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***Department of the Army Pamphlet 750–43**

Maintenance of Supplies and Equipment

Army Test, Measurement, and Diagnostic Equipment Implementation Procedures

By Order of the Secretary of the Army:

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History. This publication is a major revision. The portions affected by this major revision are listed in the summary of change.

Applicability. This publication applies to the Regular Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve, unless otherwise stated.

Proponent and exception authority. The proponent of this publication is Deputy Chief of Staff, G–4. The proponent has the authority to approve exceptions or waivers to this publication that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief within the proponent agency or its direct reporting unit or field operating agency in the grade of colonel or the civilian equivalent. Activities may request a waiver to this publication by providing justification that includes a full analysis of the expected benefits and must include formal review by the activity's senior legal officer. All waiver requests will be endorsed by the commander or senior leader of the requesting activity and forwarded through their higher headquarters to the policy proponent. Refer to AR 25–30 for specific requirements.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to the Deputy Chief of Staff, G–4 at usarmy.pentagon.hqda-dcs-g-4.mbx.publications@army.mil.

Distribution. This publication is available in electronic media only and is intended for the Regular Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve.

*This pamphlet supersedes DA Pam 750–43, dated 24 January 2014.

SUMMARY of CHANGE

DA PAM 750–43
Army Test, Measurement, and Diagnostic Equipment Implementation Procedures

This major revision, dated 15 July 2024—

- Updates title from “Army Test Program Set Implementation Guide” to “Army Test, Measurement, and Diagnostic Equipment Implementation Procedures” (title page).
- Adds the test equipment modernization program (chap 2).
- Adds procedures and objectives for the preferred items list (paras 2–3 through 2–7).
- Adds automatic test equipment-related procedures (chap 3).
- Consolidates all test program set-related procedures (chap 4).
- Replaces “integrated logistics support” with “integrated product support” (chap 5).
- Updates fielding of test program set and post deployment support (chap 6).
- Adds test, measurement, and diagnostic equipment calibration and repair support program objectives, concepts, and administrative procedures (chap 7).
- Transfers DA Form 4062 from AR 750–43 and adds procedures for DA Form 4062 (TMDE Acquisition Approval Analysis Data) (app C).
- Replaces “test, measurement, and diagnostic equipment support activity” with “calibration and repair support activity” (throughout).

Contents (Listed by chapter and page number)

Chapter 1
Introduction

1–1. Purpose
This pamphlet provides guidance and procedures for determining the requirements, acquisition, development, sustainment, and life cycle management of Army automatic test equipment (ATE); calibration, test, measurement, and diagnostic equipment (TMDE); and test program sets (TPSs) used in the maintenance and support of Army materiel, test equipment modernization (TEMOD), embedded diagnostics, and embedded prognostics.

1–2. References, forms, and explanation of abbreviations
See appendix A. The abbreviations, brevity codes, and acronyms (ABCAs) used in this electronic publication are defined when you hover over them. All ABCAs are listed in the ABCA database located at https://armypubs.army.mil/abca/.

1–3. Associated publications
Policy associated with this pamphlet is found in AR 750–43, DoDD 5000.01, DoDI 5000.02, AR 70–1, AR 700–127, AR 750–1, and TB 43–180.

1–4. Records management (recordkeeping) requirements
The records management requirement for all record numbers, associated forms, and reports required by this publication are addressed in the Records Retention Schedule-Army (RRS–A). Detailed information for all related record numbers, forms, and reports are located in Army Records Information Management System (ARIMS)/RRS–A at https://www.arims.army.mil. If any record numbers, forms, and reports are not current, addressed, and/or published correctly in ARIMS/RRS–A, see DA Pam 25–403 for guidance.

Chapter 2
Test Equipment Modernization

2–1. General
The TEMOD program is the Army's approved program of record for replacing obsolete test equipment. Additionally, the TEMOD program addresses redundant or duplicate functionality that occurs when organizations procure test equipment without validating if a like function already exists within the Army inventory. This chapter describes processes and procedures relating to the TEMOD Program.

2–2. Test equipment modernization prioritization process
a. The TEMOD prioritization process occurs biennially to identify, prioritize, and validate replacement general purpose electronic test equipment for all proponent maintainer military occupational specialties (MOSs). The Army Futures Command (AFC) TMDE capability developer and the product director (PD) for TMDE co-chair the TEMOD Prioritization Joint Working Group with participation from supporting Army commands (ACOMs).

b. The AFC TMDE capability developer coordinates with the acquisition and operation force to establish timelines for conducting requirements analysis to identify replacement candidate TEMOD items. Multiple data resources are used and coordination with owning organizations takes place to validate the development of the TEMOD list. Additionally, coordinate with the U.S. Army Training and Doctrine Command (TRADOC), U.S. Army Materiel Command (AMC), ACOMs, Army service component commands (ASCCs), Army National Guard (ARNG), and weapon system managers to validate institutional and future acquisition test equipment requirements.

c. The TEMOD Prioritization Joint Working Group uses the information collected during the requirements analysis phase of the prioritization process as a method to develop a draft list that is prioritized and submitted for Deputy Chief of Staff (DCS), G–8 approval. The PD for TMDE uses the approved TEMOD prioritization list for materiel development solutions under the TEMOD Program. See figure 2–1 for the TEMOD and calibration set (CALSET) prioritization diagram.

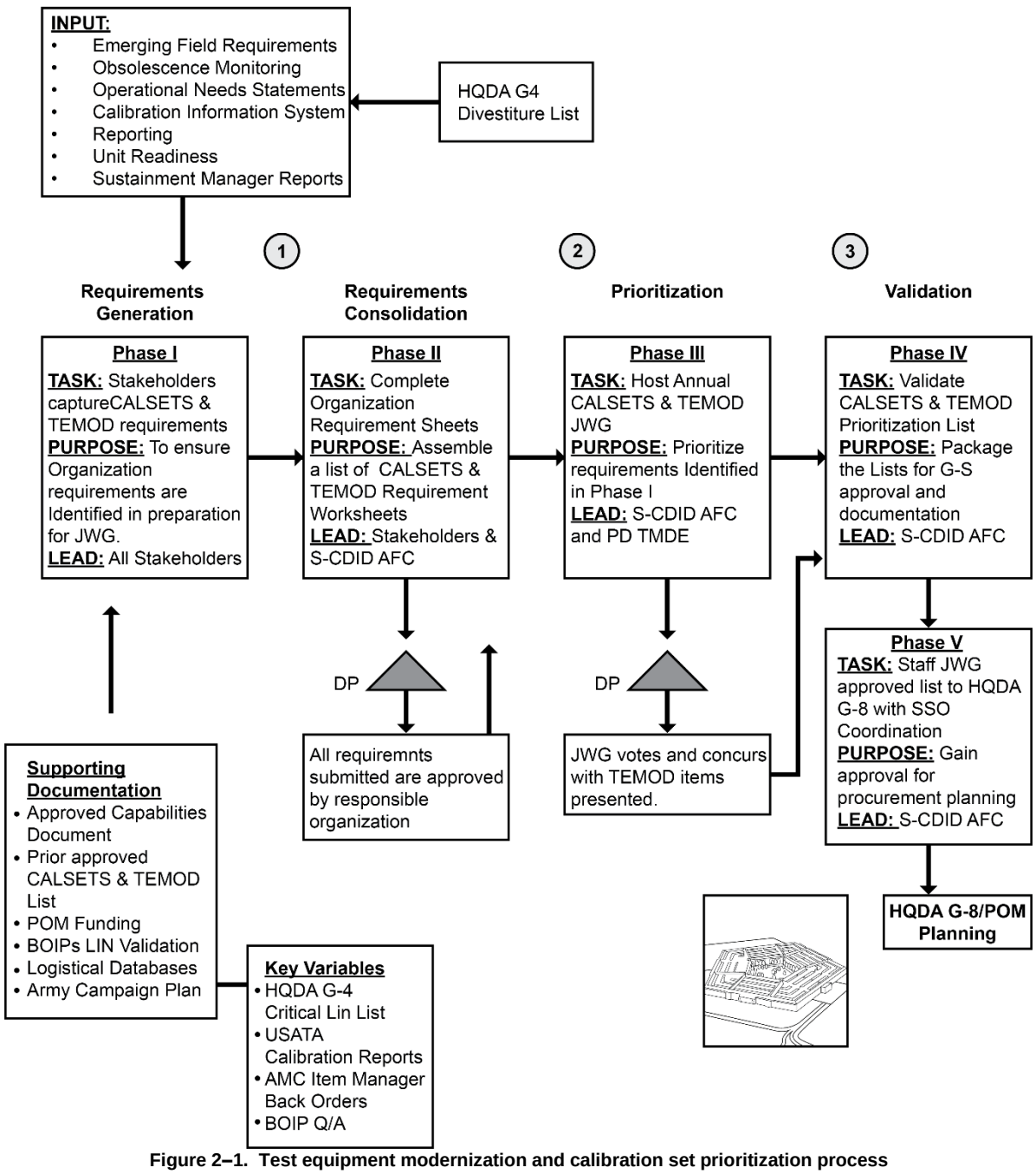

Figure 2–1. Test equipment modernization and calibration set prioritization process

2–3. Test equipment modernization preferred items list

a. The Army TMDE Preferred Items List (PIL) includes ATE and TMDE. This paragraph describes procedures for users of ATE and TMDE. On determination that ATE or TMDE is required and the designated standard within the PIL (https://pd-tmde.us.army.mil/), ATE hardware, and software cannot be used or expanded in capability or that it is not cost effective to accommodate the test requirements, the system developer will prepare a memorandum request for waiver. The memorandum request for waiver is an acquisition request for a non-standard TMDE using DA Form 4062 (TMDE Acquisition Approval Analysis Data) and supporting documents as a package that must be submitted to the PD TMDE along with a

supportability analysis submitted to U.S. Army Test, Measurement, and Diagnostic Equipment Activity (USATA) as required by DA Form 4062. The PD TMDE will in turn provide a memorandum back to the system developer on the approval or disapproval of the waiver request. Instructions to prepare a waiver/DA Form 4062 package are outlined below and also available at the PD TMDE website above.

b. Complete DA Form DA 4062 using the example in figure C–1.

c. DA Form 4062 must be accompanied with supporting documents that include a copy of data sheets or specification of the non-standard TMDE to be procured, a copy of the vendors quote, and an approval or justification memorandum of the users' local command (that is, commander, logistics managers, and property book officer or non-commissioned officer). An example of an approval or justification memorandum is in figure C–2.

Note. When preparing the waiver package, ensure information on all included documents (data sheets or specification, vendor's quote, and approval or justification memorandum) are consistent, particularly those that are in DA Form 4062 blocks 3 (Nomenclature), 4 (Model/Part Number), 5 (Unit Cost), 8 (Manufacturer's Name), and 19 (Distribution/Quantity).

d. Send the waiver documents in PDF as a package via email attachment to the PD TMDE TEMOD at usarmy.redstone.peo-cs-css.mbx.pd-tmde-temod2@army.mil.

e. TMDE items that are procured outside of the waiver process still require an approved DA Form 4062, including a favorable supportability analysis from USATA concerning resourcing support requirements.

2–4. Objectives of the preferred items list

The objectives of the PIL are to—

a. Provide TMDE users with a catalog of general purpose and calibration equipment instruments that are acceptable for use and that are logistically supportable and available.

b. Identify candidate instruments that are not yet qualified for the PIL, but that have planned dates for type classification and system supportability.

c. Provide a listing of ATE for selection in applications for which the Army single ATE policy designated items may not be appropriate.

2–5. Preferred items list qualifications and policy

a. An item of TMDE will be added to the TMDE PIL when—

(1) It is standard general purpose TMDE or member of the integrated family of test equipment (IFTE) general purpose ATE.

(2) It is not standard general purpose TMDE or IFTE, but it has been determined by the TMDE PIL in-process review panel to be suitable for use.

b. A PIL item must be type classified standard. A PIL candidate item may be type classified generic.

c. All items added to the TMDE PIL will have complete technical specifications.

d. An item of TMDE will be deleted from the PIL when it is no longer considered the most technically acceptable, available, or supportable Army-adopted item.

2–6. Review and update of the preferred items list

a. This paragraph describes the TMDE PIL in-process review panel. It is chaired by the PD TMDE and includes representatives from AFC, U.S. Army Aviation and Missile Command (AMCOM), the Integrated Materiel Management Logistics Center, the Ordnance Munitions and Electronics Maintenance School, the U.S. Combined Arms Support Command Director, Logistics Materiel Readiness Directorate, and others designated by the PD TMDE. This panel will meet biennially to update the PIL.

b. The PD TMDE will—

(1) Solicit proposed changes to the PIL and prepare a coordinating draft 90 days prior to the scheduled in-process review panel meeting.

(2) Staff the coordinating draft with panel members for review and comment.

(3) Resolve issues on PIL changes when panel consensus is not reached.

(4) Update and provide access to the PIL.

2–7. Item management

a. TEMOD products listed within TMDE PIL are typically managed by the item manager at AMCOM. Users need to contact the item manager for further instructions for TEMOD products within the PIL that are returned with code out or not repairable this station status by their local calibration and repair support (C&RS) activity.

b. For PIL technical assistance or other related questions, contact the PD TMDE. If the item in question is not listed within the PIL, organizations will submit a waiver to the PD TMDE with coordination through USATA for concurrence.

Chapter 3
Automatic Test Equipment

3–1. General

The PD TMDE, under the direction of the Program Executive Office Combat Support and Combat Service Support Army Acquisition Executive, will maintain the automatic test systems (ATSs) ATE program for Army forces. All ATE procured for use in the field, a depot, or a contractor's production facility must be acquired in accordance with this pamphlet and current policy, directives, and charters. The following paragraphs provide procedural details relating to ATE.

3–2. Automatic test equipment and test, measurement, and diagnostic equipment acquisition strategy

a. The material developer's (MATDEV) first priority for support strategy is to use Army standard ATE (for example, next generation at-platform test set (NGATS)) to meet maintenance requirements (see AR 700–127).

b. MATDEVs will ensure that system and subsystems contractors use the same diagnostic capability (that is, no special factory test equipment) that will be used under operational conditions to perform diagnostics for weapon system components in the field to the maximum extent possible (considering life cycle, costs, and skill sets). This applies specifically to ATE for field, depot, and factory original equipment manufacturer (OEM) testing.

c. MATDEVs will identify ATE requirements and list them in a detailed funding profile, which will include a cost summary in section IX of the depot maintenance support plan (DMSP) and the life cycle sustainment plan (LCSP) if the MATDEV sustainment concept plans for field-level employment of ATE–TPS (see DA Pam 700–127).

d. If a waiver to the Army standard ATE policy is required, provide a plan for obtaining the waiver from the Army Acquisition Executive. Include the waiver approval document from the Army Acquisition Executive as an annex to the DMSP. If field-level maintenance using ATE–TPS is planned, include a copy of the waiver in the LCSP (see DA Pam 700–127).

e. Program Management Office, PD TMDE, AFC Sustainment Capabilities Integration Directorate (S–CDID), and TRADOC will review ATE support strategies in coordination with TPS Centers and development of TPS management plans.

3–3. Automatic test equipment requirements determination

AFC S–CDID will coordinate with the institutional training, operational force, and proponent capability developer and weapons systems managers to validate ATE requirements. They will document all ATE requirements using the Joint Capabilities Integration Development System and coordinate with the PD TMDE for materiel solutions. Additional coordination with USATA will occur for metrology-related support and impacts to the Army Calibration Program.

a. System developers, in coordination with AFC S–CDID, TRADOC, and the PD TMDE, will determine ATE–TPS requirements. A system analysis is required per AR 700–127 that includes a product support analysis (for example, failure mode, effects, and criticality analysis (FMECA); level of repair analysis (LORA); and so forth).

b. AFC and AMC subordinate commands, PD TMDE, major subordinate commands, and their respective ATE–TPS centers will assist system developers in preparation of the product support analysis which will address the following areas:

(1) Built-in test (BIT) and built-in test equipment (BITE) requirements.

(2) TMDE requirements and alternatives, system test envelope, workload distribution, and estimated failure frequency.
(3) System maintenance plan and personnel requirements.
(4) System interface and TPS requirements.
(5) Force structure requirements.
(6) Life cycle costs.
(7) Risk assessment.
(8) System or subsystem calibration requirements.
(9) Test program set management plan (TPSMP) preparation.

c. Once the ATE requirements have been identified for a system, the system developer will—

(1) Determine if use of standard ATE will fulfill the ATE technical and operational requirements of the system.

(2) Determine, in coordination with the PD TMDE, the feasibility of expanding the basic capabilities of standard ATE, if standard ATE does not satisfy the requirements.

(3) If weapons systems are unable to use the Army program of record ATE, they must submit a non-standard ATE waiver request to the PD TMDE for approval by the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA (ALT)).

3–4. Automatic test equipment waiver

Commands and organizations will submit a memorandum to the PD TMDE for relief of using the standardized Army ATE. Justification and rationale for the waiver request is included in the memorandum. The PD TMDE will concur or non-concur all ATE waiver requests prior to the ASA (ALT) approval.

3–5. Automatic test equipment system software

a. The PD TMDE as the proponent for ATE will manage software embedded in the ATE consistent with the Army TMDE policy. The PD TMDE will decide how the software will be accessed, modified, and maintained for standardized ATE. Changes to Army standard ATE system software will be coordinated with–

(1) Product managers and commands having equipment supported by the ATE.
(2) The capability developer for the supported equipment.
(3) USATA, when applicable.
(4) TPS Development Centers.

b. The ATE system software developed for and issued with the ATE is considered to be part of the ATE. The ATE system software will—

(1) Use an approved Department of Defense (DoD) high order language; be based on commercial, open systems architecture; and be compliant with DoD Joint Technical Architecture policies.

(2) Be identified as a separate contract line item where practicable.

c. Modularity, ease of change, and transferability will be specifically addressed in software design and development plans.

d. A disciplined approach that minimizes life cycle cost will be employed in the ATE system software design, development, programming, configuration management, and maintenance.

e. The PD TMDE will ensure ATE system software changes and updates are tested and verified prior to release.

3–6. Automated test equipment interface

The supported end item will have integrated into the design the necessary diagnostic connector assemblies and data buses that provide the minimum number of test connection points necessary to satisfy end item testability constraints. The design objective will be to minimize the number of TPS interconnection devices and cables necessary to diagnose and fault isolate quickly and easily a failed line replacement unit (LRU) or shop replaceable unit (SRU) at the location of the failed replaceable item. As a core member of the automated test system management board for Army ATE interfaces, the PD TMDE will leverage the services and industry standards for standardized ATE solutions.

3–7. Automatic test equipment selection criteria for joint programs

Each Service has its own unique ATE standardization policies necessitated by basic mission differences and operational scenarios. On joint programs, to minimize duplicate costs for technical publications, training, TPS, and other logistics factors, the following guidelines will be used:

a. BIT/BITE will be used in the design of the system to perform fault detection for 100 percent of detectable faults (in accordance with MIL–PRF–32070A) and fault isolation to a single component for 90 percent of detected faults with 85 percent confidence.

b. Depot-level maintenance technical publications, training, TPSs, and other logistics items will be procured only for the service depots designated to perform depot-level maintenance for the joint system. Designation of the performing depots will be required early in the acquisition cycle.

c. The PD TMDE participates in the DoD ATS Management Board and influences hardware and software standardization among services.

Chapter 4
Test Program Sets

Section I

Test Program Set Program Management Summary

4–1. Organizational missions and functions

a. Product Director, Test, Measurements, and Diagnostic Equipment.

(1) Recommend TPS policy guidance in conjunction with AFC, AMC, and TRADOC for DCS, G–4 approval. Provide subject matter expert support during waiver processes.

(2) Act as the Army representative for Headquarters, Department of the Army to DoD, joint, and industry ATS conferences, symposia, and technology initiatives.

(3) Monitor TPS center implementation plans and resource impact statements for TPS support.

(4) Monitor and approve the MATDEV TPSMP.

(5) Monitor and submit for ASA (ALT) approval all waiver requests for non-standard TPS (non-program of record ATE and out-of-date TPS developed) and development programs.

(6) Ensure TPS planning, development, acquisition, fielding, and life cycle support are consistent throughout the Army across all TPS centers and MATDEV TPS programs.

(7) Establish and maintain the Army master TPS database of cost, schedule, technical, and as-built configuration information, to include TPS software, electrical path, and diagnostic information.

(8) Develop and maintain a TPS integrated master schedule of all Army TPS programs using inputs from the TPS Centers and MATDEV TPS programs.

(9) Develop, publish, collaborate, coordinate, and maintain an Armywide TPS cost model using inputs from the TPS centers and MATDEV TPS programs.

(10) In collaboration with the TPS centers, develop and publish a common TPS performance work statement suitable for procurement of TPS development, integration, acceptance, production, fielding, and sustainment from TPS centers, OEMs, or other product support providers.

(11) Coordinate with USATA on C&RS requirements for TPS development.

b. Test program set centers. TPS centers are established to support MATDEVs and the PD TMDE for expertise in TPS engineering, organic development, fielding, quality assurance (QA), quality control (QC), and sustainment system technical support. ATE–TPS centers will manage TPSs according to the direction of the MATDEV and PD TMDE and the procedures, processes, and requirements described by this pamphlet. The MATDEV and PD TMDE retain oversight of all ATE–TPS centers. Designated TPS centers—

(1) Tank, automotive, and armament systems—U.S. Army Tank-Automotive and Armaments Command TPS Center located at U.S. Army Combat Capabilities Development Command (DEVCOM) Armaments Center, Picatinny Arsenal.

(2) Aviation and missile systems—AMCOM TPS Center located at DEVCOM Aviation and Missile Center Redstone Arsenal.

(3) Communication and electronic systems—U.S. Army Communications-Electronics Command TPS Center located at Tobyhanna Army Depot.

c. Test program set center support to the materiel developer.

(1) Serve as the weapon system diagnostics development center and TPS subject matter expert.

(2) Maintain the organic staff and facilities to provide diagnostics services for the MATDEVs.

(3) Assist preparation of the TPSMP.

(4) Maintain an organic repository for the life cycle management center (LCMC) diagnostics hardware, software, and technical data. The MATDEV and PD TMDE have unrestricted access to all Government-owned data.

(5) Maintain configuration management of delivered TPS and test program hardware (TPH).

(6) Provide TPS and weapon system support for—

(a) Design for testability concepts to ensure weapon systems can be efficiently maintained at all stages of design.

(b) Assistance in preparation and review of LORA.

(c) TPS engineering requirements.

(d) TPS fielding.

(e) TPS sustainment system technical support.

(f) TPS cost estimates.

(g) Monitor TPS cost and schedule status if TPS is not developed by the TPS center.

d. Test program set center support to the Product Director, Test, Measurements, and Diagnostic Equipment.

(1) Provide PD TMDE situational awareness with ongoing Army TPS activities.

(2) Provide TPS development schedules and updates to the PD TMDE TPS integrated master schedule.

(3) Provide TPS costs to the Army master TPS database managed by the PD TMDE.

(4) Provide support for conferences, symposia, and DoD TPS forums as requested by the PD TMDE.

(5) Provide all cost, schedule, configuration management, and hardware and software technical data on TPS and TPH to the PD TMDE.

e. Materiel developer.

(1) *Test program set acquisition.*

(a) TPS acquisition planning for LRU/SRU design levels will give first priority to competitive acquisition, independent of the supported system prime contractor. This may be from an organic TPS Center or from third-party TPS developers in industry. The materiel developer must recognize the extremely important issue of unit under test (UUT) intellectual property ownership and configuration management required to support competitive TPS procurement.

(b) The MATDEV must solicit a cost/schedule estimate from an organic TPS Center. This estimate will be used in the TPSMP as a benchmark against which to determine the acquisition strategy for the TPS.

(c) TPS acquisition will provide a suitable work breakdown structure (WBS) from the TPS developer to ensure management visibility into the development process. The WBS will be outlined in the TPSMP.

(2) *Test program set funding.*

(a) TPS funding is determined by the life cycle status of the supported (parent) system since TPSs are a special purpose (SP) test capability belonging to the hardware undergoing test.

(b) If any TPS scheduled for a newly developed system is not type classified standard concurrently with the parent system, the parent system research, development, test, and evaluation (RDT&E) funding will be used by the end item manager to complete development of such TPS.

(c) Responsibilities for TPS funding are the same as responsibilities for funding the parent/system item.

(3) *Level of repair analysis.* The MATDEV will perform a LORA required by AR 700–127 to determine the echelon of repair and necessary TPS logistics support. The analyses will address BIT/BITE, off-board ATE with associated TPS, and design for testability. LORA details will be reported in the TPSMP.

(4) *Test program set management plan.*

(a) The MATDEV will prepare a TPSMP for each platform or weapon system that requires ATE/TPS support.

(b) The MATDEV will engage the cognizant TPS Center for assistance in preparing the TPSMP.

(c) The MATDEV will coordinate TPS development and fielding actions with the supporting TPS Center.

(d) The TPSMP will be a component of the DMSP, the LCSP, and the materiel fielding plan (MFP).

(5) *Quality assurance program.*

(a) The MATDEV will establish and maintain a TPS QA program.

(b) The supporting TPS Center will facilitate TPS QA/QC with their QA/QC program.

4–2. Test program set life cycle management development

a. TPSs needed to support a specific end item will be planned, funded, acquired, tested, evaluated, deployed, and modified in accordance with AR 750–43 and this pamphlet.

b. TPSs will be type classified as part of the weapon system that they support.

c. The TPSMP will serve as the central document to guide planning, development, acquisition, and maintenance of the TPSs.

(1) The TPSMP will be used as part of the acquisition milestone authority program review.

(2) The TPSMP will be included as an annex to the MATDEV DMSP.

(3) The DMSP, with the TPSMP annex, is a part of the weapon system LCSP.

d. TPS development will conform to the latest revisions of MIL–PRF–32070 and MIL–PRF–49503.

4–3. Test program set program management summary

TPS management encompasses the life cycle administrative and technical management of TPSs for field and sustainment maintenance ATE. TPS life cycle management is consistent with DoDI 5000.02, DTM–09–027, and DTM–11–003.

a. A TPS is a collection of hardware, software, and applicable documentation used for testing, fault detection and isolation, maintenance, and any other evaluations of components and equipment within a UUT.

(1) Test program (TP) is a coded sequence, that when executed by an ATE, provides instruction, UUT stimuli, measurements of UUT responses, detection of UUT faults, isolation of UUT faults, and alignment/adjustment procedures for fault correction. TP may reside on various forms of transportable media.

(2) TPH includes various hardware items required by a TPS to function. These may include an interface device (ID), or a combination of ID, cable assembly (set), test fixtures, holding fixtures, accessories, and ancillary equipment.

(3) TPS documentation may include—

(a) Technical manuals (TMs).

(b) TBs.

(c) Depot maintenance work requirements (DMWRs).

(d) Technical data packages (TDPs).

(e) Operator instructions.

(f) Engineering data required for TPS modification and integrated product support (IPS).

(g) Applicable specifications (for example, UUT specification and fabrication specifications).

(h) Information assurance plans (for example, information assurance controls and security).

(i) Documentation that allows TPS software to be maintained and modified.

(j) Integrated media instruction. A modern evolving documentation source for instructional guidance.

b. A TPS designed only to detect, not isolate failures, is referred to as a functional, go/no-go, screening or end-to-end TPS. Such TPSs are used to reduce false return rates to the next level of maintenance or to verify failures for items which are not cost effective to repair.

c. A TPS designed to isolate failures is termed a diagnostic or fault isolation TPS.

d. TPS management will be a separate and distinct action in the materiel system's life cycle. When involved in joint service support, depot maintenance inter-Service policies and procedures may apply.

e. An illustration of the TPS life cycle process and methodology of the procedures, processes, and requirements described by this pamphlet is available at https://pd-tmde.us.army.mil/.

4–4. Test program set management plan

The TPSMP is the central document for planning, developing, acquiring, and maintaining TPSs for each materiel system. TPS requirements will be addressed as a major element in all phases of the supported system life cycle. TPS planning will be initiated by the MATDEV in conjunction with the capability developer during generation of the Joint Capabilities Integration and Development System and weapon system maintenance concept. TPS management responsibilities will be included in the prime system acquisition strategy.

a. A TPSMP will be approved for each system requiring TPSs during the technology development phase of the system acquisition or its equivalent if the supported system program accelerates the development life cycle.

b. The TPSMP will identify TPS acquisition and life cycle planning factors and establish management guidelines to ensure that these factors are adequately considered in the acquisition planning process.

c. A significant relationship exists between the TPSMP, the acquisition program baseline, and the MFP. It is essential that all sites requiring TPSs be identified early in the planning stages. The MFP and associated funding requirements reflect the fielding and life cycle support requirements for TPSs.

d. The TPSMP will be used to support other formal planning documents, such as LCSP and the test and evaluation master plan. The TPSMP will be tailored to the acquisition strategy for the system in addition to the MFP, including the DMSP.

e. Preparation and the processing of the TPSMP is the responsibility of the MATDEV. System acquisition will not proceed into the engineer and manufacturing development (EMD) phase until the TPSMP has been approved or a waiver processed. A TPSMP that assumes TPS development on other than IFTE standard ATE must first be supported by an approved ATE waiver from the ASA (ALT).

f. TPS/TPSMP status will be monitored by the MATDEV product support manager and reported through the Army System Acquisition Review Council process. If TPSs are being developed by the contractor, the TPS status will be monitored by the MATDEV manager and ATE/TPS center and updated in the TPSMP.

g. The TPSMP will be reviewed, modified, and reapproved as required throughout the life cycle of the system.

4–5. Materiel system life cycle criteria

The following TPS-related criteria will be met at the associated milestone in the materiel system life cycle. Accelerated development programs that omit any intervening milestones between concept and the production decision require an approved TPSMP as soon as the necessary information is known. In general, systems will not pass into EMD or its equivalent or have a request for proposal issued without an approved TPSMP from the PD TMDE.

a. Milestone 0–decision for program initiation. Document the use of qualified TPS personnel in the evaluation of alternative system concepts.

b. Milestone A to Milestone B-technology maturation and risk reduction phase. The following actions are taken:

(1) Draft TPSMP.

(2) TPS funding is planned, programmed, and budgeted according to Army budget policy.

(3) Acquisition strategy, development, and planning are drafted. An evaluation comparing acquisition from the prime contractor, independent TPS source, and an in-house development activity will be conducted and annotated in the TPSMP.

(4) TPS requirements will be considered in the MATDEV cyber security strategy.

c. Milestone B-decision to enter engineer and manufacturing development. The following actions have been taken:

(1) TPS management plan has been updated and approved.

(2) TPSs have been established as a major element in the LCSP and IPS reviews.

(3) Development of TPSs will be based on realistic projections of UUT design maturation. TPS design will conform to MIL–PRF–32070. Documentation reflecting testing requirements or testing specifications have been acquired or scheduled for each UUT according to the TPS time phasing and the acquisition method as required by this pamphlet.

(4) Sufficient engineering and product assurance resources are available to conduct verification, validation, and acceptance of TPSs.

(5) Configuration management (CM) planning has been accomplished and includes schedules for transfer of configuration control of the TPSs to the government.

(6) Early UUT design stabilization and CM must be consistent with the supported system operational readiness requirements.

(7) Failure detection and fault isolation requirements for the TPSs are specified in both deterministic (coverage) and probabilistic (confidence) terms. Both specifications must be outlined in the TPSMP, and both must conform to MIL–PRF–32070.

(8) TPS procurement package provided to MATDEVs at Milestone B identifies the requirement to use IFTE standard family of testers or to have an approved waiver from the ASA (ALT) to use non-IFTE ATE, with concurrence of the PD TMDE.

(9) If developing TPS on non-IFTE ATE, ensure the TPS procurement package emphasizes the requirement to be interoperable with the IFTE program of record ATE.

(10) For non-IFTE TPS, require ad hoc audits of compliance with IFTE interoperability by the appropriate ATE–TPS center and maintain a publicly viewable master audit status record of all non-IFTE TPS.

(11) Ensure the TPS procurement package provided to MATDEVs at Milestone B identifies the requirement to use IFTE standard family of testers or to have an approved waiver from the ASA (ALT) to use non-IFTE ATE.

(12) If developing TPS on non-IFTE ATE, ensure the TPS procurement package emphasizes the requirement to be interoperable with the IFTE program of record ATE.

d. Milestone C-decision to enter production and deployment phase.

(1) TPSMP has been updated and approved.

(2) Required field-level TPSs have successfully completed development test or operational test II.

(3) Field-level TPS results from development test or operational test have been evaluated and approved by the U.S. Army Test and Evaluation Command.

(4) Funding and phasing of additional TPSs are addressed.

(5) Interim contractor logistics support program (ICLS), additional spares, and other elements of support required prior to a full TPS deployment are included in the production contracts or other system support requirements established. MFPs and agreements will address ICLS and TPS availability.

(6) Support infrastructure, including ATE, TPSs, and UUTs. TPS development environment and personnel are planned, funded, or established.

(7) Methods for TPS identification, accountability, materiel release, maintenance, and deployment have been defined, developed, approved, and implemented in coordination with each gaining command and organization.

(8) Procedures for TPS modification, test, production, and deployment have been defined and approved in the MFP, materiel fielding agreements, and the TPSMP.

(9) TPS requirements have been defined and updated in the logistic support analysis (LSA) by a LORA.

4–6. Test program set categories

A TPS generally can be categorized by the design level of a UUT which the TPS tests. Categories are as follows:

a. At-platform field test program sets. Used to detect system failures (system go/no-go TPS) and to isolate to the LRU or cables (system diagnostic TPS).

b. Off-platform field test program sets. Used to screen LRUs (LRU go/no-go TPS) and diagnose and isolate to the SRU.

c. Sustainment-level test program sets.

(1) LRU TPSs are used to screen LRUs or to determine LRU status after repair (LRU go/no-go TPS) and to isolate to the SRU (LRU diagnostic TPS).

(2) SRU TPSs are used to screen SRUs or to determine SRU status after repair (SRU go/no-go TPS) and to isolate to the component or group of components, known as an ambiguity group (SRU diagnostic TPS).

4–7. Unit under test design maturity impact to test program set development

TPS development for any UUT is most efficient when the design of the target UUT has stabilized. Design stabilization occurs along a continuum from system to component. It generally occurs when the number of engineering change proposals (ECPs) reaches some minimal steady state after the UUT has been in production. If TPS development has begun before UUT stabilization, then the MATDEV must be prepared to accept the tradeoffs implied and closely manage the TPS development process. Completion of TPS development will be consistent with the TPS support requirements and TPS schedule as follows:

a. If used, at-platform level TPSs will be fielded with the supported system.

b. LRU and SRU TPSs will be fielded according to the requirements of the supported system.

(1) If LRU and SRU TPS availability is mandated at system initial operational capability (IOC), the MATDEV must stabilize the UUT design and enforce UUT design stability consistent with TPS support requirements to assure availability at IOC. An illustration of the general relationship of the TPSMP and TPS development activities to the materiel system development phases when this alternative is employed is available at https://pd-tmde.us.army.mil/. Note that critical TPS decisions must be made and implemented early in the materiel system EMD phase for this alternative to be implemented.

(2) If LRU and SRU TPS availability is not mandated at system IOC, alternative means of logistic support must be planned to span the gap between system IOC and delivery of the final TPSs. This will be implemented in the form of ICLS or other support agreement and will be addressed in the system MFP and materiel fielding agreements. The interim alternative support method will also be addressed in the TPSMP. An illustration of the general relationship of the TPSMP and TPS development activities to the materiel system development phases when this alternative is employed is available at https://pd-tmde.us.army.mil/.

Section II

Test Program Set Requirements Determination

4–8. General

Before any TPS development begins, the requirements for each TPS must be clearly established. These requirements should be addressed using MIL–HDBK–2165. This approach adheres to the instruction of DoDD 5000.01 and DoDI 5000.02 for early identification of requirements that influence the system performance parameters and the system configuration from a support standpoint. Ensure that the language in the TPS procurement package clarifies the need to host on Army standard IFTE ATE developed by the PD TMDE or have an approved waiver from the ASA (ALT), with concurrence by the DCS, G–4, before procuring non-IFTE TPS. Ensure in the case of non-IFTE TPS that interoperability with the IFTE standard ATE is emphasized and audited by the appropriate ATE–TPS center. Ensure that PD TMDE and ASA (ALT) monitor and maintain cognizance of non-IFTE TPS interoperability audit status.

a. The process further requires the development of an optimum diagnostic concept that considers various degrees of BIT/BITE, ATE with associated TPS, and a manual test (see fig 4–1).

b. Using the support system alternatives, a LORA is performed to determine the most cost-effective alternative (see para 4–10).

c. AR 750–1 requires that “discard at failure” be considered by all MATDEVs as a preferred alternative to repair when a business case analysis supports it. All repair and discard analyses are documented and reported in the TPSMP.

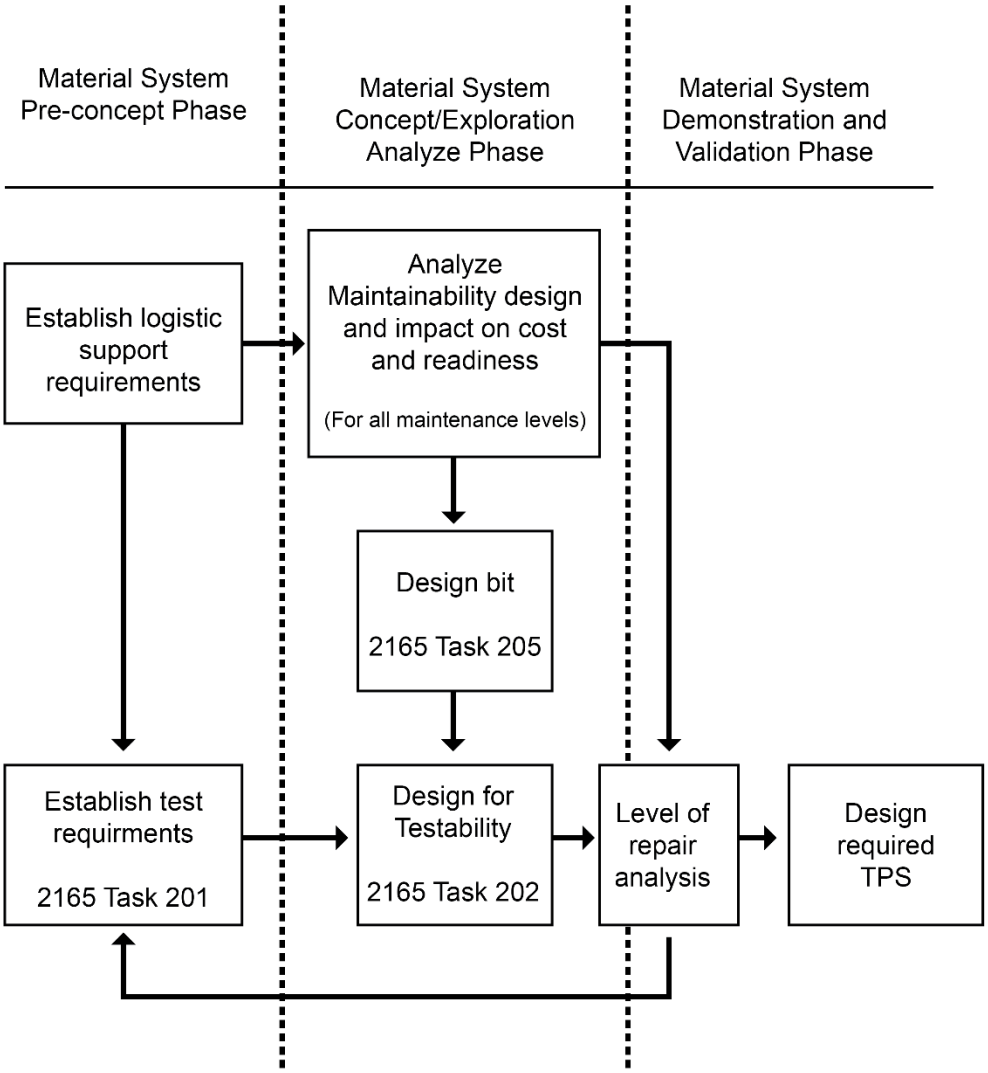

Figure 4–1. Built-in test/automatic test equipment determination

4–9. Testability

Historically, the testing of electronic circuits has not been considered until the end of the system design or prototype phase. The result has been increased cost and performance limitations for TPSs. The MATDEV will consider testability early in the conceptual design stages to mitigate these risks.

4–10. Level of repair analysis

As an integral part of LSA, the LORA will be used to determine the initial TPS requirements and to update these requirements as part of the iterative LSA process. The LORA will consider the support alternatives and their interrelationships. This analysis will consider the following minimum factors of a UUT before deciding that a TPS is required:

a. A workload analysis to determine the total testing time for a particular UUT at each level of maintenance for a given period. This is a function of the UUT failure rate, no evidence of failure rate, and inventory size of the particular UUT.

b. A cost-effective analysis to determine the cost for each of the various options. This cost will consider life cycle costs. The cost elements should include at least the following:

(1) Labor costs (manual versus ATE), including testing time, skill levels, and training costs.

(2) UUT spares and spare parts, including cost savings due to reduced inventory when an automatic test is implemented, effect of no evidence of failure rate on the UUT inventory, and transportation costs.

(3) Estimated life cycle costs (for example, ATE, manual test equipment, TPS, and BIT software).

(4) Estimated hardware costs, if applicable (ATE augmentation).

4–11. Built-in test/built-in test equipment requirements

The TPS must have the capability to interface and analyze the BIT/BITE.

4–12. Automatic test equipment

In the development of support alternatives, maximum emphasis will be placed on the use of the IFTE. Any use of nonstandard ATE will require a waiver and approval according to AR 750–43 and will be specifically addressed in the TPSMP.

4–13. Test program prerequisites

A primary criterion for TPS development by a contractor or organization other than the UUT manufacturer will be the availability of UUT documentation from which a TPS specification can be formulated.

a. The ATE/TPS centers, in concert with the acquisition manager for the UUT, must determine the availability of the UUT test requirements data prior to the development of the TPS acquisition strategy.

b. The minimum data requirements are outlined in paragraph 4–25. If the data are not readily available prior to the projected TPS acquisition, as determined by the LCSP and TPSMP, then the requirement exists for procuring data.

4–14. Life cycle sustainment plan

The LCSP is initiated early in the materiel system life cycle. As a minimum, the following TPS-related information will be contained in the LCSP:

a. ICLS plans.

b. Organic support dates.

c. ATE requirements.

d. Milestones schedule.

e. Maintenance plan.

4–15. Classified test program sets

Classified TPSs requirements will be reviewed and evaluated for applicable TPS development. The TPS acquisition manager will verify the correctness of the weapon system classified guide as it affects the classification of TPS. Classification of TPS parameters will be questioned to verify correctness.

a. The TPS acquisition manager will verify the intention to classify parameters beyond development and into fielding. If weapon system operation discloses a classified parameter, the rationale for imposing a classification requirement on TPSs will be questioned.

b. The TPS acquisition manager will consider the development and fielding of TPSs without the classified portions. If the classified tests in a TPS only account for a small portion of the field failures, then the MATDEV should consider deleting the classified portion from TPSs that will be fielded. Techniques will be used that avoid TPS classification.

c. A TPS is classified if the program contains classified information (in the source or executable code) or if it requires the displaying or printing of classified information during execution of the TP.

d. A TPS may also be classified if it processes classified information during execution of the TP. The first classification factor is within the control of the TPS developer (for example, dummy stimuli values that are unclassified may be substituted for the actual classified values wherever possible). In cases where classified values cannot be avoided, the values will be contained in a separate classified TM until the values are entered at runtime.

e. The TPS developer should take steps to ensure that classified parameters are not easily available or extractable from the software routines. The TPS developer can also take steps to assure that classified data will not be displayed or printed. The displaying and printing of classified values will be avoided by

using dimensionless values or by only displaying and printing the difference between the entered value and the actual measured value.

f. Another classification factor, processing classified data, is an electromagnetic emanations problem. The Army's standard ATE manager, PD TMDE, is responsible for controlling the electromagnetic emanations from the standard ATE and for establishing ATE memory erasure criteria. Guidance will be developed and distributed by the PD TMDE.

g. If published guidance is not available when needed, the MATDEV or TPS center will contact the PD TMDE for guidance.

4–16. Test program set acquisition strategy

a. The formulation of the TPS acquisition strategy is critical to developing a cost-effective TPS that will meet operational requirements in a timely manner. The formulation of the acquisition strategy will be based on a detailed review of TPS needs, budget constraints, and UUT data content and availability. After the materiel system has entered the EMD phase, the availability of UUT data below can be readily ascertained. If the—

(1) Required UUT data is obtained and a TPS specification can be formulated that completely defines the performance requirements of a TPS, then the acquisition manager has a wide range of procurement options. The acquisition manager may go through the request for proposal process to industry or select one of the government facilities available.

(2) If UUT data is not readily available or on contract, the cost and time to obtain the data must be assessed. If the UUT prime contractor and subcontractors permit the TPS contractor to have immediate engineering visibility to design changes, this can be considered.

b. If the UUT data is not available or complete, one of the following options must be evaluated and selected on the basis of the best match with program schedule requirements and availability of data and assets:

(1) Sole source award to the prime contractor or UUT subcontractor for all UUTs without available UUT data. If the TPS for the remaining UUTs can be practically grouped, the TPSs should be procured competitively; otherwise, they should be procured with the sole source award.

(2) Adjust the TPS schedule and wait for the UUT data before procuring TPSs competitively. ICLS for the UUTs may become necessary. The possibility of sole source procurement of some TPSs and competitive procurement of others should be considered.

(3) Reverse engineering by the ATE/TPS center may be required.

c. The formulation of the TPS statement of work (SOW) and the TPS specification provides the acquisition manager with the tools to achieve these goals. However, an inherent time delay lies between initiation of the supported item design and initiation of the TPS design.

(1) For at-platform level category TPS, for example, the initial delay is normally 5 months or longer, depending on the complexity of the system.

(2) Progressively longer delays are associated with the initiation periods of LRU and SRU TPSs. Initial delay is a normal characteristic of systems development and must be taken into account when planning TPS acquisition strategy and availability for use at each level of maintenance.

d. The projected cost and schedule needs for TPS development should be compared with the fiscal year (FY) budget funding profile. The comparison should assure that the correct type of funds (see chap 4, sec III) has been budgeted and that the development can be completed within budgeted funds and schedule. If the profiles are not compatible, the acquisition manager, in conjunction with the ATE/TPS center, must take appropriate action to change or to extend the TPS development schedule. The delay will also affect the initial support capability and ICLS will have to be provided.

e. The preferred type of contract for TPS development is a firm fixed price or fixed price incentive fee contract. The firm fixed price assumes that an adequate TPS specification with UUT data will be available for the proposal.

(1) If it is necessary to have an accelerated schedule that requires concurrent ECP revision to the UUT and the TPS, then a cost-plus-fixed-fee (CPFF) or a cost-plus-incentive-fee (CPIF) contract should be considered. The CPFF or CPIF will permit TPS cost adjustments to be made due to unpredictable UUT design changes.

(2) Premature initiation of TPS development incurs expenditures of critical resources and may be counterproductive. Therefore, in planning for TPS development, the TPS acquisition manager and MATDEV will recognize these factors before recommending CPFF or CPIF contracts.

(3) Incentive contracts may be used (for example, stimulating early schedule completion, reduced TP, and interface design complexity).

Section III

Test Program Set Funding

4–17. General

TPSs are an integral part of the end item and do not have their own individual type classification. TPS funding is determined by the life cycle status of the supported (parent) system or the reconfiguration requirement.

a. Research, development, test, and evaluation. RDT&E is when an end item is in the development phase or when it undergoes a configuration change that affects the performance envelope and is the appropriate funding category of associated TPS development.

b. Procurement. When an end item is in the production phase, the appropriate funding category is procurement appropriations, except when a configuration change of the end item affects the performance of the end item. In this case, use RDT&E funding for TPSs.

c. Operational and maintenance, Army. Operational and maintenance, Army (OMA) is when an end item is out of the production phase. The appropriate funding category is OMA, except when a configuration change of the end item affects the performance of the end item. In this case, use RDT&E funding for TPSs.

4–18. Assistance

Funding policy questions that cannot be resolved locally by comptrollers or resource managers will be referred through comptroller channels to DCS, G–8.

Section IV

Test Program Set Acquisition

4–19. General

TPS acquisition will be planned as part of the system acquisition to provide a cost-effective and tailored solution that provides effective isolation or detection of failures.

4–20. Test program set management plan

The central document for planning, developing, acquiring, and maintaining the TPS is the TPSMP. The TPSMP will be written to reflect the requirements, to include the security requirements and information assurance controls, of the materiel system life cycle. The content of the TPSMP is outlined in appendix B. In the TPSMP, the MATDEV will clearly address the procurement alternatives of acquiring TPSs. In addition, the TPSMP will clearly justify and display total TPS quantity requirements. In justifying these quantities, the units to receive TPSs are to be identified for both mission support and wartime contingency requirements.

a. Test program set management plan preparation. The MATDEV is responsible for assuring the development of the TPSMP. The respective ATE/TPS center will act as the principal staff advisor to the MATDEV for the TPSMP. The task of preparing the TPSMP may be assigned to the ATE/TPS center, which may further task the principal matrix support elements of the LCMC for appropriate assistance. The ATE/TPS center will coordinate the development of the TPSMP and will ensure final integration of all sections of the TPSMP.

b. Test program set management plan submissions. Drafts, approvals, and updates for each element of the TPSMP will be completed at various times during the TPS life cycle. The objectives of each of these elements will be completed according to appendix B.

c. Test program set management plan concurrence. Coordination will be achieved prior to formal submission of the TPSMP. This coordination will be made with the supporting ATE/TPS center and PD TMDE. Coordination should reflect concurrence or non-concurrence and any supporting comments.

4–21. Competitive acquisition

TPS acquisition planning for LRU/SRU levels will give first priority to competitive acquisition, independent of the supported system MATDEV. This may be from in-house AMC TPS development activities or from third-party TPS developers in industry.

a. The MATDEV must recognize the extremely important issue of UUT CM required to support competitive TPS procurement.

b. Competitive acquisition of TPSs is encouraged for cost and schedule reasons. This places significant emphasis upon development of a comprehensive UUT TPS development plan. Because of this emphasis, the TPSMP will not be approved unless the program manager has documented that adequate, technically accurate UUT source technical data will be available prior to the TPS development effort. These data requirements are outlined in chapter 6.

c. Availability of the UUTs and ATE must also be clearly identified during the acquisition planning and in the TPSMP. Knowledgeable procurement of TPSs will provide for the phased development of TPSs according to the timing of UUT design maturity as discussed in chapter 2.

d. An exception to competitive acquisition of TPSs may be made for acquisition of at system level TPSs.

4–22. Cost and schedule estimates

Managers of every support system must solicit a cost and schedule estimate from at least one in-house TPS development activity. This estimate will be used in the TPSMP as a benchmark for comparing alternate acquisition strategies.

4–23. Work breakdown structures

All TPS acquisitions will provide a suitable WBS to ensure management visibility in the development process. A sample TPS WBS for a TPS program is available at https://pd-tmde.us.army.mil/. As a minimum, WBS elements 1.0 through 8.0 should be included in the first submission of the TPSMP for a particular TPS program. The information for WBSs is normally obtained from the TPS development contractor's proposal and will be included in updates to the TPSMP.

Section V

Test Program Set Engineering Development Management

4–24. General

This chapter identifies the MATDEV's responsibilities for the engineering management functions required for TPS development. It focuses on the items needed to begin TPS development, the actions necessary to accomplish TPS development, and the deliverables required at each of the various design reviews. TPS design and test readiness reviews (TRRs) and acceptance participants should include the MATDEV, TPS developer, product assurance and test (PA&T), PD TMDE configuration manager, and ATE/TPS center. Throughout this chapter, generic terms are used to describe the type of information and documentation required when more than one definition exists. The intent is to identify the minimum acceptable requirements for TPS development and acceptance as illustrated in figure 4–2.

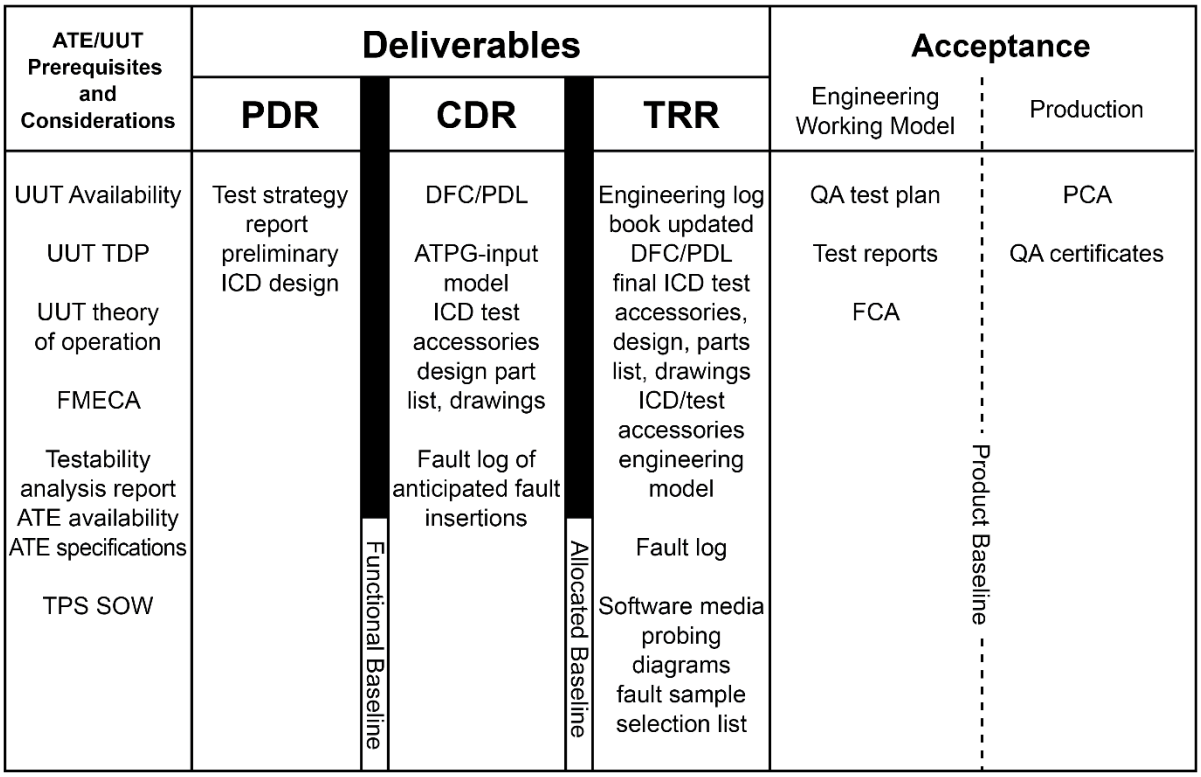

Figure 4–2. Test program set minimum requirements

4–25. Test program set engineering design considerations

a. Test program set development environment. A TPS set development environment is the set of services or interface by which the TPS developer either creates or maintains a TPS, whether captured in the form of a textual or graphical language (for example, LabWindows CVI, Visual Basic, or C++).

b. Allocated baseline. The allocated baseline will consist of the identified and approved documents defining the configuration items (CIs) as illustrated in figure 4–2.

c. Automatic test program generator. A program, often based on simulation, which aids in the development of test patterns and diagnostics information from the model of a UUT.

d. Functional baseline. As applied to TPSs, the functional baseline is comprised of the documentation available at https://pd-tmde.us.army.mil/ and the configuration management plan (CMP), after successful completion of the preliminary design review (PDR).

e. Functional configuration audit. The functional configuration audit (FCA) validates that development of the TPS has been completed satisfactorily. FCAs will be conducted on TPSs to ensure that the functional characteristics reflected in baseline documentation are met.

f. Failure mode, effects, and criticality analysis. The FMECA is used to identify potential design weaknesses through systematic, documented consideration of the following:

(1) All likely ways in which a component or equipment can fail.
(2) The causes for each failure mode.
(3) The effects of each failure mode.
(4) Task frequency.

g. Test program hardware. The TPH will provide mechanical and electrical connection and signal conditioning between the ATE and the UUT.

h. Physical configuration audit. The physical configuration audit (PCA) examines the hardware to assure that the documentation reflects the “as-built” configuration of the TPS, ensuring an accurate product baseline.

i. Product baseline. This is the baseline that describes the necessary "build to" (CI form, fit, and function characteristics) requirements for the TPS as defined at https://pd-tmde.us.army.mil/. After acceptance, the documentation becomes the product baseline. Once the product baseline is established, it cannot be changed except by formal change procedures.

j. Technical data package. A TDP is a technical description adequate for use in procurement of an item. The description defines the required design configuration and assures adequacy of item performance. It consists of all applicable technical data such as plans, drawings, and associated lists, specifications, standards, models, performance requirements, QA provisions, and packaging data. The UUT TDP will include UUT product specification, testing requirements, UUT schematics, UUT assembly drawings, UUT parts list, and UUT system software documentation as required.

k. Test strategy report. A test strategy report (TSR) describes functions and operating modes for each UUT. It identifies the proposed tests and the man/machine interface parameters that affect the tests and provides additional descriptive reference information for use in testing. The TSR will be the primary reference document for TPS development and review. It provides performance and diagnostic data that are defined independently of the test equipment.

4–26. Test program set prerequisites

The items below are necessary to initiate TPS development. These items must be supplied by the MATDEV to the TPS developer. Any effort to begin TPS development without these items may result in cost increases, schedule delays, and poor performance. Availability of each of these items must be addressed in the TPSMP prior to EMD.

a. Unit under test requirements.

(1) Current configurations of the UUTs must be made available. A minimum of three known good UUTs for every TPS will be furnished as government-loaned equipment. These UUTs will be government-furnished equipment to the TPS developer. After acceptance testing, one of the UUTs will go to the TPS repository as a golden UUT. The second UUT will go to the TPS fielding team (see chap 6). It is preferable that one UUT be modified for fault insertion (that is, conformal coating removal, use of sockets to replace or remove integrated circuits, and so forth).

(2) UUT TDP.

(3) UUT theory of operation.

(4) UUT failure mode, effects, and criticality analyses. The FMECA may be used to prepare the TPS test strategy so that the most likely faults are detected and isolated first. It may also be used to select a realistic set of UUT failure modes that can be inserted during TPS development and acceptance.

(5) Testability analysis report.

(6) UUT test software. Any unique software that is loaded on an LRU/SRU for the purpose of testing the LRU/SRU functionality.

b. Automatic test equipment requirements.

(1) The MATDEV must provide the TPS developer access to the designated ATE and provide sufficient time to use the ATE for the timely development of TPSs.

(2) ATE specifications and documents are needed to determine UUT test strategies and TPH designs.

c. Statement of work considerations. The TPS SOW will state the requirements against which the TPS will be evaluated at the various design reviews and audits. Reference will continually be made to this document at all phases of TPS development. The SOW must be prepared to accurately reflect the specific requirements, such as programming practices, design practices, schedules, deliverables, and QA and CM requirements of TPSs.

d. Maintenance manuals. Materiel system TMs should be closely monitored for any impact that the TPS might have on these TMs.

4–27. Preliminary design review

a. Preliminary design review objectives. The PDR objectives will be conducted to determine if the preliminary TPS design can be developed according to government-furnished test specifications of the target ATE. The following are objectives of the PDR:

(1) Verify that the UUT baseline evaluation is consistent with the TDP provided. All inconsistencies between the UUT and TDP must be resolved by the TPS developer in conjunction with the MATDEV configuration manager prior to the PDR so that a functional baseline can be established.

(2) Verify that the preliminary TPS design will meet the UUT test requirements by performing a UUT/ATE interface evaluation prior to the PDR.

(3) Assess the quality of the test strategy with relationship to the FMECA in detecting and isolating faults. The FMECA identifies the most common failure modes for the UUT. The test strategy will reflect the FMECA by detecting and isolating the most likely faults first, followed by the less likely faults. Through this method, a more effective TPS will be developed.

(4) Evaluate test design for compliance with functional test requirements and summarize any automatic test program generator (ATPG) application.

(5) Approve the documentation identified below as PDR deliverables.

b. Preliminary design review deliverables. Timely response to the delivered items by the MATDEV is vital for the TPS developer to maintain the TPS development schedule. The following items are to be delivered to the MATDEV from the TPS developer according to the TPS SOW:

(1) *Unit under test strategy.* The TSR addresses the specific LRU/SRU attributes and performance requirements, the related TPS requirements, and the necessary ATE/TPS interface.

(2) *Preliminary test program hardware design and self-test strategy.* The TPH self-test strategy must be included whether or not the TPH has a separate self-test TPS.

c. Functional baseline. The functional baseline will be established at the completion of the PDR on those CIs illustrated in figure 4–2. Any changes to this baseline following the PDR will be controlled by the configuration manager as detailed in chapter 4, section VI.

4–28. Critical design review

a. Critical design review objectives. The critical design review (CDR) will be conducted at the completion of the TPS detailed design and TPH design. The objectives of the CDR are as follows:

(1) Verify that the TPS design meets the UUT test requirements.

(2) Ensure the quality of the TP logic reflects the FMECA in detecting and isolating the most likely faults first, followed by the less likely faults.

(3) Ensure the anticipated fault list is a realistic set of UUT failure modes based on the FMECA and engineering development fault insertion log data.

(4) Evaluate the electrical and mechanical design of TPH to ensure effective use of the ATE.

(5) Ensure that CM practices have been followed and all changes to the functional baseline have been incorporated.

(6) Approve the documentation given to the MATDEV from the TPS developer.

b. Critical design review deliverables. Timely response to the delivered items by the MATDEV is vital for the TPS developer to maintain the TPS development schedule. The following items are to be delivered to the MATDEV from the TPS developer according to the TPS SOW:

(1) TP source code (for example, go-chain tests, ATE survey tests, UUT identification, and ID identification).

(2) TPH design, parts list, drawings, and TPS development environment documentation.

(3) ATPG files (for example, modeling and simulation data, net list model, and test pattern files), if applicable.

(4) Fault log of anticipated faults to be inserted by the TPS development engineer during the TPS test and debug phase.

c. Allocated baseline. The allocated baseline will be established at the completion of the CDR. Any changes occurring to this baseline following the CDR will be controlled by the configuration manager as outlined in chapter 4, section VI.

4–29. Test readiness review

a. Test readiness review objectives. The TRR will be conducted at the completion of the TPS development phase prior to the government acceptance of the TPS. The objectives of the TRR are to—

(1) Confirm that the TP adheres to approved test specifications and uses good programming techniques.

(2) Confirm that the TPH schematics adhere to approved test specifications.

(3) Confirm that the TPS documentation reflects the TP and TPH.

(4) Ensure that the proposed fault sample selection list to be used during TPS acceptance is a realistic representation of UUT failure modes as reflected in the FMECA and adequately exercises the TPS fault isolation paths.

(5) Ensure that CM practices have been followed and all changes to the allocated baseline have been incorporated.

b. Test readiness review deliverables. The following items are to be delivered to the MATDEV from the TPS developer according to the TPS SOW:

(1) Engineering logbook containing any relevant information, text, schematics, logic diagrams, and supplementary data necessary for analysis of the TPS and UUT in the event of a problem during the testing process. This log is kept up to date by the TPS developer.

(2) Updated TP source code.

(3) ATPG documentation will include all source files (for example, net list, fault list, pattern file, and environment and rules files), including local library models and simulation listings (for example, net list, model listings, a list of detected and undetected faults, and a list and explanation of all pre-detects and tap files (IEEE 1445–1998)).

(4) Final TPH design, parts list, and drawings.

(5) TPH engineering working models.

(6) The fault log, including all faults inserted during the TPS development process. The fault log will contain all the faults listed on the approved fault list for TPS acceptance.

(7) TPS instructions as defined in DI–ATTS–80285.

(8) UUT probing diagrams, if required.

(9) The proposed fault sample selection list that will be used during TPS acceptance, based on the most likely faults as identified in the FMECA. This list should also specify faults that exercise different sections of the TP, especially long diagnostic chains.

4–30. Acceptance of test program sets

TPS acceptance should be done using the first production model, if available. If production TPH is not available, then the acceptance of a TPS can be performed using the engineering working model TPH. The four parts of the acceptance are—

a. Acceptance test plan. An acceptance test plan must be developed for logical group of TPSs or a single TPS. It must address how TPS acceptance will be implemented, locations where TPS acceptance will take place, general test conditions, the approach to be followed when relevant and non-relevant failures occur, and the approach to be followed for failure recovery and re-submittal procedures.

b. Acceptance test procedure. An acceptance test procedure must be developed for each TPS. At a minimum, it must address how many announced and unannounced faults are to be inserted during acceptance testing and the conditions that constitute passing and failing the acceptance test. This plan must be completed before the FCAs.

c. Configuration audits. Configuration audits will be conducted to verify that the TPS CIs conform to a specified standard or requirement.

(1) FCAs will verify that development of the TPS has been completed satisfactorily and that the CI has achieved the performance and functional characteristics specified in the functional or allocated baseline.

(2) PCA will examine the “as-built” configuration of the TPS for accurate reflection against its technical documentation.

d. Acceptance test reports. An acceptance test report is a full documentation of all actions that occur during the acceptance test. A report should be completed for each attempt to accept a TPS and attested to by all participants and witnesses.

4–31. Product baseline

The product baseline will be established at the completion of the TPS acceptance. Any changes to this baseline following TPS acceptance on those items illustrated in figure 4–2 will be controlled by the configuration manager as delineated in paragraph 4–41*c.*

4–32. Test program set replication

The first production model will be issued a TPS development QA certification as stated in chapter 4, section V. All remaining production models must be issued TPS replication QA certification prior to installation at user sites.

Section VI

Test Program Set Product Assurance and Test

4–33. General

The PA&T program establishes policy, procedures, and guidelines relevant to TPS PA&T. TPSs will be certified by an independent organization prior to fielding.

a. PA&T procedures apply to all phases of the TPS life cycle as illustrated at https://pd-tmde.us.army.mil/. PA&T is the independent organization charged with the responsibility for independent evaluation and assessment of the TPS quality, adequacy, and suitability.

b. The QA process consists of validation and verification (V&V) and certification for release during the initial development and during post deployment support (PDS).

c. Independent V&V is an integral part of the TPS QA duties of PA&T and should be performed concurrently by PA&T personnel witnessing the testing and acceptance of TPSs to conserve resources. The V&V process will be a mandatory requirement in a PA&T program.

4–34. Product assurance test

a. Test program set verification. Verification is the iterative process aimed at determining whether the product of each step in the development cycle fulfills all the requirements levied upon it by the previous step.

b. Test program set validation. Validation is the process of executing the software package to exercise the hardware and of comparing test results to required performance.

c. Test program set development quality assurance certification. This ensures that the TPS conforms to contractual and mission requirements.

d. Test program set replication quality assurance certification. This ensures that the duplication contains the same information as the original.

4–35. Product assurance and test participants

a. Quality assurance directorate. Each QA directorate performs the following:

(1) Establishes and operates a TPS PA&T QA program.

(2) TPS development QA certification.

(3) TPS replication certification.

(4) Establishes and conducts a TPS V&V program.

b. Materiel developer. Each MATDEV will establish and maintain a TPS QA program.

c. Major subordinate command automatic test equipment/test program set center. The ATE/TPS centers will provide TPS engineering support to QA during the execution of the TPS QA program. Support will be provided for both ATE/TPS center organically-developed TPSs and contractor-developed TPSs.

d. U.S. Army Training and Doctrine Command. TRADOC may provide personnel to operate TPSs during the execution of the TPS QA program.

4–36. Test program set verification and validation process

The TPS V&V process begins early in supported system development with the preparation of the requirements for the TPS SOW and continues throughout the TPS life cycle.

a. PA&T QA must monitor, review, and assess TPS CM, design, and modification changes throughout the TPS life cycle in conjunction with the CM, engineering, and other functional areas.

b. PA&T QA processes, relevant to key TPS life cycle tasks shown in figure 4–3, conform to TPS/QA standards and SOW requirements to—

(1) Ensure that the TPS undergoing V&V has been designed to the current baseline TDP of the UUT.

(2) Assure that the QA inputs into the TPS SOW are complete, adequate, and compliant with policy, procedures, and guidelines.

c. PA&T QA must verify and assure that the QA program plan developed by the contractor conforms to—

(1) Verify that the QA program plan includes the contractor's organization, planning, QCs, and testing to be performed on the TPS.

(2) Verify that the plan provides a high level of confidence and that the quality and reliability is inherent in the design.

(3) Verify and assure that the TPS test specifications, acceptance test plan, and acceptance test procedures are adequately documented.

(4) Review TPS deliverables for completeness, adequacy, and compliance with SOW requirements.

(5) Validate prototype TPSs and ensure functional and diagnostic capabilities and conformance to the allocated baseline.

(6) Verify adequacy of any updates to the TPS test specifications, test strategy and associated procedures, and acceptance test plan and procedures.

(7) Ensure that the fault insertion portion of the acceptance test plan is in accordance with an approved sampling plan for TPS fault insertion.

(8) Validate production TPH against the product baseline.

(9) Review the acceptance test report.

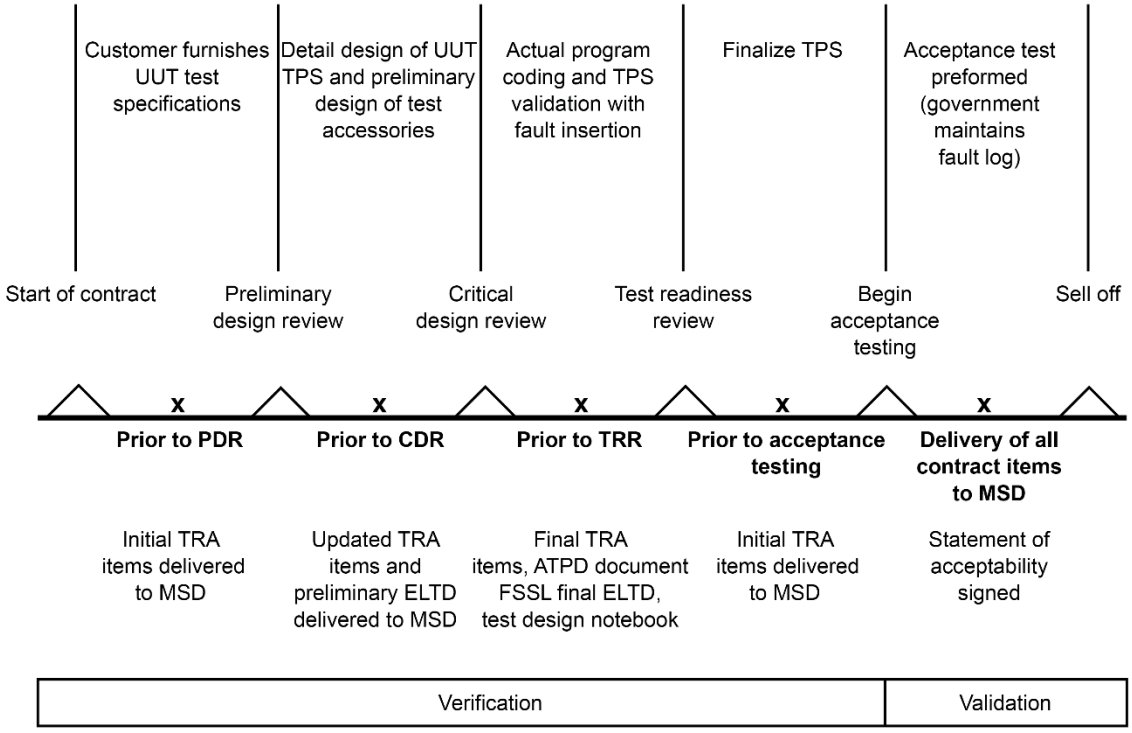

Figure 4–3. Test program set activities, phases, and reviews

4–37. Certification and release

a. Certification. The PA&T QA will certify the TPS against development contract requirements, mission requirements, replication, and duplication requirements.

b. Test program set release. TPS suitability for release issues will be addressed during the materiel release process for the materiel system.

c. Test and evaluation. Test and evaluation performed by Army Test and Evaluation Command will focus upon materiel system support, not on individual TPS performance. Specific TPS certification is a function only of the PA&T activity.

Section VII

Test Program Set Configuration Management

4–38. General

The purpose of this chapter is to explain CM discipline as applied to TPSs and to separate these functions and procedures from those of the materiel system CM organization.

a. Intrinsic to an understanding of this chapter is a clarification of the distinction between the MATDEV's CM organization and the ATE/TPS center's CM organization.

b. The overall responsibility for CM of the entire materiel system, including support of TPSs, rests with the materiel system configuration manager. The materiel system configuration manager assures adequate budgeting and funding for an appropriate TPS CM organization.

c. Any responsibility for the ATE/TPS center CM organization is limited to that delegated by the materiel system configuration manager. The documents describing these responsibilities are the system TPSMP, the TPS SOW, and the TPS CMP.

4–39. Test program set configuration management participants

The substance of TPS CM is the formal application of the CM discipline. This discipline identifies controls, accounts for, and audits the functional and physical characteristics of TPSs throughout their life cycle. Additionally, CM controls in-house special applications programs used to develop TPSs. An illustration of the TPS CM relationships is provided in figure 4–4 and is further described below.

a. The materiel system configuration manager—

(1) Delegates TPS CM to an organization capable of performance.

(2) Ensures that the TPS configuration manager is notified of ECPs.

(3) Provides approval authority over all actions.

b. The ATE/TPS center configuration manager—

(1) Coordinates with the materiel system configuration manager for the following:

(a) Action approval requests.

(b) Action notification.

(c) CM problem alerts.

(d) CM problem solutions.

(2) Coordinates with the TPS development activity for the following:

(a) ECP notification.

(b) Delegation of TPS CM maintenance.

(c) Approval notification.

(d) CM problem alerts.

(3) Coordinates TPS problems identification and solutions with the TPS users.

c. TPS development activity coordinates with the ATE/TPS center configuration manager for—

(1) Action approval requests.

(2) Action notification.

(3) Problem alerts.

(4) Problem solutions.

d. TPS user activities coordinate with the ATE/TPS center configuration manager for—

(1) TPS problem identifications.

(2) TPS solutions.

4–40. Test program set configuration management organization

The ATE/TPS center will ensure that a qualified TPS CM organization commensurate with the magnitude of the TPS workload is in place.

4–41. Test program set configuration baseline system

The system used to manage the configuration of TPSs is the baseline. It is the capturing of the developing TPS at discrete times through identification and control of all the physical and functional aggregates of the TPS composition. These aggregates are defined as control and identification aggregates. A complete description is achieved when all end use functions are satisfied. Electronic Industries Alliance (EIA) 649 defines a baseline as a configuration identification document or as a set of such documents formally

designated and fixed at a specific time during the TPS life cycle, including all approved changes. The baselines used for TPS life cycle management are as follows:

a. Test program set functional baseline. This baseline defines the top-level performance functions that are to be achieved by the TPS, usually being quantified in a TSR. This baseline ensures identifying all the documents that were required to derive the performance functions from chapter 6 and the specific configuration of the UUT. These documents are then controlled after completion of the PDR and officially sanctioned as the functional baseline. Once established, this baseline is under control of the configuration manager.

b. Test program set allocated baseline. This baseline breaks out and defines the detailed TPS design entities of software and hardware. These entities are identified and controlled as computer software CIs and hardware CIs. This baseline ensures that all documents from paragraph 4–25 articulating these CIs are identified and controlled after completion of the CDR. This identification base is officially sanctioned by CM as the allocated baseline.

c. Test program set product baseline. This baseline describes the necessary "build to" requirements for the TPS as identified and defined by the above configuration baselines. The acceptance of this documentation at the PCA, as described in paragraph 4–25, establishes the product baseline. Once established, this baseline cannot be changed except under formal change procedures. Transfer of the management of the TPS to PDS commences at this milestone.

d. Configuration control. The changes to approved TPS baselines are under strict control. Configuration control is defined as the systematic evaluation, coordination, and approval or disapproval of changes after establishing a baseline. The purpose of configuration control is to ensure that a process for implementing the changes agreed to is in effect. During a TPS development effort, this process is defined in the TPS CMP. Throughout the TPS life cycle, the materiel system configuration manager maintains primary responsibility and the right of approval for all CM actions implemented by the ATE/TPS center.

e. General configuration identification. During development of the evolving TPS, a numbering system is used to identify the CIs that comprise the hardware and software configuration. This numbering system is specified in the CMP. Identification becomes more defined as the design matures until eventually a complete description of all CIs is obtained. This numbering system is required by EIA 649 to satisfy CI development, control, and product replication responsibilities for fielding. The numbering system is unique to the development organization. Upon transition to the field, these CIs come under higher commands' positive identification to ensure support for IPS elements. Identify all TPS hardware by part number and all TPS software by a computer program identification number to be assigned by the ATE/TPS center.

f. Test program set configuration status accounting. Configuration status accounting provides a recordkeeping system to track the evolving status of the TPS developing baseline and its changes. Configuration status accounting provides the tracking that managers need to ascertain the implementation status of the baseline at any time. Configuration status accounting is based on the accepted numbering system defined in the approved CMP. These numbers are used by the development organization to satisfy CM development requirements. Upon transition to PDS, status accounting becomes the focal point for accomplishing change implementation.

g. Test program set configuration audits. Compliance with TPS specifications and other contractual requirements will be verified by TPS configuration audits. Each TPS will undergo the following:

(1) *Functional configuration audits.* The FCA will verify that development of the TPS has been completed satisfactorily. FCAs will be conducted on TPSs to ensure that the functional characteristics reflected in baseline documentation are met.

(2) *Physical configuration audits.* The PCA establishes that the "as-built" configuration of the TPS is accurately reflected in the product baseline. The documentation must reflect the approved hardware and software designs.

(3) *Follow-on audits.* Plans for periodic verification of data accuracy will be accomplished by—

(a) CM PCA.

(b) Review and response from recipients through configuration status accounting reports.

(c) CI verification reviews.

h. Post deployment support/repository. Delegation of the fielded or operational phase of the TPS life cycle is illustrated in figure 4–4. CM responsibility for TPS maintenance support is delegated by the materiel system configuration manager by a PDS CMP, a memorandum of understanding, a tasking assignment, or a SOW to or through the ATE/TPS center as required. Upon the formal establishment of the TPS product baseline, the CI masters that represent the TPS are placed into a designated TPS repository. The

physical location of the repository may be different from that of the materiel system configuration manager. The PDS configuration manager is responsible for management and operation of the repository. The CM role during this phase of the TPS life cycle is the maintenance process of the identification, control, accounting for, and auditing of authorized changes to the functional and physical characteristics of the TPS. As approved changes are made to the TPS, the affected baseline must be updated to reflect the current revision level. New software masters must be created and backed up to at least one revision level and high visibility made of the TPS configuration status to the ATE/TPS center.

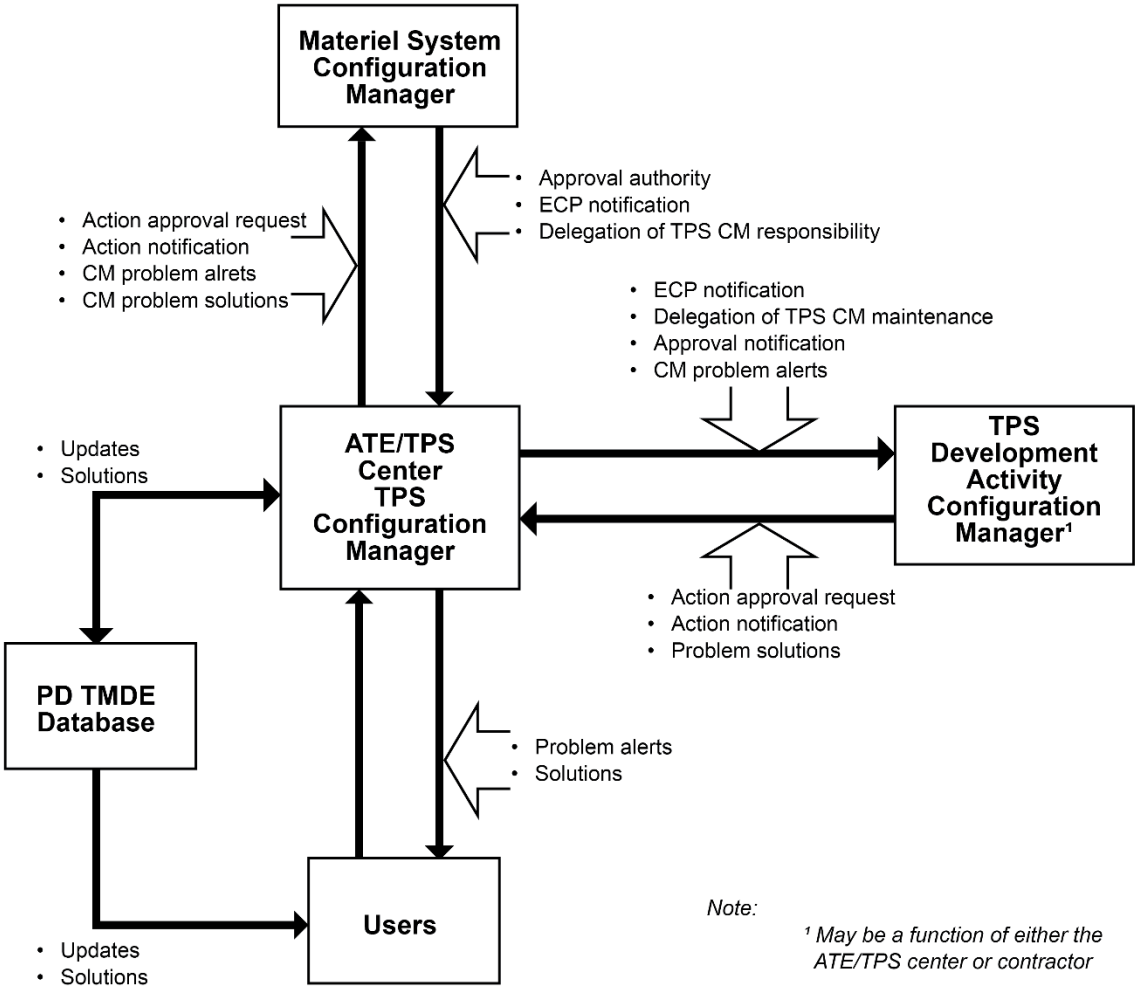

Figure 4–4. Test program set configuration management

4–42. Summary

No single set of CM procedures will meet every need. Because of variations in product requirements, staffing, organizations, and working relationships, CM must be tailored to recognize particular product requirements. However, optimum uniformity throughout a broad spectrum of organizations can be achieved through this pamphlet. CM is a formalization of the methods and techniques used by managers in achieving the project goals of schedule, cost, and performance.

Chapter 5
Integrated Product Support Impact of Test Program Sets

5–1. Document of planning
Planning documents that will contain TPS IPS issues are as follows:

a. Test program set management plan. The TPSMP will present a thorough coverage of the selected TPS IPS strategy and provide early IPS guidance and planning. The TPSMP will identify program acquisition and development management disciplines in addition to the total life cycle support of TPSs.

b. Materiel fielding plan. The MATDEV MFP will contain a TPS annex which will be submitted to the PD TMDE, TRADOC, and AFC S–CDID for coordination.

c. Life cycle sustainment plan. The system LCSP and incorporated LSA process will include TPS requirements in summary form and reference the TPSMP or include the TPSMP as an appendix to the LCSP.

d. Acquisition plan. The acquisition plan will summarize procurement deliverables specified within the TPSMP.

5–2. Accountability
TPSs listed as special tools in the LRU or SRU repair parts and special tool list or DMWR are exempt from separate type classification, in accordance with AR 70–1. TPSs automatically assume the type classification of each system they support. TPS will be accountable at the using unit by property book, in accordance with AR 710–2.

5–3. Supported end system integrated logistics support
a. Materiel fielding plan. The initial fielding of the materiel system will be supported by simultaneous fielding of complete, verified TPSs, or an alternative plan will be addressed. The MFP for the materiel system will describe all elements of system support that are related to non-ATE support and TPS support. The MFP will specifically identify all the TPS user sites, consistent with the materiel system maintenance concept and user mission.

b. Supply support. Execution will be successfully accomplished by budgeting for sufficient initial quantity of SRUs to support the end system in the field concurrently with the TPS. This strategy will be supported using standard Army supply and transportation systems. Item managers must be notified of the scheduled TPS fielding timeframe, so they can adjust the initial supply support quantity and recipients accordingly.

c. Technical manuals. Materiel system technical publications will include removal or replacement of items that will be tested by TPSs. When the TM requires automated testing using a TPS, the appropriate TPS narrative technical publication will provide operator instructions using an ATE display message to the operator. Materiel system technical publications and displayed messages will undergo V&V by target ATE military maintenance operators. In the interest of cost reduction, this function may be performed simultaneously with TPS validation testing.

d. Storage. Storage must be adjusted to account for the following:

(1) Additional LRU and SRU quantities for those LRU/SRU TPSs that provide only end-to-end (functional) testing according to the materiel system maintenance allocation chart.

(2) Bench stock requirements at the user site as determined by SRU diagnostic TPSs.

e. Personnel. Personnel manpower authorization requirements criteria must include work loading of the ATE personnel.

f. Training. Training for maintenance personnel must be accomplished through TRADOC-approved MOS courses.

g. Assistance. Logistics assistance representatives (LARs) will be provided in the field as the AMC LCMC single face to the field.

5–4. Test program set integrated product support
Complete and total IPS will be accomplished according to AR 700–127. The ATE/TPS center will perform or task the required IPS functions to ensure adequate support for TPSs. The following items relate to TPS IPS:

a. Materiel fielding plan test program set annex. The MFP TPS annex, as discussed in detail in chapter 6, must be completed and submitted to the PD TMDE, TRADOC, and AFC S–CDID for coordination.

b. Supply support for test program set. TPS elements will be provisioned according to AR 700–18 based upon appropriate factors. Coordination for TPS distribution will be by the ATE/TPS center.

c. Test program set storage. TPS storage must be adjusted to account for the following:

(1) Materiel system TPS storage requirements.

(2) Allocated materiel system TPS storage space.

d. Test program set support. The TPS maintenance concept will be established through logistic analysis to support initial fielding (for example, operations and maintenance from developing logistics plan in accordance with DI–SESS–82178). A maintenance allocation chart will be prepared. The problem reporting process is detailed in chapter 6. CM procedures are detailed in chapter 4, section VI.

e. Personnel. TPS fielding team personnel and duties are described in chapter 6. Personnel requirements must also include additional quantity of LARs necessary to support the system work loading impact on the LAR's function. LARs will be involved in TPS fielding, TPS problem report preparation, and any additional TPS-related training.

f. Technical manuals. For all maintenance procedures using ATE, the overall system publications will be developed in accordance with MIL–STD–40051–2, unless the maintenance procedure is performed only at depot level, in which case a DMWR will be developed.

5–5. Test program set problem reporting

TPS problem reporting will be accomplished by contacting the NGATS Help Desk (email opats@redstone.army.mil or phone 256–876–6829) or by using SF 368 (Product Quality Deficiency Report (PQDR)) in accordance with DA Pam 750–8 for TPS hardware and software or equivalent reporting method. DA Form 2028 (Recommended Changes to Publications and Blank Forms) will be used for TM problem reporting. An alternate method of problem reporting will be telecom network by the LAR, followed by written report. The problem report will be prepared by the user with the assistance of the LAR. This will aid in distinguishing problem areas. The problem reports will be directed to the appropriate ATE/TPS center.

5–6. Distribution of test program set

The TPSMP will identify total TPS requirements early in the life cycle so that budget, production quantities, and impacted field organizations can be identified early. This also allows system distribution plan changes to be reflected in modified TPS delivery quantities and schedules. Receiving units will be clearly identified in the first draft of the applicable MFP so that the formal mission support plan can reflect receipt of the TPS support mission. Material changes (ECPs) will follow guidance in AR 770–2 and AR 770–3.

Chapter 6
Fielding of Test Program Set and Post Deployment Support

6–1. General

This chapter covers TPS IPS beginning with planning and continuing through life cycle maintenance support. This chapter provides MATDEVs with procedures for TPS planning, fielding, and life cycle support.

6–2. Test program set requirements

TPS requirements must be determined early in the materiel development (materiel solution analysis phase) (see chap 4, section II and https://pd-tmde.us.army.mil/). During this process, they will be identified in the appropriate TM repair parts and special tool list.

6–3. Materiel fielding plan

After the determination has been made that TPSs will be developed in support of a materiel system, the MFP TPS annex will be developed and submitted to TRADOC and the PD TMDE. The TPS annex will consist of the following:

a. TPS documentation requirements, including separate TMs developed in accordance with both MIL–STD–40051 and AR 25–30 for TPS maintenance actions.

b. A description of total TPS development effort by fielding milestone and distribution schedules.

c. Maintenance concept for ID repair.

d. TPS component provisioning procedures (for example, IDs, TMs, spare ID parts, software, and transit cases).

e. Plans for a TPS pre-fielding team to support the MATDEV new equipment training. Pre-fielding identifies all TPS efforts until the materiel system first unit equipped date (FUED).

f. Plans for audit or follow-up for subsequent TPS fielding from the ATE/TPS center repository (without a new equipment training team).

g. TPS storage space requirements and power, load, and quality requirements at ATE/TPS centers and each user site.

h. Procedures identifying push method of fielding initial TPS deployment and TPS change distribution.

i. Plans identifying work loading impact for user sites. Planning by site will include—

(1) Quantity of TPSs to be fielded.

(2) Throughput rate of UUTs to be tested based on projected and actual failure rate data.

(3) TPS execution times.

j. Plans outlining coordination with the PD TMDE for consolidated bench stock list.

6–4. Test program set fielding

TPS fielding is the term used to identify TPS deployment, which occurs at FUED. On occasion, the complete set of TPSs required to provide materiel system support will not be available. This is usually the case when development for major materiel systems dictates a requirement for a large quantity of TPSs. If this condition exists, the definition of "fielding" is broadened to include TPS deployment that will occur after FUED. It is recommended that a TPS materiel fielding team be established.

a. The MATDEV, TPS developer, PD TMDE, and TPS user representative (TRADOC/AFC S–CDID) will determine jointly whether a materiel fielding team will be established.

b. TPS fielding team duties will—

(1) Ensure TPSs to be deployed to user sites are complete.

(2) Obtain a documented go-chain for each TPS to be fielded using golden UUTs at the ATE/TPS center.

(3) Coordinate with the designated LCMC LAR at least 30 days prior to fielding to ascertain the following:

(a) Current status of ATE at user site.

(b) Availability of selected user site personnel.

(c) Current status and availability of special support items (for example, TMDE).

(4) Initiate action to field TPSs to the user site.

(5) Upon arrival at the user site—

(a) Verify the operational and calibration status of the ATE to be used.

(b) Confirm availability of user site personnel.

(6) At the user's site, with the golden UUT—

(a) Obtain documented go-chains of TPSs being deployed.

(b) Compare and analyze TPS go-chains achieved at the ATE/TPS center with go-chains achieved at the user site.

(c) Document and attempt to resolve any discrepancy that precludes a user site go-chain. Resolution of discrepancy will not include revision to the TPS.

(7) Train user personnel to demonstrate competence in the proper use of the TPSs. Training will include user site operators running the TPSs referenced in paragraph 6–4*b*(6)(*a*).

c. A complete record of TPSs deployed to the user site will then be made available to ATE/TPS center for incorporation into their database.

6–5. Test program set problems, errors, and suggested improvement reporting

TPS user sites (ATE support activities using the TPSs) will report TPS problems, errors, and suggested improvements to the ATE/TPS center in accordance with this pamphlet.

6–6. Supply support for test program sets

a. Revised TPSs will be shipped to the field by the ATE/TPS center.

b. TPS stockage requirements will be established in accordance with approved supply model. Due to the inherently low density of TPSs, limited quantities may be stocked.

c. Requisitions will not be processed for the entire TPS except under unusual circumstances (for example, battle loss and equipment fire).

d. Request for individual TPH elements (for example, IDs and cables) and TP media (for example, tapes and disks) will be by national stock number (NSN), otherwise by part number and are available through the ATE/TPS centers.

6–7. User site hotline assistance

The ATE/TPS centers will establish and maintain a user hotline. Contact numbers will be provided at fielding or through the appropriate LCMC LAR.

Chapter 7
Test, Measurement, and Diagnostic Equipment Calibration and Repair Support Program

Section I

Program Objectives and Administration

7–1. Program objectives

Calibration of TMDE requires traceability to the International System of Units (SI). This chapter provides procedural details to ensure Army TMDE assets maintain their required accuracy levels and owning organizations meet TMDE program objectives.

a. Provide TMDE C&RS and ensure that all measurements performed using calibrated TMDE are traceable to national or international standards maintained by the SI.

b. Ensure that TMDE complies with specifications and meet or exceed Army readiness standards (90 percent) for TMDE available for use. TMDE C&RS programs, objectives, concepts, and administrative procedures are outlined within this pamphlet.

(1) On average, 90 percent of items will be in tolerance over the calibration interval, and 81 percent will be in tolerance at the end of the interval.

(2) That 90 percent or above of the TMDE inventory identified in the owner's instrument master record file (IMRF) is available to the user in a calibrated and repaired condition. Items placed in calibrate before use (CBU) status will be subtracted from the owner's IMRF when calculating availability.

(3) The TMDE owner's delinquency rate (failure to submit for required support/calibration) is 2 percent or below. Items placed in CBU and calibration not required (CNR) status will be subtracted from the owner's IMRF when calculating delinquency.

(4) Methods for computing availability and delinquency rates are outlined in figure 7–1.

Availability Rate

$$\%\ \text{available} = 100 - \left[\frac{\text{items in shop + delinquent items}}{\text{total items in IMRF – CBU items}} \right] \times 100$$

Delinquency Rate

$$\%\ \text{delinquent} = \left[\frac{\text{delinquent items}}{\text{total items in IMRF – CBU items}} \right] \times 100$$

Figure 7–1. Methods for computing availability and delinquency rates

7–2. Program administration

a. All ACOMs and support elements with a C&RS mission will—

(1) Provide C&RS for general purpose TMDE and selected SP TMDE as identified in TB 43–180.

(2) Ensure measurements made by calibration activities are traceable to national or international standards maintained by SI.

(3) Provide TMDE owners with a quarterly master listing of all TMDE belonging to the unit, a monthly projection of TMDE scheduled for calibration, a monthly listing of TMDE where the calibration due date has expired and a monthly in-shop status report that indicates the current status of owner TMDE turned in to the C&RS activity.

(4) Perform reconciliation actions on TMDE in repair or evacuation status. For items that have been evacuated for more than 60 days, the supporting activity will contact the performing activity or contractor to determine the status of those items. Owners that have TMDE awaiting repair or TMDE that has been evacuated (awaiting repair parts, in-shop repair, or evacuated to another activity or contractor) over 60 days will be notified of the status of those items. Thereafter, status updates on repair or evacuated items will be provided to the owner at 30-day intervals.

(5) Perform all TMDE management information data reporting requirements as directed by the TMDE C&RS program.

(6) Ensure that the standards for readiness and availability and delinquency are met in accordance with the requirements of this pamphlet.

b. USATA's Program execution entails—

(1) Exercising mission command of all assigned support elements in the execution of the Armywide TMDE support mission. USATA will locate C&RS activities in strategic locations in the continental United States (CONUS) and outside the continental United States (OCONUS) to provide optimum support.

(2) Maintaining and staffing the U.S. Army Primary Standards Laboratory (USAPSL) to provide direct measurement traceability to SI, to fundamental natural phenomena, or to other USATA-approved sources

and to develop appropriate measurement systems and techniques to support new and emerging technologies.

(3) Provide nucleonic, radiation dosimetry, and health physics services, to include—

(a) National Voluntary Laboratory Accreditation Program accredited dosimetry service worldwide and maintenance of a dosimetry records repository.

(b) Radioactive source leak test analysis services, specialized radiation monitoring equipment, and support services and QA program for dosimetry and counting laboratories through radiation, detection, identification, and computation (RADIAC) instrumentation and counting standards traceability to SI.

(c) Radiological TMDE and measurement standards coordination with supporting ACOMs.

(d) Emergency health physics assistance, radiation facility design review, and technical assistance and technical interface while ensuring Nuclear Regulatory Commission compliance.

(4) Control radioactive calibration devices and materiel, personnel safeguards, and all corresponding licenses, authorizations, permits, and related radiation records that apply to TMDE C&RS operations (see AR 385–10).

(5) Maintain technical management and control processes for the TMDE C&RS program.

(6) Establish, manage, and execute the Army TMDE C&RS QA program in coordination with ACOM stakeholders.

(7) Develop, establish, and maintain a central TMDE C&RS data collection and management information system that will provide performance, reliability, maintenance management, and program administration information.

(8) Provide metrology engineering support for calibration standards.

(9) Evaluate the reliability of TMDE through assessment of maintenance data.

(10) Provide information to the TEMOD and CALSETs Joint Working Group concerning TMDE that is no longer supportable.

(11) Provide technical assistance for C&RS standards and equipment and assisting MATDEVs in determining TMDE C&RS requirements.

(12) Monitor technical training requirements for TMDE C&RS and coordinate with TRADOC proponent schools on program training needs.

(13) Coordinate TMDE C&RS requirements with ACOMs, ASCCs, and direct reporting units (DRUs) providing C&RS and with other military Services to identify common requirements.

(14) Upon request, develop and publish TMDE calibration procedures to support the TMDE C&RS program.

c. Execution of the TMDE program by the ACOMs, ASCCs, and DRUs with a TMDE C&RS mission entails—

(1) Exercise command and control of all assigned support elements in the execution of the Armywide TMDE support mission. Commanders will locate C&RS activities in strategic CONUS and OCONUS locations to provide optimum support.

(2) Exercise command and control of assigned COMPO I and COMPO II C&RS activities.

(3) Coordinate TMDE technical issues and requirements for augmentation support with the USATA.

(4) Ensure that standards for availability and delinquency are met in accordance with the requirements of this pamphlet.

(5) Perform all TMDE management information data reporting requirements as directed by the TMDE C&RS program.

Section II

Support Calibration

7–3. Calibration and repair support activities

a. C&RS activity is a generic term used to identify TMDE support organizations providing C&RS. It includes the USAPSL, area calibration laboratories, TMDE support centers, area TMDE support teams in both COMPO I and COMPO II, combined support maintenance shops, theater aviation sustainment maintenance groups, Army Medical Logistics Command, medical maintenance laboratories, and Government-owned, contractor-operated facilities.

b. The Army Calibration Program is comprised of civilian and military organizations that have a mission role for supporting the operating and generating forces, and Organic Industrial Base with C&RS of TMDE assets. The USATA provides the majority of the C&RS across the TMDE enterprise (Operating Force,

Generating Force, and Organic Industrial Base). The military calibration teams also known as the area TMDE support teams, provide C&RS for the operational forces.

(1) The area TMDE support teams are allocated for both Component (COMPO) I and COMPO II formations.

(2) For COMPO II C&RS, the National Guard Bureau resources tables of distribution and allowance authorized calibration teams at the combined support maintenance shop for State-specific C&RS.

c. TMDE owners submit their equipment requiring C&RS to their designated supporting C&RS activities. TMDE requiring C&RS will normally be transported by the TMDE owner to their C&RS activity unless otherwise directed by the C&RS activity. An on-site calibration may be coordinated with the supporting C&RS activity when it is determined TMDE cannot or should not be moved. The supporting C&RS activity is responsible for providing or coordinating the C&RS designated in the TB 43–180 and for notifying the TMDE owner of TMDE awaiting pickup.

d. The C&RS activities will—

(1) Perform preventative maintenance checks and services on organic calibration standards.

(2) Provide C&RS in a fixed or mobile configuration.

(3) Provide C&RS on a first-in, first-out basis unless a higher priority mission dictates an out-of-cycle calibration requirement. Calibration standards may be given a higher priority.

(4) Turn-in standards that have been identified for replacement or modernization. Calibration standards that have been replaced or modernized will be removed from service in accordance with AR 710–2 unless a waiver to retain the item is in place. Army C&RS activities will submit a calibration standards retention waiver request for field grade level approval prior to use after modernization fielding has occurred. The waiver will document the reason the calibration standard needs to be retained and will be approved by the C&RS activity's commander or director. C&RS activities will maintain the waiver locally and will include a copy of the waiver each time the calibration standard is submitted for C&RS. Waivers must be renewed each calibration cycle. TB 43–180 identifies calibration standards that have been replace or modernized.

(5) Identify standards that are unable to be repaired. When TMDE repair parts are no longer available or repair cost would exceed maintenance expenditure limits, the instrument will be condition coded and returned to the TMDE owner for disposition, in accordance with the applicable recoverability codes and AR 710–2.

(6) Publish an external standing operating procedure listing operating hours, turn-in and pickup times, and any local requirements so the using customers are informed of the local C&RS activity process.

(7) Adhere to Army maintenance turnaround time standards as defined in AR 750–1.

7–4. Commercial contract support

Whenever possible, C&RS will be accomplished using Army resources or support agreements with other DoD departments or agencies to optimize the use of existing workload capacity. Commercial contracts may be used to provide C&RS when the required support is not available from the above organizations.

a. Commercial contract support is authorized for specific TMDE by TB 43–180. Support for TMDE not authorized by TB 43–180 will be coordinated with the USATA prior to contract development.

b. Commercial contractors will have measurement capabilities that are suitable for the TMDE being supported. Commercial contractors that are accredited to ISO/IEC 17025 in the required parameters and the OEM are acceptable. The command developing the commercial contract will evaluate and determine the suitability of other commercial contractors prior to contract development.

c. Commercial contractors will have a measurement traceability system in place that is suitable for the TMDE being supported. All commercial contracts for C&RS services will specify that calibration certificates showing measurement traceability are included as part of the contract. The calibration certificates will be reviewed upon return of the equipment to determine if a proper calibration was performed. Commercial contractor calibration certificates and calibration labels will not contain any recommendation on the calibration interval. Incorrectly assigned commercial contractor intervals will be replaced with the correct TB 43–180 or DA Form 3758 (Calibration and Repair Requirements Worksheet) interval.

d. The USATA may be contacted if assistance is needed identifying or determining the suitability of a commercial contactor. Commercial contract support is subject to review by the USATA.

7–5. Customer support and feedback

a. Units with TMDE support issues of any type are encouraged to bring them to the attention of their supporting C&RS activity. In addition to providing C&RS, the supporting C&RS activity is responsible for providing assistance in resolving TMDE support issues and communicating with other support locations when additional assistance is required. The USATA or the CALSETs helpdesk may also be contacted when technical issues cannot be resolved at the supporting C&RS activity.

b. C&RS activities should work closely with AMC logistic assistance officers or TMDE owners to coordinate the resolution of TMDE support issues. Every effort will be made to satisfy the TMDE owner's request for assistance at the local level. If an issue cannot be resolved locally, the supporting C&RS activity will forward the request for assistance up through their chain of command or to the USATA as appropriate.

7–6. Workload workshop

The purpose of the workload workshop (WW) is to ensure calibration support is available during transition to and from missions (deployments or major exercises) and to develop a workload balancing strategy. AMC and USATA will host an annual WW with each area TMDE support team and higher headquarters (support operations and calibration laboratory leadership) to formulate a workload balance in support of garrison operations and other activities associated with the efficient and effective operations of the calibration laboratory. The WW is required to plan workload distribution between the area TMDE support teams and the USATA calibration laboratories while operating in a garrison location and will include formalizing activities and timelines of home station TMDE augmented C&RS during all phases of area TMDE support team deployment.

a. AMC and USATA will host, in coordination with the respective ACOM and ASCC, the WW with each area TMDE support team and higher headquarters to formulate workload balancing and other activities noted below. The WW will be held annually for each Army area TMDE support team. To effectively forecast workload balancing and assist in calibration production, the following personnel are recommended to attend the WW—

(1) Calibration laboratory leadership, including company commander.
(2) Support operations representation.
(3) ACOM and ASCC representation.
(4) Local USATA laboratory leadership.
(5) USATA leadership representation.

b. The WW meeting will be facilitated via face-to-face, video teleconferencing, or telephone conferencing. Coordination for the meeting will be made minimum 60 days prior by USATA with the ACOM or ASCC.

c. The following areas (at a minimum) will be covered during the WW. The meeting is open to further topics of discussion to improve calibration support to using units—

(1) Number of 94Hs authorized and assigned.
(2) Duty positions for those assigned personnel.
(3) Total work orders submitted to laboratory within last 90 days.
(4) Total work orders completed last 90 days.
(5) Work order turn (average) around time for the last 90 days.
(6) Expected production for the next 90 days.

7–7. Pre and post deployment calibration support

The area TMDE support teams are resourced for a battlefield mission of area C&RS that is capable of accommodating the requirements of an Army division. As stipulated in ATP 4–33, augmented TMDE C&RS for home station customers will be provided by a geographically collocated USATA TMDE Support Center. Pre-deployment timelines are based on ready to load date (RLD). Post deployment timelines will be based on equipment arrival date (EAD).

a. Area TMDE support teams will adhere to the following pre deployment practices and timelines:

(1) RLD minus 120 days: Plan and evacuate support maintenance company CALSET items that may become delinquent prior to deployment +180.

(2) RLD minus 210 days: Coordinate with USATA TMDE support center leaders to establish pre and post deployment back up support plan. Disseminate notification plans to supported units.

(3) RLD minus 90 days: Finalize customer jobs. Strategically monitor and restrict the number of jobs and evacuations to avoid untimely returns to customer.

(4) RLD minus 45 days: Transition customer accounts to USATA TMDE support center. Return any incomplete job orders to TMDE owners.

b. USATA TMDE support center will adhere to the following pre deployment practices and timelines:

(1) Area TMDE support team RLD minus 210 days: Coordinate with area TMDE support team leaders to establish pre and post deployment backup support milestones.

(2) Area TMDE support team RLD minus 45 days: Facilitate the transfer of area TMDE support team customer accounts. Begin accepting TMDE for support from customers.

c. Area TMDE support teams will adhere to the following post deployment practices and timelines:

(1) EAD minus 30 days: Coordinate with USATA TMDE support center leaders to validate post deployment workload shift. Disseminate projected shift dates to supported customers.

(2) EAD plus 30 days: Plan and evacuate support maintenance company CALSET items that may become delinquent within the next 90 days.

(3) EAD plus 45 days: Reassume customer accounts from USATA TMDE support center to support maintenance company. Resume support to home station customers.

d. USATA TMDE support centers will adhere to the following post deployment practices at area TMDE support team CALSET EAD plus 60 days:

(1) Transition TMDE customer accounts from USATA TMDE support centers to area TMDE support team.

(2) Complete any open job orders and coordinate with the owning units to pick up completed work orders.

(3) Equipment and space permitting, provide workspace for area TMDE support team Soldiers to perform their C&RS mission during TMDE support center regular work hours should their CALSET equipment scheduled return date be greater than 30 days from redeployment.

7–8. Measurement traceability

The Army TMDE program is comprised of multiple measurement traceability levels (MTLs) that ensure all U.S. Army TMDE receive measurement results that are metrologically traceable to national standards of measurement (SI units) through an unbroken chain of calibrations. The number of calibration steps required to reach the SI units establishes the links in the traceability chain and determine the designated MTL. The National Institute of Standards and Technology (NIST) is considered the highest MTL and has the responsibility to maintain the SI units used in the United States. MTL should not be confused with U.S. Army standard maintenance levels and access to any of the following MTL may be accomplished by submitting a field-level transaction to the TB 43–180 designated C&RS activity. The Army TMDE program also includes various laboratory types which are established worldwide.

a. Calibration hierarchy. TMDE measurement traceability is ensured through the use of MTLs and C&RS laboratory types. The USATA reviews all TMDE to identify the proper MTLs, laboratory types, configuration types, and locations required to adequately maintain TMDE.

(1) *Measurement traceability levels.* National and intrinsic standards maintained by NIST provide the highest accuracy and highest level MTL available in the United States. The U.S. Army provides four distinct levels below NIST. TMDE is categorized in TB 43–180 by the number of MTLs between the test instrument and NIST.

(a) Primary measurement traceability level. C&RS that is performed using calibration standards that were verified directly to the SI units or calibrated by NIST or intrinsic standards. This is considered one MTL below the NIST. The USAPSL is the provider of the majority of Primary (P) MTL calibration of TMDE items documented within TB 43–180.

(b) Secondary measurement traceability level. C&RS that is performed using calibration standards that were calibrated at or have accuracy traceable to the Primary MTL. This is considered two MTLs below NIST.

(c) Transfer measurement traceability level. C&RS that is performed using calibration standards that were calibrated at or have accuracy traceable to the Secondary (S) MTL. This is considered three MTLs below NIST.

(d) Field measurement traceability level. The support of these items varies and obtaining support is the responsibility of the TMDE owner. These items have special C&RS requirements that are not provided

under the P, S, or transfer (T) levels. TMDE C&RS is normally provided by field units, TMDE owners, or vendors. Measurement traceability to the SI units for these items is required.

(2) *Calibration and repair support laboratory types.* TMDE items documented within TB 43–180 receive a type designation that helps identify the type of C&RS laboratory that can provide the required C&RS based on its calibration standards configuration. These types are identified as—

(a) Type 1 is the USAPSL. The USAPSL primarily performs Primary (P) MTL C&RS. This facility is a civilian capability.

(b) Type 2 calibration facilities are generally called area calibration labs and primarily provide Secondary (S) MTL C&RS to several TMDE support centers and area TMDE support teams. They are strategically employed through CONUS and OCONUS. These facilities are a civilian capability.

(c) Type 3 locations primarily perform Transfer (T) MTL C&RS which is the largest workload among the laboratory types. These facilities apply to civilian TMDE support centers and military area TMDE support teams (COMPO I and II), combined support maintenance shops, and theater aviation support maintenance groups.

(d) Type 4 laboratory types are designated to provide C&RS capabilities for the Army's small arms and ammunition gauges.

(e) Type 5 Army Medical Logistics Command, SP-medical TMDE laboratories provide T MTL C&RS for only TMDE designated as SP-medical in TB 43–180.

(f) Type 6 TMDE items are items that cannot be supported by organic Army C&RS resources. This type outsources C&RS to a vendor and still requires field (F) MTL C&RS. Vendors include the OEM, third-party commercial calibration facilities, and government calibration facilities not operated by the U.S. Army.

(g) Type 7 TMDE owner calibration is for TMDE that does not require service from a specialized calibration facility and can be performed by the equipment owners or their local maintenance units providing field (F) MTL. The servicing of this equipment should still be coordinated with the TMDE owner's supporting C&RS activity.

(3) *Individual locations.* Single locations may also be identified by TB 43–180 as capable of providing support beyond their normal type designated capabilities. This authorization is established through the submission of a request for authorization to calibrate. The request for authorization to calibrate process in covered in TB 43–180.

b. International Organization for Standards compliance and accreditation.

(1) *International Organization for Standards compliance.* C&RS activity customers certified to ISO 9001 or a similar quality management system may require documentation that their supporting C&RS activity's measurement traceability was evaluated and is compliant with ISO requirements. USATA QA inspections include an ISO measurement traceability compliance evaluation to assist the locations that require it. Documentation of this evaluation and its result are provided to the C&RS activity in the QA audit report. The USATA can provide additional assistance demonstrating compliance when required.

(2) *ISO/IEC 17025 accreditation.* The U.S. Army has a number of ISO/IEC 17025 accredited calibration activities which may be used if an accredited calibration is required. A listing of these accredited locations may be found in the TB 43–180 or by contacting the USATA.

7–9. Calibration and repair support procedural requirements

Obtaining C&RS for TMDE requires the owning organization to follow appropriate procedures to identify and document the requested support which include the following:

a. Identification of test, measurement, and diagnostic equipment requiring calibration and repair support. The TMDE owner will ensure that their supporting organization is continuously provided accurate, complete, and up-to-date information on their TMDE. When any of the following occur, the TMDE owner must identify such to the supporting C&RS activity: activation, inactivation, or relocation of the units; receipt of new types or additional quantities of TMDE; or turn-in or placement of TMDE in storage; and when errors are detected on any listing provided by the C&RS activity.

(1) The TMDE owner will coordinate new TMDE with their supporting C&RS activity. All organizations with TMDE not enrolled in the TB 43–180 are responsible to submit DA Form 3758 to the USATA.

(2) TMDE calibration requirements will be established when TMDE accuracy must be maintained and when an out-of-tolerance condition could adversely affect system operations, product evaluation, end item performance, or safety.

(3) TB 43–180 will be used by all units, organizations, installations, activities, and commands, to include schools and training centers, ARNG, and U.S. Army Reserve units that are responsible for the maintenance of materiel for determining TMDE C&RS requirements.

b. Submitting test, measurement, and diagnostic equipment for calibration and repair support.

(1) U.S. Army activities will use DA Form 1687 (Notice of Delegation of Authority - Receipt for Supplies) to identify personnel authorized to exchange TMDE between the C&RS activity and the equipment owner. C&RS activities may accept a memorandum as a substitute for DA Form 1687 for non-U.S. Army activities and contractors. C&RS activities will not accept or return TMDE to personnel not identified on the applicable DA Form 1687 or memorandum. DA Form 1687 instructions are documented in AR 710–4. TMDE support guidelines for DA Form 1687 signatories are available from USATA or the local supporting C&RS activity. The supporting C&RS activity will provide access to the current guidelines when DA Form 1687 is submitted.

(2) TMDE requiring C&RS will be submitted to the supporting C&RS activity in accordance with the calibration recall schedule and TB 43–180 on or before the calibration void date listed on DA Label 80 (U.S. Army Calibrated Instrument) or DA Label 163 (U.S. Army Limited or Special Calibration). Each commander is responsible for submission of their TMDE prior to the calibration expiration date list on the unit's IMRF.

(3) The TMDE owner will perform field maintenance on their TMDE in accordance with the maintenance allocation chart and designated maintenance manual prior to submitting to their C&RS activity (see AR 750–1).

(4) The TMDE owner is responsible for the delivery and pickup of TMDE. TMDE that is too heavy, bulky, or sensitive to be transported will be serviced on site as agreed upon between the TMDE owner and the supporting C&RS activity. TMDE must be transported in a manner that provides protection from inclement weather, vibration, and shock. It must be complete with all unique or SP adapters, cables, and accessory items required by the C&RS organization to accomplish the calibration or repair.

(5) Upon request, TMDE owners will provide maintenance or manufacturer manuals. If the maintenance or manufacture manuals are not available, the C&RS activity will coordinate with the USATA for technical assistance.

c. Instruments not listed in TB 43–180.

(1) When an instrument not listed in TB 43–180 is identified as requiring C&RS, DA Form 3758 will be generated and submitted to the USATA. Once DA Form 3758 is submitted, the TMDE owner may either—

(a) Wait for the DA Form 3758 to be processed before adding the item to the IMRF. C&RS activities may provide C&RS on the instrument once the DA Form 3758 has been approved by the USATA identifying a suitable technique, MTL, laboratory type, and calibration interval.

(b) Request that the item be added to the IMRF immediately if it has a current vendor calibration certificate. Once added to the IMRF, the instrument may be used with the vendor calibration until the DA Form 3758 is fully processed and the item is added to the TB 43–180. Items added to the IMRF prior to receiving DA Form 3758 approval will receive default codes of field (F) MTL, "Vendor" (calibration procedure), and the OEM recommended calibration interval. The DA Form 3758 submission number should also be included in the entry. The item will be updated to the TB 43–180 requirements at the next scheduled calibration.

(2) DA Form 3758 is submitted to USATA using the DA Form 3758 submission application on the USATA external web page at https://tmdehome.redstone.army.mil/. DA Form 3758 submissions for new equipment will include copies of the item's technical or manufacturer manual, current calibration certificate (if available), MATDEV-assigned NSN, build of material NSN and component part/cage number when NSN is not available or point of contact of purchasing agent if bought by an organization commercially off-the-shelf, and other relevant support documents. DA Form 3758 is also used to provide support change recommendations to previously identified calibration requirements listed in TB 43–180. Guidance for completing and submitting DA Form 3758 is provided in TB 43–180.

d. Unsupported test, measurement, and diagnostic equipment. Unsupported TMDE is equipment that is no longer maintained by U.S. Army C&RS activities. During interval analysis and the TMDE life cycle, management review items may reach a point where it is no longer feasible or practical to continue providing support. In these cases, TMDE models may be designated as "not supported" in the TB 43–180 by the U.S. Army's C&RS program. Individual pieces of TMDE may also be removed from service when justified and in accordance with the following:

(1) *Determination.* TMDE models may be deemed unsupported for—

(a) Obsolescence—removed from service due to age or supportability issues (calibration standard or accessory availability, and parts availability). “Not supported” is used for all items placed on the Army G3 master divestiture list. TMDE support equipment that is divested without replacement can be found in CALSETs CMTool in the document repository in disposition instructions. This equipment will also become not supported by the Army C&RS program.

(b) Interval analysis—removed from service because of poor reliability demonstrated by calibration failure rate.

(c) Replaced—a newer version has been fielded and the item is no longer needed or authorized. TEMOD publishes dispositions for TMDE displaced from the PIL in TB 11–6625–3263–25. This equipment also becomes not supported by the Army C&RS program.

(d) Availability—there are no assets identified as still being supported in the field (see TMDE Integrated Materiel Management System (TIMMS) records).

(e) Individual poor performing TMDE may be removed by the C&RS activity for—

1. Repeated failed calibrations documented in calibration data templates (CDTs).
2. Excessive repair cost (see maintenance expenditure limits).
3. TMDE owner’s request.

(2) *Documentation.*

(a) In most instances, TMDE models that are deemed unsupported will initially be identified as “not supported” in TB 43–180. This TMDE entry may eventually be removed from the TB 43–180 after a reasonable amount of time has elapsed.

(b) Advance notification of TMDE in the process of being removed from active support may be given in the TB 43–180. Example: “This item will no longer be supported after 1 Jan 20XX.” Items designated for removal will be reviewed and approved by the USATA to ensure TMDE is not part of equipment sets and the reasoning for removal is valid. Appeals for reconsideration of equipment designated for “not supported” status may be sent to the USATA with justification for keeping the TMDE actively supported.

(c) The TMDE owner’s supporting C&RS activity, PD TMDE, or the USATA may be contacted for assistance in identifying suitable replacement equipment.

(3) *Handling.* Unsupported TMDE received by a C&RS activity will be condition coded and returned to the submitting unit for turn-in.

(4) *Exceptions.*

(a) Support for items marked as “not supported” may be performed for individual customers on a limited basis. This equipment may be supported under unique circumstances, such as—

1. Item is still required to meet foreign military sales contracts.
2. Item is part of a system and cannot be replaced due to software or cost issues.
3. New equipment has been ordered and an item is temporarily needed until the replacement is received.
4. Support will be limited to a specific system code.

(b) In these instances, the TMDE owner must submit written justification why calibration or repair for a “not supported” item is needed. Additionally—

1. These items may be identified in TIMMS, but C&RS activities are not authorized to purchase resources to support them. If they cannot be supported with assets on hand, they will be designated as F/Vendor.
2. Calibration intervals will be based on the TMDE owners documented request and will not be reviewed as part of the interval analysis program.
3. Calibration procedures will be designated by the submitter and will not be updated or maintained by USATA or the C&RS activity.
4. The supporting C&RS activity will maintain the TMDE owner’s documented request that includes the support justification, calibration interval, calibration procedure, expected support timeframe, and any other pertinent information.

e. Visual inspections.

(1) A visual inspection will be performed on all TMDE that is received from calibration activities not located in the same building. A visual inspection may also be performed if physical damage is suspected (item dropped or nearby lightning strike or power surge).

(2) The visual inspection will ensure all labels and forms have been annotated properly. Visual inspections will also be sufficient to assure that no internal parts came loose or physical damage occurred during transportation which could impair the operation of the TMDE or degrade its measurement capabilities.

When a visual inspection indicates that damage may have occurred, an operational test will be performed to determine if performance has been compromised.

(3) Visual inspections can be documented in TIMMS or may alternately be noted in a logbook, on the back of the DA Form 7372 (TMDE Calibration and Repair Data), or through another archiving method. DA Form 7372 is available at https://armypubs.army.mil/. As a minimum, data will include the date of the visual inspection, condition of the TMDE, and person performing the inspection. When damage is observed, a short explanation of the damage, suspected cause, and corrective action taken will also be recorded. These records will be retained for a minimum of 2 years or the length of the calibration interval, whichever is longer.

f. Handling of calibration equipment.

(1) *Receiving.* TMDE received for calibration will be inspected to ensure the model number and serial number are correctly annotated. This inspection will also document any accessories accompanying the item and record any visible damage. A receipt will be provided to the customer acknowledging the item was accepted by the C&RS activity. TMDE will be entered into TIMMS upon receipt.

(2) *Equipment status.* C&RS activities will ensure the current status of TMDE received for C&RS support is identifiable using DA Form 7372 or similar method until it is returned to the customer. Changes in instrument status will be recorded.

(3) *Safeguarding equipment.* TMDE received by the C&RS activity will be kept in a secure environment to prevent damage, tampering, loss, or environmental deterioration until it is returned to the customer.

g. Test, measurement, and diagnostic equipment reports. C&RS activities will ensure TIMMS files remain current. This data is used to create TMDE reports. TMDE owners will review the generated reports and report any errors to their supporting C&RS activity.

7–10. Calibration and repair support recall system

Calibration and repair support priorities. Under normal operating conditions, TMDE C&RS will be provided on a cyclic basis using an automatic recall system. Extenuating circumstances may preclude C&RS from being provided to all units as scheduled and may necessitate providing support on a priority basis for a unit or mission essential TMDE.

7–11. Calibration interval

The C&RS requirements for Army TMDE is identified in TB 43–180. TB 43–180 provides MTLs, laboratory types, approved calibration procedures, calibration intervals, and any special requirements needed to ensure measurement traceability and TMDE reliability. Instruments requiring calibration will be calibrated at regularly prescribed intervals.

a. The calibration interval specified in TB 43–180 is the maximum amount of time an instrument may be used before recalibration is required. Instruments will not be used beyond the calibration void date identified on DA Label 80 or DA Label 163; however, deviation from the calibration void date may be permissible under the following conditions:

(1) Calibration of an instrument may be requested by the TMDE owner any time the user wants to break up due dates to ensure continuous availability, suspects the TMDE is not functioning properly, or suspects an out-of-calibration condition.

(2) The TMDE owner may request, in writing, an extension beyond the calibration void date for a limited period of time (a maximum of 10 percent of the established interval) under certain specific conditions (for example, an item being used on an in-process test.) The TMDE owner will submit a request for the deviation, in writing, to the supporting C&RS activity. All TMDE used in areas for personnel safety will not be allowed deviation from prescribed calibration intervals.

(3) U.S. Army Reserve and ARNG assigned TMDE specified in TB 43–180 as requiring calibration at intervals less than 1 year may be extended to a 1-year interval if the TMDE is used solely during weekends and annual training periods and is identified in writing to the scheduling C&RS activity. This extended interval authority does not apply to TMDE used in support of aircraft, watercraft, and safety of operations. Overprint DA Label 80 and DA Label 163 affixed to TMDE with extended intervals with “EI” as specified in TB 43–180.

(4) The TMDE owner may request a permanent interval change based on their organization’s unique requirements. If a shorter calibration interval than that listed in the TB 43–180 is needed, a memorandum will be submitted to the C&RS activity, maintained on file by the C&RS activity, and take effect

immediately. If a request for a longer interval is needed, DA Form 3758 will be submitted and approved prior to the extended interval taking effect. A longer interval request will not be approved if the longer interval could affect the safety of Army personnel or potentially damage other equipment. The TMDE owner's commander or director assumes the risk that items with longer calibration intervals may not maintain their stated accuracy for the full extended calibration cycle.

b. Calibration intervals will be established and changed by USATA in coordination with the responsible MATDEV or materiel manager. Calibration intervals for instruments not listed in TB 43–180 will be established by reviewing similar items listed in TB 43–180, manufacturer's recommendations, sound engineering judgment, or statistical analysis. The calibration intervals provided in the TB 43–180 are periodically reviewed and updated based on calibration result data submitted through TIMMS. Changes to intervals will be generated based on analysis of TMDE calibration performance reliability data. USATA will establish a program to review TMDE performance reliability. Based on the results of the review and coordination with the MATDEV, USATA will adjust calibration intervals to achieve the established TMDE reliability goals as identified in paragraph 7–1.

7–12. Test, measurement, and diagnostic equipment calibration and repair support publications

Equipment publications will be provided for each instrument introduced into the Army inventory. Specific considerations toward TMDE maintenance and calibration procedural publications include TMDE owners' applicable paper or digital TMs and TBs with TMDE calibration procedures. TMDE owners will include applicable paper or digital TMs when submitting TMDE for repair if requested by the C&RS activity. Calibration procedures for TMDE will be developed using a TB format and prepared as stated in MIL–PRF–38793C.

a. Approved calibration procedures. Approved calibration procedures refer to published documents or software that identify the technical specifications of an instrument to be calibrated, the required calibration standards needed to perform the calibration, and the detailed technique to be used to perform the calibration. These include procedures developed by the DoD (U.S. Army, U.S. Navy, and U.S. Air Force), NIST, other Government or commercial agencies, and manufacturers. Approved calibration procedures have been validated by the USATA and are identified in TB 43–180. Procedures not listed in TB 43–180 may be used once they have been reviewed by USATA through the submission of DA Form 3758. Commercial service manuals may be used for C&RS if TMs are not available. Manufacturer specifications will be applied during the use of inter-Service TMs (for example, Technical Order, Naval Air Systems Command).

b. Approved revisions.

(1) TBs. The current revision of calibration TBs will be used and are available in the Publications-Master List/Integrated Calibration Environment or Test Equipment Management Information System (TEMIS) TB 43–180 Query located on the USATA home page. The calibrator will also check the Publications-Master List on the USATA home page for validated DA Form 2028. The validated DA Form 2028 will be used in conjunction with the approved calibration TB until the change is incorporated into a revised TB.

(2) Non-TB procedures. The latest revision of other approved calibration procedures should be used. A link to these procedures is frequently available in the TEMIS TB 43–180 Query located on the USATA home page. Contact USATA if additional assistance is required obtaining approved calibration procedures.

(3) Calibration procedure changes. To ensure calibration procedures and their associated documents remain current and accurate, update requests should be submitted whenever opportunities for improvement or required corrections are found. Change requests may be submitted in one of three manners—

(a) Method one is the use of DA Form 2028. Proposed updates for calibration TB are submitted using the DA Form 2028 process. The specific process is documented in the TB being changed.

(b) Method two is the use of a publication change request. Calibration data certificates, USATA calibration procedures, and integrated calibration environment procedures may have update requests submitted using the publication change request option on the USATA home page. This option can be found on the USATA home page under Publications Publication Change Request.

(c) Method three applies to non-U.S. Army documents. Changes to documents not controlled by the U.S. Army (U.S. Navy, U.S. Air Force, or manufacturer) should use the appropriate update process called out in the applicable document.

(4) Locally developed calibration procedures. C&RS activities will coordinate with USATA in specific circumstances. One circumstance is when TMDE is identified as requiring calibration support and an acceptable calibration procedure cannot be located, the TMDE has a limited distribution, and developing a

calibration procedure is more efficient than sending the TMDE to a vendor. Another circumstance is when the C&RS activity has a unique calibration standard that requires calibration usage instructions not covered by other authorized calibration procedures. In these cases, the C&RS activity may develop a local calibration procedure to provide support. Once drafted, the local calibration procedure will be submitted to USATA on DA Form 3758 for validation and approval. The C&RS activity may start using the local calibration procedure to provide support after USATA approval has been received. USATA or organization level standard operating procedures can provide guidance in the preparation of locally developed calibration procedures.

(5) The Government Industry Data Exchange Program may be used as a source for locating potential calibration procedures. The Government Industry Data Exchange Program can be accessed at https://www.gidep.org/.

(6) The United States Navy Metrology and Calibration Program may also be used as a source for locating potential calibration procedures. The United States Navy Metrology and Calibration Program can be accessed at https://www.navsea.navy.mil/Home/Warfare-Centers/NSWC-Corona/.

(7) TMDE owner submitted calibration procedures. TMDE owners with unique TMDE support requirements may request that their TMDE be supported using calibration procedures that they have developed. Submitters are responsible for developing, validating, revising, and ensuring these procedures meet their requirements. Support will be provided by the C&RS activities using the calibration standards and accessories that are currently available. The requesting organization is responsible for providing any additional calibration standards or accessories that are needed to support their unique requirements. These support requests will be documented through the submission of DA Form 3758 or in an inter-Service support agreement. Contact the USATA if additional assistance is required.

c. Use International System of Units. Per AR 25–30 and NIST policies, SI units will be used in all publications and reports. To maintain uniformity and standardization with NIST and U.S. Army publications, C&RS activity personnel will use SI units in manuscripts, technical reports, and reports of measurement whenever possible. For licensed radiation sources and detection equipment, conventional units may be used in accordance with Nuclear Regulatory Commission guidance, followed by SI units in parentheses when possible.

d. National Institute of Standards and Technology Special Publication 811. NIST Special Publication 811 provides a reference and guide for the use of SI units. This publication defines acceptable SI units and identifies exceptions to the use of SI units when it may not be feasible. The publication is available on the NIST website at https://www.nist.gov/ or by contacting the USATA.

7–13. Calibration labels, forms, certificates, and templates

DA Label 80, DA Label 163, and DA Form 2417 (U.S. Army Calibration System Rejected Instrument) will be used by all activities providing C&RS. These labels and forms allow the C&RS activity and equipment user to readily identify the item's calibration status and calibration expiration date and is available at https://armypubs.army.mil/. Preparation, use, and overprinting instructions for these labels and forms are provided in TB 43–180.

a. DA Label 80. DA Label 80 indicates that the calibration performed on an instrument was sufficient to verify the item's full specifications and the item may be used to its manufacturer stated capabilities without limitation. If the item was not fully calibrated or the TB 43–180 authorized calibration procedure imposed a limitation, a DA Label 163 will be applied.

b. DA Label 163. DA Labels 163 are used for limited calibrations to identify and report to the owner how the TMDE was supported. Examples of limited calibration scenarios are—

(1) Limited calibrations may be directed by the authorized calibration procedure if the authorized calibration procedure does not check all parameters, ranges, or functions. The authorized calibration procedure will state the basis for the limited calibration. In TB and USATA developed calibration procedures, this will be indicated in "Table 1" or in the "Final Procedure" paragraph.

(2) Equipment owners may request a limited calibration if select parameter or ranges are not employed when used in support of its intended maintenance mission. The owner will specify the desired requirements to the C&RS activity. DA label 163 will be applied with the limitations that were requested by the owner.

(3) With the TMDE owner's approval, TMDE may receive a limited calibration if the performing C&RS activity does not have the capabilities to provide a full calibration. The performing C&RS activity may also provide a temporary limited calibration if an item requires deferred maintenance in certain ranges or

parameters but is otherwise still usable. The C&RS activity can establish general limitations to calibration of general purpose equipment within their external operating procedure as long as such limitations are made explicitly clear in advance. An example may be limited calibration of a high-density multimeter for temperature unless specifically requested.

(4) Unless directed by the approved calibration procedure, calibration standards may only receive a limited calibration when a range or parameter is not available or not needed. Limited calibrations will not be used to downgrade specifications when a calibration standard fails to meet the tolerances specified in the authorized calibration procedure. Calibration standard ranges or parameters must either meet the authorized calibration procedure tolerances or not be used.

c. Special calibrations. Equipment owners may request for an item to be calibrated to specific values, settings, or more stringent specifications than normally covered in the approved calibration procedure. If the owner requests for a range or parameter to be calibrated to a more stringent specification than indicated in the approved calibration procedure, the equipment owner assumes the risk that the item may not maintain the stated accuracy for the full TB 43–180 designated calibration cycle.

d. DA Form 2417 (U.S. Army Calibration System Rejected Instrument). DA Form 2417 is used to identify an instrument which is unserviceable and is turned in for repair, is awaiting repair or repair parts, or an accessory used in the calibration process is found to be unserviceable during a calibration. The use of DA Form 2417 does not eliminate the requirement for the servicing C&RS activity to complete condition coding paperwork.

e. Overprinting DA Label 80 and DA Label 163. Overprinting of DA Label 80 and DA Label 163 may be performed by the supporting C&RS activity or the TMDE owner. Overprinting may be accomplished with a rubber stamp or by hand printing. When using a rubber stamp, approximately 12 millimeter (1/2 inch) letters with a thin outline overprint is recommended. The information behind the overprint must remain legible. Overprinting is authorized in accordance with the guidance provided in TB 43–180.

f. Affixing of DA Label 80, DA Label 163, and DA Form 2417.

(1) DA calibration labels and forms will be legible. DA calibration labels and forms that have been damaged or have become illegible will be replaced. The information documented in TB 43–180 is mandatory but additional information may be added, provided it does not obscure or contradict the mandatory information.

(2) Army C&RS elements receiving TMDE recently calibrated at commercial contractor, U.S. Air Force, U.S. Marine Corp, U.S. Navy, or other government agency facilities will apply DA Label 80 or DA Label 163. The DA Label 80 or DA Label 163 will be affixed next to the calibrating agency's label and reflect the interval indicated in the TB 43–180 or DA Form 3758. The TB 43–180 authorized calibration interval will be the interval entered into TIMMS and is the interval used for recall purposes.

(3) The appropriate label or form will be affixed to the front of the instrument whenever size permits. If it cannot be affixed to the front of the instrument, place it in as visible and conspicuous a place as possible. When the size of an instrument prevents affixing the label to it, one of the following methods may be used. The label may be affixed to a blank tag and tied to the instrument. Instruments such as gage block sets, micrometers, and weight sets may have the label affixed to the outside of the item's container (case). When the label cannot be affixed to an instrument in accordance with the above, a card or book file will be maintained with the labels affixed to the cards or pages. This file will be maintained in the immediate area where the instruments are used.

(4) Previously affixed labels will be removed when a new label is affixed.

g. DA Form 7372. DA Form 7372 will be used as the official document for recording TMDE C&RS actions and signatures. When required, DA Form 7372 will be supplemented with a calibration certificate. All calibration standards used during the calibration (this includes all calibration standards identified in the TB 43–180) will be recorded on DA Form 7372 and its accompanying calibration certificate. The use of other documents or electronic means to identify or record TMDE C&RS actions does not eliminate the requirement for completing DA Form 7372. Responsibilities, instructions, and guidance for DA Form 7372 are provided TB 43–180.

h. Calibration data templates and calibration certificates. Calibration measurement data generated during the performance of Army TB calibration procedures will be recorded and retained for equipment stability and reliability analysis. CDTs are designed to record calibration data and are kept at the C&RS activity. If the equipment owner requires the data generated during calibration, then a calibration certificate should also be generated.

(1) CDTs are being created as part of the calibration TB revision process. If the current revision of the TB paragraph 6 does not include a statement to collect CDT data or a CDT is not available for the model in question, then no data collection is required at this time. Contact the USATA if a CDT is required but not yet available.

(2) CDTs are specific to TMDE model numbers and are collocated in the applicable calibration TB folder. Their use instructions are—

(a) Obtain the appropriate CDT from the calibration TB folder.

(b) Follow guidance provided in the CDT "Instructions" tab for recording data.

(c) Save completed CDT.

(d) Provide archived CDT data for equipment reliability analysis when requested. CDT data may also be referenced during subsequent calibrations to determine TMDE stability and drift.

(3) Automated calibration TB procedures are being designed to record calibration measurement data and generate a CDT upon completion. If the current automated calibration TB procedures do not have a CDT option, then saving the calibration data file will be sufficient to meet the recording and retention requirements. The calibration measurement data generated from approved alternate automated procedures (for example, Met-Cal) will be retained but is not required to be transferred to a CDT.

(4) There is currently no requirement to record non-TB calibration procedure measurement data unless it is specifically required by the calibration procedure or requested by the customer.

i. Calibration certificates. Calibration certificates are created to supplement DA Form 7372 by providing additional information to the TMDE owners. They may be created for any calibration but are required when requested by the customer, when mandated by the applicable calibration procedure and when calibration standards are received with a parameter in an out-of-tolerance condition. Depending on the TMDE owner's requirements, a calibration certificate may report all the data generated during calibration or may be simplified by only reporting data from parameters that were received in an out-of-tolerance condition. As a minimum, copies of the current and two previous calibration certificates will be maintained by the calibrating facility.

(1) To aid in the calibration certificate creation process, CDTs have been developed with the option to generate a calibration certificate. Guidance for creating a calibration certificate using the CDT are covered in the CDT's "Instructions" tab.

(2) A calibration certificate cover sheet is available for items not covered by a CDT is available from USATA or may be created locally. To create a calibration certificate, complete a calibration certificate cover sheet and attach it to the applicable calibration data.

(3) Contact USATA if additional assistance is needed developing calibration certificates.

7–14. Calibration and repair support laboratories and teams

a. Facilities.

(1) *U.S. Army Primary Standards Laboratory.* The USAPSL is the principal laboratory for developing and maintaining appropriate metrology and calibration capabilities in support of current and future weapon systems. The USAPSL provides the highest MTL (P-Level) of C&RS services within the Army. It is dedicated to advancing state of the art metrology in this unique mission area and to ensuring effective management of the related technical programs, to include support to the radiation safety community by providing program specific services, such as Armywide personnel dosimetry support and personnel radiation exposure database archive records update and maintenance. As part of this highly technical support mission, the USAPSL—

(a) Provides the most accurate source of physical, mechanical, electrical, electromagnetic, and radiation measurements and standards with direct traceability to legal U.S. measurement standards at NIST, to standards demonstrated to be traceable to the SI, to fundamental natural phenomena, or to standards maintained at the U.S. Naval Observatory.

(b) Provides expert calibration and technical support for Army laboratories, field units, DoD, and other Federal agencies. The USAPSL represents the Army in tri-Service metrology research and development and assigns professional scientists and engineers to participate on the subcommittees of the Joint Technical Coordination Group for Calibration and Measurement Technology and the associated Tri-Service Calibration Coordination Group.

(c) Provides scientists and engineering subject matter experts to serve on the National Conference of Standards Laboratories International executive committees and other DA, DoD, and national technical

committees and provides liaison between the Army and NIST and other measurement technology developers.

(2) *Radiation Standards Laboratory and U.S. Army Dosimetry Center.* As major organizational elements of the USAPSL, the USAPSL manages and operates the nucleonic, radiation dosimetry, and health physics programs as central components of the health physics and radiation metrology support mission. The mission encompasses—

(a) Planning, directing, controlling, training, and performing basic research development and engineering efforts related to radiation measurement standards, health physics, and techniques required to provide adequate personnel dosimetry, calibration, and radioactive waste or nuclear contamination spectrum analysis.

(b) Providing special measurement services for the assigned parameters of the electromagnetic spectrum, from far infrared wavelengths through gamma radiation, to advance the metrology state of the art in this unique mission area and to ensure effective management of the related technical programs.

(c) Managing a support program that provides special nuclear services to various governmental agencies, such as Federal Emergency Management Agency and the White House Military Office pursuant to an appropriate interagency agreement.

(d) Providing a centralized radiological control program and Radioactive Material Control Point for the USATA.

(e) Support the collection of unwanted radioactive sources at OCONUS locations and the worldwide RADIAC C&RS Program and providing technical support and policy guidance relative to these programs. This includes providing a facility for temporary storage of low-level radioactive waste until disposal by Joint Munitions Command.

(3) *Area calibration laboratories and small arms and ammunition gage facilities.* These are strategically located to provide calibration support to multiple facilities in a geographic region.

(4) *Area test, measurement, and diagnostic equipment support teams and test, measurement, and diagnostic equipment support centers provide transfer (T–Level) calibration and repair support.* These teams are generally the first C&RS activity that a field customer encounters. Area TMDE support teams are outfitted with COMPO I and COMPO II personnel and TMDE support centers are outfitted with civilian personnel. Both can operate independently and are located throughout CONUS or OCONUS locations to provide area TMDE support. The area TMDE support team is the principal C&RS activity during wartime operations. Civilian TMDE support centers provide augmentation support for all TMDE C&RS.

b. Environmental requirements.

(1) Facility and environmental conditions will be suitable for the calibrations being performed. TB 43–180 and approved calibration procedures take into account TMDE's stated environmental requirements to determine support capability.

(2) Unless otherwise designated by the approved calibration procedure, the environmental requirements stated in figure 7–2 are acceptable for C&RS provided in type 2, 3, and 4 facilities.

(3) Calibrations performed outside a permanent calibration facility will take into account the effects and adequacy of the local environment.

c. Environmental monitoring.

(1) C&RS activities will monitor and record the local temperature and humidity conditions to ensure the environment remains adequately controlled.

(2) C&RS activity operations will be suspended when the environmental conditions fall outside the regulatory guidance. The C&RS activity chief or their designee will review the out-of-tolerance condition and may allow limited calibration operations to resume in parameters the out-of-tolerance condition does not adversely impact. The out-of-tolerance condition and subsequent actions will be documented in either an environmental logbook or electronic file. The following information will be recorded:

(a) When the out-of-tolerance condition occurred.

(b) If applicable, the authorizing official and the operations that were allowed to continue during the out-of-tolerance condition.

(c) When the laboratory returned to normal operation.

(d) Any relevant notes.

(3) Environmental records will be retained for a minimum of 2 years.

(4) Environmental monitors are not required to be documented on the DA Form 7372/calibration certificate or in TIMMS as a calibration standard used during C&RS actions.

Labratory Type	Field	Temperature (ºC)		Relative Humidity %
		Set Point and Limits	Maximum Rate of Change (ºC/hour)	
2/4	Mechanical/ Dimensional	20ºC ± 2ºC	1.0	20% - 50%
	Electric/ Electronic	23ºC ± 2ºC	1.5	20% - 60%
	Other	The environmental conditions for other fields of measurements should be developed and assessed with respect to appropriate influencing factors.		
3	General	Range of 18º —28º with perferred setpoint of 23ºC	2.2	20% - 70%

Figure 7–2. Environmental requirements

7–15. Quality assurance and inspection program

The QA and inspection program will consist of the following items.

a. End item verification inspection. An end item verification inspection encompasses the inspection of an item of TMDE that has completed the calibration or repair process. On a quarterly basis, every individual performing a calibration and affixing DA Label 80 or DA Label 163 to an item of TMDE will have at least one end item verification inspection performed by their supervisor or a designated inspector. These inspections evaluate technical competence, ensure product quality, identify support deficiencies, and help determine potential training opportunities. Areas evaluated during an inspection include the end item's performance, calibration technique, documentation accuracy, and safety factors. The corrective actions taken when errors are found in the provided calibration procedure or other support documents are also evaluated. End items may be selected randomly or be based upon the following criteria:

(1) Criticality of end item application.
(2) Frequency of end item use.
(3) Complexity and relative difficulty of calibration or repair.
(4) Failure experience.
(5) Personnel experience and reliability.

b. Intermediate checks. A description of intermediate checks and guidance for their performance is outlined in TB 9–4931–537–24. Intermediate checks will be performed on all calibration standards designated by the TB.

c. Technical measurement audits. Technical measurement audits evaluate C&RS activity technical proficiency. This is accomplished by having a C&RS activity and the USAPSL calibrate the same piece of

TMDE and then comparing the readings to evaluate the C&RS activity's results. Facilities authorized to perform Secondary MTL C&RS will receive technical measurement audits annually or when a potential problem area is suspected. Other locations may also receive periodic technical measurement audits.

d. Internal quality assurance audits. An internal QA audit is a self-assessment of a site's compliance to ARs documented in the current QA audit checklist. This checklist is available on the USATA home page under Calibration Support, Quality Assurance. Each active C&RS activity will conduct at least one internal audit each calendar year (1 January to 31 December). The results of this internal audit will be kept locally and be provided to the USATA QA Office or higher command upon request.

e. U.S. Army Test, Measurement, and Diagnostic Equipment Activity quality assurance inspections.

(1) *U.S. Army Test, Measurement, and Diagnostic Equipment Activity quality assurance inspections overview.* At a minimum, formal inspections will be conducted at 24–month intervals and may include a review of the TMDE management program with the TMDE support coordinators of the supported commands, installations, or activities and an assessment of customer satisfaction. A more frequent inspection interval will be established for those military area TMDE support teams with tour assignments less than 24 months, such as in Korea. All inspected activities will be notified through formal memoranda at least 30 days prior to the inspection. The QA inspection will be in accordance with the checklist located on the USATA home page under the Calibration Support tab. All findings, including those areas requiring corrective action, will be documented in a QA inspection report. A QA Council consisting of representatives from USATA, area TMDE support team, ARNG, and the inspected activity will review the QA inspection report, the corrective actions taken, and all required supporting documentation. Any unresolved issues pertaining to the inspection may be presented to the QA Council for discussion. At the conclusion of the QA Council review, all activities will receive an inspection rating of either—

(a) Proficient. The activity did not have any deficiencies or has successfully resolved any deficiencies that were identified and is deemed competent to continue providing calibration support.

(b) Re-inspection required. Those support activities demonstrating a significant number of findings may require a re-inspection in no sooner than 90 days. Activities exhibiting a general lack of program discipline or inadequate quality practices may be placed on a 12-month inspection cycle. After the site demonstrates a proficiency to maintain calibration operations, it will be returned to the normal inspection cycle. Any unresolved issues will be presented to USATA for resolution.

(2) *Quality assurance inspection process.*

(a) Functional areas. Inspected activities will be evaluated in multiple functional areas, including management, operations, safety, facilities, technical competence, and if applicable RADIAC. Each finding found in the functional area will be classified as either—

1. *Observation.* An informational finding that may document positive areas of performance or areas of concern that do not warrant a deficiency. Observations do not require a response.

2. *Deficiency—minor.* A random error or other minor finding that may or may not require a documented corrective action response.

3. *Deficiency—major.* Systemic issues, compromised traceability, repeat findings, safety issues, or other major finding that requires a documented corrective action response.

(b) Corrective actions. Deficiencies will require corrective actions to eliminate the problem area. Corrective actions are broken into two categories—

1. *Correction verified.* Minor deficiencies that have been corrected and verified by the QA inspection team during the inspection. For a deficiency to be marked correction verified, the deficiency must be corrected and action implemented to prevent its recurrence prior to the QA inspection team's departure.

2. *Resolution required.* All major deficiencies and minor deficiencies that cannot be corrected during the inspection or require additional action to ensure they do not recur. The activity must formally respond through the appropriate command channels and provide objective evidence of the actions taken to correct the problem and prevent its recurrence. Resolution required corrective actions will be reviewed during the QA Council.

(3) *Quality assurance inspection report handling process.*

(a) A draft QA inspection report will be provided to the commander or chief of the activity upon completion of the QA inspection prior to departing the site. Any noted deficiency will reference the regulation and paragraph that is not in compliance.

(b) A formal QA inspection report will be provided to the inspected activity within 30 days of the audit completion. Additionally, the results of all inspections will be provided to the Army Inspector General's Office. Reports pertaining to area TMDE support teams will be provided to the appropriate brigade

headquarters; those pertaining to the ARNG will also be provided to the Chief, National Guard Bureau; and reports pertaining to Government-owned, contractor-operated C&RS operations will also be provided to the contracting officer's representative and appropriate senior commander.

(c) The inspected activity is given 45 days from the date on the formal QA inspection report in which to reply.

(4) *Quality assurance inspection team support.*

(a) The commander or chief of the activity scheduled to be inspected or their next higher headquarters should ensure—

1. All leave and temporary duty are kept to a minimum for the duration of the inspection.
2. A sufficient number of recently calibrated end items are available for end item verification inspection of all personnel performing calibrations.
3. The calibration section supervisor or their representative should be available for the entrance and exit briefing by the QA inspection team.

(b) The following items are required to be on hand for use by the QA inspection team:

1. The activity's organizational chart and mission statements, along with all records and documentation that are required for inspection on the QA audit checklist. This checklist is available on the USATA home page under Calibration Support, Quality Assurance.
2. All applicable regulations, technical publications, and local standing operating procedures.
3. A copy of the latest IMRF and the current in-shop status list saved as a file in Excel format.
4. Access to restricted areas when necessary.
5. A room with sufficient table or desk space for the inspection team to work and discuss matters in private.

(5) *Maintenance of records.* All inspected documentation, to include formal records of QA inspections and end item inspections, will be retained for the period between the USATA QA inspections.

7–16. Calibration standard failure

a. Calibration standard failures and other non-conforming events. Calibration standards that fail calibration, intermediate checks, or visual inspection and other events which could create doubt in the validity of previously performed calibrations will require an equipment recall evaluation.

(1) Visual inspection failures may require repetition of the C&RS process. A function test or intermediate check will be performed as applicable to determine if the affected item requires recalibration. If the affected item has not been placed into service, an equipment recall evaluation is not required.

(2) A failed intermediate check will require further C&RS activity action in accordance with TB 9–4931–537–24. If the failed intermediate check occurred after the affected item was placed into service, an equipment recall evaluation will be performed.

(3) Standards found out-of-tolerance during calibration will have an equipment recall evaluation performed. If a standard is found out-of-tolerance during calibration by an outside activity, the activity performing the calibration will inform the owning C&RS activity of the out-of-tolerance condition.

(4) Any event which creates doubt in the validity of a C&RS activity's previous performed calibrations will have an equipment recall evaluation performed.

b. Equipment recall evaluation. If a C&RS activity calibration process is suspected of being compromised, a process review will be performed immediately to determine if a non-conformance exists and if any previously calibrated TMDE has been negatively affected. Examples of issues that could create non-conforming calibrations are environmental conditions exceeding established limits, calibration procedure errors causing incorrectly aligned TMDE, and TMDE calibrated with a C&RS activity calibration standard found to be in an out-of-tolerance condition. If the non-conforming condition is confirmed and deemed sufficient to have adversely impacted calibrated TMDE, the TMDE owners will be notified of the non-conformance and given the option to have their affected TMDE recalibrated. This equipment recall evaluation will be documented on a memorandum for record and retained until after the C&RS activity's next QA inspection.

(1) *Calibration and repair support activity calibration standards.* C&RS activity calibration standards suspected of being out-of-tolerance or operating improperly will immediately be submitted for calibration. If the out-of-tolerance condition is confirmed, the owning C&RS activity will perform an equipment recall evaluation to determine its extent and impact.

(a) C&RS activity calibration standards found significantly out-of-tolerance will require further review to determine if a TMDE recall is required. Significantly out-of-tolerance is considered any reading that

exceeds the allowable tolerance by an additional 10 percent, but at the C&RS activity's discretion can include any out-of-tolerance reading.

(b) The TMDE calibrated with the significantly out-of-tolerance C&RS activity calibration standard will be identified in accordance with paragraph 7–14*a*. Standard utilization reports are available on the USATA home page to aid in identifying affected TMDE. Contact the USATA if additional assistance is required.

(c) The equipment recall evaluation will determine if the C&RS activity calibration standard's out-of-tolerance parameter was sufficient to compromise the accuracy of any of the readings taken during the calibration of the TMDE identified in the previous paragraph. In most instances, a calibration will be considered compromised in any case where the C&RS activity calibration standard's accuracy became less than four times greater than the TMDE being calibrated. The calibrated TMDE and C&RS activity calibration standards required accuracy is normally designated at the beginning of the authorized calibration procedure. In U.S. Army TB calibration procedures, this can be found in "Table 1" and "Table 2."

(d) The C&RS activity will initiate a recall by contacting the TMDE owners of TMDE that was compromised by the out-of-tolerance condition. The TMDE owners will review the parameters and extent of the out-of-tolerance condition to determine its impact on their operations. Any compromised TMDE that adversely affects the TMDE owner's operation will be submitted for recalibration. The TMDE owner will notify the C&RS activity in writing if they determine their operations were not affected and their TMDE does not require recalibration.

(2) *Calibration procedures.* If a calibration procedure caused an incorrect alignment or false pass or fail conditions, the TMDE calibrated with the faulty procedure will be recalled and recalibrated with the corrected procedure. Calibration procedure corrections requiring a TMDE recall will be accompanied by a memorandum from the USATA documenting the fault and the corrective actions to be taken. Routine calibration procedure updates and minor grammatical corrections do not require a TMDE recall.

(3) *Other non-conforming events.* The C&RS activity will perform an evaluation on the suspected non-conforming event. If it is determined that calibrations were compromised, then a corrective action plan will be implemented to alleviate the problem area and determine if any TMDE needs to be recalled and recalibrated. Contact the USATA if assistance is required.

7–17. Test, measurement, and diagnostic equipment technical assistance program

The USATA home page is a centralized location for a significant amount of U.S. Army metrology documentation. This website contains an online TB 43–180, calibration procedures, special advisories, other relevant program enterprise essentials, and a SharePoint containing multiple checklists, forms, special advisories, and other documents. Access to this website is available at https://usata.redstone.army.mil. An access request is required to use this website. Access requests may be submitted by going to https://tmdehome.redstone.army.mil/ and selecting the "Intranet Login Request" option.

7–18. Calibration and repair support logistics information system

Maintenance man-hour reporting. Each activity providing TMDE C&RS will report man-hours per AR 750–1 and AR 570–4. Man-hour reporting for C&RS will include line item number, NSNs, and commercial off-the-shelf equipment when appropriate. Direct C&RS data will be available using the TEMIS. Indirect and non-productive maintenance hours will be documented in Global Combat Support System–Army by COMPO I and COMPO II C&RS activities.

7–19. Test, Measurement, and Diagnostic Equipment Integrated Materiel Management System

a. Test, Measurement, and Diagnostic Equipment Integrated Materiel Management System. TIMMS is the U.S. Army database for identifying TMDE for recall, providing customer notification of equipment readiness, processing equipment through the C&RS shops, accounting for customer equipment while in the shop, identifying repair parts and associated cost, and documenting historical calibration data. Each C&RS activity providing TMDE C&RS will establish and maintain an IMRF that includes all supported TMDE. The TMDE owners will ensure that their TMDE is identified in the IMRF and that any changes to their TMDE assets are reported to their C&RS activity. When applicable, the C&RS activity will assist TMDE owners with modified table of organization and equipment or tables of distribution and allowances TMDE enrollment analysis. A TMDE owner may be supported by more than one C&RS activity that reports C&RS data under a performing unit identification code (UIC) but will have only one designated C&RS activity that reports data under a scheduling UIC. It is noted that the scheduling UIC may also be

the performing UIC. The scheduling C&RS activity will not delete any operational TMDE without the written consent of the TMDE owner.

b. Instrument master record file. An IMRF is a complete listing of the TMDE a unit owns. Each C&RS activity providing C&RS will establish and maintain an IMRF for their supported units in TIMMS. Field and sustainment units performing TMDE C&RS will maintain an IMRF through the scheduling C&RS activity. Field and sustainment units will notify the supporting C&RS activity whenever an IMRF change or update is required. DA Form 7372 will be used as the basic source document for establishing and updating records in the IMRF. The IMRF includes instruments that require C&RS, those that are in administrative storage (CBU), and those that are designated CNR.

c. Review interval. TMDE identified in TIMMS that does not have a cyclic interval will be reviewed by the owning UIC periodically to ensure that the equipment is still functional or the reason for the non-cyclic action is still relevant. The owner of TMDE in a CNR, CBU, or training aid status will be contacted by the scheduling UIC every 3 years for a status update. The owning UIC will request an update to the TIMMS records at this time and records that are no longer needed will be removed.

7–20. Army pre-positioned stock/at rest

At rest status applies to TMDE placed in storage as part of the Army pre-positioned stock (APS) program. At rest TMDE will receive a full calibration prior to being placed into storage, use the at rest calibration interval, and have an at rest overprinted DA Label 80. When at rest TMDE is activated, it will be submitted to a C&RS activity for a calibration review prior to issue. The supporting C&RS activity will use the following process to activate at rest TMDE:

a. Note the date calibrated in block 1 of the at rest overprinted DA Label.

b. Reference TB 43–180 to determine the item's current calibration interval using the USA system code.

c. Apply the current USA system code calibration interval to the date calibrated on the AR overprinted DA Label 80 to determine the calibration void date.

(1) If the calibration void date is prior to the current date, the item will have a routine calibration performed. Upon completion of the calibration, the AR overprinted DA Label 80 will be removed and a new DA Label 80 will be affixed.

(2) If the calibration void date is beyond the current date, the item will not require a new calibration. Remove the AR overprinted DA Label 80 and affix a new DA Label 80 reflecting the calibration void date based on the USA interval. Print "APS" in block 4 Name/Report No. Transfer the data from the AR overprinted DA Label 80 to the new DA Label 80 for the remaining blocks.

d. Update TIMMS by changing the system code to "USA," entering the current "USA" calibration interval code, and entering the newly established calibration void date.

Appendix A

References

Section I

Required Publications

AR 25–30
Army Publishing Program (Cited in the title page.)

AR 70–1
Army Operation of the Adaptive Acquisition Framework (Cited in para 1–3.)

AR 700–127
Integrated Product Support (Cited in para 1–3.)

AR 750–1
Army Materiel Maintenance Policy (Cited in para 1–3.)

AR 750–43
Army Test, Measurement, and Diagnostic Equipment (Cited in para 1–3.)

DA Pam 750–8
The Army Maintenance Management System (TAMMS) Users Manual (Cited in para 5–5.)

Section II

Prescribed Forms

DA Form 4062
TMDE Acquisition Approval Analysis Data (Prescribed in para 2–3*a*.)

Appendix B

Test Program Set Management Plan Format Guidance

B–1. Role of test program set management plan

The TPS management plan is the central document for planning the budgeting, acquisition, development, deployment, and life cycle support of TPSs. This appendix identifies important life cycle planning factors and describes management guidelines to ensure that these factors are adequately considered during the materiel system acquisition process and are documented in the TPSMP. See paragraph B–4 for an outline of the minimum requirements of a TPSMP.

B–2. Participants

The MATDEV is the key player for the preparation, content, and submission of the TPSMP. The PD TMDE and capability developer will assist in the preparation of TPSMPs and all updates and revisions as required. Contributing organizations, including the LCMC PA&T, IPS, CM, technical training, publications organizations, test integration working group, TPS user activities, and TPS developers, will provide inputs to the TPSMP.

B–3. Test program set management plan format

a. General description.
b. Program management and funding.
c. Acquisition management.
d. Development management.
e. PA&T management.
f. CM.
g. IPS management.

B–4. Test program set management plan outline

a. Section 1 of the TPSMP, General Description, provides an overview of the materiel system, its overall TPS requirements, and the relationship of the TPSs to the system BIT/BITE. Section 1 addresses the following in the initial submission of the TPSMP (Milestone A of the materiel system life cycle) and updates with each succeeding submission as required.

(1) Provide a general description of the materiel system and any pertinent background information.

(2) Provide an overview of the materiel system maintenance requirements of the TPSs, including an associated testability concept, and the relationship thereto of the system BIT/BITE.

(3) List all applicable documents as referenced throughout the TPSMP, including an approved testability management plan.

b. Section 2 of the TPSMP, Program Management and Funding, specifies the organizations and the personnel requirements of those organizations involved in the management of the TPS acquisition. Section 2 also identifies the funding required for the life cycle acquisition and support of the required TPSs. Address identification of the MATDEV and the ATE/TPS center with overall management responsibility for the integration of TPSs in the initial submission of the TPSMP (Milestone A of the materiel system life cycle). Address the following prior to entering the EMD phase of the materiel system (Milestone B):

(1) Identify the funding requirement for acquisition of required UUTs, technical data, TSRs, test specifications, and so forth for the timely development of TPSs.

(2) Overall funding requirements, sources of funds, and availability of funds will be indicated in the format of table B–1.

Table B–1
Format of test program set funding requirements

Program	FY	FY+1	FY+2	FY+3	FY+4
RDT&E funded	1.0M	1.0M	0.0M	0.0M	0.0M
Unfunded	1.0M	1.0M	0.0M	0.0M	0.0M

Table B–1
Format of test program set funding requirements—Continued

OPA funded	0.0M	0.0M	1.0M	1.0M	0.0M
Unfunded	0.0M	0.0M	1.0M	1.0M	0.0M
OMA funded	0.0M	0.0M	0.0M	1.0M	1.0M
Unfunded	0.0M	0.0M	0.0M	1.0M	1.0M

(1) Plans for cost modeling, audits, IPS, design for testability studies, testing, and so forth to determine which TPSs and ATE (such as standard ATE, augmented standard ATE, and nonstandard ATE) are required. Waivers for nonstandard ATE are to be addressed in accordance with AR 750–43.

(2) Plans and justification for acquisition of required resources (for example, test software, ATE, and ATPG) necessary for TPS development, deployment, and PDS.

(3) Breakout of projected ATE and TPS costs will be provided in the form of a first-level TPS WBS. The type of funds should also be identified for each of the WBS elements.

c. Section 3 of the TPSMP, TPS Acquisition Management, identifies the TPS acquisition strategy, the risks involved, and the trade-offs to be considered. If additional TPs are identified later in a program, this section will be updated and resubmitted within 60 days. Address the following prior to entering the EMD phase of the materiel system life cycle (Milestone B).

(1) A complete list of UUTs for which TPSs are to be developed will be submitted. Documentation will also be submitted to demonstrate that this selection has been based upon the results of IPS studies, economic analysis, feasibility studies, experience, and participating activity inputs. Included in this documentation will be the results of trade-offs between BIT/BITE and TPSs and the results of any design for testability studies.

(2) If nonstandard ATE or augmented standard ATE has been selected, then documentation will be submitted to identify the standardization and commonality considerations used in determining which ATE and TP languages will be used. Deviations from the PD TMDE ATE policy must be approved according to that policy. If nonstandard ATE is to be used, then this fact must be clearly identified. If a waiver for nonstandard ATE has been requested or approved, then a copy of the waiver should be attached to the TPSMP. Included will be a detailed justification and a life cycle impact statement for use of other than standard development concepts, tools, and specifications. Also included will be an evaluation of the impact of anticipated changes to the ATE capabilities and ATE system software.

(3) A master schedule of major milestones, key events, and any critical actions essential to timely development of TPSs in relation to the total system acquisition schedule will be submitted.

(4) Acquisition and support requirements of TPS software, TPS hardware, TPS documentation, and TPS software tools (ATPGs) to be used for TPS development will be identified.

(5) An evaluation of the impact on existing ATE workload at the locations where the TPSs are to be fielded will be documented.

d. Section 4 of the TPSMP, TPS Development Management, addresses and documents the TPS developer's approach for the development of TPS software, hardware, and documentation. Address the following prior to entering the EMD phase of the materiel system life cycle (Milestone B).

(1) Identify the source of TPS development (prime contractor, TPS contractor, or organic TPS developer). In addition, identify the type of contract to be used (that is, fixed price, cost plus, and so forth) and state whether the contract method is to be competitive or sole source.

(2) Identify the estimated resources (such as manpower, management personnel, hardware, software, and so forth) necessary for the TPS developer to support the development and testing of the TPSs.

(3) Complete and submit the following items within 60 days of the selection of the TPS developer:

(a) Identify the organizational structure of the TPS developer and indicate the responsibilities of the groups developing, designing, and producing TPSs. This is to include, at a minimum, TPH design, TPH testability, TPH fabrication, TPH production, software development, drafting, and TPS checkout.

(b) Further, identify the TPS developer's QA organization and the methodology used by the TPS developer's QA to ensure satisfactory design and testing, and ensure that all performance and design requirements have been implemented by the TPS developer during design reviews.

(c) Also include within the organizational structure the identification of the TPS developer's CM organization. It will address the management, technical controls, and methodology used by the TPS developer's CM. This is to ensure configuration identification, control, and status accounting functions have been implemented by the TPS developer and provided in their CMP. The plan will include identification of security controls and requirements for both classified and unclassified work.

(4) Provide a development schedule for each TPS CI indicating when the various reviews and audits will occur. Include a list and description of the deliverables required for each review or audit.

(5) Identify the methods for reporting TPS development activities as follows:

(a) The approach the TPS developer will use for reporting the status of TPS development at the various reviews (for example, PDR, CDR, and TRR) and audits (PCA and FCA).

(b) The approach the TPS developer will use for monitoring and reporting the status of TPS development to the Materiel Systems Directorate at the in-process reviews.

(c) The methodology that the TPS developer will use for ensuring satisfactory design and testing during development and design reviews.

(d) The procedure the TPS developer will use for reporting changes to the ATE/TPS center on CI after the establishment of the TPS functional baseline.

(6) Identify guidelines and requirements to ensure future TPS maintainability.

(a) TP topics will include modularity, readability, simplicity, and self-explanation.

(b) TPH topics will include ease of ID modification, simplicity, use of standard parts, expandability, and standard ID design. The greatest number of unique IDs will be specifically addressed.

(c) TPS documentation and TPS technical data to be received from the TPS developer will be identified in the product baseline. Also identified will be the organizations that will review or use the documentation.

(7) Identify the training requirements and associated equipment necessary for the deployment phase.

e. Section 5 of the TPSMP, TPS PA&T Management, addresses the management of the government product and QA of TPSs throughout the TPS life cycle. Paragraphs B–4*f*(1) through B–4*f*(4) will be addressed prior to entering the EMD phase of the materiel system life cycle (Milestone B).

(1) Document the identification of the organizations or activities responsible for independent TPS verification. Verification is the iterative process aimed at determining whether the product of each step in the development cycle fulfills all the requirements levied upon it by the previous step. Additionally, identify the methodology and process used for TPS verification at each of the various design reviews and audits (for example, PDR, CDR, TRR, FCA, and PCA). Include the procedures for documenting and resolving program errors and deficiencies discovered during reviews and audits.

(2) Document the identification of the organizations or activities responsible for TPS validation. Validation is the process of executing the software package to exercise the hardware and of comparing test results with required performance. Additionally, identify the methodology and process used for TPS validation. Include the procedures for documenting and resolving program errors and deficiencies discovered during validation testing.

(3) Identify the TPS production QC procedures and methods used for TPS replication certification.

(4) Identify the procedures used to verify, validate, and release any TPS modifications after the TPS product baseline has been established.

f. Section 6 of the TPSMP, TPS CM, addresses the government CM procedures necessary to identify, establish, and control the TPS baselines. This phase starts with the TPS functional baseline and continues through the allocated baseline, product baseline, and PDS. Paragraphs B–4*f*(1) through B–4*f*(9) will be addressed prior to entering the EMD phase of the materiel system life cycle (Milestone B).

(1) Identify the organization (materiel system CM) with primary responsibility for the CM of the materiel system prior to materiel system transition.

(2) Identify the organization (materiel system CM) of primary responsibility for the CM of the materiel system after materiel system transition.

(3) Identify the ATE/TPS center (CM controller) that is the primary interface between the configuration manager and the TPS developer or user activity.

(4) Identify the procedures for disseminating UUT modifications or updates that occur after the TPS functional baseline goes to the TPS configuration manager for TPS impact.

(5) Identify the CM responsibilities at each of the various reviews and audits (for example, PDR, CDR, TRR, FCA, and PCA).

(6) Explain approval and disapproval procedures of TPS impact recommendations that are reported by the TPS configuration manager.

(7) Explain procedures for distributing pertinent UUT information that affect the TPS to the TPS developer prior to product baseline.

(8) Explain methods to ensure that all UUT modifications or updates impacting the TPS have been incorporated by the TPS developer at the various reviews and audits (for example, PDR, CDR, TRR, FCA, and PCA).

(9) Explain procedures for reporting to the materiel system configuration manager impacts to TPSs and list recommended solutions.

g. Section 7 of the TPSMP, TPS IPS Management, identifies the training, equipment, and procedures necessary to support TPSs after transfer of TPS program management to the ATE/TPS center. This section also addresses the basic agreements between the supporting and using commands for management and support of TPSs. After approval of the TPSMP, this section of the TPSMP will be included as an annex of the MATDEV's MFP. Address the following prior to entering the EMD phase of the materiel system life cycle (Milestone B):

(1) Identify PDS organizations.

(a) The organization of primary management for the PDS of TPSs is the ATE/TPS center. Identify the organization primarily implementing the PDS changes as directed by the ATE/TPS center. Include the guidelines the PDS implementation organization will use for distributing information to the TPS user activities.

(b) Include the PDS implementation guidelines and responsibilities for storing, handling, controlling, and maintaining the following at the ATE/TPS center repository: TP media (for example, magnetic, optical, and compact disk) TPH and spare parts, TPS documentation, TPS product baseline, ATE supporting software (software for ATE self-tests), ATE supporting hardware (IDs for ATE self-tests), ATE spare parts or equipment, and a golden UUT.

(2) Identify activities using the TPSs and the guidelines for TPS problem reporting and the guidelines for reporting ATE utilization. Identify the guidelines and responsibilities for storing, handling, controlling, maintaining, and providing the following at the TPS user activity:

(a) TP media (for example, magnetic, optical, and compact disk).

(b) TPH and spare parts.

(c) TPS documentation.

(d) ATE supporting software (for example, software for ATE self-tests).

(e) ATE supporting hardware (for example, IDs for ATE self-tests).

(f) ATE spare parts and equipment.

(3) Identify the qualifications and training requirements needed for personnel required to support the TPS. Also identify the computer equipment and devices required to facilitate TPS software maintenance along with those doing the acquisition.

(4) Identify the qualifications and training requirements needed by personnel who are required to support the ATE equipment. Also identify the computer programs required to support ATE equipment and those who make the acquisition. Identify the plans for supporting the repair and maintenance of the ATE along with those doing the acquisition.

(5) Identify the provisions for system or equipment deployment to user organizations.

Appendix C

DA Form 4062

C–1. Purpose

To provide use, disposition, and preparation instructions for DA Form 4062 (see fig C–1). Users will submit DA Form 4062 to the PD TMDE and USATA for review to usarmy.redstone.peo-cs-css.mbx.pd-tmde-temod2@army.mil. Email notifications are sent to ACOMs, ASCCs, and DRUs when specified for approval.

C–2. Use

DA Form 4062 is used to provide the PD TMDE with logistical, technical, and supportability data for making an acquisition decision for TMDE not identified in the DA TMDE PIL or in the DoD consolidated equipment list or that is not designated Army or DoD standard equipment. The form will also address Army capability to provide C&RS for the item of TMDE. When additional space or explanation is required, attachments to the form are authorized. Such attachments will be referenced (“see attachment”) in the appropriate block of DA Form 4062. If any data on the form are classified, then the completed form will be classified no lower than the highest level of classified data used.

C–3. Disposition

The PD TMDE will retain completed DA Forms 4062 on file for a minimum of 1 year after a final decision on the request.

TMDE ACQUISITION APPROVAL ANALYSIS DATA
For use of this form, see DA PAM 750-43; the proponent agency is DCS, G-4.

1a. THRU	1b. TO	2. FROM
Commander US Army Aviation and Missile Command ATTN: AMSAM-TMD-LI Redstone Arsenal, AL 35898-5000	PD TMDE ATTN: SFAE-CSS-FP-TM-CAL Redstone Arsenal, AL 35898-5400	Commander Tobyhanna Army Depot ATTN: AMSEL-LC-ME-N 11 HAP ARNOLD BLVD Tobyhanna, PA 18466-5075

3. TMDE NOMENCLATURE	4. MODEL / PART NUMBER	5. UNIT COST
SIGNAL GENERATOR	MDL: 2030 W/OPT 001-006	$18,000.00

6. NSN	7. LIN	8. MANUFACTURER'S NAME	9. CAGE CODE
N/A	N/A	IFR	0GKL4

10. SYSTEM APPLICATION	11. RDD	12. AUTHORIZATION DOCUMENT
AIR NAVIGATION	30 FEB 2025	Approved DA 4610-R to TDA (see attached)

USER SUPPORTABILITY DATA

13. END ITEM MEASUREMENT REQUIREMENTS / TMDE SPECIFICATIONS

Frequency 20 Khz to 1 Ghz	TMDE Manufacturer specifications (attached)
Resolution 0.1 Hz	Critical parameters: Frequency 10 Khz to 1.35 Ghz Resolution 0.1 Hz

14. PUBLICATIONS

IFR operating and maintenance manual

15. USER MOS OR SKILL	16. LEVEL OF USE	17. MAINT MOS OR SKILL	18. LEVEL OF MAINT
WG-2610	D	WG-2610	D

19. DISTRIBUTION / QUANTITY	20. REMARKS
Air Navigation Division / Quantity 1	Avionics options needed

21a. TYPED NAME AND TITLE	21b. PHONE NUMBER / E-MAIL
[First MI Last Name/Title]	[Insert Phone Number/email address]
21c. SIGNATURE	**21d. DATE *(YYYYMMDD)***
DIGITAL SIGNATURE 123456789	20240627

USATA SUPPORTABILITY ANALYSIS

22. CALIBRATION AND REPAIR SUPPORTABILITY *(C&RS)*
ITEM ☐ IS ☒ IS NOT SUPPORTABLE BY THE ARMY'S C&RS PROGRAM

23. REMARKS
Compliance with AR 700-127 is required to assure supportability issues are addressed.

24a. TYPED NAME AND TITLE	24b. PHONE NUMBER / E-MAIL
[First MI Last Name/Title]	[Insert Phone Number/email address]
24c. SIGNATURE	**24d. DATE *(YYYYMMDD)***
DIGITAL SIGNATURE 123456789	20240627

DA FORM 4062, JUN 2024 PREVIOUS EDITIONS ARE OBSOLETE APD LC v1.00ES

Figure C–1. Sample of a completed DA Form 4062

DEPARTMENT OF THE ARMY
ORGANIZATION
STREET ADDRESS
CITY STATE ZIP

SFAE-AV-AMSA-A3S [Date]

MEMORANDUM FOR Product Director Test, Measurement, and Diagnostic Equipment (SFAE-CSS-FP-TM), Redstone Arsenal, AL 35898

SUBJECT: Test, Measurement, and Diagnostic Equipment (TMDE) Acquisition

1. This is a request to acquire TMDE for Army Airfields (CTA 510-909, Table 85). The Tektronix, TBS1072C, Oscilloscope is required to be fielded with the Federal aviation Administration (FAA) certified Selex Distance Measuring Equipment (DME).

2. Originating organization identification:

a. Command: Product Manager Assured Airspace Access Systems (PdM A3S)

b. Official mailing address:

Product Management Office Assured Airspace Access Systems
Fixed Base Air Traffic Control (FB ATC)
ATTN: SFAE-AV-AMSA-A3S
5309 Martin Road
Redstone Arsenal, AL 35898-5000

c. Requestor/User: PdM A3S / Army Airfield Navigation Aids (NAVAIDS)

d. POC: [First MI Last Name], Integrated Product Support Manager

e. Telephone: [Insert Phone Number]

3. Identification of the TMDE requested:

a. Nomenclature: Oscilloscope

b. Manufacturer and model number: Tektronix, TBS1072C

c. Unit Price: $840.00

d. Quantity requested: Army Navigational Aids (NAVAIDS) Maintenance Division, 1 per FD ATC site with Selex DME

e. Number of like items on hand: N/A

f. NSN: N/A

Figure C–2. Sample memo for test, measurement, and diagnostic equipment request

SFAE-AV-AMSA-A3S
SUBJECT: Test, Measurement, and Diagnostic Equipment (TMDE) Acquisition

4. The Tektronix, TBS1072C, Oscilloscope includes a 7-inch WVGA color display with up to 2 GS/s sample rate, bandwidth of 70 MHz..

5. The Tektronix, TBS1072C, Oscilloscope will be used by Army ATC sites for maintenance of the Selex DME.

6. The point of contact for this memorandum is [First MI Last Name, Phone number] or email [Insert Email].

[Insert Digital Signature]

[First MI Last Name]
APM, Fixed Base Air Traffic Control
PdM, Assured Airspace Access Systems

2 Encls
1. DA Form 4062
2. Specification Data Sheet

CF:
FORSCOM
TRADOC
IMCOM
USAREUR-AF
EUSA
ATEC
MDW
ARSOUTH
ARSCENT
NGB

Figure C–2. Sample memo for test, measurement, and diagnostic equipment request—continued

Glossary of Terms

Calibration and repair support activity
Generic term used to identify TMDE support organizations providing C&RS.

DA Label 163
Label that designates a piece of TMDE as a U.S. Army calibrated instrument that may be used under limited or special calibration considerations until the void date on the label.

DA Label 80
Label that designates a piece of TMDE as a U.S. Army calibrated instrument that may be used until the void date on the label.