Department of the Army
Pamphlet 750–43

Maintenance of Supplies and Equipment

Army Test Program Set Procedures

Headquarters
Department of the Army
Washington, DC
28 February 1992

Unclassified

SUMMARY of CHANGE

DA PAM 750–43
Army Test Program Set Procedures

This pamphlet--

- Provides the procedures for U.S. Army test program set (TPS) requirements established by AR 750-43 and AR 750-1.

- It is the basic guidance document for applying the requirements, acquisition, development, and life cycle management of test program sets in support of all U.S. Army Materiel Command (AMC) systems.

- Includes all U.S. Army research, development, nondevelopmental, product improved, military-adapted commercial equipment.

- Includes equipment adopted by the Department of the Army developed by other Services or foreign governments.

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Army Test Program Set Procedures

By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

Official:

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History. This UPDATE printing publishes a new Department of the Army pamphlet.

Summary. This DA pamphlet explains procedures for applying AR 750–43 and AR 750–1 to test program sets that are used in the maintenance of Army materiel systems. It also covers DA procedures determining the requirements, acquisition, development, and life cycle management of test program sets.

Applicability. The pamphlets applies to the Active Army, the Army National Guard and the U.S. Army Reserve. It is only applicable to those units involved with weapon system repair, automatic test equipment and test program sets. The Civil Works activities of the Corps of Engineers is exempt from this pamphlet. This pamphlet is not applicable to mobilization.

Proponent and exception authority. Not used.

Interim changes. Interim changes to this pamphlet are not official unless they are authenticated by the Administrative Assistant to the Secretary of the Army. Users will destroy interim changes on their expiration dates unless sooner superseded or rescinded.

Suggested Improvements. The proponent agency of this pamphlet is Headquarters, Department of the Army, Deputy Chief of Staff for Logistics (DALO–SMC), WASH DC 20310–0542. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to U. S. Army Test, Measurement, Diagnostic Equipment Activity, ATTN: AMCPM–TMDA–EA, Red Stone Arsenal, AL 35898–5400.

Distribution. This publication has been distributed as required on DA Form 12–09–E, Block 5323, intended for command levels C and D for the Active Army, the Army National Guard, and the U.S. Army Reserve.

Contents (Listed by paragraph and page number)

Unclassified

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Chapter 1
Introduction

1–1. Purpose

This pamphlet is the basic guidance document for applying the requirements, acquisition, development, and life cycle management of Army test program sets (TPSs) in support of all U.S. Army Materiel Command (AMC) systems. It also—

a. Provides the procedures for meeting U.S. Army TPS requirements established by AR 750–43 and AR 750–1.

b. Includes all U.S. Army research, development, nondevelopmental, product improved, military–adapted commercial equipment.

c. Includes equipment developed by the other Services and foreign governments and adopted by the Department of the Army (DA).

1–2. References

Required related publications and referenced forms are listed in appendix A.

1–3. Explanation of abbreviations and terms

Abbreviations and special terms used in this pamphlet are explained in the glossary.

1–4. TPS background

TPSs consists of hardware and computer software that are used with automatic test equipment (ATE) to detect and isolate failures in electronic systems, components, and modules.

a. Overall Army test, maintenance, and diagnostic equipment (TMDE) policy falls under the Assistant Secretary of the Army for Installation and Logistics.

b. The integration of TMDE/TPS consideration into the supported end item acquisition falls under the Assistant Secretary of the Army for Research, Development and Acquisition.

c. The Army's efforts to increase TMDE/TPS life cycle management falls under the Deputy Chief of Staff for Logistics.

d. AMC executive director for TMDE (EDT) has— as the Army manager of all TMDE according to AR 750–43

(1) General responsibility for policy concerning the Army TPS program.

(2) Designated the AMC Office of TMDE management to be the cognizant TPS activity at Headquarters, AMC.

e. Program manager, test, measurement, and diagnostic equipment will establish Army ATE/TPS policy, and guidance, and ensure compliance therewith.

f. Compliance of a TPS with the Army's policies, regulations, and procedures is monitored by the product manager for test program sets (PM–TPS). Items monitored and approved by this office involve—

(1) Major subordinate command (MSC) ATE/TPS center implementation plans and resource impact statements.

(2) Materiel system developer's (MSDs') Test Program Set Management Plan (TPSMP).

(3) All TPS actions that deviate from TPSMP requirements.

(4) All waiver requests for non–standard TPS development programs. (Standard TPS development requirements are contained in AR 750–43 and this pamphlet.)

(5) In–house TPS development support.

(6) TPS planning, development, acquisition, fielding, and lifecycle support are consistent throughout the Army.

(7) The Army TPS database that contains TPS status, TPS availability, parts commonality, and unit under test (UUT) application. Coordination will be established with other database developers/managers responsible for TPS/ATE/TMDE information to ensure data integrity.

g. Commanders of AMC MSCs will—

(1) Prepare an MSC TPS implementation plan and forward a copy to PM–TPS: Program Manager, Test Program Sets; ATTN: AMCPM–TMDE–EA; Red Stone Arsenal, AL 35898–5400. Each MSC will also prepare a resource impact statement, outlining all resource requirements and impacts associated with the TPS implementation plan and forward it to PM–TPS (action); and Headquarters, USAMC; ATTN: AMCTM–E; 5001 Eisenhower Avenue; Alexandria, VA 22333–0001 (information).

(2) Maintain existing organic capacity for development, maintenance, and support of commodity managed TPSs. The U.S. Army Depot System Command (DESCOM) will maintain a U.S. Army organic TPS acquisition support capability. The DESCOM will also provide TPS development services and/or TPS post deployment support for systems when contracted by the AMC MSCs.

(a) The depots will continue to provide related TPS acquisition support such as being members of source selection evaluation boards (SSEBs), supporting development of ATE hardware and system software augmentation, and providing expertise to materiel developers in acquiring ATE vans and shelters.

(b) Headquarters (HQ) DESCOM will establish and maintain a TPS office to provide management oversight of TPS development activities within DESCOM.

(3) Establish and maintain a TPS center for management of TPS development, acquisition, fielding, requisition, and support. The MSC ATE/TPS centers will provide TPS technical and management support to materiel developers/managers.

h. The MSC ATE/TPS centers—

(1) Assist in preparing of TPSMPs and all updates and revisions to TPSMPs for the materiel developers.

(2) Are the principal reviewing agency of TPSMPs prior to submission to PM–TPS. Nonconcurrence with any part of the TPSMP must outline coordination with the materiel developer to resolve conflicts prior to submission to PM–TPS.

(3) Receive and review the TPS cost and performance reports periodically submitted by the TPS developer. The MSC TPS centers will report any TPS funding or schedule deviations/problems to PM–TPS.

(4) Coordinate, consolidate, and submit TPS data to the AMC TPS database developed and managed by PM–TPS. This will be a recurring requirement.

(5) Assist the MSD in any waiver requests for nonstandard TPS development programs.

(6) Monitor and document in–house and contractor development of MSC commodity managed TPSs and update the AMC data base.

(7) Ensure that TPS planning, development, acquisition, fielding, and life cycle support are consistent and standardized to the maximum extent in the MSCs commodity grouping.

(8) Provide TPS postdeployment support (PDS) to include assistance in the field to accomplish on–site definition and identification of TPS problems, TPS installation, and participation in TPS certification.

(9) Review and coordinate maintenance support plans, integrated logistics support plans, preacquisition reviews, evaluation and verification of hardware and associated publications required for operation, calibration, and maintenance of system unique ATE within the MSC.

i. MSDs—

(1) Prepare a TPSMP for each system that will, or is expected to, require automatic testing per AR 70–1 and AR 750–43.

(2) Coordinate TPS development and fielding actions with the supporting MSC ATE/TPS center as required by AR 750–43.

(3) Acquire TPS support for the supported system per requirements in AR 750–43.

(4) Establish a Memorandum of Understanding (MOU) with an MSC for the purpose of identifying principal ATE/TPS center support. This includes MSD that are AMC activities.

(5) Coordinate TPS development and fielding actions with the assigned Training Doctrine Command (TRADOC) combat developer and training developer.

1–5. Exceptions

a. Requests to waive procedures as explained in this pamphlet will be submitted, with appropriate justification, through command channel, to the AMC EDT. Central liaison for all AMC TPS activities is the Product Manager, Test Program Sets (PM–TPS);

AMCPM–TMDE–EA; Red Stone Arsenal, AL 35898–5400. The telephone number for PM–TPS is (908) 532–1442/1494, DSN 992–1442/1494. The DATAFAX number is (908) 532–2391, DSN 992–2391. AMCPM–TMDE@MONMOUTH–EMH3.ARMY.MIL is the Arpanet address.

b. User conferences are held on a regular basis. Contact the PM–TPS for further assistance.

Chapter 2
Program Management Summary

2–1. General

TPS management encompasses the life cycle administrative and technical management of TPSs for organizational, direct support, general support, and/or depot level maintenance ATE. TPS life cycle management is consistent with AR 1000–1.

a. A TPS consists of the peculiar software, hardware, and documentation that is used with computer controlled test equipment to detect and isolate failures within a unit under test (UUT).

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

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

(1) This TPS software may reside on magnetic tape, cassette, programmable read–only–memory (PROM), bubble memory, and so on.

(2) TPS hardware, or test accessories, may include an interconnecting device (ICD), load card assemblies, cables, cooling devices, or UUT peculiar stimuli or measurement devices.

(3) TPS documentation may include—

(a) Technical manuals (TMs).

(b) Depot maintenance work requirements (DMWRs).

(c) Technical data packages.

(d) Operator instructions.

(e) Engineering data required for TPS modification and integrated logistic support (ILS) of the test accessories.

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 interservicing policies and procedures contained in joint regulation will apply.

e. Figure 2–1 illustrates the process and underlying methodology of the procedures, processes, and requirements described by this pamphlet. This figure also shows specific tailoring of the requirements in MIL–STD–2167 as applied to TPSs. Any additional implementation or tailoring of this standard is unnecessary.

f. Additionally, the application of the appropriate templates contained in DOD 4345.7–M will add technical discipline to the management of the technical risks associated with TPS development.

2–2. Test Program Sets Management Plan (TPSMP)

TPS requirements will be addressed as a major element in all phases of the supported system life cycle. TPS planning will be initiated as early in the life cycle as is practical. 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 demonstration and validation phase of the system acquisition, or its equivalent if the supported system program accelerates the development life cycle. As discussed in chapter 5, the TPSMP is the central document for planning, developing, acquiring, and maintaining TPSs for each materiel system.

b. A significant interrelationship exists between the TPSMP, the Project Master Plan (PMP), and the Materiel Fielding Plan (MFP). While this relationship is further discussed in chapter 9, it is particularly essential that all TPS user sites be identified early in the planning stages. The MFP and the identified funding requirements will properly reflect the fielding requirements and life cycle support requirements of the TPSs.

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

d. The TPSMP will be used to support other formal planning documents such as, but not limited to, the Integrated Logistics Support Plan (ILSP), and the coordinated test program (CTP) (DA Pam 70–21). The TPSMP will be tailored to the acquisition strategy for the system.

e. Preparation and the processing of the TPSMP is the responsibility of the MSD. System acquisition will not proceed into full scale development (FSD) phase until the TPSMP has been approved or a waiver processed through AMC EDT, per AR 70–1.

f. TPS status will be monitored by the ILS Management Team and reported through the Acquisition Management Milestone System (AMMS), as well as through exception reporting to PM–TPS.

2–3. Prime system life cycle criteria

The following TPS related criteria will be met at the associated milestone in the prime 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 FSD or its equivalent, or have a request for proposal (RFP) issued, without an AMC–approved TPSMP as required by AR 70–1.

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

b. Milestone I to milestone II—demonstration and validation phase. The following actions are taken:

(1) Draft TPSMP available.

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

(3) Acquisition strategy development and planning is drafted. This may result in a recommendation that system level category TPSs be acquired through the prime contractor. For all other TPSs, 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) Plans to acquire TPSs from an independent source will be supported by planned UUT availability, UUT documentation (that is, technical data package (TDP), testability analysis report (TAR), failure mode effects and criticality analysis (FMECA), and theory of operation) availability, and configuration control methods.

c. Milestone II—decision to enter FSD. The following actions have been taken:

(1) TPSMP has been updated and approved.

(2) TSPs have been established as a major element in the ILSMT charter and in the AMMS.

(3) Phased development of TPSs will be based on realistic projections of UUT design maturation. TPS design will conform to the Army TPS engineering design specification published by PM–TPS.

(4) 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.

(5) TPS requirements have been defined and updated in the logistics support analysis (LSA) by a level of repair analysis (LORA).

(6) Sufficient Government engineering and product assurance personnel are dedicated to the defined verification, validation, and acceptance processes.

(7) Configuration management planning has been accomplished and includes schedules for transfer of configuration control for the UUTs and the TPSs to the Government. Early UUT design stabilization and configuration management (CM) must be consistent with the supported system operational readiness requirements.

(8) 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 be consistent with the Army TPS engineering design specification.

(9) Identification of depot maintenance interservicing candidates will be processed as early as possible, but, in no case later than 90 days after award of the FSD contract or the equivalent acquisition milestone.

d. Milestone III—decision to enter production and deployment phase.

(1) TPSMP has been updated and approved.

(2) Required system level category TPSs have successfully completed development test/operational test (DT/OT) II.

(3) Funding and phasing of any additional TPSs are addressed.

(4) Interim contractor logistics support (ICLS) and 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.

(5) Support facilities, including all ATE, TPSs, UUTs, support environment, personnel, and funding are planned and implemented according to AR 750–43 and this pamphlet.

(6) 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.

(7) Procedures for TPS modification, test, production, and deployment have been defined and approved in the MFP, Materiel Fielding Agreements (MFAs), and the TPSMP.

(8) Results of DT/OT have been evaluated and received concurrence of the TRADOC combat developer.

2–4. TPS categories

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

a. System TPS—used to detect system failures (system go/no–go TPS), and to isolate to the line replaceable unit or cables (system diagnostic TPS).

b. Line replaceable unit (LRU) TPS—used to screen LRUs or to determine LRU status after repair (LRU go/no–go TPS) and to isolate to the shop repairable unit (LRU diagnostic TPS).

c. Shop replaceable unit (SRU) TPS—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).

d. Component TPS—used to detect component failures. These are most commonly used for inspection and production facilities and are not discussed in this pamphlet.

2–5. UUT design maturity

TPS development for any UUT is possible only 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 steady state after the UUT has been in production. Design stabilization may be imposed on a UUT prior to steady state ECP submissions by establishing configuration control of the UUT design. When UUT design stabilization occurs artificially, the MSD must be prepared to accept the tradeoffs implied. Accordingly, MSDs must closely monitor and control UUT design stability consistent with TPS support requirements and the TPS schedule outlined as follows:

a. System level TPSs, if used, 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/or SRU TPS availability is mandated at system initial operational capability (IOC), the MSD must stabilize the UUT design and enforce UUT design stability consistent with TPS support requirements to assure availability at IOC.

(a) Figure 2–2 illustrates the general relationship of the TPSMP and TPS development activities to the materiel system development phases when this alternative is employed.

(b) Note that critical TPS decisions must be made and implemented early in the materiel system FSD phase for this alternative to be implemented.

(2) If LRU and/or 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 MFAs. The interim alternative support method will also be addressed in the TPSMP. Figure 2–3 illustrates the general relationship of the TPSMP and TPS development activities to the materiel system development phases when this alternative is employed.

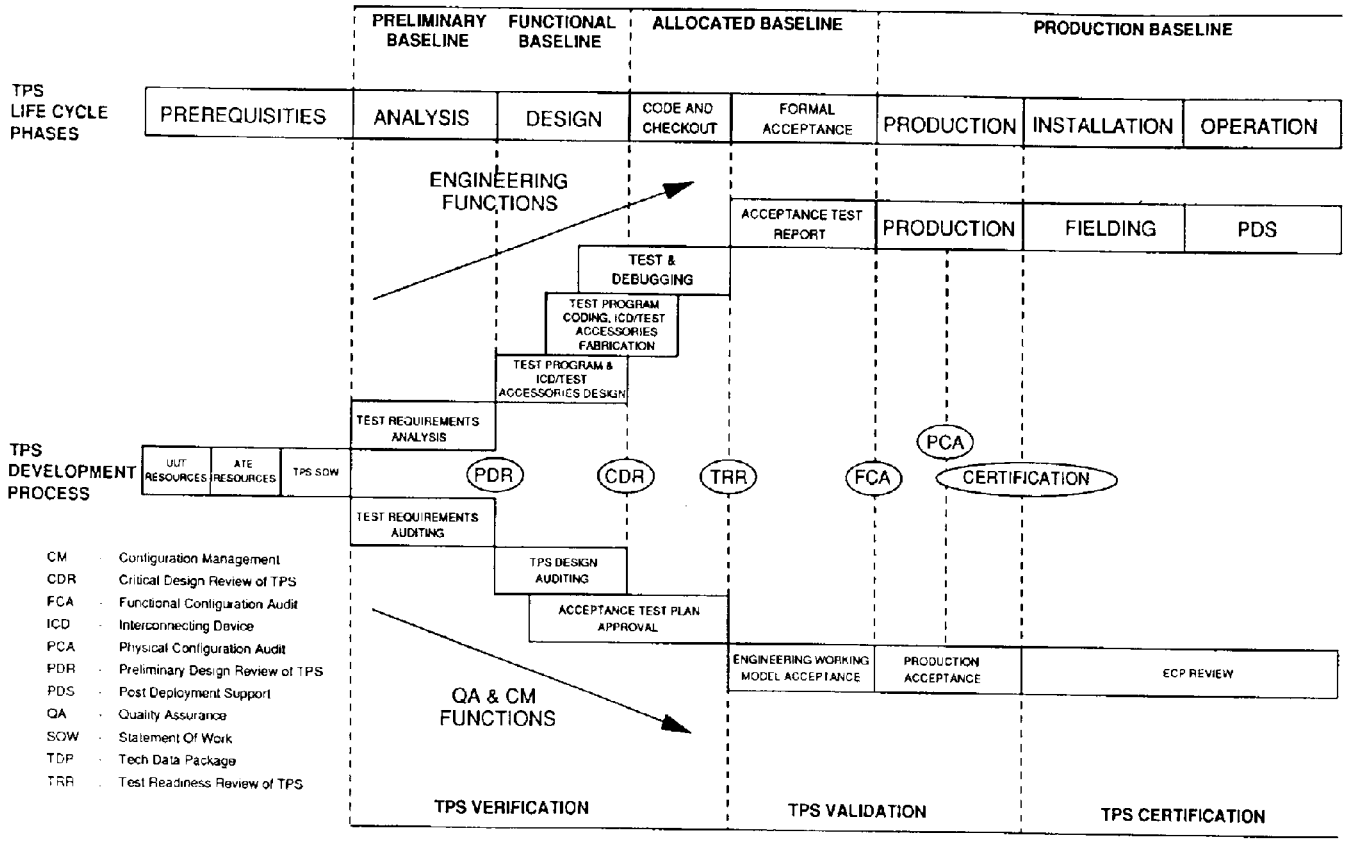

Figure 2-1. TPS life cycle process

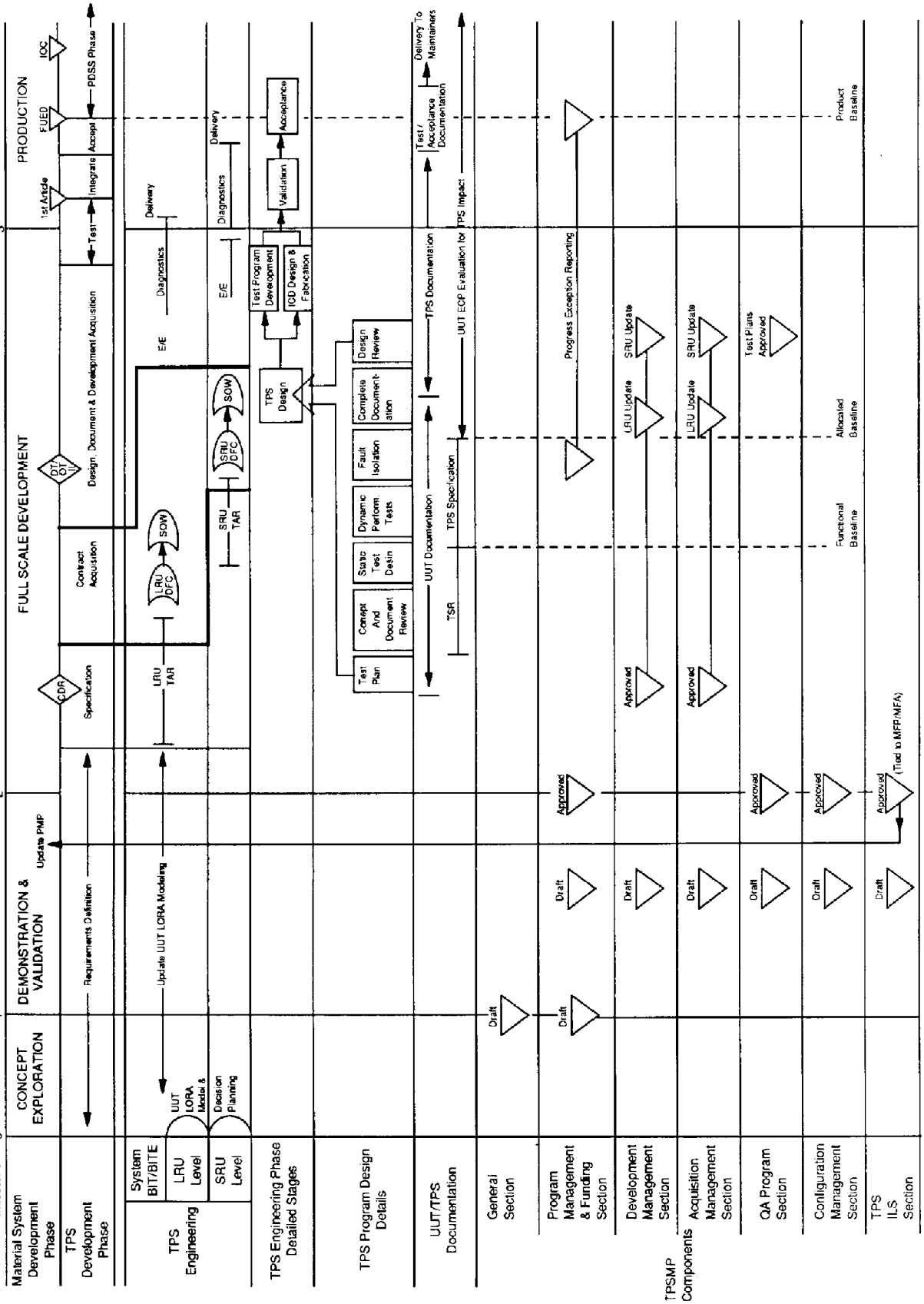

Figure 2-2. Test program set development activities (TPSs at IOC)

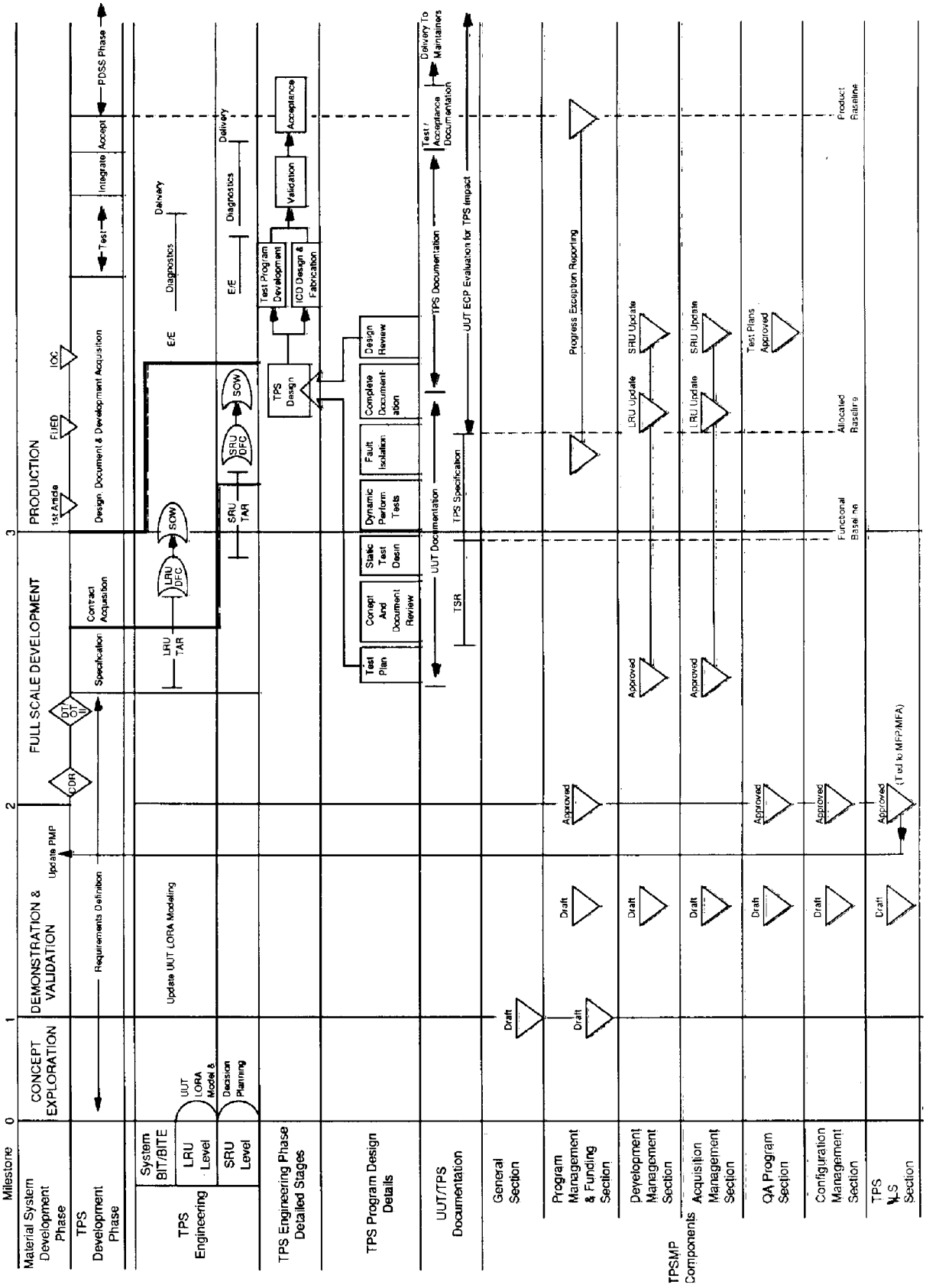

Figure 2-3. Test program set development activities (TPSs not required at IOC)

Chapter 3
Automatic Test Equipment (ATE)/TPS Requirements Definition

3–1. General

Before any TPS development is begun, the requirements for each TPS must be clearly established. These requirements are established through MIL–STD–1388–lA and MIL–STD–2165. This approach adheres to the prescriptions of DODD 5000.1 and DODD 5000.39 for early identification of requirements that influence the system performance parameters and the system configuration from a support standpoint.

a. The process further requires the development of an optimum diagnostic concept that considers various degrees of built–in–test (BIT) and built–in–test–equipment (BITE), ATE with associated TPS, and manual test. MIL–STD–2165 implements a design process that ensures the subject electronic systems and/or equipment has testability. The design process has an inherent traceability to MIL–STD–1388–lA. Table 3–1 depicts the traceability between MIL–STD–1388–lA and MIL–STD–2165.

Table 3–1
MIL–STD–1388A–1A to MIL–STD–2165 traceability

1388–1A Subtask	Subtask Name	2165 Subtask
202.2.1	Identify Existing and Planned Logistic Support Resources	201.2.1B
203.2.4	Identify Supportability Problems on Comparative Systems	201.2.1C
204.2.1A	Identify Technology Advancements for Systems	201.2.1A
204.2.1C	Identify Technology Advancements for Logistics Elements	201.2.1A
205.2.2	Establish Supportability Objectives	201.2.2
205.2.3	Establish Supportability Constraints	201.2.3
303.2.4	Establish Sensitivity of Readiness	201.2.4A
303.2.5	Estimate Manpower and Training Implications	201.2.4C
303.2.8	Evaluate Alternative Diagnostic Concepts	201.2.4C

b. Figure 3–1 depicts the general flow of the process of determining testing/testability requirements.

c. Task 303, MIL–STD–1388–lA, addresses contractor development of support system alternatives based on the government–provided maintenance concept options and contract requirements. Using the support system alternatives, a LORA is performed to determine the most cost–effective alternative.

d. AR 750–1 requires that, for printed circuit boards (PCBs), discard at failure are considered by all MSDs as a preferred alternative to repair. All repair/discard analyses are documented and reported in the TPSMP.

3–2. Testability

Testing of electronic circuits historically has not been considered until the end of the system design or prototype phase. The emphasis instead has been on testing as a post design activity. In the past, this has been acceptable because the complexity of electronic circuits has been manageable, particularly from the point of view of "observability" of component behavior.

a. Integrated circuit technology has changed that perspective. Because of high costs and the inability to adequately test complex components, it is imperative for the designer or developer to consider testability at the early conceptual design stages in order to avoid insupportable designs.

b. The term testability addresses the extent to which a system, or subsystem supports fault detection in a confident, timely, and cost–effective manner.

c. The incorporation of adequate testability, including BIT, requires early and systematic management attention to testability requirements, design and measurement. This is accomplished by implementing MIL–STD–2165.

d. The standard prescribes a uniform approach to testability (including BIT) requirements, testability analysis, prediction and evaluation, and preparation of testability documents. This standard additionally prescribes the integration of the testability program requirements such as design engineering, maintainability, and LSA.

3–3. LORA

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 be performed according to Task 303, MIL–STD–1388–lA. The tool for performing this analysis will normally be a computer model (for example, Optimum Supply and Maintenance Model (OSAMM), Logistics Analysis Model (LOGAM), and so on). 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, false alarm rate, and inventory size of the particular UUT.

b. The determination of testing requirements of a UUT in terms of input and output signal characteristics. This test requirements analysis is used to determine compatibility between the candidate UUT and the targeted test equipment.

c. A cost–effectiveness analysis to determine the cost for each of the various options. This cost will consider life cycle costs. The cost elements 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 automatic test is implemented, effect of reduced false alarm rate on the UUT inventory, and transportation costs.

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

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

3–4. BIT

BIT and BITE generally have the following four functional applications:

a. Performance monitoring/assessment which provides the operator or crew assurance that the mission critical and safety subsystems are operational.

b. Fault prediction—provides the operator or crew and maintainer an indication of potential failures.

c. Fault detection—provides the maintainer with a fault indication.

d. Fault isolation—for the maintainer, isolates the indicated fault to the replaceable item.

3–5. BIT/BITE requirements

BIT/BITE for performance monitoring/assessment is a requirement for all end items. In the support environment BIT/BITE requirements to perform fault prediction, detection, or isolation will be determined by the applicable task of MIL–STD–2165. The TPS must have the capability to interface and analyze the BIT/BITE.

3–6. ATE

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

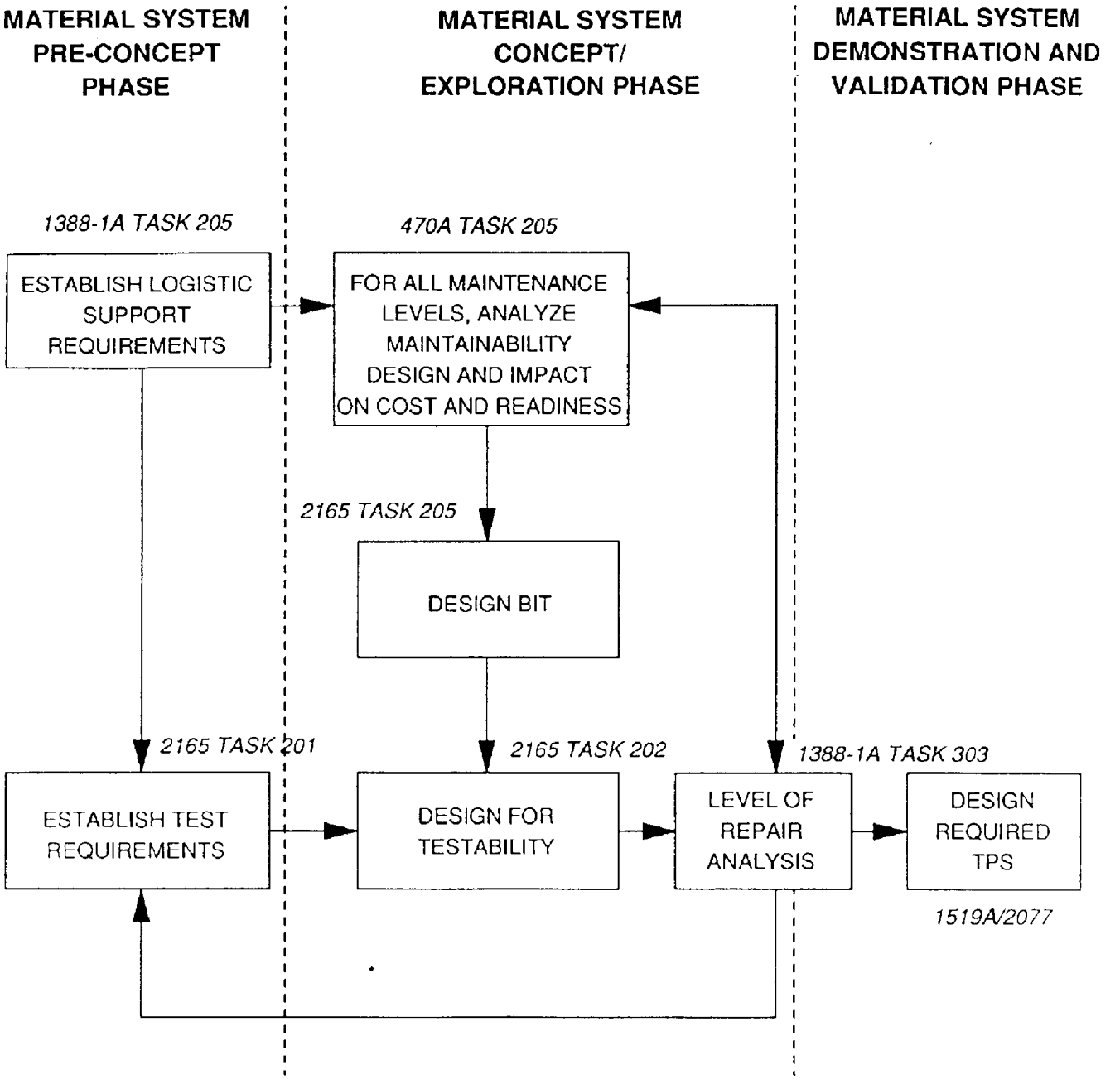

Figure 3-1. BIT/ATE Determination

3–7. TPS 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 within each MSC, 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 discussed in chapter 6. If this data is not readily available prior to the projected TPS acquisition, as determined by the ILSP and TPSMP, then the requirement exists for procuring data.

3–8. ILSP

The ILSP is initiated early in the prime system life cycle. As a minimum, the following TPS–related information will be contained in the ILSP:

a. ICLS plans.
b. Organic support dates.
c. ATE requirements.
d. Milestones schedule.
e. Maintenance plan.

3–9. ICLS

ICLS and additional spares will be planned to fill the gap between initial deployment and each phase of TPS deployment. It should be noted that in most cases, required system level category TPSs (for

example, contact test set (CTS), simplified test equipment—expandable (STE–X), etc.) will be deployed concurrently with the supported system, and, therefore, must be acquired from the materiel system prime contractor.

3–10. Classified TPSs

Classified TPSs will not be developed and fielded unless a validated requirement exists. 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 materiel system developer 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/printing of classified information during execution of the test program.

d. A TPS may also be classified if it processes classified information during execution of the test program. 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, PM–ATSS, 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 PM–ATSS. If published guidance is not available when needed, the TPS acquisition manager will contact the PM–ATSS for guidance.

3–11. TPS 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 prime system has entered the full–scale engineering 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. He or she may go through the RFP process to industry, or select one of the government facilities available.

(2) 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/or 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 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.

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 system–level category TPS (for example, STE–X or the CTS), the initial delay is a minimum of 5 months and can be 1 year or longer, depending on the complexity of the system.

(2) Progresively 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 budget funding profile. The comparison should assure that the correct type of funds (that is, research and development, production, or operation and maintenance) have 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 MSC ATE/TPS center, must take appropriate action to change or to stretch 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 (FFP) or fixed price incentive fee (FPIF) 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 is, in fact, counterproductive. Therefore, in planning for TPS development, the TPS acquisition manager and/or MSD will recognize these factors before recommending CPFF or CPIF contracts.

(3) Incentive contracts may be used for stimulating early schedule completion, reduced test program and interface design complexity, and so forth.

Chapter 4
TPS Funding

4–1. General

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

a. When an end item is in the development phase, the appropriate funding category of associated TPS development is research, development, test, and evaluation (RDTE).

b. Reconfiguration can involve various funding sources as follows:

(1) When an end item undergoes a developmental reconfiguration effort, this is a change in the demonstrated performance envelope. If a reconfiguration to the TPS is required in conjunction with this developmental effort, the funding source including TPSs is RDTE.

(2) When the reconfiguration of an end item only involves TPSs, that reconfiguration is nondevelopmental by definition in that it does not change the demonstrated performance envelope of the end item. A reconfiguration involving TPSs is classified as nondevelopmental unless associated with a developmental hardware effort as covered in (1) above. Reconfiguration efforts (to include TPSs) are funded per AR 70–15. Engineering is funded with procurement appropriations (PA) if the end item is in production, and operation and maintenance, Army (OMA) appropriation if the end item is out of production.

(3) If an end item TPS effort involves only software (to include necessary related chips and circuit boards), the reconfiguration effort is essentially complete at the end of the engineering phase. However, in cases where the TPS effort also involves hardware, the procurement of hardware modification items is funded by PA.

4–2. Assistance

Funding policy questions that cannot be resolved locally by comptrollers or resource managers will be referred through comptroller channels to HQ, USAMC; ATTN: AMCRM–PP; 5001 Eisenhower Avenue, Alexandria, VA; 22333–0001.

Chapter 5
TPS Acquisition

5–1. General
TPS acquisition will be planned as a separate (program controlled) item consistent with the importance of the TPS and the end system it supports.

5–2. TPSMP
The central document for planning, developing, acquiring, and maintaining the TPS is the TPSMP. The TPSMP will be written to reflect the requirements of the materiel system life cycle phase. The content of the TPSMP is outlined in appendix B. In the TPSMP, the MSD 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.

5–3. Competitive acquisition
TPS acquisition planning for LRU/SRU levels will give first priority to competitive acquisition, independent of the supported system prime contractor. This may be from in–house AMC TPS development activities or from third–party TPS developers in industry.

a. The MSD must recognize the extremely important issue of UUT configuration management 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 TDP. Because of this emphasis, the TPSMP will not be approved unless the PM has documented assurances 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 TPS 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 system–level TPSs.

e. Relatively few TPSs are required at the system level and they are usually required for demonstration during DT/OT II in the materiel system FSD phase. The materiel system prime contractor would be the best source for these initial system–level TPSs.

5–4. Cost/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.

5–5. Work breakdown structure (WBS)
All TPS acquisitions will provide a suitable WBS to ensure management visibility in the development process. Figure 5–1 is a sample TPS WBS for a TPS program. As a minimum, WBS elements 1.0 through 8.0, the first row in figure 5–1, should be included in the first submission of the TPSMP for a particular TPS program. The information for figures 5–2, 5–3, and 5–4 is normally obtained from the TPS development contractor's proposal and will be included in updates to the TPSMP.

5–6. TPSMP preparation
The MSD (program manager, development laboratory project leader, or MSC materiel manager) is responsible for assuring the development of the TPSMP. The ATE/TPS center of the supporting MSC will act as the principal staff advisor to the MSD for the TPSMP. The task of preparing the TPSMP will be assigned to the ATE/TPS center, which may further task the principal matrix support elements of the MSC 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. Deviations in the TPSMP from requirements outlined in appendix B must be requested by waiver submitted to PM–TPS per AR 750–43.

5–7. TPSMP 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.

5–8. TPSMP approval
Coordination among affected agencies will be achieved prior to formal submission of the TPSMP. Two copies of the TPSMP will be submitted for approval to the PM–TPS after concurrence by the ATE/TPS center. Any PM–TPS disapproval of the TPSMP will require command attention of the AMC EDT and will be coordinated with the AMC office of TMDE management per AR 750–43. A copy of all TPSMPs and waiver requests will be provided to the Office of the Deputy Chief of Staff for Logistics; ATTN: LOEA–IL; Washington, DC. 20310–0542.

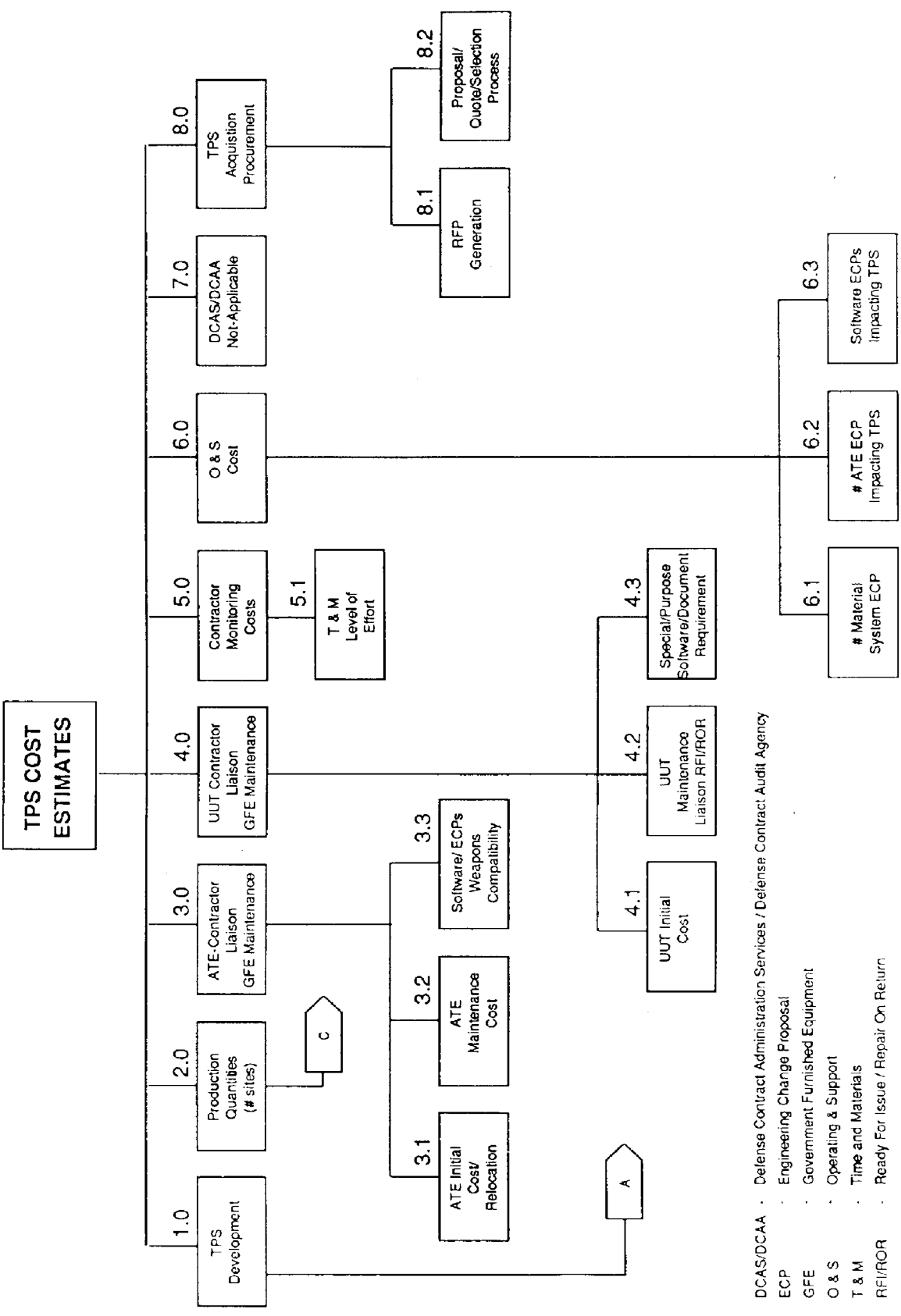

Figure 5-1. Work breakdown structure

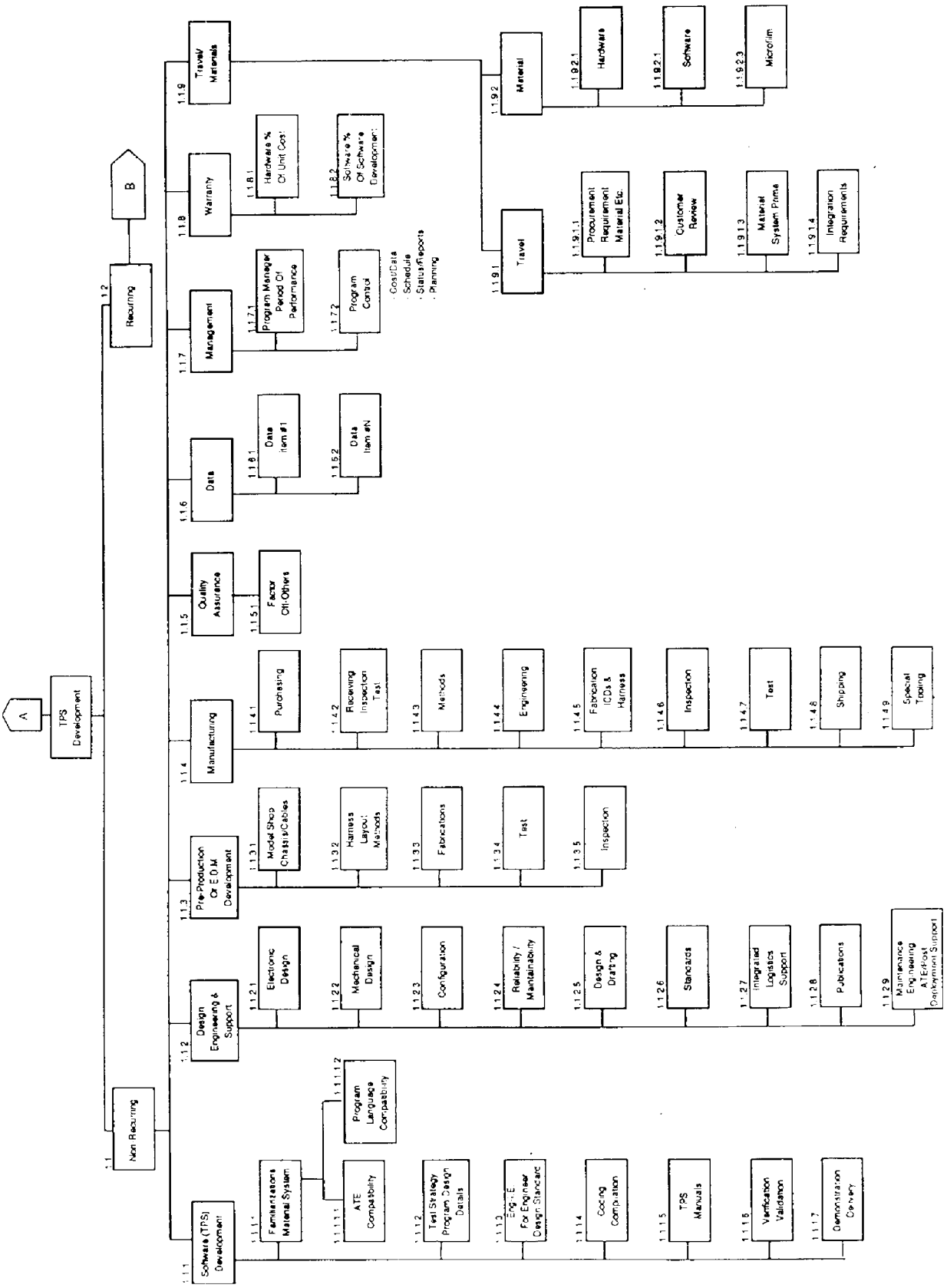

Figure 5-2. Work breakdown structure

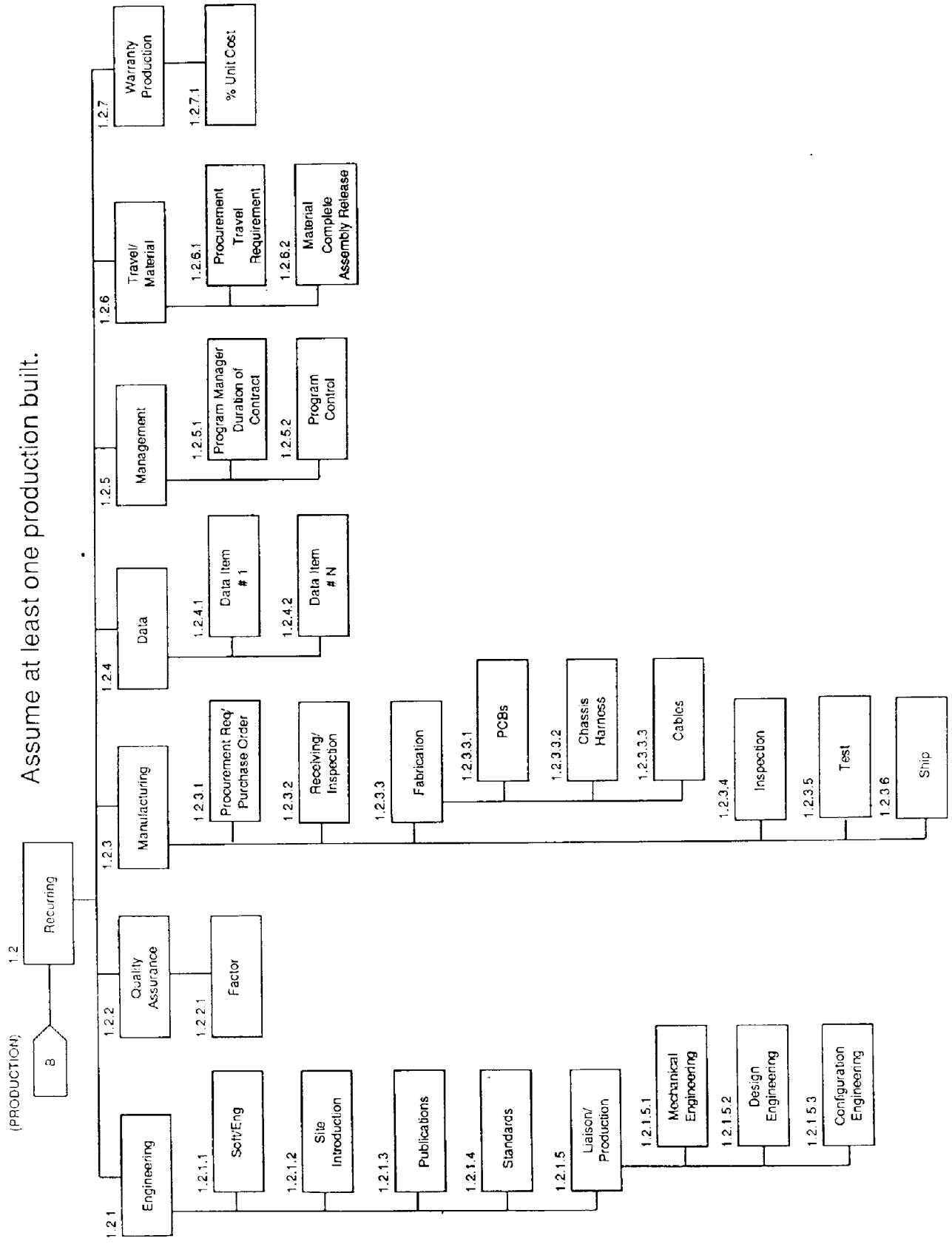

Figure 5-3. Work breakdown structure (recurring costs)

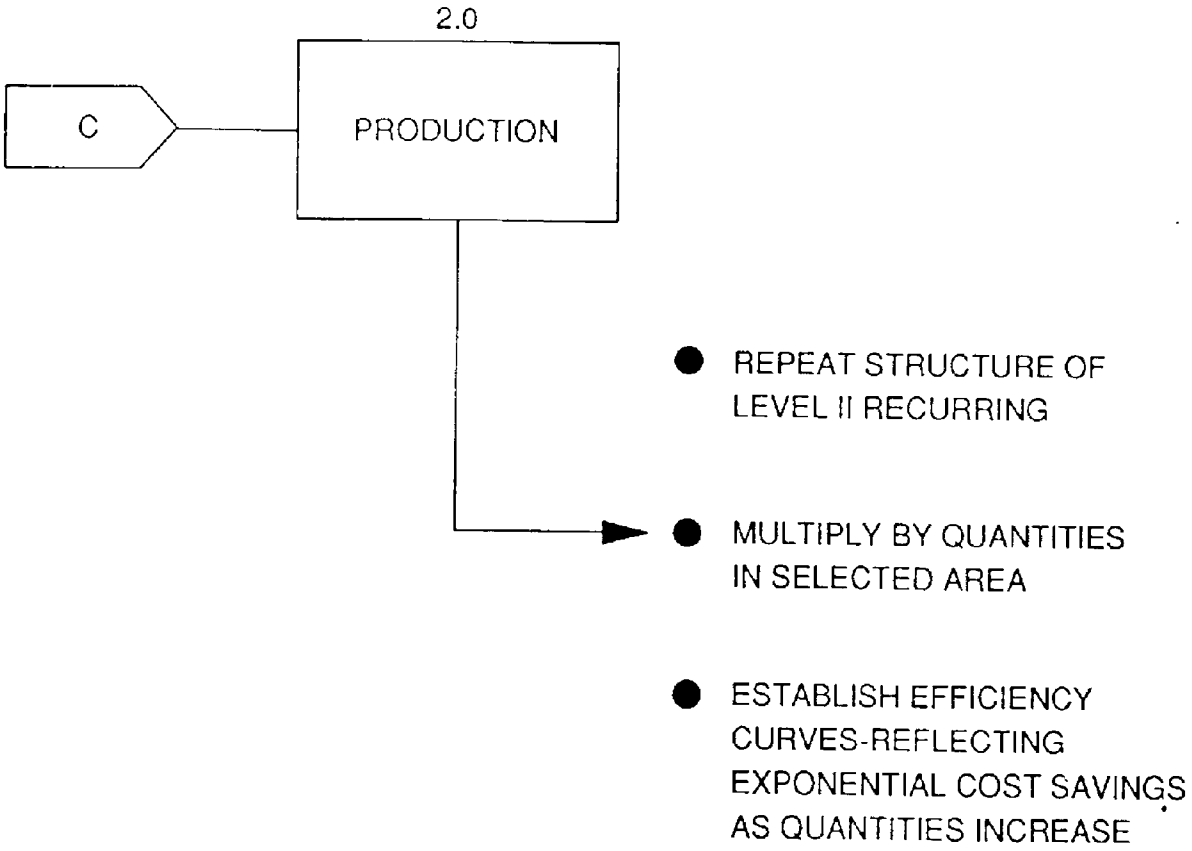

Figure 5-4. Work breakdown structure

Chapter 6
TPS Engineering Development Management

6–1. General

This chapter identifies the MSD's responsibilities for the engineering management functions required for TPS development as illustrated in figure 2–1. This chapter will focus 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. 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 6–1.

6–2. TPS engineering design issues

a. Allocated baseline. As applied to TPSs, the allocated baseline will consist of the identified and approved documents defining the configuration items (CIs) as illustrated in figure 6–l. Once the allocated baseline is established it cannot be changed except by formal change procedures.

b. Automatic test program generator (A TPG). An ATPG produces automated digital stimulus and response patterns (that is, HITS and LASAR).

c. Diagnostic flow chart (DFC). A DFC is a UUT/TEST–oriented flow chart representing the UUT test strategy being implemented on the ATE.

d. Functional baseline. The standard definition of DOD–STD–480A is applicable. As applied to TPSs, the functional baseline is comprised of the documentation illustrated in figure 6–1 and the configuration management plan (CMP), after successful completion of the preliminary design review (PDR).

e. Functional configuration audit (FCA). The FCA is the audit which 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 (MIL–STD–483).

f. Failure mode, effects, and criticality analysis (FMECA) (MIL–STD–785B, Task 204). 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.

g. ICD. The ICD will provide mechanical and electrical connection and signal conditioning, if required, between the ATE and the UUT.

h. Physical configuration audit (PCA). The PCA is the audit that 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 by figure 6–1. After acceptance the documentation becomes the product baseline.

j. Program design language (PDL). A PDL is a standardized, test oriented language for expressing test specifications and procedures independent of test equipment, normally C/ATLAS (IEEE Standard 716 ATLAS).

k. Technical data package (TDP). A TDP is a technical description of an item adequate for use in procurement. 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, quality assurance provisions, and packaging data. As discussed in this chapter, the UUT TDP will include, at a minimum, UUT product specification, testing requirements, UUT schematics, UUT assembly drawings, UUT parts list, and UUT system software documentation as required.

l. Test strategy report (TSR). As required by MIL–STD–2077A, a TSR describes functions and operating modes of 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 is defined independently of the test equipment.

6–3. TPS prerequisites

The items below are necessary to initiate TPS development. These items must be supplied by the MSD to the TPS developer and coordinated with the TRADOC combat developer and training developer. Any effort to begin TPS development without even one of these items will result in cost increases, schedule slippage's, and poor quality. Availability of each of these items must be addressed in the TPSMP prior to FSD.

a. UUT requirements.

(1) Current configurations of the UUTs must be made available. A minimum of two new UUTs per TPS will be furnished. These UUTs will be Government loan equipment to the contractor that will eventually develop the TPS. 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 (chap 10). It is preferable that one UUT be modified for fault insertion (that is, no conformal coating, use of sockets to replace or remove integrated circuits (ICs), and so on).

(2) UUT TDP.

(3) UUT theory of operation.

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

(5) TAR (See MIL–STD–2165 and DI–T–7199).

b. ATE requirements.

(1) The MSD must provide to 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 interconnecting device (ICD) designs.

c. SOW considerations. The TPS SOW states 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. Discrepancies between attained and desired requirements must be resolved by formal documented changes and become a part of the PCA. The SOW must be prepared to accurately reflect the specific requirements such as programming practices, design practices, schedules, deliverables, and quality assurance (QA) and CM requirements of TPSs.

d. Maintenance manuals. Materiel system TMs at the general support level of maintenance and depot maintenance work requirements (DMWRs) at the depot level of maintenance should exist in a draft stage. They should be closely monitored for any impact that the TPS might have on these manuals.

6–4. Preliminary design review (PDR)

a. PDR deliverables. At a minimum, the parties to attend the PDR are the representatives of the MSD, TPS developer, Product Assurance and Test (PA&T), configuration manager, and ATE/TPS center. Timely response to the delivered items by the MSD is vital for the TPS developer to maintain the TPS development schedule. The following items are to be delivered to the MSD from the TPS developer at a prearranged time prior to PDR:

(1) UUT test strategy. The TSR will be prepared per MIL–STD–2077A. The TSR addresses the specific LRU/SRU attributes and performance requirements, the related TPS requirements, and the necessary ATE/TPS interface.

(2) Preliminary ICD design and self–test strategy. The ICD self–test strategy must be included whether or not the ICD has a separate self–test TPS.

b. PDR objectives. The PDR 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 MSD 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 ATPG application.

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

c. Functional baseline. The functional baseline will be established at the completion of the PDR on those CIs illustrated in figure 6–1. Any changes in to this baseline following the PDR will be controlled by the configuration manager as detailed in chapter 8.

6–5. Critical design review (CDR)

a. CDR deliverables. The same parties attending the PDR should also attend the CDR on those configuration items illustrated in figure 6–1. Timely response to the delivered items by the MSD is vital for the TPS developer to maintain the TPS development schedule. The following items are to be delivered to the MSD from the TPS developer at a prearranged time prior to the CDR:

(1) UUT DFC or PDL to include go–chain tests, diagnostic tests, ATE survey tests, UUT identification, ICD identification, etc.

(2) ICD/test accessories design parts list, drawings, and ICD, DFC, or PDL.

(3) ATPG input model.

(4) Fault log of anticipated faults to be inserted by the TPS development engineer during the TPS test and debug phase, based on the most likely UUT faults as identified in the FMECA.

b. CDR objectives. The CDR will be conducted at the completion of the TPS detailed design and ICD/test accessories 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 program logic reflects the FMECA in detecting and isolating 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.

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

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

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

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 explained in chapter 8.

6–6. Test readiness review (TRR)

a. TRR deliverables. The same parties attending the previous reviews should also attend the TRR. The following items are to be delivered to the MSD from the TPS developer at a prearranged time prior to TRR:

(1) Engineering log book 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 development engineer.

(2) Updated DFC or PDL.

(3) ATPG documentation. As an example, ATPG documentation would include a model debug listing, list of all faults detected, list of all faults undetected, list and explanation of all predetects and connections.

(4) Final ICD/test accessories design, parts list, and drawings.

(5) ICD/test accessories engineering working model(s).

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

(7) Software media as defined in DI–H–5545.

(8) Test program instructions as defined in MIL–STD–2077A, and in DI–ATTS–80284.

(9) UUT probing diagrams, if required.

(10) 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 test program, especially long diagnostic chains.

b. TRR 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 TPS software adheres to approved test specifications and utilizes good programming techniques.

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

(3) Confirm that the TPS documentation reflects the TPS software and TPS hardware.

(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 configuration management practices have been followed, and all changes to the allocated baseline have been incorporated.

6–7. Acceptance of TPSs

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

a. Acceptance test plan. An acceptance test 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.

b. FCAs. FCAs will verify that development of the TPS has been completed satisfactorily. FCAs will be conducted on TPSs to ensure that the functional and physical characteristics reflected in the baseline documentation is consistent. In those cases where an ICD is used with only one TPS, the FCA is the same as the acceptance test. When an ICD is used with more than one TPS, the family of TPSs sharing the ICD is known as an operational TPS (OTPS). In this instance, the FCA is conducted after the last TPS in an OTPS is accepted, thus ensuring that no changes were made that would impact a previously accepted TPS.

c. 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.

6–8. 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 6–1 will be controlled by the configuration manager as delineated in paragraph 8–3e.

6–9. Physical configuration audit (PCA)

PCAs establish that the "as–built" configuration of the TPS is accurately reflected in the product baseline. A PCA should be performed incrementally as hardware and software are approved and released to be manufactured so that the PCA is completed at the time the first model or unit is presented for Government acceptance.

6–10. TPS replication

The first production model will be issued a TPS replication QA certification as stated in chapter 7. All remaining production models must be issued TPS replication QA certification prior to installation at user sites.

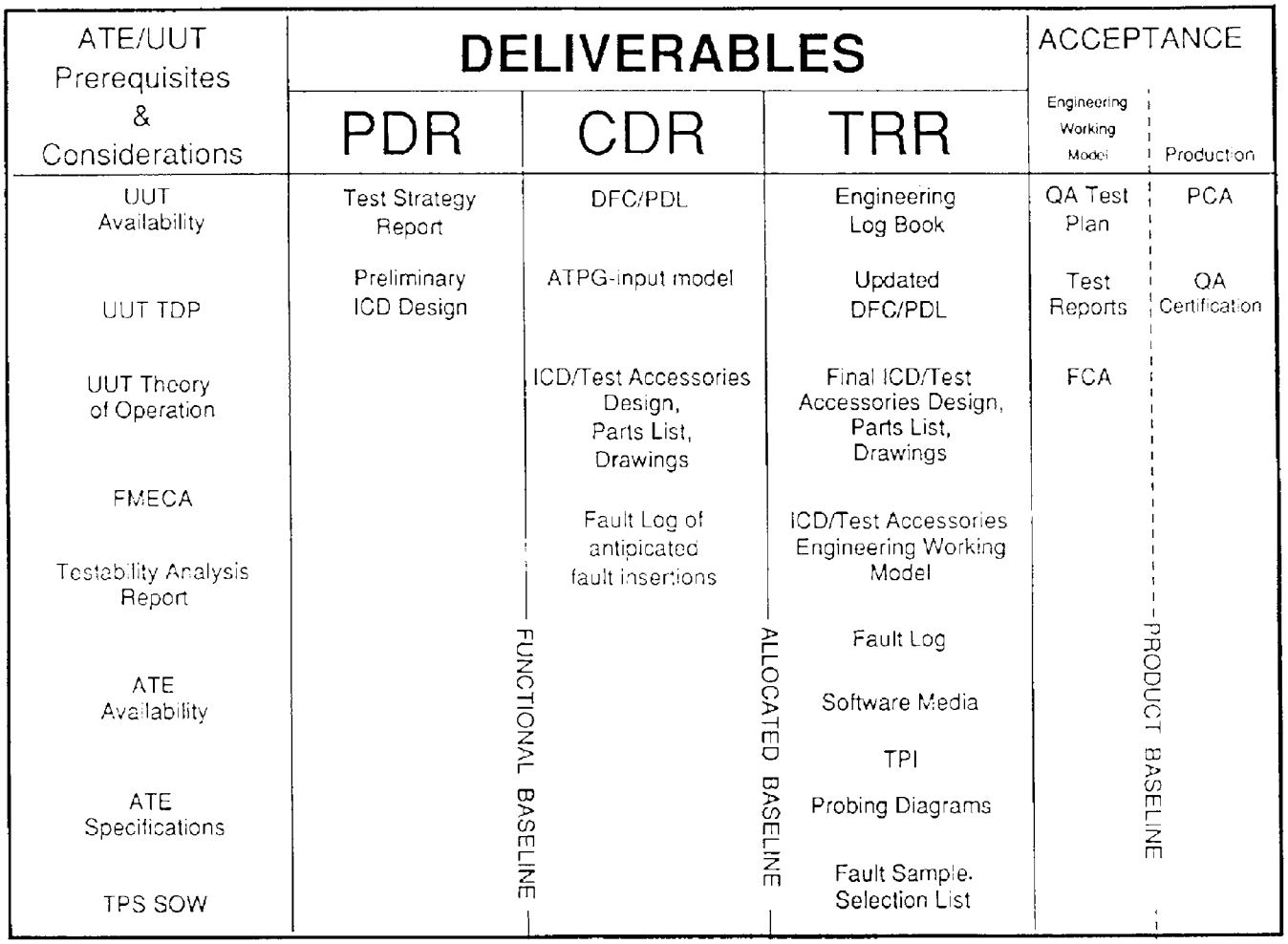

Figure 6-1. TPS Minimum Requirements

Chapter 7
TPS Product Assurance and Test (PA&T)

7–1. 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 and concurred by the TRADOC combat developer and training developer. This is usually the product assurance and test organization of the responsible MSC.

a. PA&T procedures apply to all phases of the TPS life cycle as illustrated in figure 2–1. PA&T is the independent organization charged with the responsibility for independent evaluation and assessment of the TPS quality, adequacy, and suitability.

b. Specifically, the QA process consists of verification and validation (V&V) and certification for release both during the initial development and during postdeployment support.

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.

7–2. PA&T

a. 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.

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

c. TPS development QA certification. This ensures that the TPS conforms to contractual and mission requirements.

d. TPS replication QA certification. This ensures that the duplication contains the same information as the original.

7–3. PA&T participants

a. AMC PA&T directorate. The AMC PA&T directorate oversees PA&T policy and the procedures for assuring acceptability and suitability of TPSs.

b. PA&T directorate. Each MSC PA&T directorate performs the following:

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

(2) Maintains a TPS development QA certification independent of the MSD.

(3) TPS replication certification.

(4) Addresses the correlation of the QA process to production acceptance requirements.

(5) Logs and tracks of SF 368's for TPS problem reporting.

c. MSD. Each MSD will establish and maintain a TPS quality assurance program according to MIL–STD 2168, MIL–STD–2077A, and MIL–1–45208.

7–4. TPS V&V process

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

a. PA&T quality assurance must monitor, review, and assess TPS configuration management, design, and modification changes throughout the TPS life cycle in conjunction with the configuration management, engineering, and other MSC functional areas.

b. PA&T quality assurance processes, relevant to key TPS life cycle tasks shown in figure 7–1, TPS activities, phases, and reviews, are to—

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

(2) Assure that the QA inputs into the TPS SOW are complete, adequate, and within policy, procedures, and guidelines established and/or referenced in this chapter.

c. PA&T quality assurance must verify and assure that the QA program plan developed by the contractor conforms to MIL–Q–9858A, MIL–I–45208 and MIL–STD–2168, or the latest revision thereof. This process must—

(1) Verify that the QA program plan includes the contractor's organization, planning, quality controls, 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) In addition, 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/or procedures.

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

(8) Validate production hardware against the product baseline.

(9) Review the acceptance test report.

7–5. TPS product assurance

Product assurance will assure that product conformance is demonstrated through preliminary design, critical design, and test readiness reviews. These reviews are to be consistent with the TPS activities, phases, and reviews shown in figure 7–1, and coordinated with engineering development management as described in chapter 6.

7–6. Certification and release

a. Certification. The MSC PA&T quality assurance will certify the TPS against development contract requirements, mission requirements, replication, and duplication requirements as discussed in this chapter.

b. TPS 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 U.S. Army Test and Evaluation Command (TECOM), U.S. Army Materiel System Analysis Activity (AMSAA), and U.S. Army Operational Test and Evaluation Activity (OTEA) will focus upon materiel system support, not on individual TPS performance. Specific TPS certification is a function only of the appropriate PA&T activity.

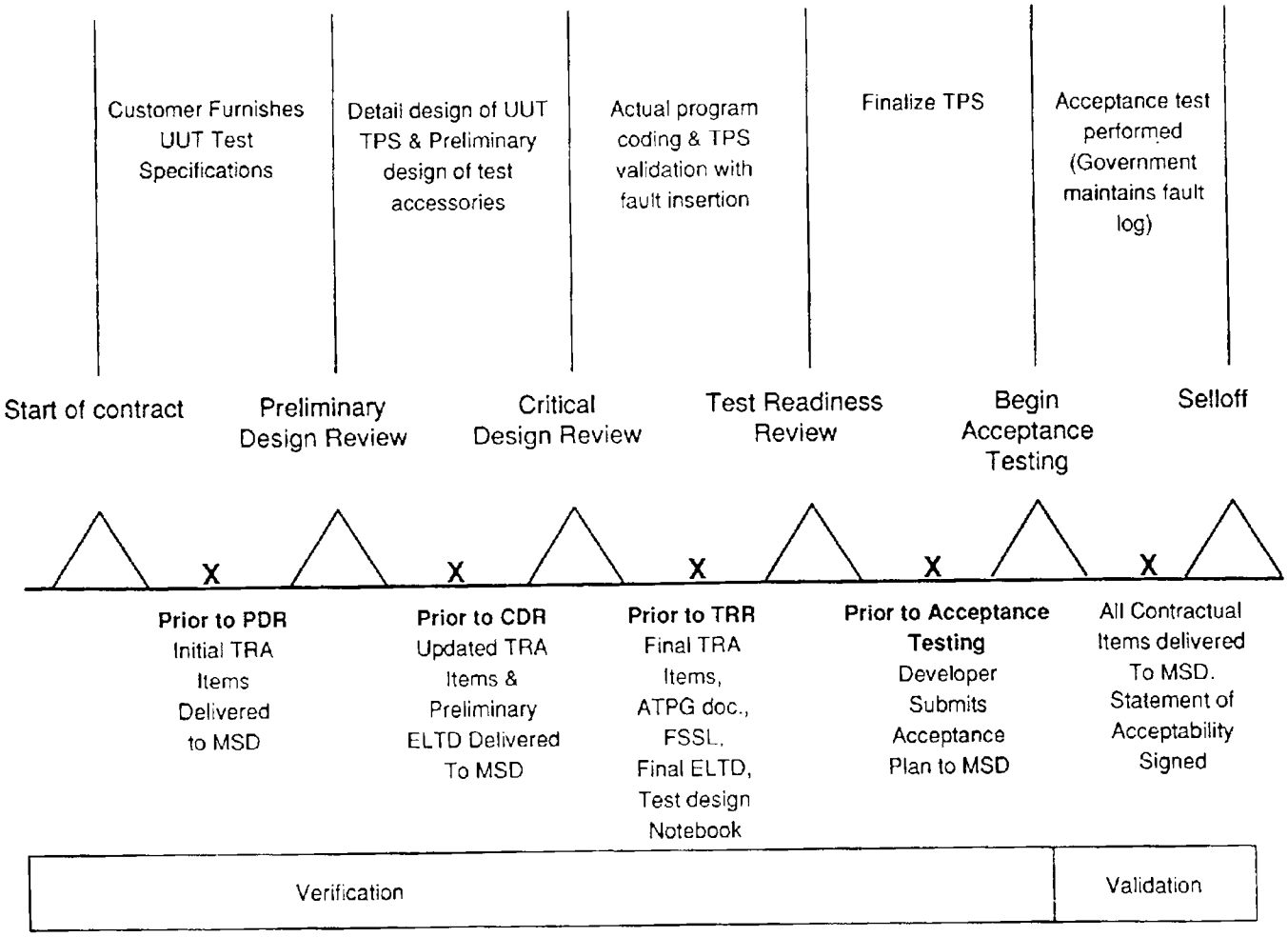

Figure 7-1. TPS Activities, Phases, and Reviews

Chapter 8
TPS Configuration Management

8–1. General
The purpose of this chapter is to explain the CM discipline as applied to TPSs and to separate these functions and procedures from those of the materiel system configuration management organization.

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

b. The overall responsibility for configuration management 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 MSC ATE/TPS center CM organization is limited to that delegated by the materiel system CM manager. The documents describing these responsibilities are the system TPSMP, the ATE/TPS center implementation plan for each MSC, the TPS statement of work, and the TPS configuration management plan (CMP).

8–2. TPS CM 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 cycles. Additionally, CM controls in–house special applications programs used to develop TPSs. An illustration of the TPS CM relationships is provided in figure 8–1 and is further described below.

a. 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. 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.

(4) Updates, as necessary, the TPS database through PM–TPS.

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.

e. PM–TPS will—

(1) Maintain the TPS database.

(2) Ensure proper coordination between the various TPS configuration managers and TPS users to determine TPS problem identification and solution.

8–3. CM organization
The ATE/TPS center will ensure that a qualified TPS configuration management organization commensurate with the magnitude of the TPS workload is in place. This organization will be established according to AR 70–37.

8–4. TPS 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 CIs. A complete description is achieved when all end use functions are satisfied. MIL–STD–483A 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. TPS 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. TPS 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 configuration items (CSCIs) and hardware configuration items (HWCIs). This baseline ensures that all documents from chapter 6 articulating these CIs are identified and controlled after completion of the CDR. This identification base is officially sanctioned by CM as the allocated baseline. Once established, this baseline cannot be changed except under formal change procedures.

c. TPS 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 physical configuration audit, as described in chapter 6, establishes the product baseline. Once established, this baseline cannot be changed except under formal change procedures authorized by higher command. Transfer of the management of the TPS to postdeployment support 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/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 MSC 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 MIL–STD–483A 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 ILS elements. All TPS hardware will be identified by national stock number (NSN), and all TPS software will be identified by a computer program identification number (CPIN) to be assigned by the MSC ATE/TPS center.

f. TPS configuration status accounting. Configuration status accounting (CSA) provides a record–keeping system to track the evolving status of the TPS developing baseline and its changes. CSA provides the tracking that managers need to ascertain the implementation status of the baseline at any time. CSA 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. TPS 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 the data bank accuracy will be accomplished by—

(a) Configuration management PCA.

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

(c) Configuration control master file inventory.

h. PDS/repository. Delegation of the fielded or operational phase of the TPS life cycle is illustrated in figure 8–1. CM responsibility for TPS maintenance support is delegated by the materiel system configuration manager by either a PDS configuration management plan, an MOU, a tasking assignment, or a statement of work to or through the MSC 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 MSC. 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 MSC ATE/TPS center.

8–5. Summary

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

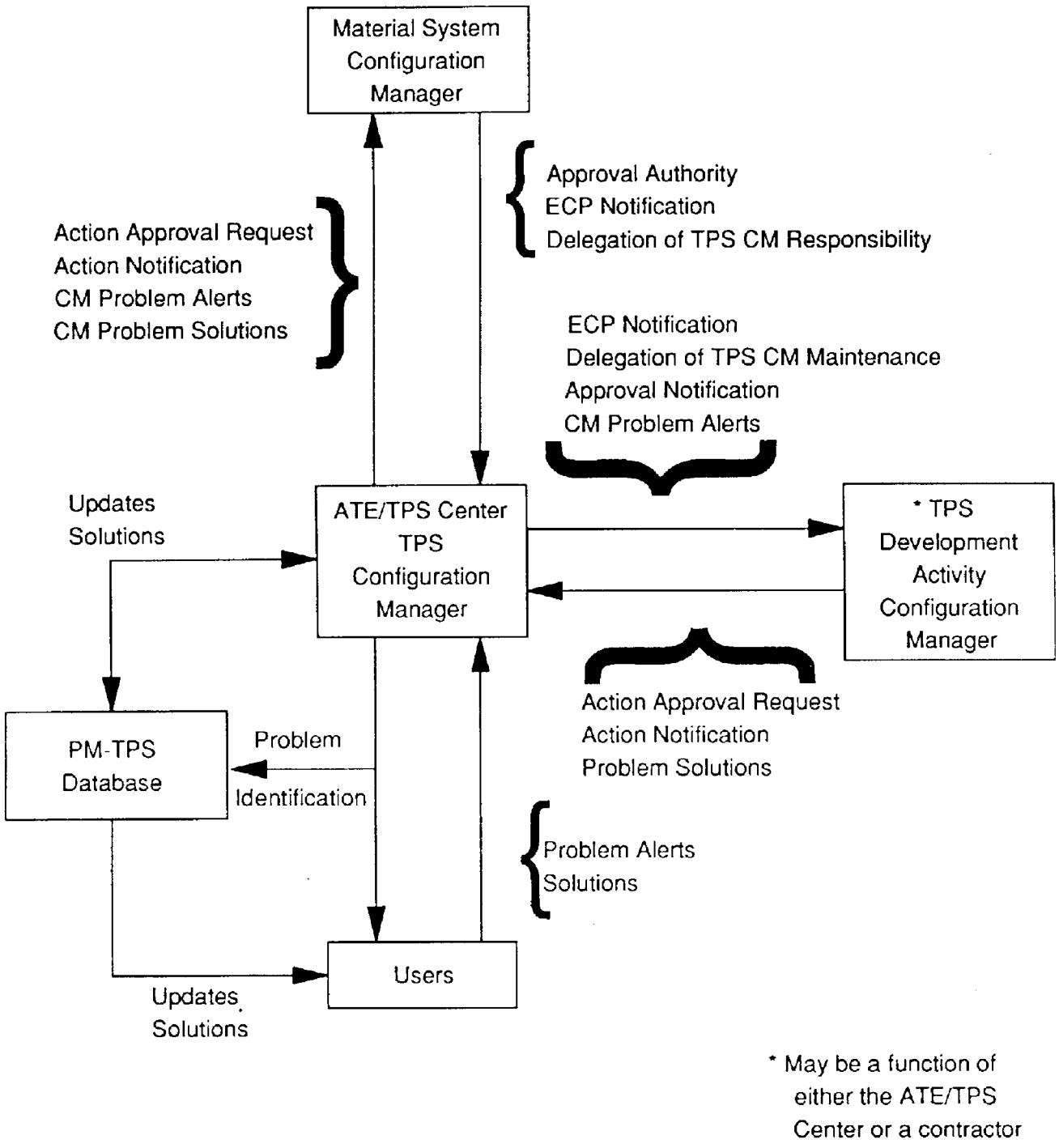

Figure 8-1. TPS configuration management

Chapter 9
ILS Impact of TPSs

9–1. General
ILS for test program sets requires that planning begins during the conceptual phase and continues through to final obsolescence of the prime materiel system. The prime planning document is the TPSMP for the prime materiel system.

9–2. Documentation of planning
Planning documents that will contain TPS ILS issues are as follows:

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

b. MFP. The MSD MFP will contain a TPS annex which will be submitted to PM–TPS for approval. Specifics of the MFP TPS annex are defined in chapter 10.

c. ILSP. The system ILSP (and incorporated LSA process) will include TPS requirements in summary form and reference the TPSMP or include the TPSMP as an appendix to the ILSP.

d. Computer resource management plan (CRMP). The CRMP will reference the TPSMP.

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

9–3. Accountability
TPSs listed as special tools in the LRU or SRU repair parts and special tools list (RPSTL) or DMWR are exempt from separate type classification (AR 70–61, para 1–9). TPSs automatically assume the type classification of each system they support. TPS will be accountable at the using unit by property book (AR 710–2, para 2–5a(8)).

9–4. Supported end system ILS
a. MPF. The supported end system materiel process is not altered by TPS; however the content is. The process must now address all of the issues associated with timely support of an end system with TPSs. The initial fielding of the materiel system will be supported by simultaneous fielding of complete, verified TPSs, or a remedial plan will be addressed. The MFP for the materiel system will describe all elements of system support that are related to non–ATE support, as well as TPS support. The MFP will specifically identify all of 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 by the same requisitioning, distribution, accountability, and authorization process as is currently in place for end system module support. The process is the same, but the quantity may not be. Supply support planners must be privy to the TPSMP and thus must be aware 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 only removal or replacement of items that will be tested or maintained by TPSs. At that point in the system maintenance, the appropriate TPS narrative technical publication will take over. Information delivered to the operator by ATE as display message or operator instruction, per MIL–STD–344, is considered a technical manual. Materiel system technical publications and displayed messages will undergo validation 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 LUR and/or SRU quantities for those LRU/SRU TPSs that provide only end–to–end (functional) testing according to the materiel system maintenance allocation chart (MAC).

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

e. Personnel. Personnel requirements manpower authorization criteria (MACRIT) must include, but not duplicate, loading of the ATE personnel. Logistics assistance representatives (LARs) will be provided in the field as the MSC single face to the field.

f. Training. Training for maintenance personnel must be accomplished per TRADOC–approved military occupational specialty (MOS) courses.

9–5. TPS ILS
Complete and total ILS will be accomplished according to AR 700–127. The ATE/TPS center will perform or task the required ILS functions to ensure adequate support for TPSs. The items below relate to TPS ILS:

a. MFP TPS annex. The MFP TPS annex, as discussed in detail in chapter 10, must be completed and submitted to PM–TPS for approval.

b. Supply support for TPSs. TPS elements will be provisioned according to AR 700–18, MIL–STD–1561B and based upon appropriate factors. Coordination for TPS distribution will be by the MSC ATE/TPS center.

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

(1) Materiel system TPS storage requirements.

(2) Allocated materiel system TPS storage space by Program Manager, Test Measurement and Diagnostic Equipment.

d. TPS support. The TPS maintenance concept will be established through logistic analysis to support initial fielding. A MAC will be prepared. The problem reporting process is detailed in chapter 10. Configuration management procedures are detailed in chapter 8.

e. Personnel. TPS fielding team personnel and duties are described in chapter 10. Personnel requirements must also include additional quantity of LARs necessary to support the system workloading impact on the LAR's function. LARs will be involved in TPS fielding, TPS problem report preparation and any TPS–related delta training.

f. Technical manuals. For all maintenance procedures using ATE, normally a TM–40 and TM–40P separate from the overall system publications will be developed per MIL–M–63038B, unless the maintenance procedure is performed only at depot level, in which case a depot maintenance work requirement (DMWR) will be developed. TPS hardware support requires the development of a TM–24 and TM–24P per MIL–M–63038B.

9–6. TPS problem reporting
TPS problem reporting will be accomplished by using SF 368 (Quality Deficiency Report) for TPS hardware and software. DA form 2028 (Recommended Changes to Technical Publications) will be used for technical manual 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 MSC ATE/TPS center, the MSC PA&T directorate, and PM–TPS.

9–7. Distribution of TPSs
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.

Chapter 10
Fielding of TPSs

10–1. General
This chapter covers test program set integrated logistics support, beginning with planning and continuing through life cycle maintenance support. Intent for this chapter is to provide MSDs with definitive procedures regarding TPS planning, fielding, and life cycle support.

10–2. TPS requirements
TPS requirements must be determined early in the materiel system concept evaluation phase (fig 2–2 and chap 3). Once TPS requirements have been defined by this process they will be identified in the appropriate RPSTL.

10–3. MFP
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 Product Manager, Test Program Sets, ATTN: AMCPM–TMDE–EA, Red Stone Arsenal, AL 35898–5400. The TPS annex will consist of the following:

a. TPS documentation requirements, including separate technical manuals (–40, –40P, –24, –24P), developed per MIL–M–63038B for TPS maintenance actions. In no case will the TPS source code be fielded below configuration management level.

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

c. Maintenance concept for ICD repair.

d. TPS component provisioning procedures (for example, ICDs, TMs, spare ICD parts, software, transit cases, and so forth).

e. Plans for TPS prefielding team to support materiel system developer new equipment training (NET) (AR 750–43).

f. Plans for audit/follow–up for subsequent TPS fielding from MSC ATE/TPS support center repository (that is, without a new equipment training team (NETT)).

g. TPS storage space requirements at MSC ATE/TPS center(s) and each user site.

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

i. Plans identifying workloading impact for user site(s). 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 Program Manager, Test Measurement Diagnostic Equipment, for consolidated bench stock list (CBSL).

10–4. MFP TPS annex approval
One copy of materiel system MFP with its TPS annex will be coordinated with TRADOC and provided to PM–TPS. Per AR 750–43, PM–TPS will exercise approval authority for the TPS annex of materiel system MFP. An approved TPSMP, as the TPS annex of the MFP, will meet the above requirements.

10–5. TPS prefielding
Prefielding identifies all TPS efforts until the materiel system first unit equipped date (FUED). Listed below are duties of the major U.S. Army activities involved with test program set development.

a. The MSD—

(1) Develops TPS prefielding technical assistance teams. Every MSD will establish a TPS prefielding technical assistance team. The TPS prefielding technical assistance team, which will be addressed in the TPS annex to the MFP, will provide TPS technical assistance to the materiel system NET team during DT/OT I and II. Members of the TPS prefielding technical assistance team may be contractors, ATE/TPS center representatives, and/or their authorized representatives.

(2) Prepares for PM–TPS approval, the materiel system TPSMP.

(3) Identifies all TPSs required per chapter 3.

(4) Plans funding for all significant events that occur during the TPS life cycle up to FUED; that is, TPS development, TPS fielding (including funding for TPS production quantities), and TPS support disciplines such as TPS configuration management and control.

(5) Ensures that TPSs to be developed are consistent with directives referred to in this pamphlet.

(6) Ensures that the TPS annex contents in the MFP and key TPS annex milestone schedules based on support up to FUED are accurately and successfully adhered to.

(7) Initiates all correspondence related to TPSs proposed to be used as system support equipment for the materiel system under development.

(8) Enlists the technical support of MSC ATE/TPS center representatives at the beginning of the conceptual phase of materiel system development.

(9) Informs coordinate and gain approval from PM–TPS for all actions related to planned TPS development.

b. MSC ATE/TPS center(s) provide TPS technical support to the MSD for TPS development activities occurring during concept exploration (CE), development and validation (DV) and FSD phases of materiel system development. Examples of TPS technical support provided are as follow:

(1) Attendance and participation in materiel system ILSMTs.

(2) Participation in ATE/TPS requirements definitions.

(3) Assistance in preparation of TPS statements of work.

(4) Attendance at TPS design reviews and audits.

(5) Service as the key Government engineering representative for TPS acceptance testing at TPS development facilities.

c. PM–TPS and/or its authorized representatives will—

(1) Serve as the designated U.S. Army watchdog for all aspects of MSD TPS requirements.

(2) Review and provide approval of all MSD TPS implementation plans.

(3) Review and provide approval of all MSD TPSMPs.

(4) Review and provide approval of each materiel system MFP TPS annex.

(5) Monitor progress of all U.S. Army TPS efforts and report to the executive director for TMDE, AMC Headquarters.

(6) Establish, maintain and manage an AMC TPS database.

d. TRADOC combat developers/training developers—

(1) Serve as the TRADOC designated representative for ATE and TPS development.

(2) Review and provide concurrence of all TPS fielding plans.

(3) Monitor progress of all TPS developmental efforts for HQ TRADOC.

(4) Participate in MSC TPS milestones.

(5) Validate TPS procedures prior to fielding.

10–6. TPS fielding
TPS Fielding is the term used to identify TPS deployment, which occurs at FUED. On occasion, the complete complement 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. To the extent that this condition does exist, the definition of the term "fielding" is broadened to include TPS deployment that will occur after FUED. It is strongly recommended that a TPS Materiel Fielding Team (MFT) be established. The MSD, TPS developer, and TPS user will determine jointly whether an MFT will be established. The TPS fielding team differs from the TPS prefielding technical assistance team described previously in that the TPS fielding teams

Appendix A
References

Section I
Required Publications

AR 70–1
System Acquisition Policy and Procedures. (Cited in paras 1–4, 2–2, 2–3.)

AR 750–1
Army Materiel Maintenance Concepts and Policies. (Cited in paras 1–1, 3–1.)

AR 750–43
Test, Measurement and Diagnostic Equipment. (Cited in paras 1–1, 1–4, 2–3, 3–6, 5–6, 5–8, 10–3, 10–4.)

Section II
Related Publications

AR 70–37
Configuration Management

AR 70–61
Type Classification of Army Materiel

AR 700–18
Provisioning of U.S. Army Equipment

AR 700–127
Integrated Logistics Support

AR 710–2
Supply Policy Below the Wholesale Level

AR 1000–1
Basic Policies for Systems Acquisition

DA Pam 70–21
The Coordinated Test Program

DODD 4345.7–M
Transition from Development to Production

DODD 5000.1
Major System Acquisition

DODD 5000.39
Acquisition and Management of Integrated Logistic Support for Systems and Equipment

DOD–STD–480A
Configuration Control–Engineering Changes, Deviations, and Waivers

MIL–STD–344
Display Messages for Automatic Test Equipment

MIL–STD–483
Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs

MIL–STD–785B
Reliability Program for Systems and Equipment Development and Production

MIL–STD–1388–lA
Logistic Support Analysis

MIL–STD–1561B
DOD Uniform Provisioning Procedures

MIL–STD–2077A
General Requirements for TPS

MIL–STD–2165
Testability for Electronic System and Equipment

MIL–STD–2167
Defense System Software Development

MIL–STD–2168
Software Quality Assurance Program Requirements

MIL–I–45208
Quality Program Requirements

MIL–M–63038B
Manual Technical Organizational of Aviation Intermediate, Direct Support and General Support Maintenance

MIL–Q–9858A
Quality Program Requirements

IEEE–STD–716
C–ATLAS

Section III
Prescribed Forms
This section contains no entries.

Section IV
Referenced Forms

DA Form 2028
Recommended Changes to Publications and Blank Forms

SF 368
Quality Deficiency Report

Appendix B
TPS Management Plan (TPSMP) Format Guidance

B–1. Role of TPSMP

The TPSMP is the central document for planning the budgeting, acquisition, development, deployment, and life cycle support of test program sets. 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. To this end, an outline of the minimum requirements of a TPSMP is provided.

B–2. Participants

The MSD is the key player for the preparation, content, and submission of the TPSMP. The ATE/TPS center at each MSC will assist in the preparation of TPSMPs as well as all updates and revisions as required. Contributing organizations, including the MSC PA&T, integrated logistics support, configuration management, technical training, and publications organizations, as well as the Test Integration Working Group (TIWG), TPS user activities, and TPS developers, all will provide inputs to the TPSMP. PM–TPS will approve or disapprove the TPSMP.

B–3. TPSMP format

The TPSMP is divided into seven sections: General Description, Program Management and Funding, Acquisition Management, Development Management, Product Assurance & Test Management, Configuration Management, and ILS Management. The paragraphs below address the stated objectives of the TPSMP.

B–4. TPSMP outline

a. Section 1 of the TPSMP is entitled General Description. It provides an overview of the materiel system, its overall TPS requirements, and the relationship of the TPSs to the system built in test and built in test equipment (BIT/BITE). Subparagraphs (1), (2), and (3) below should all be addressed in the initial submission of the TPSMP (milestone 1 of the materiel system life cycle) and updated 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 is entitled Program Management and Funding. It 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. Subparagraph (1) below will be addressed in the initial submission of the TPSMP (milestone 1 of the materiel system life cycle). Subparagraphs (2) through (6) below will be addressed prior to entering the FSD phase of the materiel system (milestone 2).

(1) Identify the MSD and the ATE/TPS center with overall management responsibility for the integration of TPSs.

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

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

(4) Plans for cost modeling, logistics support analysis per MIL–STD–1388–lA, audits, ILS support, 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 to the Central TMDE Activity (CTA).

(5) Plans and justification for acquisition of required ATE, ATPG, and so forth required for TPS development, deployment, and postdeployment support.

(6) Breakout of projected ATE and TPS costs will be provided in the form of a first–level TPS work breakdown structure (WBS). Type of funds should also be identified for each of the WBS elements.

c. Section 9 of the TPSMP is entitled TPS Acquisition Management. It identifies the TPS acquisition strategy, the risks involved, and the trade–offs to be considered. If additional test programs are identified later in a program, this section will be updated and resubmitted within 60 days. Paragraphs (1) through (5) will be addressed prior to entering the FSD phase of the materiel system life cycle (milestone 2).

(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 ILS studies, economic analysis, feasibility studies, experience, and/or participating activity inputs. Included in this documentation will be the results of trade–offs between BIT/BITE and TPS as well as the results of any design for testability studies.

(2) If nonstandard automatic test equipment (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 test program languages will be used. Deviations from the AMC ATE policy must be approved according to that policy. If nonstandard ATE is to be used, this fact must be clearly identified. If a waiver for nonstandard ATE has been requested or approved, 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/ 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 is entitled TPS Development Management. It addresses and documents the TPS developer's approach for the development of TPS software, hardware, and documentation. Subparagraphs (1) and (2) will be addressed prior to entering the FSD phase of the materiel system life cycle (milestone 2). Subparagraphs (3) through (7) will be completed and submitted within 60 days of the selection of the TPS developer.

(1) Identify the source of TPS development (that is, 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 on) necessary for the TPS developer to support the development and testing of the TPSs.

(3) 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, ICD design, ICD testability, ICD fabrication, ICD production, software development, drafting, and TPS checkout.

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

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

identification of security controls and requirements for both classified and unclassified work.

(4) Provide a development schedule for each TPS configuration item 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 (that is, PDR, CDR, TRR) and audits (that is, PCA, FCA).

(b) The approach the TPS developer will use for monitoring and reporting the status of TPS development to the MSD at the in–process reviews (IPRs).

(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 MSC ATE/TPS center on configuration items after the establishment of the TPS functional baseline.

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

(a) TPS software topics will include modularity, readability, simplicity, and self–explanation.

(b) TPS hardware (ICD/Test Accessories) topics will include ease of ICD modification, simplicity, use of standard parts, expandability, and standard ICD design. The greatest number of unique ICDs will be specifically addressed.

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

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

e. Section 5 of the TPSMP deals with TPS product assurance and test management. It addresses the management of the Government product/quality assurance of TPSs throughout the TPS life cycle. Subparagraphs (1) through (4) will be addressed prior to entering the FSD phase of the materiel system life cycle (milestone 2).

(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/or process used for TPS verification at each of the various design reviews and audits (PDR, CDR, TRR, FCA, 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/or 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 quality control 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 involves TPS configuration management. This section addresses the Government configuration management procedures necessary to identify, establish, and control the TPS baselines. This phase starts with the TPS functional baseline and continues through allocated baseline, product baseline, and postdeployment support. Subparagraphs (1) through (9) will be addressed prior to entering the FSD phase of the materiel system life cycle (milestone 2).

(1) Identify the organization (materiel system configuration manager) of primary responsibility for the configuration management of the materiel system prior to materiel system transition.

(2) Identify the organization (materiel system configuration manager) of primary responsibility for the configuration management of the materiel system after materiel system transition.

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

(4) Identify the procedures for disseminating UUT modifications/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 (PDR, CDR, TRR, FCA, and PCA).

(6) Explain approval/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 (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 deals with TPS integrated logistics support management. This section identifies the training, equipment, and procedures necessary to support TPSs after transfer of TPS program management to the MSC ATE/TPS Center. This section also addresses the basic agreements between the supporting and using commands for management and support of TPSs. After approval by PM–TPS of the TPSMP, this section of the TPSMP will be included as an annex of the MSD's materiel fielding plan (MFP). Subparagraphs (1) through (5) will be addressed prior to entering the FSD phase of the materiel system life cycle (milestone 2).

(1) Identify postdeployment support organizations.

(a) The organization of primary management for the PDS of TPSs is the MSC ATE/TPS center. Identify the organization primarily implementing the PDS changes as directed by the MSC 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: TPS software (tapes, disks, and so forth); TPS ICD/test accessories/spare parts; TPS documentation; TPS product baseline; ATE supporting software (software for ATE self–tests); ATE supporting hardware (ICDs for ATE self–tests); ATE spare parts/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) TPS software (tapes, disks, and so on),
(b) TPS ICD/test accessories/spare parts,
(c) TPS documentation,
(d) ATE supporting software (software for ATE self–tests),
(e) ATE supporting hardware (ICDs for ATE self–tests), and
(f) ATE spare parts and equipment.

(3) Identify the qualifications necessary 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.

Table B–1
Format of TPS Funding Requirements

Program	Current FY	Current FY+1	Current FY+2	Current FY+3	Current FY+4
RDTE Funded	1.0M	1.0M	0.0M	0.0M	0.0M
Unfunded	1.0M	1.0M	0.0M	0.0M	0.0M
PAA 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

Glossary

Section I
Abbreviations

AMC
Army Materiel Command

AMMS
Acquisition management milestone system

AMSAA
Army Materiel Systems Analysis Activity

ARNG
Army National Guard

Assy
assembly

ATE
automatic test equipment

ATP
acceptance test plan

ATPG
automatic test program generator

BIT
built–in–test

BITE
built–in–test–equipment

BSTF
Base Shop Test Facility

CBSL
consolidated bench stock list

CD
combat developer

CDR
critical design review

CDRL
contract data requirements list

CE
concept exploration

CI
configuration item

CM
configuration management

CMP
Configuration Management Plan

CPFF
cost plus fixed fee

CPIF
cost plus incentive fee

CPIN
Computer Program Identification Number

CRMP
Computer Resources Management Plan

CSA
configuration status account

CSAR
Configuration Status Account Report

CSCI
computer software configuration item

CTA
Central TMDE Activity

CTP
Coordinated Test Program

CTS
Contact Test Set

DA
Department of the Army

DCAA
Defense Contract Audit Agency

DCAS
Defense Contract Administration Services

DESCOM
U.S. Army Depot Systems Command

DFC
diagnostic flow chart

DFT
design for testability

DID
data item description

DMWR
depot maintenance work requirement

DT/OT
development test/operational test

DV
development and validation

E/E
end to end TPS

EAC
echelon above corps

ECP
engineering change proposal

EDT
Executive Director for TMDE

ELTD
English Language Test Document

ESD
electro–static discharge sensitive device

FCA
functional configuration audit

FFP
firm fixed price

FMECA
failure mode, effects and criticality analyses

FPIF
fixed price incentive fee

FSD
full scale development

FSSL
fault sample selection list

FUED
first unit equipped date

GFE
Government furnished equipment

GS
general support

HQ
headquarters

HCI
hardware configuration items

IC
integrated circuit

ICD
interconnecting device

ICLS
interim contractor logistics support

ILS
integrated logistics support

ILSMT
integrated logistics support management team

ILSP
Integrated Logistics Support Plan

IOC
initial operational capacity

LAR
logistics assistance representative

LASAR
logic and stimulus automatic response

LLTIL
long lead time items list

LORA
level of repair analysis

LRU
line replaceable unit

LSA
logistics support analysis

LSAR
logistics support analysis report

MAC
maintenance allocation chart

MACRIT
manpower authorization criteria

MFA
Materiel Fielding Agreement

MFP
Materiel Fielding Plan

MFT
Materiel Fielding Team

MOS
military occupational specialty

MOU
Memorandum of Understanding

MSC
major subordinate command

MSD
materiel system developer

NET
new equipment training

NETT
new equipment training team

NICP
national inventory control point

NSN
national stock number

NSO
national stock objective

O&S
operation and support

OBT
on board test

OMA
Operational and Maintenance, Army

OTEA
Army Operation Test and Evaluation Agency

OTPS
operational test program set

PA&T
product assurance and test

PA
procurement appropriations

PCA
physical configuration audit

PCB
printed circuit board

PDL
program design language

PDR
preliminary design review

PDS
postdeployment support

PIP
product improvement program

PM–ATSS
Product Manager, Automatic Test Support System

PM–TPS
Product Manager, Test Program Sets

PMP
Project Master Plan

PO
Purchase Order

PPL
provisioning parts list

PPS
provisions performance schedules

PROM
programmable read only memory

PS
production set

QA
quality assurance

RDTE
research, development, test and evaluation

RFI
ready for issue

RFP
request for proposal

ROR
repair on return

RPSTL
repair parts and special tools list

SOW
statement of work

SRU
shop replaceable unit

SSEB
source selection evaluation board

STE–X
simplified test equipment—expandable

TAR
testability analysis report

TDP
technical data package

TECOM
U.S. Army Test and Evaluation Command

TIWG
test integration working group

TM
technical manual

TMDE
test, measurement, and diagnostic equipment

TPI
test program instruction

TPS
test program set

TPSMP
Test Program Set Management Plan

TRA
test requirements analysis

TSR
test strategy report

TRR
test readiness review

TRADOC
U.S. Army Training and Doctrine Command

USAR
U.S. Army Reserve

UUT
unit under test

V&V
verification and validation

WBS
work breakdown structure

Section II
Terms

Allocated baseline
Identified and approved documents which define the CI.

ATE/TPS center
The central point of focus, at the MSC level, for ATE and TPS automatic test issues.

Baseline
CM milestone achieved, marked by controlled documentation.

Certification
Endorsement of reliability.

Diagnostic test
Test that isolates the fault to the level of replaceable item.

go–chain
Functional test of the UUT.

LASAR
Digital test design tool for ATPG.

Manual test
Test performed using manual equipment.

Product baseline
Describes "build–to" requirements.

Repository
A receptacle for storage.

Test accessories
The items required to interface an ATE TPS.

Validation
Official confirmation/approval.

Verification
To ascertain correctness.

Section III
Special Abbreviations and Terms
This section contains no entries.

Index

This index is organized alphabetically by topic and by subtopic within a topic. Topics and subtopics are identified by paragraph number.

USAPA

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