 HZ)
- 6756 Ldr sta, whole body vibration, at SRP IAW TECOM TOP 1-2-610, Z-axis, (RMS, 30 HZ; RMS, 50 HZ; RMS, 80 HZ)

Human Factors Engineering Data Base

File Name: AMR4

Gunner's Station

- 5000 Gun sta, seat back dimensions, l x w, (mm; in.)
- 5001 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, seat pan dimensions, l x w, (mm; in.)
- 5004 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, seat padding thickness, (mm; in.)
- 5006 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, back-rest-to-seat angle, (degrees)
- 5008 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, seat slope, (degrees)
- 5010 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, distance from seat front, top of padding, to floor, (mm; in.)
- 5012 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, vertical adjustability, (range in mm; in.)
- 5014 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, forward-rearward adjustability, (range in mm; in.)
- 5016 Gun sta, seat, seat pan material, (text)
- 5018 Gun sta, seat, seat back material, (text)
- 5020 Gun sta, seat, head rest material, (text)
- 5022 Gun sta, seat, restraint system provided? (Yes/No; comments)
- 5023 Gun sta, adequacy of restraint system, rating scale 1 1-6)
- 5024 Gun sta, seat, MIL-STD-1472C, Table 28 dimension A, Elbow, dynamic, (mm; in.)
- 5026 Gun sta, seat, MIL-STD-1472C, Table 28 dimension B, Elbow, static, (mm; in.)
- 5028 Gun sta, seat, MIL-STD-1472C, Table 28 dimension C, Shoulder, (mm; in.)
- 5030 Gun sta, seat, MIL-STD-1472C, Table 28 dimension D, Knee width, minimum, (mm; in.)
- 5032 Gun sta, seat, MIL-STD-1472C, Table 28 dimension E, Knee width, maximum, (mm; in.)
- 5034 Gun sta, seat, MIL-STD-1472C, Table 28 measurement 1, SRP

- to closest object overhead, (mm; in.)
- 5036 Gun sta, seat, MIL-STD-1472C, Table 28 measurement 2, Abdominal, seat back to nearest forward object, (mm; in.)
- 5038 Gun sta, seat, MIL-STD-1472C, Table 28 measurement 4, seat depth SRP to front edge of seat pan, (mm; in.)
- 5042 Gun sta, seat, MIL-STD-1472C, Table 28 measurement 7, boot, front of seat pan to nearest object forward, (mm; in.)
- 5044 Gun sta, seat, effectiveness of gunner's seat, considering adjustability, cushioning, size, and back angle, rating scale 4 (1-6)
- 5046 Gun sta, seat, adjustable vertically? (Yes/No; comments)
- 5048 Gun sta, instruments, overall quality of viewing during closed hatch operations, rating scale 3 (1-6)
- 5050 Gun sta, adequacy of lumbar (back) support during cross country maneuvers, rating scale 1 (1-6)
- 5052 Gun sta, seat material promote excessive perspiration during extended operations? (Yes/No; comments)
- 5054 Gun sta, protective guard provided between leg and gun breech? (Yes/No; comments)
- 5056 Gun sta, ease of emergency egress, non-NBC, 95th percentile male, rating scale 2 (1-6)
- 5058 Gun sta, ease of emergency egress, NBC MOPP-4, 95th percentile male, rating scale 2 (1-6)
- 5060 Gun sta, average time to emergency egress from sta, non-NBC, 95th percentile male, (no. trials; seconds)
- 5062 Gun sta, average time to emergency egress from sta, NBC MOPP-4, 95th percentile male, (no. trials; seconds)
- 5064 Gun sta, ease of access to adjustment controls for seat operation, rating scale 2 (1-6)
- 5066 Gun sta, force required to operate seat adjustment controls, (N; lbs)
- 5068 Gun sta, quality of viewing all controls and displays, rating scale 3 (1-6)
- 5070 Gun sta, seat designed to laterally restrain gunner during violent maneuvers? (Yes/No; comments)
- 5072 Gun sta, seat designed so forward edge prevents restricted

- blood flow in popliteal (underside) of leg? (Yes/No; comments)
- 5074 Gun sta, retractable chest support provided? (Yes/No; comments)
- 5076 Gun sta, adequacy of retractable chest support to steady gunner during gunnery operations, rating scale 1 (1-6)
- 5078 Gun sta, dimensions of chest support, l x w x d, (mm; in.)
- 5100 Gun sta, adequacy of workspace to perform powered target acquisition and tracking, rating scale 1 (1-6)
- 5104 Gun sta, adequacy of workspace to perform powered gun lay, rating scale 1 (1-6)
- 5106 Gun sta, average time to acquire targets using GPS, powered mode, (no. trials; range of target in meters; seconds)
- 5110 Gun sta, adequacy of workspace to perform manual target acquisition and tracking, rating scale 1 (1-6)
- 5112 Gun sta, adequacy of workspace to perform manual gun lay, rating scale 1 (1-6)
- 5116 Gun sta, average time to acquire target, manual mode, (no. trials; range of target; seconds)
- 5118 Gun sta, average time to lay on target, manual mode, (no. trials; range of target; seconds)
- 5120 Gun sta, ease of selecting designated ammunition type during main gun firing, rating scale 2 (1-6)
- 5122 Gun sta, effectiveness of range finder during firing procedures, rating scale 6 (1-6)
- 5126 Gun sta, ease of selection of coax or main weapon as desired, rating scale 2 (1-6)
- 5127 Gun sta, accessibility of main gun/coax selector, rating scale 4 (1-6)
- 5128 Gun sta, controls, distance from SRP to nearest control, (mm; in.)
- 5130 Gun sta, controls, distance from SRP to most distant control, (mm; in.)
- 5134 Gun sta, accessibility for operation of all controls, rating scale 4 (1-6)

- 5136 Gun sta, quality of visual access to all controls and displays, day and night operations, rating scale 3 (1-6)
- 5150 Gun sta, location of communications equipment, (text)
- 5152 Gun sta, ease of operation of com box w/arctic handwear, rating scale 2 (1-6)
- 5153 Gun sta, com equip, space between connector and bulkhead or nearest object, (mm; in.)
- 5154 Gun sta, speech intelligibility, gnr's com equip, CVC helmet, MRT, non-NBC, (percent correct)
- 5155 Gun sta, speech intelligibility, gnr's com equip, CVC helmet, MRT, w/NBC mask, (percent correct)
- 5156 Gun sta, quality of speech intelligibility, gnr's com equip, CVC helmet, non-NBC, rating scale 2 (1-6)
- 5157 Gun sta, quality of speech intelligibility, gnr's com equip, CVC helmet, w/NBC mask, rating scale 2 (1-6)
- 5158 Gun sta, effectiveness of communicating with other crew members using hand signals or other non-electronic methods, rating scale 6 (1-6)
- 5159 Gun sta, overall adequacy of controls/displays for critical gunnery tasks, 1 (1-6)
- 5160 Gun sta, controls/displays arranged for optimum usage? (Yes/No; comments)
- 5162 Gun sta, controls/displays; size, shape, spacing appropriate for intended usage? (Yes/No; comments)
- 5164 Gun sta, similar controls/displays grouped for sequential usage? (Yes/No; comments)
- 5165 Gun sta, direction of control movement for all controls correct IAW MIL-STD-1472C? (Yes/No; comments)
- 5166 Gun sta, viewing angle from design eye position to worse case primary display, (degrees)
- 5167 Gun sta, adequacy of control/display illumination, rating scale 1 (1-6)
- 5168 Gun sta, illumination level, open hatch, measured at primary display/control position, (lx; ft-C)
- 5169 Gun sta, illumination level, closed hatch, measured at primary display/control position, (lx; ft-C)

- 5171 Gun sta, adequacy of control/display luminance, rating scale 1 (1-6)
- 5172 Gun sta, displays color-coded efficiently, IAW MIL-STD-1472C? (Yes/No; comments)
- 5174 Gun sta, display color coding, primary display, (red, blue-green, white, etc.)
- 5176 Gun sta, display color coding, secondary display, (red, blue-green, white, etc.)
- 5178 Gun sta, variable luminance control provided with primary display? (Yes/No; comments)
- 5179 Gun sta, variable luminance control provided with secondary display? (Yes/No; comments)
- 5182 Gun sta, range of display luminance, primary display, (display description; range in lx; ft-L)
- 5184 Gun sta, indicator lights grouped together, close to gunner's line of sight? (Yes/No; comments)
- 5186 Gun sta, indicator lights correctly color-coded IAW MIL-STD-1472C? (Yes/No; comments)
- 5190 Gun sta, indicator lights testable? (Yes/No; comments)
- 5192 Gun sta, indicator lights dimmable? (Yes/No; comments)
- 5194 Gun sta, range of luminance for indicator lights, primary warning light, (warning light description; range in lx; ft-L)
- 5196 Gun sta, range of luminance for indicator lights, secondary warning or caution light, (indicator light description; range in lx; ft-L)
- 5198 Gun sta, adequacy of luminance for primary, warning indicator light, rating scale 1 (1-6)
- 5200 Gun sta, adequacy of luminance for secondary, warning or caution indicator light, rating scale 1 (1-6)
- 5204 Gun sta, for instrument panels, indicators, displays/controls, nomenclature used of appropriate size, contrast with background, and readable? (Yes/No; comments)
- 5205 Gun sta, decals/placards readable, readily understood, and properly placed? (Yes/No; comments)
- 5206 Gun sta, ease of control actuation for all gunner's controls, rating scale 2 (1-6)

- 5208 Gun sta, force required, worse case, control actuation, (N; lbs)
- 5214 Gun sta, protective covers/guards placed over controls or switches where appropriate (Yes/No; comments)
- 5216 Gun sta, NBC collective protection provided? (Yes/No; comments)
- 5218 Gun sta, if NBC collective protection not provided, describe system, (text)
- 5220 Gun sta, NBC collective protection, location of interface point with which to hook into hose of individual vest/NBC suit, (text)
- 5222 Gun sta, NBC collective protection, air temp/humidity at mask, full cooling (ambient outside temp/humidity; temp/humid measured at mask, degrees, C; degrees, F; Rh)
- 5224 Gun sta, NBC, type of mask, (text)
- 5226 Gun sta, NBC collective protection, air flow rate/volume at mask (ft/min; cu ft/min)
- 5228 Gun sta, general adequacy of NBC collective protection, (mask and vest, bulk dump, etc.), rating scale 1 (1-6)
- 5230 Gun sta, NBC collective protection, effectiveness of overpressure, rating scale 6 (1-6)
- 5232 Gun sta, NBC, effectiveness of NBC system to strain dust, other non-NBC particulates from outside, rating scale 6 (1-6)
- 5240 Gun sta, hatch provided? (Yes/No; comments)
- 5242 Gun sta, hatch, ease of opening/closing from inside vehicle, rating scale 2 (1-6)
- 5246 Gun sta, time to egress, from closed hatch position to outside of vehicle, non-NBC clad, (seconds)
- 5248 Gun sta, time to egress, from closed hatch position to outside of vehicle, NBC MOPP-4 clad, (seconds)
- 5252 Gun sta, adequacy of hatch in size for 95th percentile arctic garbed male, rating scale 1 (1-6)
- 5254 Gun sta, hatch dimensions, l x w x d, (mm; in.)
- 5456 Gun sta, hatch, combat lock provided? (Yes/No; comments)

- 5458 Gun sta, force required to unlock combat lock, (N; lbs)
- 5460 Gun sta, effectiveness of gunner's unity periscope/vision block for surveillance/initial target acquisition, without NBC mask, rating scale 6 (1-6)
- 5462 Gun sta, effectiveness of gunner's unity periscope/vision block for surveillance/initial target acquisition, with NBC mask, rating scale 6 (1-6)
- 5466 Gun sta, quality of vision through GPS, day mode, rating scale 3 (1-6)
- 5468 Gun sta, quality of vision through GPS, night mode, rating scale 3 (1-6)
- 5470 Gun sta, quality of vision through auxiliary sight, day mode, rating scale 3 (1-6)
- 5472 Gun sta, quality of vision through auxiliary sight, night mode, rating scale 3 (1-6)
- 5476 Gun sta, average overall time to engage target (target acquisition, tracking, first round fire), moving target, stationary tank, non-NBC, (no. trials; target range, target speed; seconds)
- 5478 Gun sta, average overall time to engage target (target acquisition, tracking, first round fire), moving target, stationary tank, NBC MOPP-4, (no. trials; target range, target speed; seconds)
- 5480 Gun sta, average overall time to engage target (target acquisition, tracking, first round fire), stationary target, stationary tank, non-NBC, (no. trials; target range; seconds)
- 5482 Gun sta, average overall time to engage target (target acquisition, tracking, first round fire), stationary target, stationary tank, NBC MOPP-4, (no. trials; target range; seconds)
- 5484 Gun sta, average overall time to engage target (target acquisition, tracking, first round fire), stationary target, moving tank, non-NBC, (no. trials; target range; seconds)
- 5486 Gun sta, average overall time to engage target (target acquisition, tracking, first round fire), stationary target, moving tank, NBC MOPP-4, (no. trials; target range; seconds)
- 5490 Gun sta, chance of handedness or eye glasses interfering with operations, rating scale 3 (1-6)

- 5492 Gun sta, ease of training new operator quickly, rating scale 2 (1-6)
- 5494 Gun sta, general adequacy of interior lighting, rating scale 1 (1-6)
- 5496 Gun sta, accessibility of controls for interior lighting, rating scale 4 (1-6)
- 5498 Gun sta, safeguard provided against inadvertent activation of interior lights? (Yes/No; comments)
- 5500 Gun sta, heater, temperature at gnr's sta, (degrees C; degrees F)
- 5502 Gun sta, heater, station designed for equal distribution of heat? (Yes/No; comments)
- 5510 Gun sta, ventilation, non-NBC; effectiveness of fresh air ventilation system, rating scale 6 (1-6)
- 5512 Gun sta, ventilation, non-NBC; air flow rate/volume at station, (ft/min; cu ft/min)
- 5514 Gun sta, ventilation, non-NBC; proportion fresh outside air provided to station, (percent)
- 5516 Gun sta, ventilation, non-NBC; variable control provided for ventilation system? (Yes/No; comments)
- 5518 Gun sta, ventilation, non-NBC; accessibility to ventilation control, rating scale 4 (1-6)
- 5528 Gun sta, steady-state noise hazards, any frequency/condition, rating scale 5 (1-6)
- 5530 Gun sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 125 HZ, (dBA)
- 5534 Gun sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 500 HZ, (dBA)
- 5538 Gun sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 2000 HZ, (dBA)
- 5540 Gun sta, impulse noise hazards, main gun/coax, rating scale 5 (1-6)
- 5542 Gun sta, impulse noise, main gun firing, closed hatch, gun pos forward, (A duration; B duration; peak pressure-dBA)
- 5550 Gun sta, seat vibration, prob of degrading task performance, rating scale 7 (1-6)

- 5552 Gun sta, whole body vibration, at SRP IAW TECOM TOP
1-2-610, X-axis, (RMS, 30 HZ; RMS, 50 HZ; RMS, 80 HZ)
- 5554 Gun sta, whole body vibration, at SRP IAW TECOM TOP
1-2-610, Y-axis, (RMS, 30 HZ; RMS, 50 HZ; RMS, 80 HZ)
- 5556 Gun sta, whole body vibration, at SRP IAW TECOM TOP
1-2-610, Z-axis, (RMS, 30 HZ; RMS, 50 HZ; RMS, 80 HZ)
- 5558 Gun sta, probability of ride vibration causing visual
difficulties for gunner, rating scale 7 (1-6)
- 5560 Gun sta, acceleration, gunner's primary sight optic,
(G-acceleration)
- 5562 Gun sta, acceleration, gunner's brow pad, (G-acceleration)
- 5564 Gun sta, acceleration, gunner's chest pad, (G-acceleration)
- 5566 Gun sta, effectiveness of manual data entry into ballistic
fire control system under combat; consider ammunition
selection, range data, etc., rating scale 6 (1-6)
- 5580 Gun sta, target acquisition, periscope, location (text)
- 5584 Gun sta, target acquisition, periscope, model (text)
- 5586 Gun sta, target acquisition, periscope, magnification
(power)
- 5588 Gun sta, target acquisition, periscope, horizontal field of
view, (degrees)
- 5592 Gun sta, target acquisition, periscope, vertical field of
view, (degrees)
- 5594 Gun sta, target acquisition, periscope, range (meters)
- 5596 Gun sta, target acquisition, periscope, limitations (text)

Human Factors Engineering Data Base
File Name: AMR3
Commander's Station

- 4000 Cmdr sta, seat back dimensions, l x w, (mm; in.)
- 4001 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, dimensions seat pan, l x w, (mm; in.)
- 4002 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, seat padding thickness (mm; in.)
- 4004 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, back-rest-to-seat angle, (degrees)
- 4006 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, seat slope, (degrees)
- 4008 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, distance from seat front, top of padding, to floor, (mm; in.)
- 4010 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, vertical adjustability, (range in mm; in.)
- 4012 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, forward adjustability, (range in mm; in.)
- 4014 Cmdr sta, seat pan material, (text)
- 4016 Cmdr sta, seat back material, (text)
- 4018 Cmdr sta, seat, head rest material, (text)
- 4020 Cmdr sta, seat, restraint system provided? (Yes/No; comments)
- 4021 Cmdr sta, adequacy of restraint system, rating scale 1 (1-6)
- 4022 Cmdr sta, seat, MIL-STD-1472C, Table 28 dimension A, Elbow, dynamic, (mm; in.)
- 4024 Cmdr sta, seat, MIL-STD-1472C, Table 28 dimension B, Elbow, static, (mm; in.)
- 4026 Cmdr sta, seat, MIL-STD-1472C, Table 28 dimension C, Shoulder, (mm; in.)
- 4028 Cmdr sta, seat, MIL-STD-1472C, Table 28 dimension D, Knee width, minimum, (mm; in.)
- 4030 Cmdr sta, seat, MIL-STD-1472C, Table 28 dimension E, Knee width, maximum, (mm; in.)

- 4032 Cmdr sta, seat, MIL-STD-1472C, Table 28 measurement 1, closed hatch, SRP to underside of hatch, (mm; in.)
- 4034 Cmdr sta, seat, MIL-STD-1472C, Table 28 measurement 2, Abdominal, seat back to nearest forward object, (mm; in.)
- 4036 Cmdr sta, seat, MIL-STD-1472C, Table 28 measurement 4, Seat depth SRP to front edge of seat pan, (mm; in.)
- 4040 Cmdr sta, seat, MIL-STD-1472C, Table 28 measurement 7, Boot, front seat pan to nearest object forward, (mm; in.)
- 4042 Cmdr Sta, seat, effectiveness of cmdr's seat, considering adjustability, cushioning, size, and back angle, rating scale 6 (1-6)
- 4044 Cmdr sta, seat adjustable vertically? (Yes/No; comments)
- 4046 Cmdr sta, quality of viewing cmdr's instruments with seat adjusted fully up, open hatch, for 95th percentile male, rating scale 3 (1-6)
- 4048 Cmdr sta, quality of viewing cmdr's instruments during closed hatch operations, rating scale 3 (1-6)
- 4050 Cmdr sta, adequacy of lumbar (back) support during extended operations, rating scale 1 (1-6)
- 4052 Cmdr sta, seat material promote excessive perspiration during extended operations? (Yes/No; comments)
- 4054 Cmdr sta, foot rest provided for arctic boot-sized foot? (Yes/No; comments)
- 4056 Cmdr sta, adequacy of foot rest for operations in closed hatch seated condition, rating scale 1 (1-6)
- 4058 Cmdr sta, foot rest dimensions, l x w, (mm; in.)
- 4060 Cmdr sta, vertically-adjustable standing platform provided for stand-up, open hatch operations? (Yes/No; comments)
- 4062 Cmdr sta, adequacy of standing platform considering use with arctic boots, rating scale 1 (1-6)
- 4064 Cmdr sta, can cmdr's seat be adjusted to permit sitting with head and shoulders exposed? (Yes/No, comments)
- 4066 Cmdr sta, approx distance 95th percentile seated male exposed above hatch line, seat adjusted fully up, (mm; in.)
- 4068 Cmdr sta, ease of emergency egress, open hatch, non-NBC clad 95th percentile male, rating scale 2 (1-6)

- 4070 Cmdr sta, ease of emergency egress, open hatch, NBC MOPP-4 clad 95th percentile male, rating scale 2 (1-6)
- 4072 Cmdr sta, average time to emergency egress from cmdr sta, open hatch, non-NBC clad 95th percentile male, (no. trials; seconds)
- 4074 Cmdr sta, average time to emergency egress from cmdr sta, open hatch, NBC MOPP-4 clad 95th percentile male, (seconds)
- 4076 Cmdr sta, seat, capability to fold seat back for stand-up operations? (Yes/No; comments)
- 4078 Cmdr sta, ease of folding seat back for stand-up operations, rating scale 2 (1-6)
- 4080 Cmdr sta, ease of access to adjustment controls for seat operation, rating scale 2 (1-6)
- 4082 Cmdr sta, force required to operate seat adjustment controls, (N; lbs)
- 4084 Cmdr sta, probability of injury during the performance of dynamic tasks (transitioning from open to closed hatch, etc.), due to contact with station equipment, rating scale 5 (1-6)
- 4086 Cmdr sta, quality of viewing all controls and displays during day/night closed/open hatch operations, rating scale 3 (1-6)
- 4088 Cmdr sta, effectiveness of cupola periscopes for outside viewing during closed hatch operations, rating scale 6 (1-6)
- 4090 Cmdr sta, cupola provided with controls for manual traverse (of cupola)? (Yes/No; comments)
- 4091 Cmdr sta, ease of locking/unlocking cupola manual traverse locking device, rating scale 2 (1-6)
- 4092 Cmdr sta, force required to unlock cupola traverse lock, (N; lbs)
- 4093 Cmdr sta, force required to actuate manual cupola traverse control, (N; lbs)
- 4094 Cmdr sta, level of difficulty to rotate cupola using manual controls, rating scale 2 (1-6)
- 4096 Cmdr sta, weapons servicing, ease of sighting and firing cmdr's weapon, closed hatch, considering rotation of cupola, location of periscopes, and fire controls, rating

scale 2 (1-6)

- 4098 Cmdr sta, ease of sighting and firing cmdr's weapon, open hatch mode, rating scale 2 (1-6)
- 4100 Cmdr sta, average time to charge and sight cmdr's weapon from seated position, open hatch, (no. trials; seconds)
- 4102 Cmdr sta, ease of access to ammunition for cmdr's weapon, rating scale 2 (1-6)
- 4104 Cmdr sta, average time to upload (from ammo stowage), reload cmdr's weapon, (no. trials; seconds)
- 4106 Cmdr sta, ease of uploading/reloading tasks, cmdr's weapon, rating scale 2 (1-6)
- 4108 Cmdr sta, ease of performing simple maintenance or repairs on cmdr's weapon, rating scale 2 (1-6)
- 4110 Cmdr sta, average time to acquire target using cmdr's GPS extension, open hatch mode, non-NBC, daytime, (no. trials; range in meters; seconds)
- 4120 Cmdr sta, average time to acquire target using cmdr's GPS extension, open hatch mode, NBC MOPP-4, daytime, (no. trials; range in meters; seconds)
- 4122 Cmdr sta, average time to acquire target using cmdr's GPS extension, closed hatch, non-NBC, (no. trials; range in meters; seconds)
- 4124 Cmdr sta, average time to acquire target using cmdr's GPS extension, closed hatch, NBC MOPP-4, (no. trials; range in meters; seconds)
- 4126 Cmdr sta, ease of performing target acquisition and main gun firing tasks using cmdr's GPS extension, open hatch, rating scale 2 (1-6)
- 4128 Cmdr sta, ease of performing target acquisition and main gun firing tasks using cmdr's GPS extension, closed hatch, rating scale 2 (1-6)
- 4138 Cmdr sta, com equip, location of com hookup (text)
- 4140 Cmdr sta, ease of operation of com box w/arctic handwear, rating scale 2 (1-6)
- 4142 Cmdr sta, quality of speech intelligibility, cmdr's com equip, CVC helmet, non-NBC, rating scale 2 (1-6)
- 4143 Cmdr sta, quality of speech intelligibility, cmdr's com equip, CVC helmet, w/NBC mask, rating scale 2 (1-6)

- 4144 Cmdr sta, speech intelligibility, cmdr's com equip, CVC helmet, non-NBC, MRT, (percent correct)
- 4145 Cmdr sta, speech intelligibility, cmdr's com equip, CVC helmet, w/NBC mask, MRT, (percent correct)
- 4146 Cmdr sta, com equip, space between connector and bulkhead or nearest object, (mm; in.)
- 4147 Cmdr sta, effectiveness of communicating with other crew members using hand signals or other non-electronic methods, rating scale 6 (1-6)
- 4148 Cmdr sta, overall adequacy of controls/displays for tasks cmdr must perform, rating scale 1 (1-6)
- 4149 Cmdr sta, accessibility for operation of controls, rating scale 4 (1-6)
- 4150 Cmdr sta, quality of visibility of controls/displays, day and nighttime operations, rating scale 3 (1-6)
- 4152 Cmdr sta, distance from design eye, to nearest display, (mm; in.)
- 4154 Cmdr sta, distance from design eye, to most distant display, (mm; in.)
- 4156 Cmdr sta, viewing angle from design eye position to worse case primary display, (degrees)
- 4158 Cmdr sta, display functions grouped together? (Yes/No; comments)
- 4160 Cmdr sta, closed hatch, displays readable? (Yes/No; comments)
- 4162 Cmdr sta, displays illuminated? (Yes/No; comments)
- 4163 Cmdr sta, primary display; color (red, blue green, white, green, etc.)
- 4164 Cmdr sta, secondary display; (color)
- 4165 Cmdr sta, controls provided with display for variable lumination? (Yes/No; comments)
- 4166 Cmdr sta, master power control provided? (Yes/No; comments)
- 4167 Cmdr sta, range of display luminance, (display description; range in lx; ft-L)
- 4168 Cmdr sta, displays color-coded efficiently IAW

- MIL-STD-1472C? (Yes/No; comments)
- 4170 Cmdr sta, indicator lights grouped together, close to cmdr's line of sight? (Yes/No; comments)
- 4174 Cmdr sta, indicator lights color-coded IAW MIL-STD-1472C? (Yes/No; comments)
- 4176 Cmdr sta, indicator lights testable? (Yes/No; comments)
- 4178 Cmdr sta, indicator lights dimmable? (Yes/No; comments)
- 4180 Cmdr sta, range of luminance for indicator lights, (indicator light description; range in lx; ft-L)
- 4182 Cmdr sta, direction of control movement for all controls IAW MIL-STD-1472C? (Yes/No; comments)
- 4184 Cmdr sta, for instrument panels, indicators, displays/controls, nomenclature used of appropriate size, contrast with background, and readable? (Yes/No; comments)
- 4186 Cmdr sta, decals/placards readable, understandable, properly placed? (Yes/No; comments)
- 4188 Cmdr sta, general, ease of control actuation for all cmdr's controls, rating scale 2 (1-6)
- 4190 Cmdr sta, force required, worse case, control actuation, (N; lbs)
- 4192 Cmdr sta, protective covers or guards placed over controls or switches where appropriate? (Yes/No; comments)
- 4194 Cmdr sta, NBC collective protection provided? (Yes/No; description; comments)
- 4196 Cmdr sta, NBC collective protection, location of hose to provide ready access by cmdr, closed hatch operations, rating scale 1 (1-6)
- 4197 Cmdr sta, location of interface point w/which to hook hose of individual NBC suit into collective protection system, (text)
- 4198 Cmdr sta, NBC collective protection, air temp/humidity at mask, full cooling (ambient outside temp/humidity; temp/humid measured at mask, degrees, C; degrees, F: Rh)
- 4200 Cmdr sta, type of NBC mask (text)
- 4202 Cmdr sta, NBC collective protection, air flow rate/volume at mask (ft/min; cu ft/min)

- 4204 Cmdr sta, general adequacy of NBC collective protective system, rating scale 1 (1-6)
- 4208 Cmdr sta, NBC collective protection, effectiveness of overpressure at cmdr's station, rating scale 6 (1-6)
- 4210 Cmdr sta, NBC collective protection, effectiveness of filtration system to strain dust, other non-NBC particulates from outside, rating scale 6 (1-6)
- 4230 Cmdr sta, hatch, adequacy of hatch entry padding, rating scale 1 (1-6)
- 4232 Cmdr sta, hatch, ease of opening/closing hatch from inside vehicle, rating scale 2 (1-6)
- 4234 Cmdr sta, time to egress, from closed hatch position to outside of vehicle, non-NBC clad, (seconds)
- 4236 Cmdr sta, time to egress, from closed hatch position to outside of vehicle, NBC MOPP-4 clad, (seconds)
- 4238 Cmdr sta, adequacy of hatch in size for 95th percentile arctic garbed male, rating scale 1 (1-6)
- 4240 Cmdr sta, hatch dimensions, l x w x d, (mm; in.)
- 4242 Cmdr sta, hatch, combat lock provided? (Yes/No; comments)
- 4244 Cmdr sta, force required to unlock combat lock, (N; lbs)
- 4246 Cmdr sta, ease of transitioning from open to closed hatch, rating scale 2 (1-6)
- 4248 Cmdr sta, time to transition from open to closed hatch mode (seconds)
- 4250 Cmdr sta, hatch provide a partially open ("pop-up") mode to allow unrestricted observation while maintaining overhead cover? (Yes/No; comments)
- 4252 Cmdr sta, space provided between top of turret and bottom of hatch lip in 'pop-up' mode, (mm; in.)
- 4254 Cmdr sta, hatch make contact with any other equipment of vehicle when open or partially open? (e.g., strike loader's hatch, antenna mount, etc), (Yes/No; comments)
- 4256 Cmdr sta, outside viewing, closed hatch using periscopes/vision blocks, (0 to 360 degrees)
- 4258 Cmdr sta, outside viewing, closed hatch, blind spots? (Yes/No; comments)

- 4260 Cmdr sta, outside viewing, closed hatch, upward viewing angle through periscopes/vision blocks, (degrees)
- 4262 Cmdr sta, adequacy of outside viewing, closed hatch, through periscopes/vision blocks for target acquisition and surveillance, rating scale 1 (1-6)
- 4264 Cmdr sta, cmdr's weapon periscope, adequacy of viewing to effectively engage targets using cmdr's weapon, rating scale 1 (1-6)
- 4266 Cmdr sta, means provided to clear closed hatch vision systems of frost, dust, mud, etc. without exiting vehicle? (Yes/No; comments)
- 4268 Cmdr sta, adequacy of means provided to clear vision systems of frost, etc. without exiting vehicle, rating scale 1 (1-6)
- 4270 Cmdr sta, night vision device available for viewing through periscopes/vision blocks? (Yes/No; comments)
- 4274 Cmdr sta, effectiveness of night vision device for target acquisition, surveillance, engagement, rating scale 6 (1-6)
- 4280 Cmdr sta, illumination levels, open hatch, measured at communications device and instrument panels, (lx; ft-C)
- 4282 Cmdr sta, illumination levels, closed hatch, measured at communications device and instrument panels, (lx; ft-C)
- 4284 Cmdr sta, luminance levels of displays, (type of display; location; lx; ft-L)
- 4286 Cmdr sta, chance of handedness or eye glasses interfering with operations, rating scale 3 (1-6)
- 4288 Cmdr sta, general adequacy of interior lighting, rating scale 1 (1-6)
- 4290 Cmdr sta, accessibility of controls for internal lighting, rating scale 4 (1-6)
- 4292 Cmdr sta, safeguard provided against inadvertent activation of interior lights? (Yes/No; comments)
- 4294 Cmdr sta, heater, temperature at cmdr's station, (degrees C; degrees F)
- 4296 Cmdr sta, heater, station designed for equal distribution of heat? (Yes/No; comments)
- 4300 Cmdr sta, ventilation, non-NBC; air flow rate/volume at

- station, (ft/min; cu ft/min)
- 4304 Cmdr sta, ventilation, non-NBC; proportion fresh outside air provided to station, (percent)
- 4306 Cmdr sta, ventilation, non-NBC; variable control provided for ventilation system? (Yes/No; comments)
- 4308 Cmdr sta, ventilation, non-NBC; variable control for ventilation provided for all stations at cmdr's sta? Yes/No; comments)
- 4310 Cmdr sta, ventilation, non-NBC; accessibility to ventilation control, rating scale 4 (1-6)
- 4312 Cmdr sta, ventilation, non-NBC; effectiveness of ventilation system at station, rating scale 6 (1-6)
- 4318 Cmdr sta, steady-state noise hazards, any frequency/conditions, rating scale 5 (1-6)
- 4320 Cmdr sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 125 HZ, (dBA)
- 4324 Cmdr sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 500 HZ, (dBA)
- 4328 Cmdr sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 2000 HZ (dBA)
- 4330 Cmdr sta, impulse noise hazards, main gun/coax, rating scale 5 (1-6)
- 4332 Cmdr sta, impulse noise, main gun firing, closed hatch, gun pos forward, (A duration; B duration; peak pressure-dBA)
- 4340 Cmdr sta, seat vibration, prob of degrading task performance, rating scale 7 (1-6)
- 4342 Cmdr sta, whole body vibration, at SRP IAW TECOM TOP 1-2-610, X-axis, (RMS, 30 HZ; RMS, 50 HZ; RMS, 80 HZ)
- 4344 Cmdr sta, whole body vibration, at SRP IAW TECOM TOP 1-2-610, Y-axis, (RMS, 30 HZ; RMS, 50 HZ; RMS, 80 HZ)
- 4346 Cmdr sta, whole body vibration, at SRP IAW TECOM TOP 1-2-610, Z-axis, (RMS, 30 HZ; RMS, 50 HZ; RMS, 80 HZ)
- 4348 Cmdr sta, probability of ride vibrations causing visual difficulties for cmdr, rating scale 7 (1-6)
- 4350 Cmdr sta, vibration amplitude, cmdr's console, (RMS)

Human Factors Engineering Data Base
File Name: AMR2
Driver's Station

- 3005 Dvr sta, seat back dimensions, l x w (mm; in.)
- 3010 Dvr sta, seat pan dimensions, IAW MIL-STD-1472C, Fig 50, l x w, (mm; in.)
- 3012 Dvr sta, seat padding, thickness, IAW MIL-STD-1472C, Fig 50, (mm; in.)
- 3014 Dvr sta, seat back rest-to-seat angle, IAW MIL-STD-1472C, Fig 50, (degrees)
- 3016 Dvr sta, seat slope, IAW MIL-STD-1472C, Fig 50, (degrees)
- 3018 Dvr sta, distance from seat front, top of padding, to floor, IAW MIL-STD-1472C, Fig 50, (mm; in.)
- 3020 Dvr sta, seat vertical adjustability, IAW MIL-STD-1472C, Fig 50, (range in mm; in.)
- 3022 Dvr sta, seat forward-rearward adjustability, IAW MIL-STD-1472C, Fig 50, (range in mm; in.)
- 3024 Dvr sta, MIL-STD-1472C, Table 28 dimension A, Elbow, dynamic, (mm; in.)
- 3026 Dvr sta, MIL-STD-1472C, Table 28 dimension B, Elbow, static, (mm; in.)
- 3028 Dvr sta, MIL-STD-1472C, Table 28 dimension C, Shoulder, (mm; in.)
- 3030 Dvr sta, MIL-STD-1472C, Table 28 dimension D, Knee width, minimum, (mm; in.)
- 3032 Dvr sta, MIL-STD-1472C, Table 28 dimension E, Knee width, maximum, (mm; in.)
- 3034 Dvr sta, MIL-STD-1472C, Table 28 dimension F, Boot clearance from pedal, (mm; in.)
- 3036 Dvr sta, MIL-STD-1472C, Table 28 dimension G, Distance between pedals, (mm; in.)
- 3038 Dvr sta, MIL-STD-1472C, Table 28 dimension H, Boot clearance from brake pedal, (mm; in.)
- 3040 Dvr sta, MIL-STD-1472C, Table 28 measurement 1, head clearance, closed hatch, SRP to underside of hatch, (mm; in.)

- 3042 Dvr sta, MIL-STD-1472C, Table 28 measurement 2, abdominal, seat back to steering device, (mm; in.)
- 3044 Dvr sta, MIL-STD-1472C, Table 28 measurement 3, front of knee, seat back to closest forward object, (mm; in.)
- 3046 Dvr sta, MIL-STD-1472C, Table 28 measurement 4, seat depth, SRP to front edge of seat pan, (mm; in.)
- 3050 Dvr sta, MIL-STD-1472C, Table 28 measurement 7, boot, front of seat pan to heel point of accelerator, (mm; in.)
- 3052 Dvr sta, adequacy of viewing and operating hand and foot controls, viewing displays in all vertically adjusted seat positions, open/closed hatch, rating scale 1 (1-6)
- 3054 Dvr sta, seat, adequacy of lumbar support, rating scale 1 (1-6)
- 3056 Dvr sta, seat provided with restraint, seat belts? (Yes/No; comments)
- 3058 Dvr sta, seat, adequacy of seat restraint/seat belt system, rating scale 1 (1-6)
- 3060 Dvr sta, seat designed to prevent bloodflow to popliteal area? (Yes/No; comments)
- 3062 Dvr sta, seat provided with adjustable headrest? (Yes/No; comments)
- 3064 Dvr sta, seat material, promote excessive perspiration during extended operations? (Yes/No; comments)
- 3066 Dvr sta, seat material, become excessively hot during operations in hot conditions? (Yes/No; comments)
- 3068 Dvr sta, adequacy of emergency steering or evasive maneuvers, rating scale 1 (1-6)
- 3070 Dvr sta, adequacy of emergency braking, rating scale 1 (1-6)
- 3072 Dvr sta, closed hatch, non-NBC, adequacy of ventilation (use of fresh outside air), rating scale 1 (1-6)
- 3074 Dvr sta, daylight driving, open hatch, reflective glare on instruments? (Yes/No; Comments)
- 3076 Dvr sta, open hatch, adequacy of rear view mirror, rating scale 1 (1-6)

- 3078 Dvr sta, seat back material, (text)
- 3080 Dvr sta, head rest material, (text)
- 3082 Dvr sta, distance closest hand control from SRP (mm, in.)
- 3084 Dvr sta, adequacy of access and operation of hand/foot controls, rating scale 1 (1-6)
- 3086 Dvr sta, visibility, quality of visibility of controls/displays, day and night operations, rating scale 3 (1-6)
- 3088 Dvr sta, visibility; viewing distance to most distant display (mm, in.)
- 3090 Dvr sta, visibility; viewing angle from design eye position to worse condition primary display (degrees)
- 3092 Dvr sta, adequacy of displays for critical driving tasks, rating scale 1 (1-6)
- 3094 Dvr sta, display functions grouped together? (Yes/No; comments)
- 3096 Dvr sta, closed hatch, displays readable? (Yes/No; comments)
- 3097 Dvr sta, master caution light provided? (Yes; No/ comments)
- 3098 Dvr sta, master caution light, distance, angle from design eye position, (mm; in./degrees)
- 3099 Dvr sta, master caution light, range of luminance, (range in lx; ft-C)
- 3100 Dvr sta, master caution light, color (text)
- 3101 Dvr sta, displays illuminated? (Yes/No; comments)
- 3102 Dvr sta, primary display color (Red, Blue green, White, other)
- 3103 Dvr sta, display luminance range, (lx; ft-C)
- 3104 Dvr sta, display luminance variable control? (Yes/No; comments)
- 3105 Dvr sta, spot brightness values, primary displays, (display type; location; ft-L)
- 3106 Dvr sta, primary displays, color-coded efficiently? (Yes/No, comments)

- 3107 Dvr sta, luminance controls provided with full OFF? (Yes; No; comments)
- 3108 Dvr sta, indicator lights, grouped together, close to driver's line of sight? (Yes/No; comments)
- 3110 Dvr sta, indicator lights, colored correctly, IAW MIL-STD-1472C? (Yes/No; comments)
- 3112 Dvr sta, indicator lights testable? (Yes/No; comments)
- 3114 Dvr sta, indicator lights dimmable? (Yes/No; comments)
- 3116 Dvr sta, indicator lights, luminance range, (lx; ft-C)
- 3118 Dvr sta, instrument panel nomenclature used of appropriate size, contrast with panel, and readable? (Yes/No; comments)
- 3120 Dvr sta, decals/placards readable, properly placed? (Yes/No; comments)
- 3122 Dvr sta, controls provided best choice for critical driving tasks? (Yes/No; comments)
- 3124 Dvr sta, size, shape, spacing between controls appropriate for effective intended usage? (Yes/No; comments)
- 3126 Dvr sta, controls located and arranged to facilitate sequential usage? (Yes/No, comments)
- 3128 Dvr sta, adequacy of access to driver's controls, rating scale 4 (1-6)
- 3130 Dvr sta, primary controls illuminated? (Yes/No; comments)
- 3132 Dvr sta, primary control area illumination level (lx; ft-C)
- 3134 Dvr sta, direction of control movement correct? (Yes/No; comments)
- 3136 Dvr sta, controls located adequately near associated displays? Rating scale 1 (1-6)
- 3138 Dvr sta, adequacy of driver control/display arrangement, rating scale 1 (1-6)
- 3139 Dvr sta, methods provided to reduce glare? (Yes/No; comments)

- 3140 Dvr sta, excessive force required to operate hand controls? (Yes/No; comments)
- 3142 Dvr sta, force measurement of primary hand control (N; lbs)
- 3144 Dvr sta, force measurement of secondary hand control (N; lbs)
- 3146 Dvr sta, force measurement of tertiary hand control (N; lbs)
- 3148 Dvr sta, excessive force required to operate foot controls? (Yes/No; comments)
- 3150 Dvr sta, force measurement of excelerator (N; lbs)
- 3152 Dvr sta, force measurement of foot brake (N; lbs)
- 3154 Dvr sta, control switch guards, protective covers or guards provided? (Yes/No; comments)
- 3156 Dvr sta, protective covers/guards, adequately positioned to permit observation of displays, nomenclature, indicators, etc., rating scale 1 (1-6)
- 3158 Dvr sta, steering device, adequacy of size to permit complete control of vehicle, rating scale 1 (1-6)
- 3160 Dvr sta, NBC collective protection provided? (Yes/No; comments)
- 3162 Dvr sta, NBC collective protection, hose located to provide ready access by driver, closed hatch operations, rating scale 3 (1-6)
- 3164 Dvr sta, NBC collective protection, air temp/humidity at mask (degrees, C; degrees, F; Rh)
- 3166 Dvr sta, NBC collective protection, access to collective protection filter cannister, rating scale 2 (1-6)
- 3168 Dvr sta, NBC collective protection, location of collective protection filter (text)
- 3170 Dvr sta, type of NBC mask (text)
- 3172 Dvr sta, NBC, access to heater with collective protection, rating scale 2 (1-6)
- 3174 Dvr sta, NBC collective protection, air flow rate/volume at mask (ft/min; cu ft/min)

- 3176 Dvr sta, NBC collective protection, effectiveness of overpressure on driver tasks, rating scale 6 (1-6)
- 3177 Dvr sta, NBC collective protection, bulk air dump provided? (Yes/No; location)
- 3178 Dvr sta, NBC collective protection, bulk air dump rate/volume, (ft/min; cu ft/min)
- 3179 Dvr sta, NBC collective protection, effectiveness of NBC filter to strain dust, other non-NBC particulates, rating scale 6 (1-6)
- 3180 Dvr sta, adequacy of hatch entry padding, rating scale 2 (1-6)
- 3182 Dvr sta, ease of opening/closing hatch, rating scale 2 (1-6)
- 3183 Dvr sta, hatch dimensions, l x w x d, (mm; in.)
- 3184 Dvr sta, time to egress, from closed hatch position to outside of vehicle, non-NBC-clad, (seconds)
- 3186 Dvr sta, time to egress, from closed hatch position to outside of vehicle, NBC MOPP-4 clad, (seconds)
- 3188 Dvr sta, adequacy of hatch in size for 95th percentile arctic garbed male, rating scale 1 (1-6)
- 3190 Dvr sta, open hatch mode, probability of injury from traversing turret, rating scale 5 (1-6)
- 3192 Dvr sta, ease of transitioning from open to closed hatch mode with vehicle in motion, rating scale 2 (1-6)
- 3194 Dvr sta, time to transition from open to closed hatch mode with vehicle in motion, (seconds)
- 3196 Dvr sta, driver provided with daylight, closed hatch viewing system (DAY-CHV)? (Yes/No; comments)
- 3198 Dvr sta, closed hatch viewing, viewing distance to closest point in front of vehicle, using DAY-CHV, (m; ft)
- 3200 Dvr sta, general adequacy of closed hatch viewing to outside of vehicle, rating scale 1 (1-6)
- 3202 Dvr sta, closed hatch viewing, adequacy of interface with DAY-CHV device and NBC mask, rating scale 1 (1-6)
- 3204 Dvr sta, closed hatch, forward viewing angle through periscope from left to right, (degrees)

- 3206 Dvr sta, closed hatch, forward viewing angle using DAY-CHV, from left to right, (degrees)
- 3208 Dvr sta, closed hatch, adequacy of upward viewing through DAY-CHV device, rating scale 1 (1-6)
- 3210 Dvr sta, closed hatch, adequacy of upward viewing through periscope, rating scale 1 (1-6)
- 3212 Dvr sta, closed hatch, upward viewing angle through DAY-CHV device, (degrees)
- 3214 Dvr sta, closed hatch, upward viewing angle through periscope, (degrees)
- 3216 Dvr sta, DAY-CHV system, adequacy of defroster system, operation in cold weather, rating scale 1 (1-6)
- 3218 Dvr sta, DAY-CHV system, time to defrost, cold weather operations, from cold start (min, sec)
- 3220 Dvr sta, cold weather operations, frosting or misting of windshield/periscope? (Yes/No; comments)
- 3222 Dvr sta, adequacy of wipers to remove rain, snow, dust, etc. from DAY-CHV, rating scale 1 (1-6)
- 3224 Dvr sta, night vision device provided? (Yes/No; comments)
- 3226 Dvr sta, adequacy of night vision device, rating scale 1 (1-6)
- 3228 Dvr sta, time to install driver night vision device from stowed position, (seconds)
- 3230 Dvr sta, visibility, adequacy of viewing ground, open hatch, seat adjusted fully up, 5th percentile male, rating scale 1 (1-6)
- 3232 Dvr sta, driver vision, open hatch, viewing distance to point on ground closed to vehicle, normally seated, 5th percentile male, seat adjusted fully up, (m; ft)
- 3234 Dvr sta, driver vision, open hatch, forward FOV, (degrees)
- 3236 Dvr sta, driver vision, open hatch, quality of forward, lateral visibility, rating scale 3 (1-6)
- 3238 Dvr sta, escape hatch provided other than primary hatch? (Yes/No; comments)
- 3240 Dvr sta, escape hatch dimensions, l x w, (mm, in.)

- 3242 Dvr sta, quality of accessibility to escape hatch, rating scale 3 (1-6)
- 3344 Dvr sta, location of communication (com) hookup, (text)
- 3346 Dvr sta, ease of access to com hookup from normal seated position, rating scale 2 (1-6)
- 3348 Dvr sta, com equip, ease of operation of com box w/arctic handwear, rating scale 2 (1-6)
- 3350 Dvr sta, com equip, space between connector and bulkhead, or connector and closest object, (mm; in.)
- 3352 Dvr sta, speech intelligibility, dvr's com equip, CVC helmet, MRT, non-NBC, (percent correct)
- 3354 Dvr sta, speech intelligibility, dvr's com equip, CVC helmet, MRT, w/NBC mask, (percent correct)
- 3356 Dvr sta, com equip, probability of intercom cord interfering with dvr mobility, rating scale 7 (1-6)
- 3358 Dvr sta, effectiveness of communicating to other crew members using hand signals or other methods, rating scale 6 (1-6)
- 3360 Dvr sta, quality of speech intelligibility, dvr's com equip, CVC helmet, non-NBC, rating scale 2 (1-6)
- 3364 Dvr sta, quality of speech intelligibility, dvr's com equip, CVC helmet, w/NBC mask, rating scale 2 (1-6)
- 3370 Dvr sta, chance of handedness or eye glasses interfering with driving operations, rating scale 2 (1-6)
- 3372 Dvr sta, ease of training new operator quickly, rating scale 2 (1-6)
- 3376 Dvr's exterior lights, adjustable to illuminate desired field of view? (Yes/No; comments)
- 3378 Dvr's exterior lights, illumination level, 25m, full ON, front of vehicle, (lx; ft-C)
- 3380 Dvr's exterior lights, level of difficulty to replace bulbs, etc., rating scale 2 (1-6)
- 3382 Dvr sta, general adequacy of interior lighting, rating scale 1 (1-6)
- 3384 Dvr sta, accessibility of control for interior lighting, rating scale 4 (1-6)

- 3386 Dvr sta, safeguard provided against inadvertent activation of interior lights? (Yes/No; comments)
- 3390 Dvr sta, heater, temperature at dvr's feet, full ON, (degrees C; degrees F)
- 3392 Dvr sta, heater, variable heat control provided? (Yes/No; comments)
- 3394 Dvr sta, heater, station designed for equal distribution of heat? (Yes/No; comments)
- 3396 Dvr sta, ease of operation considering practicality of heater, reliability, accessibility, etc., rating scale 2 (1-6)
- 3398 Dvr sta, heater, accessibility of heater control, rating scale 4 (1-6)
- 3400 Dvr sta, heater, adequacy of safeguards to prevent heat injury to personnel, rating scale 1 (1-6)
- 3408 Dvr sta, ventilation, non-NBC; air flow rate/volume at station, (ft/min; cu ft/min)
- 3410 Dvr sta, ventilation, non-NBC; proportion fresh outside air provided to station, (percent)
- 3412 Dvr sta, ventilation, non-NBC; variable control provided for ventilation system? (Yes/No; comments)
- 3414 Dvr sta, ventilation, non-NBC; accessibility to ventilation control, rating scale 4 (1-6)
- 3416 Dvr sta, ventilation, non-NBC; effectiveness of ventilation system at station, 6 (1-6)
- 3456 Dvr sta, steady-state noise hazards, any frequency/condition, rating scale 5 (1-6)
- 3460 Dvr sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 125 HZ, (dBA)
- 3464 Dvr sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 500 HZ, (dBA)
- 3468 Dvr sta, steady-state noise, closed hatch, veh moving, 30 MPH, hard surfaced road, 2000 HZ, (dBA)
- 3470 Dvr sta, impulse noise hazards, main gun/coax, rating scale 5 (1-6)
- 3472 Dvr sta, impulse noise, main gun firing, closed hatch, gun pos forward, (A duration; B duration: peak pressure-dBA)

- 3480 Dvr sta, seat vibration, prob of degrading task performance, rating scale 7 (1-6)
- 3482 Dvr sta, whole body vibration, at SRP IAW TECOM TOP 1-2-610, X-axis, (RMS, 30 HZ; 50 HZ; 80)
- 3484 Dvr sta, whole body vibration, at SRP IAW TECOM TOP 1-2-610, Y-axis, (RMS, 30 HZ; 50 HZ; 80 HZ)
- 3486 Dvr sta, whole body vibration, at SRP IAW TECOM TOP 1-2-610, Z-axis, (RMS 30 HZ; 50 HZ; 80 HZ)
- 3488 Dvr sta, probability of ride vibrations causing visual difficulties, rating scale 7 (1-6)
- 3490 Dvr sta, vibration amplitude, dvr's instrument panel, (RMS)
- 3494 Dvr sta, vehicle lurch, start-stop? (Yes/No; comments)
- 3500 Dvr sta, emergency brake, location (text)
- 3502 Dvr sta, emergency brake, type of actuation (text)
- 3504 Dvr sta, emergency brake, force required, operation, (N; lbs)

Human Factors Engineering Data Base
File Name: ARMRI
General, Boarding, Movement

- 2004 Handholds/footholds, adequacy of boarding, rating scale 1 (1-6)
- 2005 Boarding handholds, grasp space (mm; in.)
- 2006 Boarding footholds, dimensions, l x w, (mm; in.)
- 2008 Non-skid surfaces, adequacy of, rating scale 2 (1-6)
- 2009 Obstructions boarding vehicle? (Yes/No; comments)
- 2010 Alternate boarding paths? (Yes/No; comments)
- 2011 Alternate emergency hatch provided? (Yes/No; comments)
- 2100 Inter-crew station passage, difficulty moving from primary entrance hatch to loader's station, rating scale 2 (1-6)
- 2101 Inter-crew station passage, average time to move from primary entrance to loader's station (no. trials; seconds)
- 2102 Inter-crew station passage, difficulty moving from primary entrance hatch to cmdr's station, rating scale 2 (1-6)
- 2103 Inter-crew station passage, average time to move from primary entrance to cmdr's station (no. trials; seconds)
- 2104 Inter-crew station passage, difficulty moving from primary entrance hatch to gunner's station, rating scale 2 (1-6)
- 2105 Inter-crew station passage, average time to move from primary entrance to gunner's station (no. trials; seconds)
- 2106 Gunner's seat back, must be removed to enter station? (Yes/No; comments)
- 2108 Driver's ingress from turret to station, must turret be rotated? (Yes/No; comments)
- 2109 Driver's ingress from turret to station, average time, non-NBC garbed, (no. trials; seconds)
- 2111 Driver's ingress from turret to station, average time, NBC garbed, (no. trials; seconds)
- 2113 Driver ingress from turret to station, effort required, NBC garbed, rating scale 2 (1-6)

- 2115 Emergency egress, adequacy of moving from driver sta to turret, rating scale 2 (1-6)
- 2117 Dead weight drag, ease of dead weight drag from driver station into turret, rating scale 2 (1-6)
- 2118 Dead weight drag, from driver station into turret, average time, NBC garbed (no. trials; seconds)
- 2119 Dead weight drag, from driver station into turret, average time, non-NBC garbed (no. trials; seconds)
- 2120 Dead weight drag, from gunner station to outside vehicle, ease of, rating scale 2 (1-6)
- 2121 Dead weight drag, from gunner station to outside vehicle, average time, NBC garbed (no. trials; seconds)
- 2122 Dead weight drag, from gunner station to outside vehicle, time, non-NBC garbed (no.; seconds)
- 2124 Dead weight drag, from cmdr station to outside, thru cmdr's hatch, ease of, rating scale 2 (1-6)
- 2125 Dead weight drag, from cmdr station to outside, thru cmdr's hatch, average time, non-NBC garbed, (no. trials; seconds)
- 2126 Dead weight drag, from cmdr station to outside, thru cmdr's hatch, average time, NBC garbed (no. trials; seconds)

Human Factors Engineering Data Base
File Name: AMR1
System Profile for HFEA

- 0001 Vehicle name, generic and military, (text)
- 0002 Vehicle class; tracked, wheeled; tank, light armored vehicle; etc., (text)
- 0004 Vehicle identification, country of origin, (text)
- 0006 Vehicle identification, manufacture date, (year)
- 0008 Vehicle operability, overall condition of vehicle being evaluated, rating scale 3 (1-6)
- 0010 Vehicle operability, automotive condition, engine/drive train, (text)
- 0012 Vehicle operability, weapon condition, main gun, (text)
- 0014 Vehicle operability, weapon condition, coax machine gun, (text)
- 0018 Vehicle operability, weapon condition, commander's weapon, (text)
- 0020 Crew number, total, (numeric value)
- 0021 Crew location, driver, (text)
- 0022 Crew location, gunner, (text)
- 0023 Crew location, commander, (text)
- 0024 Crew location, loader, (text)
- 0025 Crew location, infantry passengers, (text)
- 0026 Cannon, stabilization (text)
- 0028 Turret, traverse limits (degrees)
- 0030 Cannon, rate-of-fire, cannon, (rnds/min)
- 0040 Cannon, turret traverse rate, (mils/sec)
- 0044 Mobility, fording prep time, (min)
- 0046 Cannon, rate of fire, stationary, (min/sec)
- 0047 Cannon, rate of fire, moving, (min/sec)

0048 Cannon, autoloader, description, (text)
0050 Cannon, autoloader, manual assist, description, (text)
0052 Cannon, ammo, storage, location, (text)
0054 Coax MG, type (text)
0056 Coax MG, caliber (mm)
0058 Coax MG, fire control (text)
0060 Cmdr's weapon, cupola, description, (text)
0062 Cmdr's weapon, elevation limits, (degrees)
0064 Cmdr's weapon, traverse limits, (mils/sec)
0080 Main weapon, fire control, system type, (text)
0082 Main weapon, fire control, range finder, type, (text)
0084 Main weapon, fire control, ballistic computer, description,
(text)
0086 Main weapon, fire control, ammo selector, description,
(text)
0088 Searchlight, model (text)
0090 Searchlight, field of view (degrees)
0092 Searchlight, effective range (meters)
0094 Main weapon, fire control, telescope, model (text)
0096 Main weapon, fire control, telescope, MAG, (power)
0098 Main weapon, fire control, telescope, FOV, (degrees)
0120 Main weapon, fire control, location, (text)
0124 Main weapon, fire control, FLIR, model (text)
0126 Main weapon, fire control, FLIR, MAG (power)
0128 Main weapon, fire control, FLIR, FOV (degrees)
0130 Main weapon, fire control, FLIR, location (text)
0140 Main weapon, fire control, range finder, MAG (power)
0144 Main weapon, fire control, range finder, FOV (degrees)

0146 Main weapon, fire control, range finder, location (text)
0148 Main weapon, fire control, range finder, accuracy (text)
0150 Gun azimuth indicator, description (text)
0156 Ident Friend-Foe, (text)
0160 NBC protection, type, collective protection; individual,
(text)
0166 NBC filter, type (text)
0168 NBC collective protection, type, overpressure/etc., (text)
0174 NBC individual protection, type, (text)
0176 NBC individual protection, filter type (text)
0178 NBC agent detector, type (text)
0180 NBC agent detector, location (text)
0190 Engine, location (text)
0196 Engine, maintenance access, interior (text)
0200 Resupply, POL, time (min)
0220 Cannon, ammo, type 1, descrip; weight (Kg; lbs/oz.)
0222 Cannon, ammo, type 2, descrip; weight (Kg; lbs/oz.)
0226 Cannon, ammo, type 3, descrip; weight (Kg; lbs/oz.)
0228 Cannon, ammo, type 4, descrip; weight (Kg; lbs/oz.)
0260 Main gun dead space, distance from front glacis (meters)
0266 Fire control system, elevation quadrant indicator provided?
(Yes/No; Comments)
0270 Fire control system, traverse indicator type (text)

Human Factors Engineering Data Base
File Name: AMR7
Evaluator's Rating Scales

- 0300 Evaluator's Rating Scale 1
6 = Extremely adequate
5 = Very adequate
4 = Adequate
3 = Inadequate
2 = Very Inadequate
1 = Extremely inadequate
- 0304 Evaluator's Rating Scale 2
6 = Extremely easy
5 = Very easy
4 = Easy
3 = Difficult
2 = Very difficult
1 = Extremely difficult
- 0306 Evaluator's Rating Scale 3
6 = Extremely good
5 = Very good
4 = Good
3 = Poor
2 = Very poor
1 = Extremely poor
- 0308 Evaluator's Rating Scale 4
6 = Extremely accessible
5 = Very accessible
4 = Accessible
3 = Inaccessible
2 = Very inaccessible
1 = Extremely inaccessible
- 0310 Evaluator's Rating Scale 5
6 = Definitely not dangerous/hazardous
5 = Probably not dangerous/hazardous
4 = Maybe not dangerous/hazardous
3 = Maybe dangerous/hazardous
2 = Probably dangerous/hazardous
1 = Definitely dangerous/hazardous
- 0312 Evaluator's Rating Scale 6
6 = Extremely effective
5 = Very effective
4 = Effective

3 = Ineffective
2 = Very ineffective
1 = Extremely ineffective

0314 Evaluator's Rating Scale 7

6 = Extremely improbable
5 = Very improbable
4 = Probably not
3 = Probably
2 = Highly likely
1 = Extremely likely

0316 Color coding IAW MIL-STD-1472C

Red = Critical; stop; emergency
Yellow = Caution; slow down
Green = Safe; go
White = ON; general status; operating

0318 Control movement IAW MIL-STD-1472C

ON = Up, right, clockwise, pull
OFF = Down, left, counter-clockwise, push
Increase = Forward, up, right, clockwise
Decrease = Rearward, down, left, counter-clockwise

0342 Abbrev; Cmdr = Commander

0344 Abbrev; COHb = Carboxyhemoglobin

0344 Abbrev; Com = Communications

0348 Abbrev; CVC = Combat vehicle crewman

0352 Abbrev; DAY-CHV = Day-Closed hatch viewing

0354 Abbrev; dB(A) = decibels, A-weighted

0358 Abbrev; Dvr = Driver

0360 Abbrev; FLIR = Forward looking infra red

0364 Abbrev; ft-C = Foot-candles

0368 Abbrev; FOV = Field of view

0370 Abbrev; Gnr = Gunner

0372 Abbrev; Hz = Hertz

0374 Abbrev; IAW = In accordance with

0378 Abbrev; Ldr = Loader
0380 Abbrev; lx = Lux
0382 Abbrev; m = meters
0383 Abbrev; MG = machine gun
0384 Abbrev; mm = millimeters
0386 Abbrev; MIL-STD = Military standard
0388 Abbrev; MOPP-4 = Military oriented protective posture,
level 4
0390 Abbrev; MRT = Modified rhyme test
0392 Abbrev; N = Newtons
0394 Abbrev; NBC = Nuclear, biological, chemical
0396 Abbrev; NET = New Equipment Training
0397 Abbrev; PPM = Parts Per Million
0398 Abbrev; Rh = Relative humidity
0399 Abbrev; RMS = Root mean square
0400 Abbrev; RMG = Ranging machine gun
0402 Abbrev; SRP = Seat reference point
0406 Abbrev; Sta = Station
0408 Abbrev; SWAT = Subjective Workload Assessment Technique
0408 Abbrev; TECOM = Test and Evaluation Command
0410 Abbrev; TOP = Test Operation Procedures

THE BDM CORPORATION

APPENDIX B
HUMAN FACTORS ENGINEERING ABBREVIATED DATA BASE
FOR ARMORED COMBAT VEHICLES

Human Factors Engineering Data Base
File Name: AMR7
Evaluator's Rating Scales

- 0300 Evaluator's Rating Scale 1
6 = Extremely adequate
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4 = Adequate
3 = Inadequate
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- 0304 Evaluator's Rating Scale 2
6 = Extremely easy
5 = Very easy
4 = Easy
3 = Difficult
2 = Very difficult
1 = Extremely difficult
- 0306 Evaluator's Rating Scale 3
6 = Extremely good
5 = Very good
4 = Good
3 = Poor
2 = Very poor
1 = Extremely poor
- 0308 Evaluator's Rating Scale 4
6 = Extremely accessible
5 = Very accessible
4 = Accessible
3 = Inaccessible
2 = Very inaccessible
1 = Extremely inaccessible
- 0310 Evaluator's Rating Scale 5
6 = Definitely not dangerous/hazardous
5 = Probably not dangerous/hazardous
4 = Maybe not dangerous/hazardous
3 = Maybe dangerous/hazardous
2 = Probably dangerous/hazardous
1 = Definitely dangerous/hazardous
- 0312 Evaluator's Rating Scale 6
6 = Extremely effective
5 = Very effective
4 = Effective

3 = Ineffective
2 = Very ineffective
1 = Extremely ineffective

0314 Evaluator's Rating Scale 7

6 = Extremely improbable
5 = Very improbable
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3 = Probably
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1 = Extremely likely

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0399 Abbrev; RMS = Root mean square
0400 Abbrev; RMG = Ranging machine gun
0402 Abbrev; SRP = Seat reference point
0406 Abbrev; Sta = Station
0408 Abbrev; SWAT = Subjective Workload Assessment Technique
0408 Abbrev; TECOM = Test and Evaluation Command
0410 Abbrev; TOP = Test Operation Procedures

Human Factors Engineering Data Base
File Name: AMR1
System Profile for HFEA

- 0001 Vehicle name, generic and military, (text)
- 0002 Vehicle class; tracked, wheeled; tank, light armored vehicle; etc., (text)
- 0004 Vehicle identification, country of origin, (text)
- 0006 Vehicle identification, manufacture date, (year)
- 0008 Vehicle operability, overall condition of vehicle being evaluated, rating scale 3 (1-6)
- 0020 Crew number, total, (numeric value)
- 0021 Crew location, driver, (text)
- 0022 Crew location, gunner, (text)
- 0023 Crew location, commander, (text)
- 0024 Crew location, loader, (text)
- 0025 Crew location, infantry passengers, (text)
- 0026 Cannon, stabilization? (Yes/No;Comments)
- 0028 Turret, traverse limits (degrees)
- 0030 Cannon, rate-of-fire, cannon, (rnds/min)
- 0040 Cannon, turret traverse rate, (mils/sec)
- 0048 Cannon, autoloader, description, (text)
- 0050 Cannon, autoloader, manual assist, description, (text)
- 0052 Cannon, ammo, storage, location, (text)
- 0054 Coax MG, type (text)
- 0056 Coax MG, caliber (mm)
- 0058 Coax MG, fire control (text)
- 0060 Cmdr's weapon, cupola, description, (text)
- 0062 Cmdr's weapon, elevation limits, (degrees)
- 0064 Cmdr's weapon, traverse limits, (mils/sec)

0080 Main weapon, fire control, system type, (text)
0082 Main weapon, fire control, range finder, type, (text)
0084 Main weapon, fire control, ballistic computer, description,
(text)
0086 Main weapon, fire control, ammo selector, description,
(text)
0088 Searchlight, model (text)
0090 Searchlight, field of view (degrees)
0092 Searchlight, effective range (meters)
0094 Main weapon, fire control, telescope, model (text)
0096 Main weapon, fire control, telescope, MAG, (power)
0098 Main weapon, fire control, telescope, FOV, (degrees)
0120 Main weapon, fire control, location, (text)
0124 Main weapon, fire control, FLIR, model (text)
0126 Main weapon, fire control, FLIR, MAG (power)
0128 Main weapon, fire control, FLIR, FOV (degrees)
0130 Main weapon, fire control, FLIR, location (text)
0140 Main weapon, fire control, range finder, MAG (power)
0144 Main weapon, fire control, range finder, FOV (degrees)
0146 Main weapon, fire control, range finder, location (text)
0148 Main weapon, fire control, range finder, accuracy (text)
0150 Gun azimuth indicator, description (text)
0160 NBC protection, type, collective protection; individual,
(text)
0166 NBC filter, type (text)
0168 NBC collective protection, type, overpressure/etc., (text)
0174 NBC individual protection, type, (text)
0176 NBC individual protection, filter type (text)

0178 NBC agent detector, type (text)
0180 NBC agent detector, location (text)
0190 Engine, location (text)
0196 Engine, maintenance access, interior (text)
0220 Cannon, ammo, type 1, descrip; weight (Kg; lbs/oz.)
0222 Cannon, ammo, type 2, descrip; weight (Kg; lbs/oz.)
0226 Cannon, ammo, type 3, descrip; weight (Kg; lbs/oz.)
0228 Cannon, ammo, type 4, descrip; weight (Kg; lbs/oz.)
0260 Main gun dead space, distance from front glacis (meters)
0270 Fire control system, traverse indicator type (text)

Human Factors Engineering Data Base
File Name: ARMR1
General, Boarding, Movement

- 2004 Handholds/footholds, adequacy of boarding, rating scale 1 (1-6)
- 2005 Boarding handholds, grasp space (mm; in.)
- 2006 Boarding footholds, dimensions, l x w, (mm; in.)
- 2008 Non-skid surfaces, adequacy of, rating scale 2 (1-6)
- 2108 Driver's ingress from turret to station, must turret be rotated? (Yes/No; comments)
- 2115 Emergency egress, adequacy of moving from driver sta to turret, rating scale 2 (1-6)

Human Factors Engineering Data Base
File Name: AMR2
Driver's Station

- 3005 Dvr sta, seat back dimensions, l x w (mm; in.)
- 3010 Dvr sta, seat pan dimensions, IAW MIL-STD-1472C, Fig 50, l x w, (mm; in.)
- 3012 Dvr sta, seat padding, thickness, IAW MIL-STD-1472C, Fig 50, (mm; in.)
- 3018 Dvr sta, distance from seat front, top of padding, to floor, IAW MIL-STD-1472C, Fig 50, (mm; in.)
- 3020 Dvr sta, seat vertical adjustability, IAW MIL-STD-1472C, Fig 50, (range in mm; in.)
- 3022 Dvr sta, seat forward-rearward adjustability, IAW MIL-STD-1472C, Fig 50, (range in mm; in.)
- 3026 Dvr sta, MIL-STD-1472C, Table 28 dimension B, Elbow, static, (mm; in.)
- 3028 Dvr sta, MIL-STD-1472C, Table 28 dimension C, Shoulder, (mm; in.)
- 3034 Dvr sta, MIL-STD-1472C, Table 28 dimension F, Boot clearance from pedal, (mm; in.)
- 3036 Dvr sta, MIL-STD-1472C, Table 28 dimension G, Distance between pedals, (mm; in.)
- 3040 Dvr sta, MIL-STD-1472C, Table 28 measurement 1, head clearance, closed hatch, SRP to underside of hatch, (mm; in.)
- 3044 Dvr sta, MIL-STD-1472C, Table 28 measurement 3, front of knee, seat back to closest forward object, (mm; in.)
- 3052 Dvr sta, adequacy of viewing and operating hand and foot controls, viewing displays in all vertically adjusted seat positions, open/closed hatch, rating scale 1 (1-6)
- 3054 Dvr sta, seat, adequacy of lumbar support, rating scale 1 (1-6)
- 3056 Dvr sta, seat provided with restraint, seat belts?
(Yes/No; comments)
- 3062 Dvr sta, seat provided with adjustable headrest?
(Yes/No; comments)

- 3070 Dvr sta, adequacy of emergency braking, rating scale 1 (1-6)
- 3074 Dvr sta, daylight driving, open hatch, reflective glare on instruments? (Yes/No; Comments)
- 3076 Dvr sta, open hatch, adequacy of rear view mirror, rating scale 1 (1-6)
- 3084 Dvr sta, adequacy of access and operation of hand/foot controls, rating scale 1 (1-6)
- 3088 Dvr sta, visibility; viewing distance to most distant display (mm, in.)
- 3096 Dvr sta, closed hatch, displays readable? (Yes/No; comments)
- 3097 Dvr sta, master caution light provided? (Yes; No/ comments)
- 3098 Dvr sta, master caution light, distance, angle from design eye position, (mm; in./degrees)
- 3100 Dvr sta, master caution light, color (text)
- 3101 Dvr sta, displays illuminated? (Yes/No; comments)
- 3104 Dvr sta, display luminance variable control? (Yes/No; comments)
- 3110 Dvr sta, indicator lights, colored correctly, IAW MIL-STD-1472C? (Yes/No; comments)
- 3112 Dvr sta, indicator lights testable? (Yes/No; comments)
- 3128 Dvr sta, adequacy of access to driver's controls, rating scale 4 (1-6)
- 3138 Dvr sta, adequacy of driver control/display arrangement, rating scale 1 (1-6)
- 3139 Dvr sta, methods provided to reduce glare? (Yes/No; comments)
- 3140 Dvr sta, excessive force required to operate hand controls? (Yes/No; comments)
- 3148 Dvr sta, excessive force required to operate foot controls? (Yes/No; comments)
- 3180 Dvr sta, adequacy of hatch entry padding, rating scale 2 (1-6)

- 3182 Dvr sta, ease of opening/closing hatch, rating scale 2 (1-6)
- 3183 Dvr sta, hatch dimensions, l x w x d, (mm; in.)
- 3190 Dvr sta, open hatch mode, probability of injury from traversing turret, rating scale 5 (1-6)
- 3192 Dvr sta, ease of transitioning from open to closed hatch mode with vehicle in motion, rating scale 2 (1-6)
- 3196 Dvr sta, driver provided with daylight, closed hatch viewing system (DAY-CHV)? (Yes/No; comments)
- 3198 Dvr sta, closed hatch viewing, viewing distance to closest point in front of vehicle, using DAY-CHV, (m; ft)
- 3200 Dvr sta, general adequacy of closed hatch viewing to outside of vehicle, rating scale 1 (1-6)
- 3202 Dvr sta, closed hatch viewing, adequacy of interface with DAY-CHV device and NBC mask, rating scale 1 (1-6)
- 3208 Dvr sta, closed hatch, adequacy of upward viewing through DAY-CHV device, rating scale 1 (1-6)
- 3210 Dvr sta, closed hatch, adequacy of upward viewing through periscope, rating scale 1 (1-6)
- 3224 Dvr sta, night vision device provided? (Yes/No; comments)
- 3226 Dvr sta, adequacy of night vision device, rating scale 1 (1-6)
- 3230 Dvr sta, visibility, adequacy of viewing ground, open hatch, seat adjusted fully up, 5th percentile male, rating scale 1 (1-6)
- 3232 Dvr sta, driver vision, open hatch, viewing distance to point on ground closed to vehicle, normally seated, 5th percentile male, seat adjusted full; up, (m; ft)
- 3234 Dvr sta, driver vision, open hatch, forward FOV, (degrees)
- 3236 Dvr sta, driver vision, open hatch, quality of forward, lateral visibility, rating scale 3 (1-6)
- 3344 Dvr sta, location of communication (com) hookup, (text)
- 3346 Dvr sta, ease of access to com hookup from normal seated position, rating scale 2 (1-6)

- 3350 Dvr sta, com equip, space between connector and bulkhead, or connector and closest object, (mm; in.)
- 3356 Dvr sta, com equip, probability of intercom cord interfering with dvr mobility, rating scale 7 (1-6)
- 3382 Dvr sta, general adequacy of interior lighting, rating scale 1 (1-6)
- 3412 Dvr sta, ventilation, non-NBC; variable control provided for ventilation system? (Yes/No; comments)
- 3416 Dvr sta, ventilation, non-NBC; effectiveness of ventilation system at station, 6 (1-6)
- 3456 Dvr sta, steady-state noise hazards, any frequency/condition, rating scale 5 (1-6)
- 3470 Dvr sta, impulse noise hazards, main gun/coax, rating scale 5 (1-6)
- 3488 Dvr sta, probability of ride vibrations causing visual difficulties, rating scale 7 (1-6)
- 3494 Dvr sta, vehicle lurch, start-stop? (Yes/No; comments)
- 3500 Dvr sta, emergency brake, location (text)

Human Factors Engineering Data Base

File Name: AMR3

Commander's Station

- 4000 Cmdr sta, seat back dimensions, l x w, (mm; in.)
- 4001 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, dimensions seat pan, l x w, (mm; in.)
- 4002 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, seat padding thickness (mm; in.)
- 4008 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, distance from seat front, top of padding, to floor, (mm; in.)
- 4010 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, vertical adjustability, (range in mm; in.)
- 4012 Cmdr sta, seat, IAW MIL-STD-1472C, Fig 50, forward adjustability, (range in mm; in.)
- 4020 Cmdr sta, seat, restraint system provided? (Yes/No; comments)
- 4024 Cmdr sta, seat, MIL-STD-1472C, Table 28 dimension B, Elbow, static, (mm; in.)
- 4026 Cmdr sta, seat, MIL-STD-1472C, Table 28 dimension C, Shoulder, (mm; in.)
- 4032 Cmdr sta, seat, MIL-STD-1472C, Table 28 measurement 1, closed hatch, SRP to underside of hatch, (mm; in.)
- 4042 Cmdr Sta, seat, effectiveness of cmdr's seat, considering adjustability, cushioning, size, and back angle, rating scale 6 (1-6)
- 4046 Cmdr sta, quality of viewing cmdr's instruments with seat adjusted fully up, open hatch, for 95th percentile male, rating scale 3 (1-6)
- 4048 Cmdr sta, quality of viewing cmdr's instruments during closed hatch operations, rating scale 3 (1-6)
- 4050 Cmdr sta, adequacy of lumbar (back) support during extended operations, rating scale 1 (1-6)
- 4054 Cmdr sta, foot rest provided for arctic boot-sized foot? (Yes/No; comments)
- 4056 Cmdr sta, adequacy of foot rest for operations in closed hatch seated condition, rating scale 1 (1-6)

- 4058 Cmdr sta, foot rest dimensions, l x w, (mm; in.)
- 4060 Cmdr sta, vertically-adjustable standing platform provided for stand-up, open hatch operations? (Yes/No; comments)
- 4062 Cmdr sta, adequacy of standing platform considering use with arctic boots, rating scale 1 (1-6)
- 4064 Cmdr sta, can cmdr's seat be adjusted to permit sitting with head and shoulders exposed? (Yes/No, comments)
- 4066 Cmdr sta, approx distance 95th percentile seated male exposed above hatch line, seat adjusted fully up, (mm; in.)
- 4068 Cmdr sta, ease of emergency egress, open hatch, non-NBC clad 95th percentile male, rating scale 2 (1-6)
- 4076 Cmdr sta, seat, capability to fold seat back for stand-up operations? (Yes/No; comments)
- 4078 Cmdr sta, ease of folding seat back for stand-up operations, rating scale 2 (1-6)
- 4080 Cmdr sta, ease of access to adjustment controls for seat operation, rating scale 2 (1-6)
- 4086 Cmdr sta, quality of viewing all controls and displays during day/night closed/open hatch operations, rating scale 3 (1-6)
- 4088 Cmdr sta, effectiveness of cupola periscopes for outside viewing during closed hatch operations, rating scale 6 (1-6)
- 4090 Cmdr sta, cupola provided with controls for manual traverse (of cupola)? (Yes/No; comments)
- 4091 Cmdr sta, ease of locking/unlocking cupola manual traverse locking device, rating scale 2 (1-6)
- 4094 Cmdr sta, level of difficulty to rotate cupola using manual controls, rating scale 2 (1-6)
- 4096 Cmdr sta, weapons servicing, ease of sighting and firing cmdr's weapon, closed hatch, considering rotation of cupola, location of periscopes, and fire controls, rating scale 2 (1-6)
- 4098 Cmdr sta, ease of sighting and firing cmdr's weapon, open hatch mode, rating scale 2 (1-6)
- 4102 Cmdr sta, ease of access to ammunition for cmdr's weapon, rating scale 2 (1-6)

- 4126 Cmdr sta, ease of performing target acquisition and main gun firing tasks using cmdr's GPS extension, open hatch, rating scale 2 (1-6)
- 4128 Cmdr sta, ease of performing target acquisition and main gun firing tasks using cmdr's GPS extension, closed hatch, rating scale 2 (1-6)
- 4138 Cmdr sta, com equip, location of com hookup (text)
- 4140 Cmdr sta, ease of operation of com box w/arctic handwear, rating scale 2 (1-6)
- 4142 Cmdr sta, quality of speech intelligibility, cmdr's com equip, CVC helmet, non-NBC, rating scale 2 (1-6)
- 4146 Cmdr sta, com equip, space between connector and bulkhead or nearest object, (mm; in.)
- 4147 Cmdr sta, effectiveness of communicating with other crew members using hand signals or other non-electronic methods, rating scale 6 (1-6)
- 4148 Cmdr sta, overall adequacy of controls/displays for tasks cmdr must perform, rating scale 1 (1-6)
- 4149 Cmdr sta, accessibility for operation of controls, rating scale 4 (1-6)
- 4152 Cmdr sta, distance from design eye, to nearest display, (mm; in.)
- 4154 Cmdr sta, distance from design eye, to most distant display, (mm; in.)
- 4162 Cmdr sta, displays illuminated? (Yes/No; comments)
- 4166 Cmdr sta, master power control provided? (Yes/No; comments)
- 4168 Cmdr sta, displays color-coded efficiently IAW MIL-STD-1472C? (Yes/No; comments)
- 4176 Cmdr sta, indicator lights testable? (Yes/No; comments)
- 4184 Cmdr sta, for instrument panels, indicators, displays/controls, nomenclature used of appropriate size, contrast with background, and readable? (Yes/No; comments)
- 4186 Cmdr sta, decals/placards readable, understandable, properly placed? (Yes/No; comments)
- 4188 Cmdr sta, general, ease of control actuation for all cmdr's controls, rating scale 2 (1-6)

- 4230 Cmdr sta, hatch, adequacy of hatch entry padding, rating scale 1 (1-6)
- 4232 Cmdr sta, hatch, ease of opening/closing hatch from inside vehicle, rating scale 2 (1-6)
- 4240 Cmdr sta, hatch dimensions, l x w x d, (mm; in.)
- 4242 Cmdr sta, hatch, combat lock provided? (Yes/No; comments)
- 4246 Cmdr sta, ease of transitioning from open to closed hatch, rating scale 2 (1-6)
- 4250 Cmdr sta, hatch provide a partially open ("pop-up") mode to allow unrestricted observation while maintaining overhead cover? (Yes/No; comments)
- 4252 Cmdr sta, space provided between top of turret and bottom of hatch lip in 'pop-up' mode, (mm; in.)
- 4256 Cmdr sta, outside viewing, closed hatch using periscopes/vision blocks, (0 to 360 degrees)
- 4258 Cmdr sta, outside viewing, closed hatch, blind spots? (Yes/No; comments)
- 4262 Cmdr sta, adequacy of outside viewing, closed hatch, through periscopes/vision blocks for target acquisition and surveillance, rating scale 1 (1-6)
- 4270 Cmdr sta, night vision device available for viewing through periscopes/vision blocks? (Yes/No; comments)
- 4288 Cmdr sta, general adequacy of interior lighting, rating scale 1 (1-6)
- 4312 Cmdr sta, ventilation, non-NBC; effectiveness of ventilation system at station, rating scale 6 (1-6)
- 4318 Cmdr sta, steady-state noise hazards, any frequency/conditions, rating scale 5 (1-6)
- 4330 Cmdr sta, impulse noise hazards, main gun/coax, rating scale 5 (1-6)

Human Factors Engineering Data Base
File Name: AMR4
Gunner's Station

- 5000 Gun sta, seat back dimensions, l x w, (mm; in.)
- 5001 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, seat pan dimensions, l x w, (mm; in.)
- 5004 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, seat padding thickness, (mm; in.)
- 5010 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, distance from seat front, top of padding, to floor, (mm; in.)
- 5012 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, vertical adjustability, (range in mm; in.)
- 5014 Gun sta, seat, IAW MIL-STD-1472C, Fig 50, forward-rearward adjustability, (range in mm; in.)
- 5022 Gun sta, seat, restraint system provided? (Yes/No; comments)
- 5026 Gun sta, seat, MIL-STD-1472C, Table 28 dimension B, Elbow, static, (mm; in.)
- 5028 Gun sta, seat, MIL-STD-1472C, Table 28 dimension C, Shoulder, (mm; in.)
- 5034 Gun sta, seat, MIL-STD-1472C, Table 28 measurement 1, SRP to closest object overhead, (mm; in.)
- 5042 Gun sta, seat, MIL-STD-1472C, Table 28 measurement 7, boot, front of seat pan to nearest object forward, (mm; in.)
- 5044 Gun sta, seat, effectiveness of gunner's seat, considering adjustability, cushioning, size, and back angle, rating scale 4 (1-6)
- 5050 Gun sta, adequacy of lumbar (back) support during cross country maneuvers, rating scale 1 (1-6)
- 5054 Gun sta, protective guard provided between leg and gun breech? (Yes/No; comments)
- 5056 Gun sta, ease of emergency egress, non-NBC, 95th percentile male, rating scale 2 (1-6)
- 5064 Gun sta, ease of access to adjustment controls for seat operation, rating scale 2 (1-6)
- 5068 Gun sta, quality of viewing all controls and displays, rating scale 3 (1-6)

- 5074 Gun sta, retractable chest support provided? (Yes/No; comments)
- 5076 Gun sta, adequacy of retractable chest support to steady gunner during gunnery operations, rating scale 1 (1-6)
- 5078 Gun sta, dimensions of chest support, l x w x d, (mm; in.)
- 5100 Gun sta, adequacy of workspace to perform powered target acquisition and tracking, rating scale 1 (1-6)
- 5104 Gun sta, adequacy of workspace to perform powered gun lay, rating scale 1 (1-6)
- 5112 Gun sta, adequacy of workspace to perform manual gun lay, rating scale 1 (1-6)
- 5150 Gun sta, location of communications equipment, (text)
- 5152 Gun sta, ease of operation of com box w/arctic handwear, rating scale 2 (1-6)
- 5153 Gun sta, com equip, space between connector and bulkhead or nearest object, (mm; in.)
- 5156 Gun sta, quality of speech intelligibility, gnr's com equip, CVC helmet, non-NBC, rating scale 2 (1-6)
- 5158 Gun sta, effectiveness of communicating with other crew members using hand signals or other non-electronic methods, rating scale 6 (1-6)
- 5159 Gun sta, overall adequacy of controls/displays for critical gunnery tasks, 1 (1-6)
- 5162 Gun sta, controls/displays; size, shape, spacing appropriate for intended usage? (Yes/No; comments)
- 5167 Gun sta, adequacy of control/display illumination, rating scale 1 (1-6)
- 5171 Gun sta, adequacy of control/display luminance, rating scale 1 (1-6)
- 5172 Gun sta, displays color-coded efficiently, IAW MIL-STD-1472C? (Yes/No; comments)
- 5184 Gun sta, indicator lights grouped together, close to gunner's line of sight? (Yes/No; comments)
- 5186 Gun sta, indicator lights correctly color-coded IAW MIL-STD-1472C? (Yes/No; comments)

- 5198 Gun sta, adequacy of luminance for primary, warning indicator light, rating scale 1 (1-6)
- 5205 Gun sta, decals/placards readable, readily understood, and properly placed? (Yes/No; comments)
- 5206 Gun sta, ease of control actuation for all gunner's controls, rating scale 2 (1-6)
- 5240 Gun sta, hatch provided? (Yes/No; comments)
- 5242 Gun sta, hatch, ease of opening/closing from inside vehicle, rating scale 2 (1-6)
- 5254 Gun sta, hatch dimensions, l x w x d, (mm; in.)
- 5456 Gun sta, hatch, combat lock provided? (Yes/No; comments)
- 5460 Gun sta, effectiveness of gunner's unity periscope/vision block for surveillance/initial target acquisition, without NBC mask, rating scale 6 (1-6)
- 5466 Gun sta, quality of vision through GPS, day mode, rating scale 3 (1-6)
- 5490 Gun sta, chance of handedness or eye glasses interfering with operations, rating scale 3 (1-6)
- 5494 Gun sta, general adequacy of interior lighting, rating scale 1 (1-6)
- 5502 Gun sta, heater, station designed for equal distribution of heat? (Yes/No; comments)
- 5510 Gun sta, ventilation, non-NBC; effectiveness of fresh air ventilation system, rating scale 6 (1-6)
- 5528 Gun sta, steady-state noise hazards, any frequency/condition, rating scale 5 (1-6)
- 5540 Gun sta, impulse noise hazards, main gun/coax, rating scale 5 (1-6)
- 5558 Gun sta, probability of ride vibration causing visual difficulties for gunner, rating scale 7 (1-6)
- 5580 Gun sta, target acquisition, periscope, location (text)
- 5584 Gun sta, target acquisition, periscope, model (text)
- 5586 Gun sta, target acquisition, periscope, magnification (power)
- 5588 Gun sta, target acquisition, periscope, horizontal field of

view, (degrees)

5592 Gun sta, target acquisition, periscope, vertical field of view, (degrees)

5594 Gun sta, target acquisition, periscope, range (meters)

5596 Gun sta, target acquisition, periscope, limitations (text)

Human Factors Engineering Data Base
File Name: AMR5
Loader's Station

- 6000 Ldr sta, seat back dimensions, l x w, (mm; in.)
- 6001 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, seat pan dimensions, l x w, (mm; in.)
- 6004 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, seat padding thickness, (mm; in.)
- 6010 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, distance from seat front, top of padding, to floor, (mm; in.)
- 6012 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, vertical adjustability, (range in mm; in.)
- 6014 Ldr sta, seat, IAW MIL-STD-1472C, Fig 50, forward-rearward adjustability, (range in mm; in.)
- 6020 Ldr sta, seat, restraint system provided (Yes/No/ comments)
- 6034 Ldr sta, seat, MIL-STD-1472C, Table 28 dimension B, Elbow, static, (mm; in.)
- 6036 Ldr sta, seat, MIL-STD-1472C, Table 28 dimension C, Shoulder, (mm; in.)
- 6042 Ldr sta, seat, MIL-STD-1472C, Table 28 measurement 1, closed hatch, SRP to underside of hatch, seat adjusted fully down, (mm; in.)
- 6054 Ldr sta, seat, MIL-STD-1472C, Table 28 measurement 7, boot, front of seat pan to nearest object forward, (mm; in.)
- 6056 Ldr sta, seat, effectiveness of ldr's seat, considering adjustability, cushioning, size, and back angle, rating scale 6 (1-6)
- 6072 Ldr sta, seat, effectiveness of seat design/placement for seated loading/firing operations, rating scale 6 (1-6)
- 6077 Ldr sta, main gun ammo, projectile separate from propellant? (Yes/No; comments)
- 6078 Ldr sta, ease of access and loading of main gun ammo, rating scale 2 (1-6)
- 6090 Ldr sta, objects present preventing free interface with main gun/access to main gun ammo?(Yes/No; comments)
- 6092 Ldr sta, main gun provided with stub case deflector? (Yes/No; comments)

- 6094 Ldr sta, main gun provided with stub case box? (Yes/No; comments)
- 6099 Ldr sta, main gun provided with stub/casing retractor tool/device? (Yes/No; comments)
- 6102 Ldr sta, probability of injury during loading/firing operations due to design of workstation, rating scale 5 (1-6)
- 6104 Ldr sta, probability of striking inadvertently the main gun round nose against bulkhead or objects within turret during loading process, rating scale 3 (1-6)
- 6110 Ldr sta, adequacy of workspace to perform rapid loading operations, rating scale 1 (1-6)
- 6114 Ldr sta, adequacy of workspace to allow a "safe area" to stand or sit to avoid injury from gun recoil, spent brass, etc, rating scale 1 (1-6)
- 6116 Ldr sta, ease of access to main gun ammo and operation of mechanisms to stow or release ammo, rating scale 2 (1-6)
- 6122 Ldr sta, ease of uploading main gun ammunition from semi-ready rack to ready rack, rating scale 2 (1-6)
- 6136 Ldr sta, ease of access to stowed main gun ammunition, rating scale 2 (1-6)
- 6138 Ldr sta, coax, ease of access to load, charge, clear jams as required, non-NBC clad, rating scale 2 (1-6)
- 6450 Ldr sta, coax, ease of dismounting coax for maintenance, rating scale 2 (1-6)
- 6452 Ldr sta, coax, ease of installing coax, rating scale 2 (1-6)
- 6454 Ldr sta, ease of access and operation of all ldr's controls without being subjected to main gun recoil, rating scale 2 (1-6)
- 6460 Ldr sta, ease of loading secondary weapon (i.e., 7.62 MG, .50 Cal MG, etc.), rating scale 2 (1-6)
- 6462 Ldr sta, ease of installing secondary weapon (i.e., 7.62 MG, .50 Cal MG, etc.), rating scale 2 (1-6)
- 6464 Ldr sta, ease of dismounting secondary weapon (i.e., 7.62 MG, .50 Cal MG, etc.), rating scale 2 (1-6)
- 6478 Ldr sta, effectiveness of ldr's periscopic vision, rating

- scale 6 (1-6)
- 6482 Ldr sta, outside visibility, blind spots (text)
- 6488 Ldr sta, step (other than seat) provided for ingress to and egress from station? (Yes/No; comments)
- 6490 Ldr sta, location of step for ingress/egress, (text)
- 6492 Ldr sta, dimensions of step for ingress/egress, l x w, (mm; in.)
- 6496 Ldr sta, accessibility of controls, rating scale 4 (1-6)
- 6510 Ldr sta, quality of visibility of controls/displays for day/night operations, rating scale 3 (1-6)
- 6512 Ldr sta, viewing distance from design eye to nearest display, (mm; in.)
- 6514 Ldr sta, viewing distance from design eye position to most distant display, (mm; in.)
- 6520 Ldr sta, displays readable, closed hatch? (Yes/No; comments)
- 6522 Ldr sta, displays illuminated? (Yes/No; comments)
- 6544 Ldr sta, indicator lights grouped together, close to ldr's line of sight? (Yes/No; comments)
- 6578 Ldr sta, for instrument panels, indicators, displays/controls, nomenclature used of appropriate size, contrast with background, and readable? (Yes/No; comments)
- 6646 Ldr sta, hatch provided? (Yes/No; comments)
- 6648 Ldr sta, hatch, ease of opening/closing from inside vehicle, rating scale 2 (1-6)
- 6649 Ldr sta, hatch, ease of unlocking/opening from outside, rating scale 2 (1-6)
- 6658 Ldr sta, hatch dimensions, l x w x d, (mm; in.)
- 6660 Ldr sta, hatch, combat lock provided? (Yes/No; comments)
- 6664 Ldr sta, adequacy of hatch entry padding, rating scale 1 (1-6)
- 6666 Ldr sta, ease of releasing hatch from secured, open hatch position, to closed hatch position, rating scale 2 (1-6)
- 6680 Ldr sta, location of communications equipment, (text)

- 6688 Ldr sta, com equip, space between connector and bulkhead or nearest object, (mm; in.)
- 6690 Ldr sta, quality of speech intelligibility, CVC helmet, non-NBC, rating scale 2 (1-6)
- 6702 Ldr sta, general adequacy of interior lighting, rating scale 1 (1-6)
- 6714 Ldr sta, ventilation, non-NBC; effectiveness of fresh outside air ventilation system, rating scale 6 (1-6)
- 6728 Ldr sta, steady-state noise hazards, any frequency/condition, rating scale 5 (1-6)
- 6740 Ldr sta, impulse noise hazards, main gun/coax, rating scale 5 (1-6)

AD-A170 744

HUMAN FACTORS ENGINEERING DATA BASE DEVELOPMENT FOR
ARMORED COMBAT VEHICL. (U) BDM CORP ALBUQUERQUE NM
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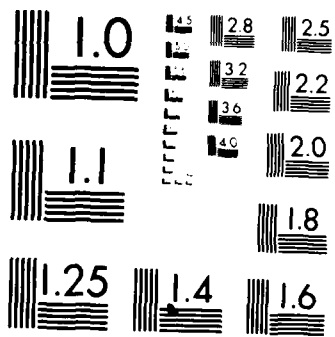
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Human Factors Engineering Data Base
File Name: AMR6
Crew Integration, Safety, Health Hazards

- 7002 CVC helmet, effectiveness of helmet communications device, rating scale 6 (1-6)
- 7046 NBC/Arctic gear, adequacy of workspace to permit efficient donning/doffing of NBC/arctic garb, rating scale 1 (1-6)
- 7056 Water stowage, capacity, (liters; gals)
- 7058 Water stowage, accessibility to stowed water, rating scale 4 (1-6)
- 7076 Ventilation, location of fresh air intake, distance from engine/other exhausts, (text; mm; in.)
- 7078 General, adequacy of interior space for extended ops; crew work/rest cycles, rating scale 1 (1-6)
- 7082 General, adequacy of padding of protruding objects to protect crew from injury, rating scale 1 (1-6)
- 7112 Ventilation, bore evacuator provided? (Yes/No; comments)
- 7114 Ventilation, ventilator fan in turret provided? (Yes/No; comments)
- 7120 Fire suppression, automatic fire suppression system provided? (Yes/No; description)
- 7140 Maintenance, automotive, accessibility to drain valves, rating scale 4 (1-6)
- 7142 Maintenance, automotive, accessibility to oil filters, rating scale 4 (1-6)
- 7144 Maintenance, automotive, accessibility to air filters, rating scale 4 (1-6)
- 7146 Maintenance, automotive, accessibility to engine adjustments, rating scale 4 (1-6)
- 7148 Maintenance, automotive, accessibility to batteries/terminals, rating scale 4 (1-6)
- 7152 Maintenance, interior, accessibility to hydraulics, rating scale 4 (1-6)
- 7154 Maintenance, interior, accessibility to electrical systems, rating scale 4 (1-6)

- 7156 Maintenance, ease of identifying maintenance checkpoints, rating scale 2 (1-6)
- 7158 Maintenance, general adequacy of workspace for performing checks, maintenance services, rating scale 1 (1-6)
- 7160 Maintenance, ease of reading dipsticks, gauge levels, etc, rating scale 2 (1-6)
- 7174 Maintenance, special tools required (Yes/No; comments)
- 7178 Maintenance, special tools stowed on-board vehicle? (Yes/No; comments)
- 7188 Repairs, interior, accessibility to electrical cables/hydraulic lines, rating scale 4 (1-6)
- 7196 Stowage, adequacy of design for stowage of replacement items (i.e., road wheels, track blocks, firing pins, etc.) for transport into combat, rating scale 1 (1-6)
- 7214 Refueling, ease of accessing fuel inlet, manipulating with arctic handwear, rating scale 2 (1-6)
- 7218 Stowage, adequacy of space for personnel equipment, NBC garments, individual weapons/ammunition, inside vehicle, rating scale 1 (1-6)
- 7220 Stowage, personnel gear/weapons stowed outside vehicle? (Yes/No; comments)
- 7222 Stowage, adequacy of stowage of combat rations, rating scale 1 (1-6)
- 7228 Stowage, accessibility of main gun ammunition, uploading, rating scale 4 (1-6)
- 7230 Stowage, accessibility of coax/cmdr's weapon ammunition, rating scale 4 (1-6)
- 7236 Stowage, method of uploading vehicle, through turret, other means, (text)
- 7238 Stowage, ease of uploading/downloading, main gun ammunition, consider hatches, hull obstructions, etc., rating scale 2 (1-6)
- 7254 Combat operations, ease of boresighting/zeroing main gun, rating scale 2 (1-6)

END

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