

MIS-PRF-55010  
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**PERFORMANCE SPECIFICATION  
SYSTEM SPECIFICATION  
FOR THE  
MAINTENANCE SUPPORT DEVICE-VERSION 2 (MSD-V2)**

Prepared for:  
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I HAVE READ THE CONTENTS OF MIS-PRF-55010 RELATIVE TO ACQUISITION REFORM AND CERTIFY THAT THE SPECIFICATION IS A PERFORMANCE BASED DOCUMENT.

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## 1.0 SCOPE

**1.1 Identification.** This specification establishes the performance, verification, and acceptance requirements for the Maintenance Support Device-Version 2 (MSD-V2), the MSD-V2 Kit, and all optional items needed to support communications, missiles, aircraft, ground vehicles, and electronic commodity equipment in the U.S. Army.

**1.2 System overview.** The MSD-V2 system of the Integrated Family of Test Equipment (IFTE) is the Army's fourth generation multipurpose standard automatic test equipment. It will be used throughout the Department of Defense (DoD) at all levels of maintenance to test and diagnose Army's highly complex communications, other electronic commodity equipment, missiles, aircrafts, and ground vehicles to identify failed line replaceable units (LRUs). The DoD maintainers will also use the MSD-V2 system to host Interactive Electronic Technical Manuals and/or specific application software and to upload/download mission data or software.

## 2.0 APPLICABLE DOCUMENTS

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

### 2.2 Government documents.

**2.2.1 Specifications, standards, and handbooks.** The following specifications, standards, and handbooks of the exact revision listed below form a part of this specification to the extent specified herein.

#### DEPARTMENT OF DEFENSE

MIL-STD-130L	Identification Marking of U.S. Military Property
MIL-STD-461E	Requirements for the Control of Electromagnetic interference Characteristics of Subsystems and Equipment
MIL-STD-464A	Electromagnetic Environmental Effects, Requirements for Systems
MIL-STD-810F	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-1472F	Human Engineering

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MIL-STD-1553B      Digital Time Division Command Response  
Notice 4              Multiplex Data Bus

MIL-HDBK-1473A    Color and Marking of Army Materiel

(Unless otherwise indicated, copies of the above standards are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094 and on-line at <http://assist2.daps.dla.mil/quicksearch/>.)

**2.2.2 Other Government documents, drawings, and publications.** The following other Government documents, drawings, and publications of the exact revision level shown form a part of this specification to the extent specified herein.

### DRAWINGS

13608012	Adapter Kit, Internal Combustion Engine (ICE) Test
13608010	ICE, Interconnecting Box
12258786	Cable Assembly, (W4)
12258784	Cable Assembly, (W1)
13580845	Cable, Volt/Ohm Extension
13580831	Adapter Set, ICE Test
13580836	Data Bus Kit (DK) (Dearborn Protocol Adapter/Cabling)
13580844	Probe Set (Standard)
13608011	Cable Assembly, MSD ICE Serial
13580856	Transit Case
13608013	Plate, Identification
13580865-2	Assembly, North Atlantic Treaty Organization (NATO) Power Cable

**2.3 Non-Government documents.** The following documents of the exact revision listed below form a part of this specification to the extent specified herein.

IEC 61010              Safety Requirements for Electrical Equipment for  
Measurement, Control, and Laboratory Use (General  
Requirements)

IPC/EIA J-STD-001C    Requirements for Soldered Electrical and Electronic  
Assemblies

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

## 3.0 REQUIREMENTS

**3.1 First Article.** When specified in the contract or purchase order, a sample shall be subjected to the first article inspection in accordance with (IAW) section 4.2.1.

**3.2 Functional and performance requirements.**

**3.2.1 Functional capabilities.**

a. The MSD-V2 Kit shall be sufficiently rugged (see section 6.2) to withstand handling in the field during operation, maintenance, supply and transport within the environmental limits for those conditions specified in this document.

b. The MSD-V2 Kit shall permit proper shutdown/turned off and storage by personnel dressed in chemical and environmental protective gear (Military Operational Protective Posture (MOPP) IV).

c. The MSD-V2 shall permit shutting down through the keyboard and the pointing device.

d. Connectors, cables, and ancillary equipment shall tolerate 500 cycles of repeated set-up and tear-down by users.

**3.2.1.1 MSD-V2 Kit.** The standard MSD-V2 Kit configuration shall include as a minimum the following items:

a. **MSD-V2**

b. **Transit case**

c. **Cables:**

Phone  
Network  
Alternating Current (AC) Power  
NATO Power Cable Assembly

d. **Standard accessories:**

European Power Adapter  
External Battery Charger  
External AC Power Supply (if required to meet power requirements)  
Primary (and Secondary if required) Batteries  
Removable Hard Disk Drive  
At Least 128 Megabytes (MB) Flash Memory Personal Computer Memory Card  
International Association (PCMCIA) Card  
Digital Versatile Disc (DVD)-Read Only Memory (ROM) or Compact Disc (CD)-ROM Boot Disk (United States (U.S) or Foreign Military Sales (FMS) Configuration)  
Two Spare Fuses per Active Fuse (if used)  
“Quick Start” Card

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### Configuration Sheet

**3.2.1.1.1 MSD-V2.** The MSD-V2 shall be configured in a clamshell design. The standard MSD-V2 configuration shall include as a minimum the following items, features, and performances:

**3.2.1.1.1.1 Processor.** The MSD-V2 processor shall be a Pentium® M processor with a clock speed of at least 1.6 Gigahertz (GHz). Future generation processors may be acceptable provided the performance is at least met.

**3.2.1.1.1.2 Memory.** The MSD-V2 shall contain at least 512 Megabytes (MB) of Random Access Memory (RAM). It shall be expandable to at least 1 Gigabyte (GB).

**3.2.1.1.1.3 Display.** The MSD-V2 shall contain at least a 13.3 inch minimum diagonal viewing area, 1024 X 768 minimum resolution, and active matrix color or equivalent display. The MSD-V2 display shall be sunlight readable. The performance and physical characteristics of the MSD-V2 display shall not be degraded due to oil and grease. The MSD-V2 display shall be cleanable, using a solution of soap and water, without degradation of performance or surface damage.

**3.2.1.1.1.4 Video.** The MSD-V2 video shall use an Advanced Graphic Processor or equivalent with at least 64MB of dedicated video RAM.

**3.2.1.1.1.5 Audio.** The MSD-V2 shall have an internal sound card with line in, stereo headphone, and microphone connectors. The sound output shall be compatible with commercial Sound Blaster or AC '97 stereo capabilities. The headphone connector shall accept a standard three-section 3.5mm miniature stereo phone plug consisting of a tip, ferrule, and barrel. The headphone connector shall be of the "break-to-make" type that automatically breaks the circuit to any internal speaker(s) and connects the stereo amplifier outputs to the external speakers (in headphone) when the headphone plug is inserted. Conversely, when the external headphone plug is removed, the connector shall switch the stereo output back to the internal speaker(s). The connector shall incorporate the standard circuit for commercial stereo headphones. That is, one stereo output shall power a speaker connected between the tip and the barrel of the inserted plug while the other output shall power a speaker connected between the ferrule and the barrel. The output shall be adjustable from 0 to a minimum of 110 millivolts root-mean-square (RMS) at 1 kilohertz (KHz) through hardware/software.

#### **3.2.1.1.1.6 Drives**

**3.2.1.1.1.6.1 Hard disk.** The MSD-V2 Kit shall include a hard disk drive of at least 60 GB that is not a part of the MSD-V2. This internal drive shall be removable from the MSD-V2 with no tools required. The rotational speed for this drive shall be at least 4200 revolutions per minute.

**3.2.1.1.1.6.2 DVD+RW/CD-RW.** The MSD-V2 shall include an internal DVD+RW/CD-RW drive. This drive shall have at least 8x DVD-ROM read speed for a DVD-ROM, 4X DVD+Rewritable (RW) for a DVD+RW disk, 4X DVD+R write speed for DVD+R disk, 24x

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CD-ROM read speed for CD, 10X CD-RW write speed for CD-RW disk, and 24x CD-R write speed for CD-R disk.

**3.2.1.1.1.6.3 Floppy drive.** The MSD-V2 shall include an internal floppy drive. This drive shall read from and write to 1.44 MB floppy disks.

**3.2.1.1.1.7 Ports.** The MSD-V2 shall include the following ports:

**3.2.1.1.1.7.1 Two Serial Recommended Standard (RS)-232.** The MSD-V2 RS-232 ports shall be 2-wire and 4-wire RS-485 configurable through an Application Program Interface. The software for these RS-232/485 configurable ports shall display the current active configuration.

**3.2.1.1.1.7.2 Two Universal Serial Bus (USB) 2.0.** The MSD-V2 USB 2.0 ports shall have a mechanism to secure the USB cables. The secured mechanism shall withstand a static force of 5 pounds and a dynamic force of 10 pounds for 500 milliseconds.

**3.2.1.1.1.7.3 External Super Video Graphics Array (SVGA).** The MSD-V2 SVGA port shall support connection at least to a 1024 x 768 resolution color monitor.

**3.2.1.1.1.7.4 PCMCIA card reader.** The MSD-V2 PCMCIA card reader port shall contain one Type III or two Type II slots, shall read two Type II PCMCIA cards simultaneously, and shall comply with the latest (see 6.3) PCMCIA Card Standard Version. This port shall support 16 bit and 32 bit PCMCIA cards.

**3.2.1.1.1.8 Strain relief of the PCMCIA cards.** The MSD-V2 shall provide strain relief capability for any PCMCIA card cables or any combination of card cables used. The strain relief shall provide protection for all PCMCIA card(s) and PCMCIA bay without damage to cable(s). The cable while attached to the MSD-V2 via the strain relief shall withstand a static force of 10 pounds and a dynamic force of 20 pounds for 500 milliseconds.

### **3.2.1.1.1.9 Communications**

**3.2.1.1.1.9.1 Modem.** The MSD-V2 shall contain an internal V.92/56K Modem that supports a data transfer rate of at least 56 Kilobits per second with an external RJ-11 connector.

**3.2.1.1.1.9.2 Network.** The MSD-V2 shall contain an internal, wireless Ethernet interface and an internal RJ-45 connector, which enables Ethernet connection to another device that does not have wireless capability. The Ethernet with the RJ-45 connection shall be at least compatible with 10 Megabits per second (Mbps) and 100 Mbps of data transfer rate. The wireless Ethernet shall be 802.11g compliant.

### **3.2.1.1.1.10 Power**

**3.2.1.1.1.10.1 Sources and connections.** The MSD-V2 Kit shall operate from 110 and 220 VAC at 47 to 400 Hz commercial power and 18 to 32 VDC. Utilization of an external power converter is permitted. Auto-sensing of power source is required. The MSD-V2 Kit shall

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include all cables required for AC and DC operations. The MSD-V2 Kit shall include a European power adapter equivalent to National Stock Number 5935-01-359-5698. The MSD-V2 or the power converter (if required) shall accept 18-32 VDC via an input power connector that shall physically interface with the military connector MS3476 W14-4S on the P2 end of the NATO Power Cable Assembly.

**3.2.1.1.1.10.2 Excessive current drain protection.** The MSD-V2 Kit shall employ automated safety mechanisms incorporated to automatically disconnect the equipment in the event of current being drawn in excess of the equipment rating. No degradation of performance or accuracy shall occur due to overload or short circuit conditions. Specified operation shall be restored after overload interruption without requiring use of tools. The MSD-V2 Kit safety mechanism shall be mounted to allow user access and shall be capable of being reset or replaced by the user without the use of tools or disassembly. If fuses are used as the safety mechanism, the following shall apply:

a. Common or separate fuse holders may be provided. If only one fuse holder is used (common), the MSD-V2 Kit shall be fitted with the 115 VAC fuse installed and the 230 VAC fuse stowed with the accessories.

b. The fuses shall be standard fuses available through commercial sources.

c. The fuse rating shall be indicated near or on the fuse holder.

d. Besides the active fuses installed in the equipment fuse holders, the MSD-V2 Kit shall be over-packed with two of each spare fuse necessary for complete operation.

**3.2.1.1.1.10.3 Heat transfer.** The hottest point (which is exposed to an operator) on the MSD-V2 Kit and any optional items shall not exceed 120 degree Fahrenheit per MIL-STD-1472F.

**3.2.1.1.1.10.4 Power management.** The MSD-V2 Kit shall include a variable automated power management system that reverts to and maintains a low power setting for system resources (i.e. display, hard disk drive) until the devices are needed, thus optimizing battery life. As a minimum, power management shall be applied to the display, hard disk drive, floppy drive, and DVD+RW/CD-RW drive. The power management system shall be user operated to enable/disable through the Microsoft® Windows® professional operating system. The PCMCIA card reader shall not be powered down or adversely impacted by the MSD-V2 Kit power management system.

**3.2.1.1.1.10.5 Indicators.** The MSD-V2 shall contain a battery charge status indicator and a low battery indicator that shall visually notify the user of a low battery charge status at least 5 minutes prior to system shutdown. The MSD-V2 shall also contain a visual indicator(s) that shows whether the external power is being used. A visual indicator shall be on the MSD-V2 to show the hard disk drive activity.

**3.2.1.1.1.10.6 Battery.** The MSD-V2 shall have battery power sufficient to operate uninterrupted for a minimum of 6 hours on internal battery power using no more than 2 hot-

swappable, memory-free batteries simultaneously. If two batteries are required, the primary internal battery shall power the MSD-V2 for at least 3 continuous and uninterrupted hours. Both the primary and secondary batteries shall be hot-swappable so that battery power to the MSD-V2 is uninterrupted. The primary battery and the secondary battery (if required to meet the 6-hour operational requirement) shall also be removable with no tools required

**3.2.1.1.10.7 External battery charger.** The MSD-V2 Kit shall include an external battery charger capable of charging 1 fully discharged battery (either primary or secondary) with a maximum total charge time of 3 hours. The external battery charger shall provide visual means for indicating the battery charge status and power on. The external battery charger shall meet the input power requirements of paragraph 3.2.1.1.10.1. The external battery charger shall accept 18-32 VDC via an input power connector that shall physically interface with the military connector MS3476 W14-4S on the P2 end of the NATO Power Cable Assembly.

**3.2.1.1.10.8 Internal battery charger.** The MSD-V2 shall include an internal battery charger capable of charging the primary battery and the secondary battery (if required). The charger shall have a power-sensing device so as to not overcharge the batteries.

**3.2.1.1.11 Input devices.** The MSD-V2 shall include an environmentally protected backlit integrated full sized QWERTY keyboard with arrow keys, function keys, and an integrated pointing device (Mouse).

**3.2.1.1.12 Handle.** The MSD-V2 shall include a handle that has sufficient internal clearance to comfortably accommodate a hand which falls in the 95 percentile of male soldiers in MOPP IV gear (see MIL-STD-1472F). The grip portion of the handle shall be of a nonmetallic material to allow carrying with a bare hand comfortably. The handle shall aid users during operation and transition.

**3.2.1.1.13 Software.** The MSD-V2 Kit shall include all software and drivers required for operation of hardware specified in paragraphs 3.2.1.1 and 3.2.1.2, except for Government furnished software stated in paragraph 3.2.1.1.13.3.

**3.2.1.1.13.1 Operating system.** The MSD-V2 Kit shall include the Microsoft® Windows® XP Professional operating system loaded on the hard disk drive.

**3.2.1.1.13.2 Basic Input/Output System (BIOS).** The BIOS used by the MSD-V2 shall allow the user to boot from the DVD+RW/CD-RW Drive.

**3.2.1.1.13.3 Government Furnished Software.** The ICE operating, Home Page Dial-up, MSD-V2 System Operator Training, MSD-V2 System Interactive Electronic Technical Manual, and Norton AntiVirus software will be provided as Government Furnished Equipment (GFE) to be incorporated in the MSD-V2 hard drive and the boot disk. The FMS boot disk shall not contain the Home Page Dial-up and the Norton AntiVirus software.

**3.2.1.1.13.4 Application performance.** The MSD-V2 shall score a minimum of 25 on the VeriTest<sup>®</sup> Business Winstone 2002 application benchmark test. Copyright ©2002 Lionbridge Technologies, Inc. All Rights Reserved.

**3.2.1.1.2 Transit cases.** The MSD-V2 Kit transit case shall function as specified after being cleaned, using a solution of dishwashing soap and water, and a soft bristle scrub brush, without degradation of performance or surface damage. When the transit case is being washed, it shall not absorb any materials, including nuclear, biological, or chemical and decontamination solutions as defined in Allied Engineering Publication (AEP)-7 ED.4, NUCLEAR, BIOLOGICAL AND CHEMICAL (NBC) DEFENCE FACTORS IN THE DESIGN, TESTING AND ACCEPTANCE OF MILITARY EQUIPMENT. The MSD-V2 Kit shall be fitted into an air transportable, single hard transit case. The transit case shall also accommodate at least two CD industry-standard protective cases (i.e. jewel cases). The transit case shall provide protection for the contained equipment (MSD-V2, accessories, cables, etc.) from the environmental conditions specified in section 3.2.3. The transit case shall not be an integral part of the MSD-V2. The transit case need not provide for operational capability of the MSD-V2 when enclosed. The physical characteristics of the transit case shall be as specified in 3.2.1.1.2.1 through 3.2.1.1.2.5.

**3.2.1.1.2.1 Accessory stowage.** The transit case for the MSD-V2 Kit shall provide complete internal stowage of all standard equipment listed in section 3.2.1.1 as a minimum. Stowage shall not adversely affect the carrying stability of the MSD-V2 system equipment and shall be contained in a manner that prevents damage to the contents of the case during transit and transport.

**3.2.1.1.2.2 Cover.** The transit case shall be fitted with an integral sealable cover that can be closed and fastened. Fasteners shall permit operation by the 95 percentile of female soldiers IAW MIL-STD-1472F in MOPP IV gear. If the cover is removable, fasteners shall not interfere with cover removal.

**3.2.1.1.2.3 Stacking provisions.** The transit case shall have a geometric configuration that permits stacking without harm to the enclosure or its contents. The minimum stacking height for the MSD-V2 Kit transit case shall be 4.

**3.2.1.1.2.4 Handles.** The transit case shall include hinged metal handles with sufficient internal clearance to comfortably accommodate a hand which falls in the 95 percentile of male soldier in MOPP IV gear IAW MIL-STD-1472F. The grip portion of the handle shall be of a nonmetallic material to allow carrying with a bare hand comfortably. Handles shall stop open at 90°, and shall be returned to a closed position by a spring-loaded or retaining mechanism when not in use. Handles shall be recessed or protected. Handles shall be located and recessed in such a manner to prevent damage and ensure accessibility when they are stacked for transit or storage.

**3.2.1.1.2.5 Corners.** All hard edged corners shall be rounded to preclude injury to personnel or damage to material. All corners shall be reinforced to protect the instruments from damage during transit, transport, and exposure to the environmental conditions specified in section 3.2.3.

**3.2.1.1.3 Cables**

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**3.2.1.1.3.1 Telephone.** The MSD-V2 Kit shall contain a standard commercial telephone cable. This cable shall be at least 8 feet in length and shall be configured with RJ-11 connectors.

**3.2.1.1.3.2 Network.** The MSD-V2 Kit shall contain a standard category 5 twisted pair cable. This cable shall be at least 8 feet in length and shall be configured with RJ-45 connectors.

**3.2.1.1.3.3 Power.** The MSD-V2 Kit shall include all necessary AC and DC power cables. All AC power cables shall be at least 8 feet in length. The NATO Power Cable Assembly with Army part number 13580865-2 shall be provided.

**3.2.1.1.4 Flash Memory.** The MSD-V2 Kit shall include a Type II Flash Memory PCMCIA Card with a minimum of 128 MB capacity.

**3.2.1.1.5 Boot disk.** The MSD-V2 Kit shall include one bootable DVD or CD and user installation instructions of either a U.S. version or a FMS version IAW paragraph 3.2.1.1.13.3 in an industry-standard protective case (i.e., jewel case) so that the soldiers can restore the software (the operating system, Adobe<sup>®</sup> Acrobat<sup>®</sup> Reader, Microsoft<sup>®</sup> Internet Explorer, all drivers, and other software) on the MSD-V2 to the state when initially shipped from the contractor.

**3.2.1.2 Optional accessories.** Connectors, cables, and ancillary equipment of the MSD-V2 system shall tolerate 500 cycles of repeated set-up and tear-down by users.

**3.2.1.2.1 ICE Test Adapter Kit.** A fully integrated ICE test system as defined in paragraph 3.3.1 shall be a part of the MSD-V2 system. The ICE operating software will be provided as GFE.

**3.2.1.2.2 PCMCIA Cards.** The following is a list of PCMCIA Cards that shall be operable in the Type II slot of the PCMCIA Card Reader Port as defined in paragraph 3.2.1.1.7.4. All cables, software, and documentation required to use these cards shall be provided. Nothing shall be done to limit or degrade the usability or functionality of the PCMCIA Card reader. Commercially available PCMCIA Cards shall perform as intended by their manufacturers in the MSD-V2 PCMCIA Card Reader.

**3.2.1.2.2.1 Digital Multimeter (DMM).** A National Instruments 4050 PCMCIA card and probes shall be a part of the MSD-V2 system. The DMM probes shall have a minimum length of 6 feet.

**3.2.1.2.2.2 MIL-STD-1553B Databus.** A Data Device Corporation Dual Redundant MIL-STD-1553 BC/RT/MT Model BU-65550M2-602 PCMCIA card with a dongle shall be a part of the MSD-V2 system.

**3.2.1.2.2.3 SCSI controller.** An Adaptec Slim SCSI 1480 Type II PCMCIA card and two dongles shall be a part of the MSD-V2 system.

**3.2.1.2.2.4 IEEE 1284 parallel.** An IEEE 1284 parallel bus shall be a part of the MSD-V2 system.

**3.2.1.2.2.5 PCIDM™ Kit.** A PCIDM™ PCMCIA card and 2 mating connectors with Innovative Concepts, Inc. (ICI) part number PCIDM-V2 and an ICI part number P2C-ASIP-SDM cable shall be a part of the MSD-V2 system.

**3.2.1.2.2.6 Oscilloscope.** A National Instruments (NI) PCMCIA-5102 oscilloscope instrument, strain relief accessory (NI Part Number 777550-01) for this PCMCIA device, and 1x to 10x switchable passive scope probe, SP200B (NI Part Number 763391-01) shall be a part of the MSD-V2 system.

**3.2.1.2.3 IEEE 488.** A National Instruments GPIB-USB-B, NI-488.2 shall be a part of the MSD-V2 system.

### **3.2.1.3 Physical characteristics**

**3.2.1.3.1 Size.** The MSD-V2 (non-operational configuration, i.e., display closed) shall not exceed 15 inches x 15 inches x 4 inches.

**3.2.1.3.2 Weight.** The MSD-V2 with a minimum of the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), and HDD installed shall weigh no more than 15 pounds (lbs) while outside the hard transit case. The MSD-V2 Kit (with MSD-V2, cables, and accessories in transit case) shall weigh a maximum of 36 lbs for a single soldier lift per MIL-STD-1472F.

**3.2.1.3.3 Mechanical stability.** The MSD-V2 with a minimum of the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), and HDD installed shall preclude tipping during specified handling and operation.

**3.2.2 Reliability.** The mean-time-between-failure (MTBF) for the MSD-V2 with a minimum of the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), and HDD installed, battery charger, external power converter (if required), and optional accessories shall be 2,500 hours under all environmental conditions specified in this document.

**3.2.3 Environmental conditions.** The MSD-V2 Kit with MSD-V2 configured with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), and HDD installed and optional accessories (not including the ICE Test Adapter Kit and IEEE 488) shall meet the specified performance requirements when subjected to the following environmental conditions, either separately or in any natural combination thereof. The ICE Test Adapter Kit shall meet the performance requirements when subjected to the environmental conditions specified in paragraph 3.3.1.

#### **3.2.3.1 Temperature**

**3.2.3.1.1 Temperature, operating.** The MSD-V2 Kit and optional accessories shall be fully operational in temperatures ranging from  $-18^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  ( $0^{\circ}\text{F}$  to  $+140^{\circ}\text{F}$ ).

**3.2.3.1.2 Temperature, non-operating.** The MSD-V2 Kit and optional accessories shall be fully operational after being exposed (while in a fully loaded (see 6.2) hard transit case) to temperatures ranging from  $-32^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$  ( $-25^{\circ}\text{F}$  to  $+160^{\circ}\text{F}$ ).

**3.2.3.2 Solar radiation.** The MSD-V2 Kit and optional accessories (not including the ICE Test Adaptor Kit) shall be fully operational after being exposed to solar radiation.

### **3.2.3.3 Shock**

#### **3.2.3.3.1 Shock, transit drop**

**a. MSD-V2.** The performance of the MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), and HDD shall not be degraded after being dropped 36 inches.

**b. Transit case.** The performance of the MSD-V2 Kit and optional accessories shall not be degraded after being dropped 36 inches in the transit case. The performance of the transit case shall not be degraded after being dropped 36 inches.

**3.2.3.3.2 Shock, functional.** The MSD-V2 Kit and optional accessories shall conform to the specified performance requirements while being operated during exposure to a 30g, 11 millisecond (ms) duration half-sine shock.

**3.2.3.3.3 Transportation vibration.** The MSD-V2 Kit and optional accessories shall perform as specified prior to and after being exposed (while in a fully loaded hard transit case) to transportation vibrations from transport by air, sea, rail, and land.

**3.2.3.4 Altitude.** The MSD-V2 Kit and optional accessories shall conform to the specified performance requirements while being operated during exposure to altitude conditions of 12,500 feet. The MSD-V2 Kit and optional accessories shall conform to the specified performance requirements prior to and after exposure to an altitude of 30,000 feet (while in a fully loaded hard transit case).

#### **3.2.3.5 Rain**

**a. MSD-V2.** The MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), HDD, external power converter (if required), battery charger, and optional accessories shall conform to the specified performance requirements while being operated during exposure to rain conditions such that the rainfall rate is 1.8 inches per hour and the wind velocity is 20 miles per hour.

b. **Transit case.** The transit case (fully loaded) shall show no signs of moisture intrusion after exposure to rain conditions such that the rainfall rate is 1.8 inches per hour and the wind velocity is 20 miles per hour.

### 3.2.3.6 **Humidity**

3.2.3.6.1 **Humidity, operating.** The MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), HDD, external power converter (if required), battery charger, and optional accessories shall conform to the specified performance requirements while being operated during exposure to conditions ranging from 10% to 95% relative humidity.

3.2.3.6.2 **Humidity, non-Operating.** The MSD-V2 Kit and optional accessories shall be fully operational after being exposed (while in a fully loaded hard transit case) to conditions ranging from 5% to 95% relative humidity.

3.2.3.7 **Salt fog.** The MSD-V2 Kit and optional accessories shall show no signs of corrosion after being exposed (while in a fully loaded hard transit case) to a  $5 \pm 1\%$  aqueous salt atmosphere.

3.2.3.8 **Sand/Dust.** The MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), HDD, external power converter (if required), battery charger, and optional accessories shall conform to the specified performance requirements while being operated during exposure to the sand and dust environment specified below:

a. **Sand.** 20 mph  $\pm$  3 mph per surface, concentration:  $2.2 \pm 0.5$  g/m<sup>3</sup>.

b. **Dust.** 20 mph  $\pm$  3 mph per surface, concentration:  $10.6 \pm 0.7$  g/m<sup>3</sup>.

3.2.3.9 **Fungus.** The MSD-V2 Kit and optional accessories shall not contain materials that provide nutrients for the growth of fungus.

### 3.2.3.10 **Electromagnetic environmental effects**

3.2.3.10.1 **Radiated emissions.** The MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), HDD, external power converter (if required), and battery charger, shall meet the radiated emissions requirements as defined in MIL-STD-461E, paragraph 5.15 (RE101) using the Army curve and 5.16 (RE102) using the helicopter curves.

3.2.3.10.2 **Radiated susceptibility.** The MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), HDD, external power converter (if required), and battery charger shall conform to the specified performance requirements while being operated during exposure to radiated electric fields as defined in MIL-STD-461E, paragraphs 5.19 (RS103) and 5.20 (RS105). The Ground System limit and frequency range of 30 MHz to 18 GHz are applicable for the RS103 environment.

**3.2.3.10.3 Conducted emissions.** The MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), HDD, external power converter (if required), and battery charger shall conform to the specified performance requirements while being operated during exposure to the conducted emissions environment as defined in MIL-STD-461E, paragraphs 5.4 (CE101) and 5.5 (CE102).

**3.2.3.10.4 Conducted susceptibility.** The MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), HDD, external power converter (if required), and battery charger shall conform to the specified performance requirements while being operated during exposure to the conducted susceptibility environments as defined in MIL-STD-461E, paragraphs 5.7 (CS101), 5.12 (CS114) using limit curve #3, 5.13 (CS115), and 5.14 (CS116).

**3.2.3.10.5 Electrostatic discharge.** The MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), HDD, external power converter (if required), and battery charger shall conform to the specified performance requirements while being operated during exposure to the personnel-borne electrostatic discharge environment as defined in MIL-STD-464A, paragraph 5.7.3.

**3.2.3.11 High Altitude Electromagnetic Pulse (HEMP).** The MSD-V2 Kit shall conform to the specified performance requirements prior to and after being exposed to the transient electric field as defined in MIL-STD-461E, Test RS 105. Exposure to this environment shall take place while the equipment is stored in a fully loaded hard transit case and de-energized.

**3.2.4 Nameplates and markings.** The MSD-V2, MSD-V2 Kit, and optional accessories shall include marking and identification in accordance with MIL-STD-130L.

**3.2.4.1 Warning markings.** Markings shall warn of the location, nature, and extent of a hazard. Letters of warning markings shall be of clearly legible gothic capitals (see MIL-HDBK-1473A, Color and Marking of Army Materiel). The background color for warning markings shall be red and for caution markings shall be yellow. Warning markings shall have high contrast between the letter and background colors and shall be readable with a red light. Warning markings shall be permanently readable throughout the lives of the MSD-V2, MSD-V2 Kit, and optional accessories, and located as close as possible to the point of danger.

**3.2.4.2 Panel markings and processes.** Functional panel markings of words or abbreviations shall indicate the use or purpose of controls, indicators, connectors, receptacles, and fuse holders of MSD-V2 system configurations. Panel markings shall enable the operator to identify the function of the variable operator controls. Markings shall be applied such that the markings will be readable with a red light and during the entire life of the MSD-V2, MSD-V2 Kit, and optional accessories.

**3.2.4.3 Identification plates.** Identification plates for the MSD-V2, MSD-V2 Kit, and optional accessories shall be constructed of a material and affixed in such a manner to allow for permanent identification for the specified life expectancy of the item to which it is affixed. Each plate shall withstand without damage under the environmental conditions specified in section 3.2.3. After being cleaned with dishwashing soap and water, each plate shall also sustain from

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damage. As a minimum, the identification plate for the MSD-V2 and the identification plate for the MSD-V2 Kit transit case shall include the information specified in “a”, “b”, and “c” (if required) below:

**a. MSD-V2 identification plate**

Manufacturer Name and Cage Code  
Equipment Model Number  
Equipment Serial Number  
Nomenclature and Type Designator  
Contract Number  
National Stock Number  
Date of Manufacture  
Warranty Expiration Date  
Toll Free Telephone Number and E-mail Account for Warranty Actions

**b. MSD-V2 Kit transit case without ICE Test Adapter Kit identification plate**

Manufacturer Name and Cage Code  
Nomenclature and Type Designator  
National Stock Number

**c. MSD-V2 Kit transit case with ICE Test Adapter Kit identification plate**

Manufacturer Name and Cage Code  
Nomenclature and Type Designator  
National Stock Number

### **3.2.5 “Quick Start” cards.**

**a.** The MSD-V2 Kit shall include a laminated card containing the following information packed inside the MSD-V2 Kit transit case:

1. Equipment designation, i.e., \_\_\_\_\_, Maintenance Support Device-Version 2, (MSD-V2), NSN XXXX-XX-XXX-XXXX (to be given by the Government).
2. Pictorial of power and interface connections, appropriately labeled.
3. Pictorial of controls and indicators, appropriately labeled.
4. Written instructions for “power up” and “power down.”
5. Operator warranty data, with instructions on how to obtain assistance, including CONUS and OCONUS telephone numbers.

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6. Maintainer warranty data with CONUS and OCONUS telephone numbers to call for warranty service.

**3.2.6 Configuration sheet.** The MSD-V2 Kit shall include a configuration sheet serving as an inventory check list. The configuration sheet shall have pictures and a description of each item included with each kit shipped. The configuration sheet shall be included in its hard transit case.

**3.2.7 Interchangeability.** Units (see 6.2) and all replaceable assemblies, subassemblies, and parts of this MSD-V2 program shall be fully interchangeable.

**3.2.8 Safety.** The MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), HDD, external power converter (if required), battery charger, and any optional accessories shall meet the safety requirements of IEC 61010. For safety ground, all accessible surfaces of the equipment shall be at ground potential. The power cable shall include a safety ground conductor. The hottest point (which is exposed to an operator) on the MSD-V2 Kit or any optional items shall not exceed 120 degree Fahrenheit per MIL-STD-1472F.

### **3.2.9 Logistics**

**3.2.9.1 Set-up and tear-down time.** The MSD-V2 configured with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), and HDD set-up and teardown times shall not (individually) exceed 10 minutes.

**3.2.9.2 Warm-up time.** The MSD-V2 warm-up time from power-on to operational status (including self-test) shall not exceed 2 minutes at standard ambient conditions as specified in paragraph 4.3.6 and 5 minutes at a temperature of -18°C (0°F).

**3.2.10 Self-test capability.** The MSD-V2 shall have a self-test capability which isolates failures to the MSD-V2, HDD, PCMCIA card, or any accessories specified in this specification. The self-test shall completely check for performance of the system and shall be controlled by a user implemented utility program to verify performance and/or indicate failures.

### **3.3 Design and construction**

**3.3.1 Production drawings.** This ICE Test Adapter Kit shall be fabricated, assembled, and tested in accordance with the drawings, parts lists, and other documents listed in this paragraph and on all lower-level drawing, parts lists, and other documents contained in Appendix A.

#### **ICE Test Adapter Kit (ICE Kit) - Army Part Number (APN) 13608012**

APN 13608010	ICE, Interconnecting Box
APN 12258786	Cable Assembly, (W4) (2 ea. per ICE kit)
APN 12235784	Cable Assembly, (W1)
APN 13580845	Cable, Volt-Ohm Extension
APN 13580831	Adapter Set, ICE Test
APN 13580836	Data Bus Kit (DK) (Dearborn Protocol Adapter/Cabling)
APN 13580844	Probe Set (Standard)

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APN 13608011	Cable Assembly, MSD ICE Serial
APN 13580856	Transit Case
APN 13608013	Plate, Identification
Decals, Inside Top Cover for the DK and for the TK	

### 4.0 VERIFICATION

**4.1 Methods of verification.** The minimum verification methods required to verify that the performance complies with the requirements of section 3 of this specification are contained in TABLE I. Where multiple methods are indicated for a given requirement, a combination of the verifications may be used. Methods utilized to accomplish verification include:

**a. Analysis.** An element of verification that utilizes established technical or mathematical models or simulations, algorithms, charts, graphs, circuit diagrams, or other scientific principles and procedures to provide evidence that stated requirements were met. The notation “X” in “Verification Method” column 1 of Table I indicates requirement verification by analysis.

**b. Demonstration.** An element of verification which generally denotes the actual operation, adjustment, or re-configuration of items to provide evidence that the designed functions were accomplished under specific scenarios. The items may be instrumented and quantitative limits of performance monitored. The notation “X” in “Verification method” column 2 of TABLE I indicates requirement verification by demonstration.

**c. Examination.** An element of verification consisting of investigation, without the use of special laboratory appliances or procedures, of items to determine conformance to those specified requirements which can be determine by such investigations. Examination is generally nondestructive and typically includes the use of sight, hearing, smell, and touch; simple physical manipulation; mechanical and electrical gauging and measurement; and other forms of investigation. The notation “X” in “Verification method” column 3 of TABLE I indicates requirement verification by examination.

**d. Test.** An element of verification that generally denotes the determination, by technical means, of the properties or elements of items, including functional operation, and involves the application of established scientific principles and procedures. The notation “X” in “Verification method” column 4 of TABLE I indicates requirement verification by test.

### 4.2 Classes of inspection.

**4.2.1 First article inspection.** When required, a sample shall be subjected to a First Article Inspection IAW Table I, Verification Class Column “A”. The sample size shall be contractually determined based upon production quantities, delivery schedules, and the number of units required to accomplish those inspections as defined herein.

**4.2.2 Acceptance inspection.** Each unit shall be subjected to the demonstrations, examinations, and tests as specified in TABLE I, Verification Class Column “B”.

### **4.3 General inspection requirements.**

**4.3.1 Inspection methods.** Unless otherwise specified in the contract or purchase order, all inspections shall be conducted IAW the methods and procedures defined in sections 4.3 and 4.4 of this specification. When specific methods and procedures are not specified, methods and procedures necessary to verify compliance to the performance requirements defined in paragraph 3.0 of this specification shall be developed.

**4.3.2 Functional check.** A functional check shall consist of booting the MSD-V2 from the DVD/CD Boot Disk and accessing the hard disk and the internal floppy drives to the extent necessary to verify proper function. As a minimum, the functional check shall be used prior to, during (as applicable), and after each environmental test to verify compliance with paragraph 3.2.3 requirements.

**4.3.3 PCMCIA Card operational check.** When specified, a PCMCIA Card Operational Check shall, as a minimum, consist of reading from and writing to the flash memory PCMCIA Card.

**4.3.4 Test item configuration.** Unless otherwise specified, the test item configuration shall be a MSD-V2 (with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6) and HDD installed), the battery charger, and the external power converter (if required). Other accessories, cables, PCMCIA cards, etc. shall be included as necessary to verify specified performance requirements. For example, a flash memory PCMCIA card is necessary for conduct of the PCMCIA Card Operational Check.

**4.3.5 Test sequence.** A portion of the First Article Sample shall be subjected to the following environments in the order shown:

1. Transit Drop Shock
2. Transportation Vibration
3. Functional Shock
4. Temperature (operating & non-operating)
5. Altitude (operating & non-operating)
6. Rain
7. Humidity (operating & non-operating)

The same First Article Test units shall not be subjected to any combination of the following environments:

1. Humidity (operating & non-operating)
2. Sand/Dust
3. Salt Fog
4. Fungus

**4.3.6 Standard ambient conditions.** Unless otherwise specified in the environmental test procedures, all measurements, and tests shall be made at standard ambient conditions. Standard ambient conditions shall be as follows:

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<b>Temperature:</b>	25°C ± 10°C
<b>Relative Humidity:</b>	Uncontrolled Room Ambient
<b>Barometric Pressure:</b>	Site Pressure
<b>Primary Power:</b>	110 VAC or 24 VDC

**4.3.7 Failure criteria.** Unsuccessful completion of the functional check, the PCMCIA Card Operational Check, or any performance requirement as defined in section 3 shall constitute a failure and shall be cause for rejection of the unit and/or lot as applicable.

### **4.4 Detailed inspection requirements.**

**4.4.1 Mission.** The contractor shall develop test procedures to verify the requirements of section 3.2. When verifying the cleaning requirement, the test item (hard transit case) shall be scrubbed all over with a soft-bristle scrub brush using a mild solution of dishwashing soap and water, prior to rinsing and checking for performance degradation and surface damage.

#### **4.4.2 MSD-V2**

**4.4.2.1 Operational tests.** The contractor shall develop a test procedure which will be used to verify that the MSD-V2 with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.1.10.6), and HDD installed is fully operational. This procedure shall require procuring activity approval and shall be used to satisfy both First Article and Acceptance Inspection requirements. This test shall, as a minimum, verify proper operation of the processor, all RAM, the display, the video/audio cards, (proper installation of) operating system, all drives, all ports, all internal communications cards, and input devices.

**4.4.2.2 Display readability.** Test procedures to verify the readability requirements of paragraph 3.2.1.1.1.3 shall be developed. The test procedures shall use the MSD Operator Training Software (Government Furnished Equipment) to provide display content during the verification process. As a minimum, MSD Operator Training Software shall be readable on the MSD-V2 with ambient light sources of 9,000, 12,600, 56,000, and 75,000 LUX.

**4.4.2.3 Battery.** The battery life requirements of paragraph 3.2.1.1.1.10.6 shall be verified IAW the latest version (see section 6.3) of VeriTest Business Winstone™ 2002 BatteryMark™ test.

**4.4.2.4 Application performance.** The requirements of paragraph 3.2.1.1.1.13.4 shall be verified IAW the latest version (see section 6.3) of VeriTest Business Winstone™ 2002 application benchmark test. This application shall be left in default settings during testing.

**4.4.3 DC power connector.** The requirements of paragraphs 3.2.1.1.1.10.1 and 3.2.1.1.1.10.7 shall be verified IAW Army Part Number 13580865-2.

**4.4.4 Mechanical stability.** The requirements of paragraph 3.2.1.3.3 shall be verified IAW the procedures listed below:

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**Step 1** Position (in its normal operating position and configuration) the test item on a raised platform or table with a surface area of sufficient size to accommodate the total bottom surface of the test item.

**Step 2** Reposition the test item so that one-fourth of the bottom surface extends beyond the edge of the platform or table. The extended side of the test item shall be parallel to the edge of the platform that is located under the test item.

**Step 3** Determine that there is no evidence of instability. Evidence of instability shall be considered as a test failure.

**Step 4** Repeat Steps 2 and 3 for all additional vertical sides of the test item.

**Step 5** Repeat Steps 2 through 4 for each required alternate operating position and configuration of the test item. When the rear of the test item is equipped with feet or bumpers (such as for use on a floor or deck) that prohibit the repositioning of the test item IAW Step 2, an auxiliary support may be provided for this step. The auxiliary support (Such as a piece of plywood) shall not be larger than the bottom surface in its alternate position, but shall be sufficiently large to accommodate the rear feet or bumpers. During the test, the support and the test item shall be repositioned as specified in Step 2.

**4.4.5 Reliability.** Reliability shall be demonstrated by point estimate through conduct of a controlled reliability test. MTBF shall be calculated by dividing 1 by the failure rate. The failure rate ( $\lambda$ ) is determined by the equation,  $\lambda$ =hours tested/relevant failures (see Section 6.2).

### **4.4.6 Environmental conditions**

**4.4.6.1 Temperature, operating.** The requirements of paragraph 3.2.3.1.1 shall be verified IAW MIL-STD-810F, Methods 501.4 and 502.4, Procedure II. The test item shall be subjected to a minimum of 3 cycles with a minimum temperature change rate of 5°C per minute. As a minimum, an operational test shall be conducted before the operating temperature test, at temperature extremes, and after the operating temperature test. Humidity control is not required.

**4.4.6.2 Temperature, non-operating.** The requirements of paragraph 3.2.3.1.2 shall be verified IAW MIL-STD-810F, Methods 501.4 and 502.4, Procedure I. The test item shall be subjected to a minimum of 5 cycles with a minimum temperature change rate of 5°C per minute. Humidity control is not required. As a minimum, a functional check shall be conducted before and after the non-operating temperature test.

**4.4.6.3 Solar radiation.** The requirements of paragraph 3.2.3.2 shall be verified IAW MIL-STD-810F, Method 505.4, Procedure I, Diurnal Cycle A1. The test item shall be subjected to a minimum of (3) three, 24-hour continuous cycles.

**4.4.6.4 Shock, transit drop.** Government-approved test procedures shall be used to verify the requirements of paragraph 3.2.3.3.1. The drops shall be conducted on each of 6 faces from a height of 36 inches onto ¾ inch plywood backed by concrete for a total of 6 drops. The drops

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shall be performed using a quick-release hook or drop tester. The test item shall be oriented such that a line from the struck corner or surface of the test item is perpendicular to the impact surface. A total of 6 each MSD-V2 First Article Samples may be used to complete this test with 1 each of the units following the test sequence as defined in paragraph 4.3.5. Only one MSD-V2 Kit shall be used to verify this test on all 6 faces and go through the test sequence as defined in paragraph 4.3.5. Functional and PCMCIA Card Operational checks shall be conducted after every drop.

**4.4.6.5 Shock, functional.** The requirements of paragraph 3.2.3.3.2 shall be verified IAW MIL-STD-810F, Method 516.5, Procedure I. The equipment shall be given 1 shock in each direction and on each axis for a total of 6 shocks.

**4.4.6.6 Transportation vibration.** The requirements of paragraph 3.2.3.3.3 shall be verified IAW MIL-STD-810F, Method 514.5, Procedure I, Category 4, Annex A vibration profile for composite-wheeled vehicles (Figure 514.5C-3). The duration of this exposure shall be 40 minutes per axis for each of 3 axes.

**4.4.6.7 Altitude.** The operational test shall be done before and after the altitude test. The requirements of paragraph 3.2.3.4 shall be verified IAW MIL-STD-810F, Method 500.4, Procedures I and II. The altitude change rate shall be 10m/s. The test duration for Procedure I shall be 1 hour minimum. The test duration for Procedure II shall be long enough to allow for completion of the operational test at maximum altitude.

**4.4.6.8 Rain.** The requirements of paragraph 3.2.3.5 shall be verified IAW MIL-STD-810F, Method 506.4, Procedure I. The test item shall be rotated as required to expose all vulnerable surfaces for a duration of 30 minutes per surface. The functional check shall be run on the MSD-V2 and optional accessories during exposure to this environment and the PCMCIA Card Operational Check shall be run after each exposure.

**4.4.6.9 Humidity, operating.** The operational test shall be done before and after the operating humidity test. The requirements of paragraph 3.2.3.6.1 shall be verified IAW MIL-STD-810F, Method 507.4. The test shall consist of a minimum of (10) ten, 24 hour cycles with an operational test performed every 2 days.

**4.4.6.10 Humidity, non-operating.** The requirements of paragraph 3.2.3.6.2 shall be verified IAW MIL-STD-810F, Method 507.4. The test shall consist of a minimum of (10) ten, 24 hour cycles. The operational test shall be done before and after the non-operating humidity test.

**4.4.6.11 Salt fog.** The requirements of paragraph 3.2.3.7 shall be verified IAW MIL-STD-810F, Method 509.4.

**4.4.6.12 Sand/Dust.** The requirements of paragraph 3.2.3.8 shall be verified IAW MIL-STD-810F, Method 510.4, Procedures I and II. The test duration shall be a minimum of 30 minutes per surface. The operational test shall be done before and after the sand test and before and after

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the dust test. A functional check shall be conducted during exposure and a PCMCIA Card Operational Check shall be conducted after exposure to this environment.

**4.4.6.13 Fungus.** The requirements of paragraph 3.2.3.9 shall be verified IAW MIL-STD-810F, Method 508.5. The test duration shall be a minimum of 28 days. Both Fungus groups shall be used. Exact test item configuration will vary with design.

**4.4.6.14 Radiated emissions.** The requirements of paragraph 3.2.3.10.1 shall be verified IAW MIL-STD-461E.

**4.4.6.15 Radiated susceptibility.** The requirements of paragraph 3.2.3.10.2 shall be verified IAW MIL-STD-461E.

**4.4.6.16 Conducted emissions.** The requirements of paragraph 3.2.3.10.3 shall be verified IAW MIL-STD-461E.

**4.4.6.17 Conducted susceptibility.** The requirements of paragraph 3.2.3.10.4 shall be verified IAW MIL-STD-461E.

**4.4.6.18 Electrostatic discharge.** The requirements of paragraph 3.2.3.10.5 shall be verified IAW MIL-STD-464.

**4.4.6.19 High Altitude Electromagnetic Pulse (HEMP).** The requirements of paragraph 3.2.3.11 shall be verified IAW MIL-STD-461E.

**4.4.7 Safety.** The requirements of paragraph 3.2.8 shall be verified IAW IEC 61010.

**4.4.8 Warm-up time.** Test procedures to verify the requirements of paragraph 3.2.9.2 shall be developed.

## 5.0 PACKAGING

**5.1 Packaging.** For acquisition purposes, the packaging requirements shall be as specified in the contract. When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6.0 NOTES

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

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**6.1 Intended use.** Equipment covered by this specification is intended for use in testing equipment and systems in the worldwide natural and controlled environments in which Military equipment is operated (on a continuous or intermittent basis for extended periods of time), either stored or transported, or both.

### **6.2 Definitions**

**Maintenance Support Device-Version 2 (MSD-V2)** - The MSD-V2 includes as a minimum items listed in sections 3.2.1.1.1, except hard disk drive (HDD), primary battery, and secondary battery (if required). The HDD, primary battery, and secondary battery (if required) are parts of the MSD-V2 Kit, not MSD-V2.

**Maintenance Support Device-Version 2 Kit (MSD-V2 Kit)** - The kit includes as a minimum items listed in sections 3.2.1.1.a through d.

**Maintenance Support Device-Version 2 System** - This system consists of the MSD-V2 Kit and optional accessories.

**Equipment/Unit** - Equipment/unit is an instrument with parts, accessories, components, or any combination thereof required for performing a specified operational function. Unless otherwise specified, the equipment consists of the MSD-V2 (with the primary battery, secondary battery (if required to meet paragraph 3.2.1.1.10.6), and HDD installed), the battery charger, the external power converter (if required), cable, PCMCIA card, any accessories, etc. necessary to perform functional and/or PCMCIA card Operational Checks as required.

**Failure** - Equipment failure as used herein is any departure from the required performance or operation outside required accuracies (not correctable by normal use of operating controls), or deviation from the criteria in section 4.4 after the test is initiated.

**Fully loaded hard transit case** - A fully loaded hard transit case is defined as a hard transit case containing the MSD-V2, all accessories, and all cables as defined in section 3.2.1.1. a through d.

**Performance requirements** - Wherever referenced in this specification, the term "performance requirements" means the satisfactory performance of all electrical and mechanical characteristics under the conditioning, destructive, and accelerated tests specified herein for simulating anticipated field service demands as closely as possible.

**Procuring activity** - The military or federal agency contracting for the equipment.

**Relevant failures** - Any malfunction which causes performance degradation and can be attributed to design defect, manufacturing defect, workmanship defect, adjustment, deterioration or unknown causes.

**Rugged** - Physical and operational characteristics that allow equipment to withstand rough handling and extreme or hostile environments.

**6.3 Other supplemental information**

a. The latest version of the industry PCMCIA Card Standard may be obtained at: <http://www.pcmcia.org>. The contractor shall be responsible for compliance with all copyright laws and licensing agreements.

b. VeriTest Business Winstone™ 2002 and Business Winstone™ 2002 BatteryMark™ software information may be obtained at: <http://www.veritest.com/benchmarks/reqfrm.asp>. The contractor shall be responsible for compliance with all copyright laws and licensing agreements. Copyright ©2002 Lionbridge Technologies, Inc. All Rights Reserved.

**REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX**

**METHOD OF VERIFICATION**

**CLASSES OF INSPECTION**

NA – NOT APPLICABLE  
 1 - ANALYSIS  
 2 - DEMONSTRATION  
 3 - EXAMINATION  
 4 - TEST

A – FIRST ARTICLE  
 B – ACCEPTANCE

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION CLASS		SECTION 4 VERIFICATION
	NA	1	2	3	4	A	B	
3.0 Requirements	X							
3.1 First Article		X	X	X	X	X		4.1 a-d, 4.2.1, 4.3, 4.4
3.2.1 Functional Capabilities	X							
a. Ruggedness				X	X	X		Ref. 4.4.5
b. MOPP IV Shutdown			X	X		X		4.1 b-d, 4.4.2.1
c. Shutdown			X	X		X		4.1 b-d, 4.4.2.1
d. Set-up/Tear-down		X		X		X		4.1 b-d, 4.4.2.1
3.2.1.1 MSD-V2 Kit	X							
3.2.1.1.1 MSD-V2			X	X	X	X	X	4.1 b-d, 4.4.2.1
3.2.1.1.1.1 Processor				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.2 Memory				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.3 Display				X	X	X	X	4.1 c & d, 4.4.2.1,4.4.2.2
3.2.1.1.1.4 Video				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.5 Audio				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.6 Drives	X							
3.2.1.1.1.6.1 Hard Disk			X	X	X	X	X	4.1 b-d, 4.4.2.1
3.2.1.1.1.6.2 DVD+RW/CD-RW			X	X	X	X	X	4.1 b-d, 4.4.2.1
3.2.1.1.1.6.3 Floppy Drive			X	X	X	X	X	4.1 b-d, 4.4.2.1
3.2.1.1.1.7 Ports	X							
3.2.1.1.1.7.1 Two RS-232/485				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.7.2 Two USB 2.0				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.7.3 SVGA				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.7.4 PCMCIA Card Reader				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.8 Strain Relief of the PCMCIA Cards			X			X		4.1 b
3.2.1.1.1.9 Communications	X							
3.2.1.1.1.9.1 Modem				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.9.2 Network				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.10 Power	X							

**Table I Requirements/Verification Cross-Reference Matrix – cont'd**

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION CLASS		SECTION 4 VERIFICATION
	NA	1	2	3	4	A	B	
3.2.1.1.1.10.1 Sources & Connections			X	X	X	X		4.1 b-d
3.2.1.1.1.10.2 Excessive Current Drain Protection			X	X	X	X		4.1 b-d
3.2.1.1.1.10.3 Heat Transfer					X	X		4.1 d, 4.4.7
3.2.1.1.1.10.4 Power Management			X			X		4.1 b
3.2.1.1.1.10.5 Indicators			X		X	X		4.1 b & d, 4.4.2.4
3.2.1.1.1.10.6 Battery				X	X	X		4.1 c & d
3.2.1.1.1.10.7 External Battery Charger				X	X	X		4.1 c & d
3.2.1.1.1.10.8 Internal Battery Charger				X	X	X		4.1 c & d
3.2.1.1.1.11 Input Devices				X	X	X	X	4.1 c & d, 4.4.2.1
3.2.1.1.1.12 Handle				X	X	X	X	4.1 c & d
3.2.1.1.1.13 Software			X	X	X	X	X	4.1 b-d
3.2.1.1.1.13.1 Operating System				X		X	X	4.1 c, 4.4.2.1
3.2.1.1.1.13.2 BIOS			X			X		4.1 b
3.2.1.1.1.13.4 Application Performance					X	X		4.1 d, 4.4.2.3
3.2.1.1.2 Transit Case				X	X	X		4.1 c & d, 4.4.6
3.2.1.1.2.1 Accessory Stowage			X			X		4.1 b
3.2.1.1.2.2 Cover			X			X		4.1 b
3.2.1.1.2.3 Stacking Provisions			X			X		4.1 b
3.2.1.1.2.4 Handles			X	X		X		4.1 b & c
3.2.1.1.2.5 Corners				X	X	X		4.1 c & d, 4.4.6
3.2.1.1.3 Cables	X							
3.2.1.1.3.1 Telephone				X		X		4.1 c
3.2.1.1.3.2 Network				X		X		4.1 c
3.2.1.1.3.3 Power				X		X		4.1 c
3.2.1.1.4 Flash Memory PCMCIA Card				X	X		X	4.1 c & d, 4.4.2.1
3.2.1.1.5 Boot Disk			X			X		4.1 b
3.2.1.2 Optional Accessories			X	X	X	X	X	4.1 b-d
3.2.1.2.1 ICE Test Adapter Kit				X	X	X		4.1 c & d, 4.4.3
3.2.1.2.2 PCMCIA Cards				X		X		4.1 c
3.2.1.2.2.1 DMM				X		X		4.1 c
3.2.1.2.2.2 MIL-STD-1553B Databus				X		X		4.1 c
3.2.1.2.2.3 SCSI Controller				X		X		4.1 c
3.2.1.2.2.4 IEEE 1284 Parallel				X		X		4.1 c
3.2.1.2.2.5 PCIDM™ Kit				X		X		4.1 c
3.2.1.2.2.6 Oscilloscope				X		X		4.1 c
3.2.1.2.3 IEEE 488				X		X		4.1 c

Table I Requirements/Verification Cross-Reference Matrix – cont'd

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION CLASS		SECTION 4 VERIFICATION
	NA	1	2	3	4	A	B	
3.1.1.3 Physical Characteristics	X							
3.2.1.3.1 Size				X		X		4.1 c
3.2.1.3.2 Weight				X		X		4.1 c
3.2.1.3.3 Mechanical Stability					X	X		4.1 d, 4.4.4
3.2.2 Reliability		X			X	X		4.4.5
3.2.3 Environmental Conditions	X							
3.2.3.1 Temperature	X							
3.2.3.1.1 Temperature, Operating					X	X		4.1 d, 4.4.6.1
3.2.3.1.2 Temperature, Non-Operating					X	X		4.1 d, 4.4.6.2
3.2.3.2 Solar Radiation					X	X		4.1 d, 4.4.6.3
3.2.3.3 Shock	X							
3.2.3.3.1 Shock, Transit Drop					X	X		4.1 d, 4.4.6.4
3.2.3.3.2 Shock, Functional					X	X		4.1 d, 4.4.6.5
3.2.3.3.3 Transportation Vibration					X	X		4.1 d, 4.4.6.6
3.2.3.4 Altitude					X	X		4.1 d, 4.4.6.7
3.2.3.5 Rain					X	X		4.1 d, 4.4.6.8
3.2.3.6 Humidity	X							
3.2.3.6.1 Humidity, Operating					X	X		4.1 d, 4.4.6.9
3.2.3.6.2 Humidity, Non-Operating					X	X		4.1 d, 4.4.6.10
3.2.3.7 Salt Fog					X	X		4.1 d, 4.4.6.11
3.2.3.8 Sand/Dust					X	X		4.1 d, 4.4.6.12
3.2.3.9 Fungus					X	X		4.1 d, 4.4.6.13
3.2.3.10 Electromagnetic Environmental Effects	X							
3.2.3.10.1 Radiated Emissions					X	X		4.1 d, 4.4.6.14
3.2.3.10.2 Radiated Susceptibility					X	X		4.1 d, 4.4.6.15
3.2.3.10.3 Conducted Emissions					X	X		4.1 d, 4.4.6.16
3.2.3.10.4 Conducted Susceptibility					X	X		4.1 d, 4.4.6.17
3.2.3.10.5 Electrostatic Discharge					X	X		4.1 d, 4.4.6.18
3.2.3.11 High Altitude Electromagnetic Pulse (HEMP)					X	X		4.1 d, 4.4.6.19
3.2.4 Nameplates and Markings				X		X	X	4.1 c
3.2.4.1 Warning Markings				X		X	X	4.1 c
3.2.4.2 Panel Markings and Processes				X		X	X	4.1 c
3.2.4.3 Identification Plate				X		X	X	4.1 c
3.2.5 "Quick Start" Card				X		X	X	4.1 c
3.2.6 Configuration Sheet				X		X	X	4.1 c
3.2.7 Interchangeability		X	X			X		4.1 a & b
3.2.8 Safety					X	X		4.1 d, 4.4.7

**Table I Requirements/Verification Cross-Reference Matrix – cont'd**

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION CLASS		SECTION 4 VERIFICATION
	NA	1	2	3	4	A	B	
3.2.9 Logistics	X							
3.2.9.1 Set-up and Tear-down Time				X		X		4.1 c
3.2.9.2 Warm-up Time				X		X		4.1 c, 4.4.8
3.2.10 Self-Test Capability			X	X		X		4.1 b & c