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The ammeter shall operate in a frequency range of 45 Hertz (Hz) to 500 Hz with a resolution of no more than 100 mAMP on the low range scale and no more than 1 AMP on the high range scale. It will have a maximum AC current range to 300 AMP and a DC current range to 300 AMP. The clamp will encompass a conductor size up to 1.25 inches in diameter-

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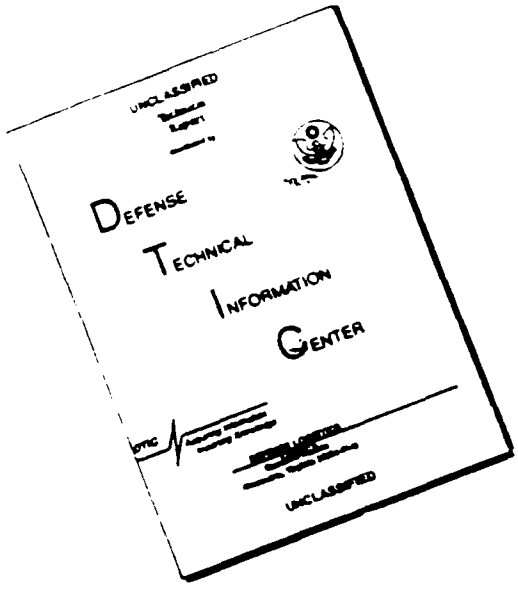

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REPLY TO ATTENTION OF

ATCD-SL (70-1f)

22 OCT 1992

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Operational Requirements Document (ORD) for the Alternating Current/Direct Current (AC/DC) Clamp-on Ammeter, ME-563

1. Reference Army Regulation 71-9, 20 Feb 87, Materiel Objectives and Requirements.

2. Headquarters, TRADOC, approved the AC/DC Clamp-on Ammeter, ME-563, ORD on 14 Jul 92. The following information is applicable to this document:

a. System Designation: Nonmajor.

b. Materiel Developer: AMC.

c. Combat Developer: TRADOC.

d. User Representative: TRADOC.

e. Trainer: TRADOC.

f. Logistician: AMSAA.

g. CARDS Reference Number: 16039.

h. TRADOC Proponent Activity: USAOMMCS.

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4. The HQ TRADOC POC is Mr. Bickhart, ATCD-SL, DSN 680-2295.

FOR THE COMMANDER:

Bettie B. Gonser
BETTIE B. GONSER
Chief, Mail Management Branch

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electronic, combat resources. In all probability, this piece of equipment will not be singled out as an item for destruction by threat forces.

b. The collateral threat to the ammeter will be that of destruction or disablement which may come from ground, air or diversified forces. The ammeter also will be vulnerable to degradation through enemy use of nuclear/non-nuclear electromagnetic pulse and nuclear, biological and chemical (NBC) contamination.

3. Shortcomings of Existing Systems. Much of the present GP TMDE is obsolete or is no longer being manufactured; therefore, repair parts are in short supply or are not available. Other GP TMDE is deficient in performance characteristics required to efficiently support the majority of current fielded and programmed systems. State-of-the-art GP TMDE is needed at all maintenance levels in support of CE, combat, combat support (CS) and combat service support (CSS) systems. Nonstandard GP TMDE currently contributes to intensive, nonessential training, resource proliferation and high materiel support costs; and it elevates manpower resource requirements. Logistics support of the current GP TMDE requires a huge inventory of spare parts, some of which are not obtainable due to obsolescence.

4. Capabilities Required.

a. System Performance. The ammeter shall operate in a frequency range of 45 Hertz (Hz) to 500 Hz with a resolution of no more than 100 mAMP on the low range scale and no more than 1 AMP on the high range scale. It will have a maximum AC current range to 300 AMP and a DC current range to 300 AMP. The clamp will encompass a conductor size up to 1.25 inches in diameter. The device shall have a digital display minimum of 3 1/2 digits. The clamp-on ammeter will indicate current with an accuracy of +/- (3 percent +4 counts) AC and +/- (3 percent +4 counts) DC. It shall be operable with standard military battery sources already existing in the Army's inventory. It will have all controls required for operation located on the front of the set and will conform to basic human factors engineering (HFE) design criteria. It will be constructed to assure that organizational maintenance can be accomplished without removing any component and that unit maintenance items (fuses, batteries, etc.) are accessible without major equipment tear-down. The ammeter will be hand-held, one-person-portable and operable by personnel wearing mission-oriented protective posture (MOPP) clothing at MOPP level 4. It will be operable, storable and transportable in climatic design types hot and basic to a lower limit of -10 degrees centigrade (C). The normal operating temperature will be from 0 degrees C to +50 degrees C.

b. Logistics and Readiness. The AC/DC clamp-on ammeter will have a reliability, availability and maintainability (RAM) operational availability of .80 and a mean time between operational mission failure of 10,416 hours. The ammeter will be supported by the USATSA.

c. Critical System Characteristics. The AC/DC clamp-on ammeter must not radiate or be disrupted by electromagnetic interference (EMI). It will be capable of maintaining tolerance specifications for a period of no less than 360 days after adjustment/calibration. The ammeter will be capable of calibration by method of adjustable components for 90 percent of calibration parameters. The ammeter is not mission essential; therefore, nuclear and NBC-contamination survivability is not required.

5. Integrated Logistics Support.

a. Maintenance Planning. The AC/DC clamp-on ammeter will be structured for standard Army TMDE logistics support.

b. Support Equipment. Standard calibration tools, TMDE and maintenance procedures will be utilized. Calibration standards, technical bulletins, technical manuals (TMs), the repair parts package and training requirement will be validated and verified prior to initial operating capability (IOC). This process constitutes the TEMOD equivalent of a system support package validation.

c. Human Systems Integration. The introduction of the AC/DC clamp-on ammeter into the Army probably will not require institutional level training. The training concept for this system, however, must ensure provision of the necessary skills for effective operation and maintenance of the AC/DC clamp-on ammeter. This equipment will have no significant personnel impacts and will not increase manpower requirements. The man-machine interface for operation and maintenance of the ammeter shall facilitate safe and effective task performance and shall not present uncontrolled residual safety hazards or present uncontrolled health hazards throughout the instrument's life cycle. This item will replace several makes and models of current equipment. Operators and/or maintainers will perform the same functions on the new item. The career management field (CMF) and associated military occupational specialties (MOSs) that apply to the AC/DC clamp-on ammeter are:

(1) CMF 29 (Signal Maintenance), operators at unit level: MOSs 29M, 29V and 39E.

(2) CMF 33 (Electronic Warfare/Intercept), operators at unit level: MOSs 33M, 33P, 33Q, 33R, 33T and 33V.

(3) CMF 67 (Aviation Maintenance), operators at unit level: MOSs 68P, 68L, 68N, 68Q and 68R.

(4) CMF 27 (Land Combat and Air Defense), operators at unit level: MOSs 27G, 27N, 27K, 24H, 27J and 24K.

(5) CMF 91 (Medical), operators at unit level: MOSs 35G and 35U.

(6) CMF 35 (Electronics Maintenance and Calibration), maintainer at GS level: MOS 35H.

d. Computer Resources. N/A.

e. Other Logistics Consideration. The life cycle cost economic analysis will be used to determine the support cost and maintenance concept to develop the maintenance allocation charts. Preparation of system TMs and materials will be in accordance with normal procedures for preparation, coordination and approval of Department of the Army publications. The U.S. Army Training and Doctrine Command (TRADOC) proponent school will evaluate commercially available TMs and materials for adequacy and will develop new or modify existing training products for the AC/DC clamp-on ammeter, as necessary. The materiel developer and the TRADOC proponent jointly will evaluate the need for standard technical documentation and extension materials and will identify training requirements for new equipment training.

f. Training devices are not required.

6. Infrastructure Support and Interoperability.

a. Command, Control, Communications and Intelligence (C3I). The AC/DC clamp-on ammeter is a diagnostic tool utilized by technicians to perform maintenance actions, and C3I does not apply.

b. Transportation and Bazing. The ammeter shall be transportable without restriction by standard highway, rail, marine and air modes. It shall be transportable by the assigned unit's organic vehicles.

c. Standardization, Interoperability and Commonality. The AC/DC clamp-on ammeter has potential use by other armed services' maintenance units and will be listed in the Department of Defense Consolidated Electronic Test Equipment Listing.

d. Mapping, Charting and Geodesy Support. N/A.

7. Force Structure.

a. The projected quantity for total distribution to the U.S. Army is 1,000 units.

b. The AC/DC clamp-on ammeter will be assigned to designated DS and GS repair facilities. It will be deployed in the division DS maintenance facilities (signal and military intelligence units, maintenance company in the forward support battalion and light maintenance company in the main support battalion for heavy divisions, etc.) and GS maintenance activities, as well as corps, theater Army and CONUS maintenance facilities.

8. Schedule Considerations. The following milestones will constitute timely fielding of the ammeter. The ammeter is replacing test equipment already fielded, supporting an extensive variety of systems; consequently, initial and full operational capability cannot be accurately specified. The total logistical support structure for this test equipment is currently instituted in the Army.

a. ORD Approval 3QFY92

b. Milestone Decision Review I/III 1QFY93

c. Validation/Verification: 4QFY94

d. IOC 2QFY95

ANNEX A

RATIONALE

The following rationale statements correspond to subparagraphs of paragraph 4, Capabilities Required.

4. Capabilities Required.

a. System Performance. The clamp-on ammeter will operate in a frequency range of 45 Hertz (Hz) to 500 Hz with a resolution of no more than 100 mAMP on the low range scale and no more than 1 AMP on the high range scale.

Rationale. The operating range of the AC/DC clamp-on ammeter must cover those ranges of the systems the ammeter will support.

It will have a maximum AC current range to 300 AMP and DC current range to 300 AMP.

Rationale. This is the current range to cover the systems supported by this ammeter.

The clamp-on ammeter will encompass a conductor size up to 1.25 inches in diameter.

Rationale. This is the minimum efficiency characteristic that will enable the ammeter to measure various sized cables of supported systems.

It will have a digital display minimum of 3 1/2 digits.

Rationale. This is the minimum capability characteristic that is required for operators to resolve measurements on the supported systems performance.

The clamp-on ammeter will indicate current with an adequacy of +/- (3 percent +4 counts) AC and +/- (3 percent +4 counts) DC.

Rationale. This is the minimum accurate characteristic that is required to support systems.

It shall be operable with standard military battery sources already existing in the Army's inventory.

Rationale. The ammeter is a DC-driven device; batteries will be required to operate the ammeter.

It will have all controls required for operation located on the front of the set and will conform to basic human factors engineering (HFE) design criteria.

Rationale. This is essential to facilitate ease of use and safety to the operator while testing and measuring for high current, and it conforms to basic HFE design criteria.

It will be constructed to assure that organizational maintenance can be accomplished without removing any component and that unit maintenance items (fuses, batteries, etc.) are accessible without major equipment tear-down.

Rationale. This provides for ease of maintenance.

The ammeter will be hand-held, one-person-portable and operable by personnel wearing mission-oriented protective posture (MOPP) clothing at MOPP level 4.

Rationale. Test equipment must be movable by one person due to the close confinement of the maintenance facility and to provide for ease of movement in the area where the clamp-on ammeter will be used. It also allows military personnel to continue operations in an NBC environment provided the system is still serviceable.

It will be operable, storable and transportable in climatic design types hot and basic to a lower limit of -10 degrees centigrade (C). The normal operating temperature will be from 0 degrees C to +50 degrees C.

Rationale. The ammeter will be deployed to many areas of the world. Though normally operated in a controlled environment, whether in a maintenance van or building, the requirement exists for the equipment to operate if the environmental systems are inoperative, unavailable or turned off.

b. Logistics and Readiness. The AC/DC clamp-on ammeter will have a reliability, availability and maintainability (RAM) operational availability of .80 and a mean time between operational mission failure of 10,416 hours.

Rationale. This is the RAM that has been created in the RAM Rationale Report for this test set.

The ammeter will be supported by the USATSA.

Rationale. The USATSA has calibration responsibility for TMDE Armywide.

c. Critical System Characteristics. The AC/DC clamp-on ammeter must not radiate or be disrupted by electromagnetic interference (EMI).

Rationale. The AC/DC clamp-on ammeter will have to function adjacent to operating vehicles, power generating systems, communications transmitters, electronic biomedical devices and other TMDE without causing disruption or being disrupted by EMI.

It will be capable of maintaining tolerance specifications for a period of no less than 360 days after adjustment/calibration.

Rationale. This is the calibration interval requirement established by the USATSA, and their table of organization and equipment (TOE) mission and strength structure requires that they not sustain or support a frequency of shorter duration.

The ammeter will be capable of calibration by method of adjustable components for 90 percent of calibration parameters.

Rationale. The USATSA has very limited automatic capability; therefore, 90 percent of the parametric adjustments must be performed manually. The other 10 percent may be made by replacement of components, i.e., capacitors, resistors, indicators, etc.

The ammeter is not mission essential; therefore, nuclear and NBC-contamination survivability is not required.

Rationale. The ammeter is not mission essential.

ANNEX B

OPERATIONAL MODE SUMMARY/MISSION PROFILE (OMS/MP)

1. OMS. The primary mission of the GP TMDE is to support all military systems and equipment.

a. Planned Deployment. This TMDE will be issued to those CS and CSS units which perform sufficient maintenance to justify its use. Issue will include those units which have responsibility for performing maintenance on their own equipment as well as equipment which is supported by the unit. The TMDE will be proposed for replacement of obsolete instruments already in the field.

b. Equipment on Time. Due to the anticipated limited issue of TMDE, usage is expected to be shared among maintenance personnel within the unit. When the TMDE is intended for uninterrupted use by a single repair person during accomplishment of an assigned maintenance task, occasions will arise when priorities mandate interrupted sharing. A maintenance task is comprised of an initial, TMDE-facilitated, diagnostic test for fault isolation, active repair and final TMDE inspection (quality assurance) testing. The normal TMDE usage cycle will consist of connecting the TMDE via cable(s) and/or adapting equipment to the system under test, performing the required tests against performance specifications and then disconnecting the test equipment. Although it is difficult to ascertain whether the operational profile will be continuous or intermittent, it is estimated that daily utilization will vary between 1.5 and 12 hours during a single 12-hour shift and 3 to 24 hours for two 12-hour shifts. The range of equipment on times will be derived from an analysis of the operation. It is assumed that TMDE diagnostic and inspection time will complete each maintenance action on system or equipment under test. Based on the various combinations of times, a reasonable operational time of TMDE on the high end of a single shift operation is 8 hours; for a double shift operation, the operational time is estimated to be 14 hours daily, depending on the type of TMDE (which considers shift change time and other nonproductive time described in Army Regulation 570-2 for Category I and II TOE units).

2. MP (Operational). Wartime operational mode is 140 operating/alert time hours weekly (7 days) for all levels of maintenance. Peacetime operational mode is 20 operating/alert time hours weekly for unit maintenance and 35 operating/alert time hours weekly for all other levels of maintenance. These operational mission statements are based on anticipated usage of the item

under a wartime usage of two 12-hour shifts per day and a peacetime usage of one 8-hour shift per day. The item will operate 52 weeks per year/7 days per week during wartime and 50 weeks per year/5 days per week during peacetime. In wartime conditions, the item at unit level will relocate four times per seven-day period. During peacetime, at both levels, the item will relocate one time per four weeks. The item will not relocate at depot level during war or peace. During relocations, it will travel 23 kilometers per hour. This will result in a three-hour downtime consisting of a two-hour pack and move plus a one-hour initialization time.

ANNEX D

FUNDING IMPLICATIONS

1. Research, Development, Test and Evaluation (RDTE): None
(Nondevelopmental Item (NDI) Test,
Measurement and
Diagnostic Equipment
Modernization Program)

NOTE: An NDI (off-the-shelf) decision is predetermined. Therefore, RDTE funds are not applicable in the acquisition process. This is a Acquisition Category III program. Procurement cost includes Other Procurement, Army, funding for spares and software.