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FINAL REPORT

IMPLEMENTING GUIDANCE FOR LOGISTIC SUPPORTABILITY TEST AND EVALUATION

JULY 1981

U. S. ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY
LOGISTICS STUDIES OFFICE
FORT LEE, VIRGINIA 23801

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The testing and evaluation of logistic supportability has not received the same emphasis or attention as that given to the test and evaluation of the hardware subsystem. This study recommends specific changes to regulatory guidance dealing with logistic supportability and the scheduling of a dedicated logistic supportability evaluation and dedicated prototype models for use in logistic supportability testing. A procedure for utilizing trained military personnel as players during the logistic supportability phase of development testing is also presented.

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RICHARD MARTINKO

US ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY
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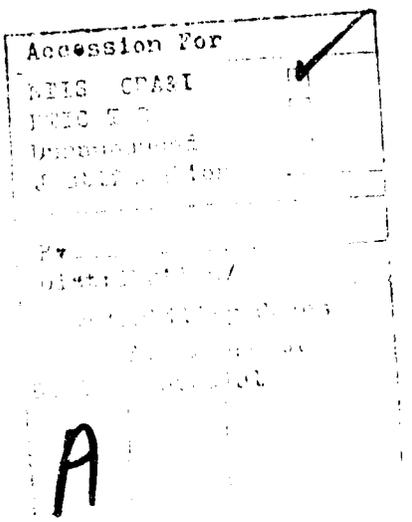
ABSTRACT

The testing and evaluation of logistic supportability has not received the same emphasis or attention as that given to the test and evaluation of the hardware subsystem. This study recommends specific changes to regulatory guidance dealing with logistic supportability and the scheduling of a dedicated logistic supportability evaluation and dedicated prototype models for use in logistic supportability testing. A procedure for utilizing trained military personnel as players during the logistic supportability phase of development testing is also presented.



Report Title: Implementing Guidance for Logistic Supportability Test and Evaluation

Study Number: LSO 006

Study Initiator and Sponsor: US Army Materiel Development and Readiness Command
Directorate for Readiness (DRCRE-IP)
5001 Eisenhower Avenue
Alexandria, VA 22333

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EXECUTIVE SUMMARY

1. Authority for the Study. The Directorate for Readiness (DRCRE-IP), US Army Materiel Development and Readiness Command (DARCOM), is the sponsor of this study. Tasking was by letter, DRCPA-S, HQ DARCOM, 13 February 1980, subject: Study Plan for LSO Project 1006. Additional guidance was provided by DF from DRCRE-I on 13 February 1981 as a result of a Study Advisory Group (SAG) meeting on 18 September 1980.

2. Problem Statement. The testing and evaluation of logistic supportability has not received the same emphasis or attention as that given to the test and evaluation of the hardware subsystem. Logistic support should be afforded a status equal to that of a hardware subsystem for testing and for assessing the suitability-for-use and suitability-for-issue to the troops of the overall system being tested.

3. Objectives. The objectives of this study were:

a. To develop, coordinate, and establish procedures and actions necessary to use Military Occupational Specialty (MOS) trained military personnel as players during the logistic supportability phase of development testing (both contract and organic).

b. To develop procedures and actions necessary to identify, justify, program, and schedule a dedicated logistic supportability evaluation and dedicated prototype models for use in logistic supportability testing.

c. To develop a life cycle plan for logistic supportability testing and evaluation.

4. Scope of the Study. The study involves a review of current regulations related to developer/user tests and test personnel. All Department of the

Army (DA) and DARCOM regulatory guidance dealing with logistic supportability testing were identified and analyzed. Procedures and actions needed to insure that a team of trained military personnel are available as players during the logistic supportability phase of development testing were examined. The feasibility of establishing a dedicated logistic supportability evaluation and dedicated prototype models for use in testing were carefully reviewed and analyzed. A life cycle plan for logistic supportability testing and evaluation has been prepared for insertion in DA Pamphlet 700-127.

5. Methodology.

a. The study involves a review of current regulations related to developer/user tests and test personnel. All DA and DARCOM regulatory guidance dealing with logistic supportability testing has been identified and analyzed.

b. Regulatory guidance dealing specifically with Life Cycle Management Models (LCMM) has been carefully reviewed and analyzed. Documents include the following:

(1) DA Pamphlet 11-25, Life Cycle System Management Model for Army Systems, May 1975.

(2) DA Pamphlet 700-127, Integrated Logistic Support Management Model and Glossary, April 1979.

(3) DARCOM Regulation 11-27, Life Cycle Management of DARCOM Materiel, 30 June 1977.

c. Visits or telephonic communication with the following activities were conducted: US Army Test and Evaluation Command (TECOM), US Army Materiel Systems Analysis Activity (AMSAA), US Army Operational Test and Evaluation Agency (OTEA), US Army Logistics Center (LOGC), US Army Materiel Readiness Support Activity (MRSA), Air Force, and others as deemed necessary to research current procedures and their effectiveness.

b. Conclusions.

a. The Five Year Test Program (FYTP) and the Test Schedule and Review Committee (TSARC) process is an adequate mechanism for acquiring supplementary troop support for user testing and developmental testing.

b. There is a need for each DARCOM test activity to maintain a staff of experienced Soldier/Operator/Maintainer Test and Evaluation (SOMTE) personnel representing the full spectrum of user and maintainer skills associated with the kinds of systems tested by that activity.

c. The Table of Distribution and Allowances (TDA) of each DARCOM test activity should designate spaces as primary SOMTE spaces. Such personnel would be available for full-time assignment to SOMTE and SOMTE-related activities.

d. The Test Design Plan (TDP) should clearly delineate and give specific guidance for SOMTE involvement in any given test situation. SOMTE personnel can be effectively utilized for early contractor testing.

e. A clear distinction must be made in evaluating logistic supportability. The test of the System Support Package (SSP) is not to be confused with those logistic functions performed to provide test continuity. The planned logistic support which should be tested is that to be provided with the fielded system to determine the capability of planned support to sustain operations in the field.

f. Logistic supportability evaluations are not meeting the intent of current acquisition policies which require that weapon systems and their respective logistic systems be evaluated at milestone decision points to assess suitability characteristics and project operational readiness.

g. Test programs conducted prior to Milestone II have been oriented toward "proof of design" concept with little emphasis on logistic supportability.

h. Test plans and policies should take account of the fact that not all elements of logistic support will be available in their mature configuration for testing prior to Milestone III.

i. The SSP should be identified early in the life cycle program as a distinct entity and should be clearly stated as such in all contracts for both prototype and production items.

j. One of the key problems related to logistic supportability is the lack of weapon systems prototype availability during the development phases to prepare required manuals and other essential logistic programs. This problem can be resolved by providing an additional prototype of the weapon system which would be devoted solely to logistic supportability testing during the Full Scale Engineering Development (FSED) phase.

k. Sufficient hardware, time, and planning are not assigned to Physical Teardown/Logistic Demonstration (PT/LD). Sufficiently matured versions of SSP are not provided for test; and thus, logistic supportability testing never seems to end because it is spread out over the developmental time span.

l. Concepts presented in this study will require changes to regulatory guidance related to logistic supportability testing and evaluation.

m. For logistic supportability testing to be given proper attention and emphasis, it would be highly desirable to conduct a dedicated nonwaiverable Logistic Support Evaluation (LSE) as a subtest of both DT II and OT II. Emphasis would be directed to testing a complete SSP or those elements of the SSP not previously tested.

n. Life cycle logistic support testing conducted prior to LSE should be limited to that effort needed to assure sufficiently matured elements of support are available at the time of the LSE. Early logistic testing efforts could well be considered as an integral part of the end item tests and not scored separately.

7. Recommendations. It is recommended that:

a. Each DARCOM test activity designate certain positions on their TDAs as SOMTE spaces. These positions are to be further categorized by their commitment to SOMTE activities such as: primary, auxiliary, or temporary; or by the level of their qualifications as senior, intermediate, or junior.

b. The TDP clearly define SOMTE responsibilities in any given test situation.

c. At least two prototypes be procured for the FSED phase of the acquisition cycle. The second prototype to be dedicated exclusively for System Support Package/Skill Performance Aids (SSP/SPA) purposes to insure that logistic supportability and training programs proceed at the pace required for testing and implementation of the logistic and training functions.

d. Each contractor be required to prepare and execute a Logistic Support Analysis (LSA) plan which provides Logistics Support Analysis Record (LSAR) output summaries at the appropriate time to support preparation of draft documentation.

e. With the availability of a dedicated prototype for SSP purposes, insure that a satisfactory PT/LD is performed using MOS qualified personnel. The PT/LD is performed using validated, baseline LSAR output reports and draft copies of Technical Manuals (TMs), Extension Training Materiels (ETMs), Provisioning Lists (PLs), and Maintenance Allocation Charts (MACs).

f. A dedicated nonwaiverable Logistic Support Evaluation (LSE) be conducted as a subtest of both DT II and OT II. Emphasis is placed on testing those elements of the SSP not previously tested.

g. SOMTE personnel be utilized for early contractor testing.

h. Logistic Support Evaluation (LSE) test results be submitted for consideration of an In-Process Review (IPR) which would assess the impact on planned deployments, assign corrective actions, and inform DARCOM and Army management.

i. Regulatory guidance related to logistic supportability test and evaluation be changed as presented in Appendix A.

MAIN REPORT

1. Statement of the Problem. The testing and evaluation of logistic supportability has not received the same emphasis or attention as that given to the test and evaluation of the hardware subsystem. Logistic support should be afforded a status equal to that of a hardware subsystem for testing and for assessing the suitability-for-use and suitability-for-issue to the troops of the overall system being tested.

2. Background. Logistics Studies Office (LSO) Project 805, Integrated Logistic Support (ILS) Guide for Demonstration, Test and Evaluation of Logistic Supportability, represented the initial Fiscal Year (FY) 78 study effort on this subject. The FY 79 phase of this study was assigned to the US Army Test and Evaluation Command (TECOM) with the expectation that TECOM's study effort would complete and validate the methodology. It was anticipated at that time that additional work might be assigned to LSO to provide implementation guidance. A meeting at Headquarters, US Army Materiel Development and Readiness Command (HQ DARCOM), on 11 October 1979 between representatives of the Directorate for Readiness, TECOM, and LSO revealed that the TECOM study was not directly related to implementation considerations. As a result of this meeting, the study objectives and specific tasks for this study were more clearly outlined and delineated in the objectives described below. A subsequent meeting of the Study Advisory Group (SAG) on 18 September 1980 reviewed the initial draft study and determined that additional research was needed to meet the stated objectives of the study.

3. Study Objectives.

a. Develop, coordinate, and establish procedures and actions necessary to use Military Occupational Specialty (MOS) trained military personnel as players during the logistic supportability phase of development testing (both contract and organic).

b. Develop procedures and actions necessary to identify, justify, program, and schedule a dedicated logistic supportability test and dedicated prototype models for use in logistic supportability testing.

c. Develop a life cycle plan for logistic supportability testing and evaluation.

4. Scope of the Study. The study will involve a review of current regulations related to developer/user tests and test personnel. All Department of the Army (DA) and DARCOM regulatory guidance dealing with logistic supportability testing will be identified and analyzed. A life cycle plan for logistic supportability testing and evaluation will be prepared to include prerequisite events to assure accomplishment of the following required testing and evaluation: Logistic content of the Coordinated Test Program (CTP), Systems Support Package (SSP), Developmental Testing/Operational Testing (DT/OT) I, dedicated prototype test model, logistic supportability demonstration of DT/OT II, evaluation plan for logistic supportability, test design plan for logistic supportability, and logistic supportability evaluation report. This task will be accomplished by preparing event blocks of information for insertion in DA Pamphlet 700-127. Visits will be made to US Army Test and Evaluation Command

(TECOM), US Army Materiel Systems Analysis Activity (AMSAA), Operational Test and Evaluation Agency (OTEA), Materiel Readiness Support Activity (MRSA), Air Force, and others as deemed necessary to research current procedures and their effectiveness. Final study product will recommend appropriate changes to regulatory guidance to meet the needs of the objectives stated in paragraph 3 above.

5. Discussion.

a. Test Personnel Utilization. One of the areas of primary investigation in this study involves the use of MOS trained military personnel as players during the logistic supportability phase of development testing (both contract and organic). Upon the dissolution of the test boards in 1975, varying numbers of civilian and military personnel spaces were allocated to the TECOM proving grounds for the express purpose of continuing soldier operator and maintainer contributions to developmental testing. Reviews of the Soldier Operator Maintainer Test and Evaluation (SOMTE) programs generally indicated that the program was considered essential and that, although some advantages could be foreseen for using temporary duty (TDY) personnel, most SOMTE should be performed by Tables of Distribution and Allowances (TDA) troops. Problems identified at that time concerned the difficulty in providing skilled personnel and the lack of specificity of requirements in test directives. At present, SOMTE positions are not identified as such in the TDAs of the proving grounds.

(1) The Five Year Test Program (FYTP) is a compendium of approved Outline Test Plans/Resume Sheets (OTP/RS) for all user testing and development testing requiring supplementary troop support. The approved FYTP is a tasking document for test execution and resources allocation developed within existing

budget/program constraints and Army priorities for the current and budget year and provides planning guidance for the out years. The Test Schedule and Review Committee (TSARC) meets semiannually to review, update, and recommend approval of the FYTP. DARCOM support of the TSARC process is paramount since approval of the FYTP places budgetary, materiel, and support requirements on the proponent materiel developers. All OTPs in areas of cognizance must be carefully reviewed, paying particular attention to equipment/item quantity needs, support requirements, and dates with their associated impact on development programs. This careful review must be conducted to insure that imposed requirements by the user community do not place undue burdens upon or adversely impact the DARCOM proponent materiel developers.

(2) DARCOM requirements for development testing supplementary troop support in excess of the soldier operator/maintainer resources are approved by the TSARC process. Approval of the FYTP constitutes tasking authority for supplementary troop support for Developmental Testing (DT). Troop support forecasting is a projection of the total DARCOM (TECOM and proponent materiel developer) nonorganic troop support requirements for all testing to be accomplished by DARCOM for a maximum 2-year fiscal period. Based on known and projected workload, test agencies and proponent materiel developers identify nonorganic troop requirements and provide DT OTP forecasts to TECOM (DRSTE-TO-O). Headquarters, TECOM, then submits consolidated DT OTP forecasts to the DA TSARC for coordination, review, and approval. DT OTPs are meant to provide planning information to the commands providing the support (normally US Army Forces Command/US Army Training and Doctrine

Command (FORSCOM/TRADOC)) and to enable the TSARC to visualize the total requirement of nonorganic troops to support not only DT but all testing. The CTP provides development and operational testers and evaluators with criteria against which their tests will be designed and the data evaluated. Supplementary troop support for DT is coordinated with appropriate commands as a function of CTP coordination. When test requirements exceed the capability of the materiel developer, the needed support will be coordinated through the TSARC process for approval using the DT OTP as the administrative documentation.

(3) Each DARCOM test activity should have as one of its primary goals the desire to maintain a staff of experienced SOMTE personnel representing the full spectrum of user and maintainer skills associated with the kinds of systems tested by that activity. Test Design Plans (TDPs) and test directives should carefully specify the required minimum participation of SOMTE personnel and require test reports to provide detailed information on SOMTE activities. Since our main thrust in this paper is to consider the logistic supportability aspects of testing, it is essential that emphasis be placed on the number of logistic positions assigned. The listing of test directorate positions should include a sufficient number of logistic data collectors possessing the proper skills and experience. Additionally, the scope, complexity, and criticality of the test may necessitate a logistic member on the directorate staff.

(4) A suggested means of assuring the assignment of dedicated, experienced personnel is represented in this concept. Certain positions on the TDA of the test activity should be designated as SOMTE spaces. These positions could be

further categorized in regards to their commitment to SOMTE activities; for example: primary, auxiliary, or temporary; or by the level of their qualifications as senior, intermediate, and junior.

(a) Primary SOMTE Personnel. Those personnel assigned to TDA spaces designated as primary SOMTE spaces. Such personnel would be available for full-time assignment to SOMTE and SOMTE-related activities. The priority of assignment for such personnel are:

- SOMTE test participation.
- Acquisition and maintenance of MOS and other skills essential to SOMTE assignment.
- Data collection, especially as observer/recorder.
- Non-SOMTE utilization of military skills.

(b) Auxiliary SOMTE Personnel. Those personnel assigned to non-SOMTE positions who are available for SOMTE participation for a specified portion of their duty time; e.g., 25 percent. Other than for the specified periods of SOMTE availability, priorities for assignment are dictated by their primary jobs.

(c) Temporary SOMTE Personnel. Those personnel either from within a test activity or in TDY status from other commands assigned to a specific test on an ad hoc basis.

(d) Senior Level SOMTE Personnel. Those SOMTE personnel in grades E-7 (skill level 4) and above possessing extensive experience in their primary MOSs.

(e) Intermediate Level SOMTE Personnel. Those SOMTE personnel in grades E-6 and E-5 (skill levels 3 and 2) possessing some field experience in their primary MOSs.

(f) Junior Level SOMTE Personnel. Personnel in grades E-4 (skill level 1) and below not necessarily having field experience beyond school or On-the-Job Training (OJT).

(5) The anticipated duties of SOMTE personnel require that they possess practical military experience and the intelligence and language skills necessary to study new systems and express their evaluations orally and in writing. All SOMTE personnel must have current, valid MOSs appropriate to their positions and should maintain passing scores on MOS and Skill Qualification Tests (SQTs).

(6) In the TDP, the chairman of the task group should assure that clear and specific guidance for SOMTE involvement is given, identifying the activities and roles in which SOMTE personnel are to participate and guidelines for the degree of participation in terms of numbers of miles to be driven, rounds to be fired, percentage of operating time, or maintenance activity, etc. Skill levels, MOSs, and crew compositions should also be stated.

(7) At the test activity, the test project officer should have access to a senior SOMTE consultant during the development of the Detailed Test Plan (DTP). Interaction with Human Factors Engineering (HFE), Reliability, Availability and Maintainability (RAM), and safety professionals should be established at this stage. As required, the senior SOMTE noncommissioned officer (NCO) should be available to the developer and the contractors concerned. Utilization of SOMTE personnel for early contractor testing should be encouraged.

(8) Every effort should be made to assign SOMTE personnel for the duration of a test and to assure that conflicts with other military duties

and personnel actions are not permitted to reduce their availability. This applies equally to junior personnel although for shorter periods. The investment in system training may be considerable; consequently, sporadic participation in test activity will impair the contribution of individuals and crews. As a parallel to this, all personnel who make up the test team should be provided adequate housing and the availability of adequate recreational facilities, particularly in remote test sites. Test directors should maintain a close liaison with their personnel at all times to assure that morale is maintained at a high level and that all test participants are kept fully informed of test proceedings and progress.

(9) An essential element of the SOMTE professional development must also be the maintenance of MOS skills not only to assure that the testers continue to represent their military specialties, but to permit these personnel to be competitive with their peers in Table of Organization and Equipment (TO&E) assignments. In this latter context, it is important to emphasize that each SOMTE position should have a carefully stated job description which can be referenced in the preparation of Enlisted Efficiency Reports (EERs) which should reflect the demanding professional character of the SOMTE assignment and the contribution to future Army equipment.

(10) Procedures established in the FYTP/TSARC appear to be as satisfactory a mechanism as can be established to support user testing and development testing requiring supplementary troop support. The proposed concept of assigning SOMTE personnel to TDA slots can accomplish a great deal toward improvement of DT. Present difficulties related to the scarcity of certain enlisted MOSs

such as 13 Echoes and 34 Gulfs remain a serious problem requiring the application of sound personnel management actions.

b. Test Classification and Reports.

(1) Testing is grouped into two basic categories: Developmental Testing (DT) and Operational Testing (OT).

(a) DT is planned, conducted, and monitored by the materiel developer and is conducted in factory, laboratory, and proving ground environments using qualified and experienced operators, crews, and maintenance support personnel. DT insures that all significant design problems and supportability considerations have been identified and solutions are in hand.

(b) OT is accomplished by operational personnel of the type and qualifications of those who are expected to use and maintain the system when deployed. OT is conducted within controlled field exercises and to the maximum extent possible using TO&E troop units and maintenance support personnel in tactical scenarios. All OT is the responsibility of and is managed by OTEA. Usually, OT is conducted by OTEA for major and selected nonmajor systems and by TRADOC, the US Army Security Agency (USASA), or by other designated operational testers for other nonmajor systems.

(2) The CTP provides development and operational testers and evaluators with criteria against which their tests will be designed and the data evaluated. The CTP is the key management tool for control of the integration of all test requirements. For major and category I nonmajor systems, the CTP is a separate document for each applicable materiel acquisition phase (CTP I for Validation Phase, CTP II for Full Scale Development Phase, and CTP III for Production and Deployment Phase) and can be updated prior to each decision review to reflect

the current status of testing. For category 2, 3, and uncategorized nonmajor systems, the CTP is a single, abbreviated document (see Appendix D, Definitions).

(3) The Test Integration Working Group (TIWG) is the primary vehicle to facilitate integration of test requirements for major and category 1 nonmajor systems and other systems jointly agreed to by the materiel and combat developers and to speed the coordination of the CTP during the acquisition cycle. For programs not requiring a TIWG, integration will be accomplished during staffing of related test documentation. The CTP is separate from the Acquisition Plan (AP); however, the CTP is summarized as Section IV of the AP. AR 1000-1, dated 1 May 1981, has replaced the Outline Acquisition Plan (OAP) and Acquisition Plan (AP) with the Program Management Plan (PMP).

(4) Independent Evaluation and Test Plans.

(a) The Independent Evaluation Plan (IEP) is the master plan for all aspects of responsibilities relative to the testing of an item or system.

(b) Outline Test Plan (OTP) contains administrative information, test purposes, objectives, scopes, resource requirements, and cost estimates. The OTP is prepared by the materiel developer and the operational tester respectively for each DT and OT.

(c) The Test Design Plan (TDP) is a formal document which expands on the IEP and reflects as much planning as is possible without knowing the details of the terrain and test personnel to be used.

(d) The Detailed Test Plan (DTP) is an informal document for a specific test prepared by the test organization which provides explicit instructions for directing every phase of the test.

(5) Test and Independent Evaluation Reports.

(a) Test reports are formal documents prepared by the test director for separate tests or prepared independently by the deputy test directors for a combined DT and OT. The test report will contain findings of fact. It is among the primary sources used to develop the independent evaluation and to update Cost and Operational Effectiveness Analysis (COEA) for the decision review.

(b) Independent Evaluation (IE) and Report (IER). IEs of items and systems are based on reports, studies, and other appropriate sources and are made formally by the materiel developer and operational tester throughout the materiel acquisition process. The IE is continuous and is the basis for the IER.

c. Elements of Logistic Supportability.

(1) One of the prime areas for investigation in this study concerns the scheduling of a dedicated logistic supportability evaluation and dedicated prototype models for use in logistic supportability testing. It is important at this point in our discussion to define carefully the terms used to describe "logistic supportability." Integrated Logistic Support (ILS) is the management process through which logistic support considerations and maintenance techniques are integrated into the design effort. The System Support Package (SSP) is a composite package of support elements required to keep a materiel system in an operationally ready condition. The SSP was formerly called the Maintenance Test Support Package (MTSP). The SSP has six basic elements as stated in DA Pamphlet 700-127 which are essential to the support of the system in the field. Each of these distinct elements is identified here and briefly described:

(a) Support and Test Equipment. All equipment, mobile or fixed, required

to support the operation and maintenance of a materiel system or facilities at all locations to which a deployment is planned.

(b) Supply Support. All management actions and execution necessary for determining requirements for acquiring, cataloging, packaging, preserving, receiving, storing, transferring, issuing, and disposing of both principal and secondary items.

(c) Transportation and Handling. Engineering for transportability during materiel design and the procedures, equipment, and facilities used for packing, crating, handling, and transporting materiel systems.

(d) Technical Data. Encompasses all types of specifications, standards, engineering drawings, instructions, reports, equipment publications, tabular data, and test results used in the development, production, testing, use, maintenance, demilitarization, detoxification, and disposal of military items, equipment, and systems.

(e) Facilities. Construction requirements to support the materiel system involved; for example, buildings, concrete pads, revetments, roads, utilities, and other peculiar requirements to include facility equipment.

(f) Personnel and Training. The appropriate number of personnel with the necessary skills to operate and to support a materiel system in its operational environment. The processes, procedures, and equipment used to train personnel in the operation and support of a materiel system.

(2) It is important to emphasize at this point that a clear distinction must be made in evaluating logistic supportability. The testing of the SSP is not to be confused with those logistic functions performed to provide test continuity. Logistic personnel must insure that tests include evaluation of

the inherent supportability of the materiel system and the adequacy of the planned support system. This can be stated another way for emphasis. The logistic support required to sustain the continuity of tests and demonstrations is a distinctly separate function and is the responsibility of the development command/Project Manager (PM). Logistic support for test continuity is not intended to be evaluated by development or operation test and evaluation, product improvement tests, or by First Article-Initial Production Test (FA-IPT). The planned logistic support which should be tested is that to be provided with the fielded system to determine the capability of planned support to sustain operations in the field. The SSP should be afforded a status equal to that of a hardware subsystem for testing and for assessing the suitability-for-use and suitability-for-issue to the troops of the overall system being tested.

(3) The SSP Component Listing also should not be confused with the testing performed in support of deployment. At least 60 days prior to the date of each test initiation, the SSP Component Listing (prepared by the materiel developer/PM) is forwarded to the tester for review and evaluation. The SSP Component Listing simply enables a testing activity to plan its test, whether DT or OT, on the dates specified in applicable Test Design Plans or the OTP/RS in order to implement the CTP. The SSP Component Listing should not be evaluated as an element of the SSP. Its completeness, timeliness, and adequacy should have no bearing on the final rating assessed the SSP.

(4) Army Regulation (AR) 1000-1 states that system support planning actions will be addressed in the Letter of Agreement and in the Outline Acquisition Plan (now Program Management Plan). Detailed support planning will begin during the Demonstration and Validation Phase and firm support

requirements will be established early in the Full Scale Engineering Development (FSED) phase. A preliminary system support package will be evaluated during OT I; a complete system support package will be validated before Milestone III which means prior to the production and deployment decision. AR 1000-1 further states that if test results reflect significant deficiencies, including deficiencies in the system support package, the program will not move into a succeeding phase until all significa.. deficiencies have been corrected and corrections verified by retest. Sufficient test hardware and elements of the system support package will be procured early enough to prepare for validation during DT/OT II. Detailed planning will begin during the demonstration and validation phase so that preliminary logistics, personnel, and training support packages may be evaluated during DT/OT I and firm requirements can be established early in the FSED phase.

d. Mandatory/Optional ILS Testing.

(1) DARCOM-R 700-15 states that a logistic demonstration including a Physical Teardown/Logistic Demonstration (PT/LD) and Skill Performance Aids (SPAs) verification, when required, will be contained and scheduled in the CTP and the Test and Evaluation Master Plan (TEMP), in accordance with DOD Directive 5000.3. The PT/LD will be conducted at the contractor's plant, maintenance engineering evaluation facility, or test site and should be completed at least six (6) months prior to the scheduled start date for DT II.

(2) DARCOM-R 700-15 further states that the testing of the SSP will be scheduled as part of the CTP. The evaluation of logistic supportability of the materiel system, its support, and the adequacy of the SSP is mandatory.

(3) AR 700-127 and AR 1000-1 are generally in agreement in stating that the materiel developers, working with the combat developers, training developers, testers, and evaluators will insure that the SSP is thoroughly tested and evaluated during DT II, OT II, and first article testing. These regulations further state that preliminary logistics, personnel, and training support packages may be evaluated during DT I and OT I. The requirement to accomplish SSP testing in DT/OT I is reduced or tailored to the need whereas the requirement for SSP testing during DT/OT II is mandatory.

(4) In accordance with AR 702-3, RAM will be tested during both DT and OT. All RAM testing will be designed to complement, not duplicate, and contribute to a broad, consistent RAM data base. DT provides a measure of system RAM against stated specifications in a controlled environment with the procedures and resources contained and/or described in the SSP. The emphasis is on:

(a) An assessment of RAM growth.

(b) Assessing the consequences of any differences anticipated during field operations.

(c) Resolving legal (contractual) issues between the Government and its contractor.

(d) Providing data to the RAM data base for aggregation and ROC requirements assessment.

(e) Obtaining a clear understanding and identification of failures and the basis for taking corrective measures on failure modes.

(5) OT assesses the RAM performance characteristics on exposure of the materiel to a variety of expected operational conditions. OT concentrates on the mission consequences associated with using the system, the system's operational suitability and operational effectiveness, and the RAM performance when

in the hands of typical user troops under operational conditions. OT provides data for the estimation of life cycle costs and logistic resource requirements, and provides a basis for improving the non-materiel aspects of RAM performance. The OT independent evaluation will present the RAM values which have been statistically aggregated from both DT and OT. These values are expected to be most indicative of future field performance.

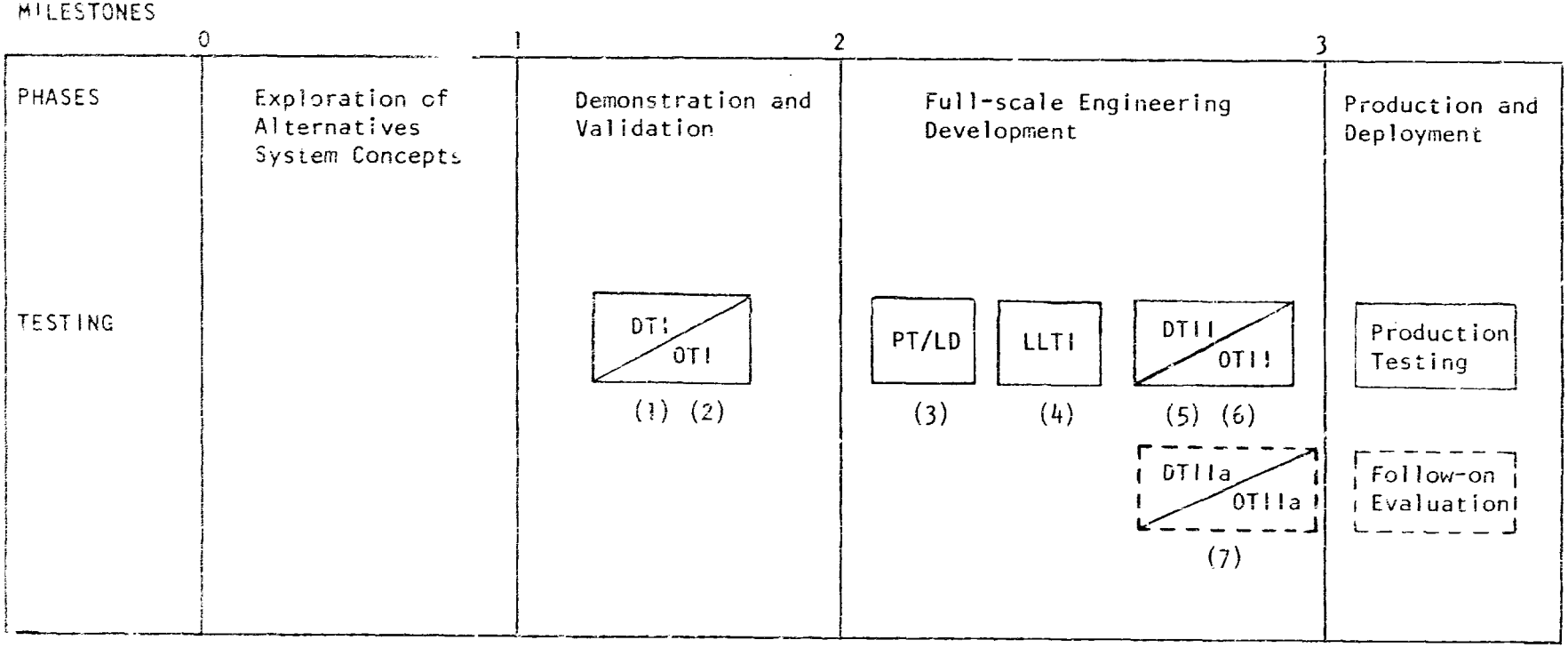
(6) A review of DA Pamphlet 700-127, ILS Management Model and Glossary; DA Pamphlet 11-25, Life Cycle System Management Model for Army Systems; and DARCOM-R 11-27, Life Cycle Management of DARCOM Materiel, identifies a number of logistic supportability events which should be accomplished. Since these documents only provide guidance, these additional events would have to be described as optional requirements. Certain limited actions preparatory to the initiation of production may be authorized to begin before Milestone III. These actions include:

(a) Manufacture of selected items of tooling.

(b) Procurement of restricted amounts of critical long leadtime items as provided for in the congressional approval process. Procurement normally will be undertaken only when DT/OT II testing is far enough along to give reasonable confidence of satisfactory completion. In addition, long-lead procurement will be used only for relatively modest dollar amounts and for items whose leadtimes are highly leveraged in terms of avoiding delays and increased costs.

(7) DARCOM-R 700-15 states that failure to test a complete SSP during DT II and OT II is a bar to a production decision. If significant deficiencies are found, corrections will be made and, prior to a production decision, a DT/OT IIa will be conducted. (See Figure 1 for a graphic picture of ILS testing).

CURRENT ILS TEST ACTIVITY



(1) RAM will be tested during both DT I and OT I.
(2) Preliminary SSP tested depending on system maturity.
(3) Physical Teardown/Logistic Demonstration (PT/LD) will be completed at least six (6) months prior to scheduled start date for DT II.
(4) Identify Long Leadtime Items (LLTI) and initiate provisioning of LLTI.
(5) RAM testing continues during DT II and OT II.
(6) Complete SSP will be tested.
(7) Completion of DT II and OT II should preclude additional testing; however, if deficiencies in hardware or system support are noted, DT IIa and OT IIa will be scheduled.

Figure 1

(8) Subsequent paragraphs in this report discuss many of the difficulties encountered in conducting logistic supportability testing and evaluation. In spite of the adequacy of the regulations which cover ILS testing, the factors which contribute to voids and deficiencies in testing are hardware immaturity, granting of waivers, and generally the failure of the logistic team to do an adequate job of incorporating ILS requirements in the CTP and other test documentation. The TIWG is the ideal forum for determining if all elements of ILS are being tested.

e. Operational Suitability.

(1) Operational suitability has become a major topic in the Defense System Acquisition Review Council/Army System Acquisition Review Council (DSARC/ASARC) In-Process Reviews (IPRs) with particular emphasis being placed on RAM and logistic supportability of new weapon systems. This interest can be attributed to the growing concern about the materiel readiness of our forces and associated operating and support costs both near-term and in the out years. There is a desire to avoid the readiness problems and support resource shortages experienced on some weapons fielded in the past decade. The weapons systems of the 1980s will be even more complex; skilled manpower is likely to become increasingly scarce, and operating and support budgets are not likely to increase. Hence, responsible individual at every level have taken a keen interest in the system suitability characteristics that drive the support resource requirements and readiness of new weapon systems.

(2) Assessment of system operational suitability under any condition is a complex undertaking. However, there are a number of factors and conditions surrounding the review of systems, particularly prior to fielding which makes

the process more difficult and demanding. Some of these problems center around test hardware immaturity, lack of representative support and test equipment, nonrepresentative training, artificial test environments, and the complex nature of weapon systems and their supporting logistic systems. In addition to these inherent technical problems, many development programs have been compressed to meet tight and concurrent schedule objectives. As a result, insufficient time and test articles have often been programmed to test and evaluate the supportability characteristics of development hardware and to gain confidence in meeting production hardware suitability goals. Thus, in many cases, operational suitability evaluations are not meeting the intent of the new acquisition policies which require that weapon systems and their respective logistic systems be evaluated at milestone decision points to assess suitability characteristics and project operational readiness.

f. Limitations on Pre-Milestone II Testing. Test programs conducted prior to Milestone II have been oriented toward "proof of design concept" with little emphasis on operational suitability. Early, direct measurement of operational suitability characteristics has been limited because the test hardware is not representative of the production design, and maintenance is conducted in a contractor support environment. However, limited test results augmented by analytical methods have been used by some programs to develop early operational suitability projections. Criteria are needed for defining reasonable operational suitability evaluation objectives for Pre-Milestone II testing. At a minimum, such testing should include an evaluation of hardware features which affect the feasibility of the maintenance concept and an assessment of risk areas and improvements which will be required to reach Milestone III thresholds.

g. Limitations on Pre-Milestone III Testing.

(1) It would be desirable to fully demonstrate logistic supportability before production decisions. However, it is not realistic to expect that all elements of logistic support will be available in their mature configuration for testing prior to Milestone III. Test plans and policies should take account of this reality. Suitability evaluations should be structured to combine direct observation of elements that are expected to be available with analytical techniques to project the characteristics of those that will not be available for testing. Acquisition planning guidelines are needed to define logistic elements that should reasonably be made available for test before Milestone III. When tradeoffs are required to meet cost and schedule constraints, priority should be given to making available as early as possible hardware items which will be committed in the Milestone III decision. Clearly defined schedules and evaluation criteria should be established for early Post-Milestone III test and evaluation of major support issues that were not assessed prior to the production decision.

(2) The services generally agree that the evaluation of supply support of system peculiar items is limited to simulation or paper analysis. Two programs are cited as examples where programs were accelerated and development of logistic elements have lagged the hardware development resulting in delays in testing the logistic elements. The AEGIS (a naval missile system) is so complex that it will not be tested as a complete up-to-date system until delivery of the first AEGIS ship in 1983. The DSARC III production decision in January 1978 was based on subsystem tests conducted on various ships and the AEGIS land-based test site.

(3) Similarly, the Navy plans a four-year phased support program for the F-18. In this program, the contractor will provide on-line and depot support when the aircraft is first deployed. As procedures are developed and proven and Navy personnel trained, support will be transferred to Navy personnel. At the end of the program, the Navy will provide all support for the aircraft.

(4) The Army is not unlike the Navy in this respect; Single Channel Ground and Airborne Radio Subsystem (SINGARS), Advanced Attack Helicopter (AAH), and PATRiOT (a term used for an Army surface-to-air missile system) will require some type of contractor depot support when these systems are fielded.

h. Pre-Milestone II Planning. What can be done to assure better planning and assessment of logistic supportability features before Milestone II? The design during this stage is very soft. The best means to assure better planning and assessment of logistic supportability is to get the logisticians actively involved in the design process during this period. Secondly, have a logistic team involved in the planning, conduct, and evaluation of testing to assure that potential logistic supportability problems are discovered and the necessary design changes or corrections to the logistics concepts are made before these designs are firm.

i. Acquisition Cycle Planning. At what point in the acquisition cycle do you believe the various logistic elements can be defined, analyzed, tested, and evaluated? The system concept and design is so soft prior to Milestone I that only a list of applicable logistic parameters can be identified. The analysis and actual development of quantifiable requirements cannot be accomplished until after Milestone I when the concept is at least firmed up. Complete test and evaluation of availability and logistic supportability in many

cases can only be accomplished after Milestone III when complete logistic elements are available and logistic support systems operable.

j. Post-Milestone III Planning. What should be done beyond Milestone III to identify and correct or accommodate logistic deficiencies? The only means to identify logistic deficiencies beyond Milestone III, which basically means that the system is fielded, is through some type of data feedback program. For those cases where there are more than minimal risks involved with the logistic supportability of major systems, then testing of production systems with the Initial Operational Capability (IOC) unit should be required. An alternative for identifying deficiencies would be to establish a short-term field data collection program when the system is fielded. Once a logistic deficiency is identified, a cost analysis would be required to justify correcting the deficiency (i.e., the cost of the correction must be offset by a reduction in the support costs and/or the improvement in the system effectiveness). More comprehensive Test and Evaluation (T&E) programs are needed to provide the desired confidence that hardware design and support characteristic measured or determined prior to major decision milestones are reasonably indicative of the performance that can be expected during operational service.

k. System Support Package (SSP) Identification.

(1) Other studies conducted recently have emphasized that the SSP should be identified early in the life cycle program as a distinct entity and should be clearly stated as such in all contracts for both prototype and production items.

(2) Elements of the SSP should be fully documented in the system contract. Furthermore, guidance provided in current Army acquisition

regulations should be changed in order that the CTF and TIWG (if one is planned) be established prior to contract award. The CTP would document the SSP requirements and be included as part of the system contract.

1. Prototype Availability.

(1) One of the key problems related to logistic supportability is the lack of weapon systems prototype availability during the development phases to prepare required manuals and other essential logistic programs. The primary reason for this deficiency is that priority for prototypes is always given to performance testing and evaluation and design changes. For the logistic supportability program to be effective including technical manual and training requirements, it must run a parallel course with hardware development and have proper evaluation during DT/OT II. Historically, where the logistic supportability program has lagged or been inadequate, the ultimate user (the soldier in the field) has paid a high price in operational difficulties. Units suffered low readiness rates and increased maintenance costs. One solution to this problem is to provide an additional prototype of the weapon system which would be dedicated solely to ILS and Skill Performance Aids (SPA) during the FSED phase. AR 1000-1 states that dedicated prototypes should be considered for use in developing SSP and support concepts. This would insure that the ILS planners are completely up-to-date with the hardware developers. It would also provide for substantive ILS recommendations for change during the development period. While this proposed course of action would require additional funds during the Research and Development (R&D) phase, this effort would likely be cost effective due to savings in operating and support costs after fielding and in training time. Further, this proposal would result in early turnover to TRADOC of a prototype

for the training base which would be offset by a reduction in production models which are normally sent to the training base.

m. Inadequacy of Logistic Supportability and Corrective Measures.

(1) The logistic supportability of new and product improved Army materiel has been inadequate because of the Army's difficulties in resolving clearly identified problem areas. This ineffectiveness can be attributed in large part to the untimely development of SSP elements, waivering of requirements for logistic support teating as required in current regulations, and the conduct of multiple evaluations which only partially evaluate supportability. Additionally, despite the requirements of AR 1000-1, materiel development continues to be date (IOC) oriented rather than event oriented.

(2) In the present environment, Logistic Support Analysis Record (LSAR) data and SSP are frequently developed simultaneously rather than sequentially. Also, sufficient hardware, time, and planning are not assigned to Physical Teardown/Logistic Demonstration (PT/LD). Sufficiently matured versions of SSP are not provided for test; and thus, logistic supportability testing never seems to end because it is spread out over the developmental time span.

(3) Correction of logistic supportability problems requires innovative application of existing ILS policies and changes in Army testing methodology to verify the worth of prescribed elements of support. The following recommendations are proposed for consideration and action as appropriate to correct deficiencies:

(a) Require that each contractor prepare and execute a Logistic Support Analysis (LSA) plan which provides LSAR output summaries at the appropriate time to support preparation of draft documentation.

(b) Have sufficient hardware and the required troops to support a satisfactory Physical Teardown/Logistic Demonstration (PT/LD). The PT/LD should be conducted using validated, baseline LSAR output reports and draft copies of Technical Manuals (TMs), Extension Training Materials (ETMs), Provisioning Lists (PLs), and Maintenance Allocation Charts (MACs).

(c) Conduct a dedicated, nonwaiverable Logistic Support Evaluation (LSE) as a subtest of both DT II and OT II. These assessments would be conducted within the normally prescribed settings already established for conducting DT/OT II but would emphasize and be dedicated to logistic supportability problems. Since the SSP receives only preliminary examination during DT/OT I, the major emphasis would be on testing a complete SSP. The subtest would fit in with the overall scenarios established for DT/OT II wherever possible. Those logistic elements not adaptable to the overall scenario would be evaluated on a stand-alone basis. Duplication of testing would be avoided. This means that a carefully orchestrated plan for DT/OT II and the subtest would have to be prepared. The advantage of the LSE lies in the fact that logistic support will be afforded a status equal to that of the hardware system for testing and evaluation. If the recommendation for conducting a dedicated LSE is not approved as a viable solution to the logistic supportability test and evaluation problem, an alternative would be to continue testing logistic supportability as now currently conceived and rely on a DT/OT IIa test to resolve any problem areas remaining. Paragraph 5j of this report discusses the means to identify and correct deficiencies beyond Milestone III.

(d) The Logistic Support Evaluation (LSE) should occur using prototype hardware, TRADOC trained personnel, final draft equipment publications,

specifically designated special and common tools and test equipment, and parts proposed for Prescribed Load Lists (PLLs) and Authorized Stockage Lists (ASLs).

(e) Results of the test would be submitted for consideration of an IPR which would assess the impact on planned deployments, assign corrective actions, and inform DARCOM and Army management.

(f) Life cycle logistic support testing conducted prior to the Logistic Support Evaluation (LSE) would be at the discretion of the PM and should be limited to that effort needed to assure sufficiently matured elements of support are available at the time of LSE. Early logistic testing efforts could well be considered as an integral part of the end item tests and not scored separately. These tests would be supported only by a test support package (that amount of hardware and support elements required to conduct the specific tests outlined in the Coordinated Test Program). These packages need not be subjected to the numerous administrative actions and delays now surrounding the processing and scoring of SSPs. By adopting the above recommended changes, the PMO (with full charter authority and responsibility) would be clearly faced with the need to point his developmental logistical testing effort to one nonwaiverable SSP in support of a single comprehensive LSE. Results of the LSE would identify the true value of matured versions of the elements of logistic support. Problem areas would be assigned for corrective action by an official IPR board and all results/recommendations reported to DARCOM and Army management.

(g) Logistic Support Evaluation (LSE) problem areas should be candidates for inclusion in Sample Data Collection (SDC) plans and the effectiveness of corrective action could be identified for consideration of management at IOC plus 1 year.

n. Testing Logistic Supportability.

(1) Development Test I (DT I). DT I occurs in the DVAL phase to demonstrate fundamentally that technical risks have been identified and that solutions are in hand. Components, subsystems, brassboard configurations or advanced development prototypes, are examined to evaluate the potential application of technology and related design approaches prior to entry into full-scale development. Depending on the technological and materiel status, DT I will be complete and thorough enough to determine component interface problems and equipment performance capability. Such testing could preclude the need to repeat similar subtests in later testing; however, a careful assessment must be made to insure that changes to the requirements and/or design baselines have not negated earlier test results. The evaluation by the materiel developer will also include an initial environmental assessment.

(2) Development Test II (DT II). DT II provides the final technical data for determining the system's readiness for transition into either the low-rate initial production portion or the full production portion of the production and deployment phase. DT II is characterized by the use of engineering and scientific approaches under controlled conditions to provide quantitative and qualitative data for use in an independent DT evaluation. DT II measures the technical performance (including RAM, compatibility, interoperability, safety, and supportability considerations) of an item or system and its associated support equipment and development training and system support packages. DT II includes tests of human engineering and technical aspects of associated training devices and methods. DT II demonstrates whether engineering is reasonably complete and whether solutions to all significant design problems

are in hand. All DT during engineering development is planned as one integrated test cycle. In planning for DT, the materiel developer will insure that minimum testing and expenditure of test resources is reflected in the CTP by requiring maximum exchange of test data by the contractor and materiel developer. Individual soldiers and vehicle or weapons crews (experienced military personnel, including maintenance personnel) should be trained under the New Equipment Training Plan (NETP). If significant deficiencies are found during DT II, provisions are made for conducting a DT IIa.

(3) Operational Testing (OT). Logistic supportability will be a critical issue during OT. OT I logistic supportability emphasis is directed toward identifying problems for resolution prior to OT II with emphasis on organizational echelons of support. OT II emphasis is directed toward determining whether the materiel system is supportable through general support echelons of support when supported by the planned assets in accordance with the logistic concept.

(4) OT I Evaluation Planning. OT I will be conducted using representative prototype hardware, support equipment, and training programs when feasible and practical. By nature of the development process, these items may not be of such maturity that OT I will yield substantial logistic data. Therefore, the evaluation plan should emphasize the review of logistic support documentation and rely less on empirical test data. The evaluator should be interested primarily in assuring that logistics is being properly considered and that appropriate actions in the logistic supportability development area are underway. There will be some information which can be obtained from OT I which, although mostly subjective in nature, will be useful in confirming

the basic approach to the logistic supportability concept for the system. The evaluator should guide and support the tester to insure the necessary data are obtained and are meaningful.

(5) OT II Evaluation Planning. The evaluation of logistic supportability at OT II should rely much more on empirical test data. The test should be conducted in as realistic an operational environment as possible using mature hardware and software in accordance with logistic supportability concepts. While the OT II results will be heavily relied upon for validation of logistic supportability, other support documentation will be essential to the evaluation, such as the test support packages and deployment plans which include item deployment density and mixes. The evaluator should be prepared to extend the results of the OT II to give consideration to expected force mixes and equipment densities in the primary theater of operation. All logistic supportability issues should be addressed and resolved prior to the production and deployment decision at Milestone III. Depending on the adequacy of the logistic support system and information available, the evaluator should be prepared to recommend additional testing for logistic data generation prior to the production and deployment decision or during follow-on evaluation testing after the production and deployment decision.

(6) Operational Test I. In the past, OT I which was occasionally combined with DT I included use of soldier operators and frequently soldier maintainers at crew and organizational level while contractor personnel conducted all maintenance support actions above organizational level. Typically, the logistic concept was very general and no attempt was made to implement the logistic concept because significant logistic elements such as manuals, tools, and test equipment were incomplete. The thrust of recent changes to Army policy, particularly as stated

in AR 1000-1, is that evaluation of logistic supportability will be emphasized more and earlier in the testing cycle. To accomplish this, the combat developer, tester, and evaluator should emphasize obtaining the necessary resources to test and evaluate the logistic system to the maximum degree possible at OT I since required changes to the logistic system and materiel design are most cost effective when identified early. The following guidelines are offered for logistic testing at OT I:

(a) As a minimum, typical user troops should operate and maintain the system at operator/crew and organizational levels and Skill Performance Aids (SPA) should be provided and used.

(b) It is also reasonable to utilize military personnel at the direct support level to some degree in accordance with the logistic concept. Special tools, test equipment, training simulators, calibration equipment, technical manuals, and Repair Parts and Special Tool Lists (RPSTLs) should be available to some degree for testing and evaluation.

(c) It is highly desirable that all logistic elements be defined and that elements which are critical to the evaluation plan be reasonably mature for test. Test data for the critical elements and analysis of other logistic elements which are defined but not yet tested (e.g., logistic support concept, transportability, etc.) should contribute to a thorough evaluation of logistic supportability following OT I.

(7) Operational Testing II. The purpose of OT II includes validation of the hardware system and elements of the system support package. It is intended that all portions of the logistic support system be demonstrated and tested at OT II in accordance with AR 1000-1. The following guidelines are offered for OT II:

(a) All maintenance and supply personnel should be selected and trained in accordance with TRADOC approved training programs. Routine use of contractor technicians to perform operator through GS maintenance is prohibited.

(b) All logistic support hardware (e.g., repair parts; tools; Test Measurement, and Diagnostic Equipment (TMDE); and other support equipment) should be available for testing and be used in every required mode of operation.

(c) All logistic support software (e.g., technical manuals and their contents (i.e., repair procedures, RPSTL, MAC) in SPA format, data collection and documentation forms) should be available for testing and be used as written. No system will be permitted to enter OT II without SPA or a formal waiver of SPA.

(d) The logistic concept should be fully developed and implemented to the greatest extent possible during the test to include definition and utilization of facsimiles of the logistic organizations with appropriate allocations of responsibilities, personnel, and mission-related hardware and software.

(e) The materiel/system under development must be of sufficient maturity that characteristics which affect logistics (such as design for maintainability, reliability, human factors, transportability, handling facilities, frequency of calibration) represent the design to be fielded.

(f) The system must be operated in a realistic field environment for a sufficient time to generate adequate logistic requirements at all field echelons where possible. As a minimum, all operator/crew, organizational, and most Direct Support (DS) maintenance actions (scheduled and unscheduled) should be observed or simulated where time to occurrence is expected to be excessive. Actions at General Support (GS) and depot level in unusual cases should be investigated to the degree appropriate to the logistic concept; e.g., to validate automatic

test equipment software programs. If GS is a backup for DS and GS basically does the same kind of work as DS but only to the degree that DS cannot handle the volume of work, assessment of GS may be of little value. Conversely, for logistic concepts which minimize DS "wrench-turning" and place the substantial burden on GS, assessment of GS functions become much more important than DS. In general, review the logistic concept, determine where unique work requirements lie, determine where bottlenecks in logistic support seem likely to develop, and then thoroughly examine those areas.

(g) Quantitative data should be collected to reflect frequency and magnitude of logistic requirements. Measures of frequency include operating hours between unscheduled maintenance requirements for each category, operating hours between scheduled maintenance for each category, and operational days between demands for repair parts by type and category. Measures of magnitude include man-hours for repair at each category, time waiting in each type of queue for manpower, parts, TMDE by type and category, number of repair parts consumed per operating hour by type part at each category, and downtime or turnaround time for each malfunction.

(8) Issues and Associated Criteria. Sample issues and associated criteria are shown here. (Issues measurable by the criteria must be based on operational requirements.)

(a) Example 1.

1 Issue. Is the logistic support concept adequate?

2 Scope. This issue includes the examination of the supply and maintenance organization, the allocation responsibilities, the allocation of hardware and software, and the allocation of personnel as contained in the Doctrinal and

Organizational Test Support Package and reflected in other documentation such as the maintenance allocation chart. (This allocation is not to be confused with the adequacy of the characteristics of the hardware, software, and personnel which are addressed elsewhere.)

3 Criteria.

a The supply and maintenance organization should be completely described and should clearly define responsibilities and workflow for each level of supply and maintenance. The organization should be such that a minimum of out-of-channel workflow and coordination is necessary so that work may be completed in a smooth and efficient manner.

b Responsibilities should be allocated to the proper level within the organization and appropriate to the materiel system requirements for logistic support to include maintenance and repair parts; Petroleum, Oil and Lubricants (POL); and ammunition resupply.

c Materiel support hardware and software (e.g., tools, repair parts, TMDE, and other support equipment) should be allocated to the appropriate level in proper number and type for efficient functioning of the logistic concept.

d Supply and maintenance personnel should be assigned to the proper levels and location; and the quantity and type of personnel should be adequate, but not excessive for correct and efficient supply and maintenance support.

(b) Example 2.

1 Issue. Are the logistic support materials adequate?

2 Scope. This issue includes examination of the logistic support hardware and software necessary or desirable for support of the materiel

system. Logistic support hardware includes repair parts, common tools, all test equipment, calibration equipment, and similar resources. Logistic support software includes technical manuals, RPSTL, MAC, Parts Allocation Chart (PAC), and Lubrication Orders (LOs). (Note that while the scope of this issue addresses the contents of the SSP, its purpose is not to address the SSP as a whole, but rather the adequacy of each of the elements of the SSP as each relates to support of the system as a whole.)

3 Criteria.

a Repair parts should be of proper form, fit, and function, available in adequate quantity at each maintenance echelon, contribute to simplicity of repair, and be standardized to the maximum extent possible.

b Common and special tools should perform as required, be durable, simple, necessary, and easy to use.

c TMDE and calibration equipment should be safe, accurate, easy to use, reliable, maintainable, supportable, and listed in the Army's TMDE Register (DA Pamphlet 700-20, Preferred Items List (PIL)).

d Technical manuals and other software should be comprehensible, complete, and easy to use to include tables, figures, narrative, and indexing according to "Skill Performance Aids" specifications.

e Procedures and documentation for processing work orders, repair parts requests, POL resupply, and ammunition resupply should be consistent with accepted doctrine, tactics, and organization.

f Materiel handling devices and resupply and maintenance vehicles should be safe, reliable, and maintainable.

(c) Example 3.

1 Issue. Are the logistic support personnel adequately trained and physically/mentally skilled to perform their required duties?

2 Scope. This issue includes an examination of the basic personnel selections, the prerequisite skills required, and an evaluation of the training program's effectiveness in further preparing them for system support in the field. (The scope of this issue includes examination of the content of the Training Test Support Package as evidenced by personnel performance during test.)

3 Criteria.

a Selection of logistic support personnel should take into consideration the physical requirements of the duties to be performed.

b Personnel selection processes should consider the mental aptitude and potential for effective training of the individual.

c Prerequisite skill requirements and how they affect the planned training program should be considered during selection of logistic support personnel.

d The training program, given the personnel selection process is effective, should prepare logistic support personnel to adequately perform their required duties in support of the system in the field.

(d) Example 4.

1 Issue. How adequately is the test item designed for efficient and effective logistic support?

2 Scope. The issue includes the characteristic end item design for efficient logistic supportability and the requirements of the end item for logistic support.

3 Criteria.

a The design should incorporate consideration of maintainability, safety, and human factors engineering for effective maintenance and supply activities.

b System transportability characteristics should be consistent with logistic support handling capabilities for all appropriate modes (e.g., land, sea, air, rail, and truck).

c Requirements for supply and maintenance facilities should be consistent with facility capabilities and allocations as described in the logistic concept and should be minimized to the extent possible.

d Requirements for resupply of expendibles such as ammunition and POL should be consistent with the allocations described in the logistic concept and within the capabilities of support materiel and support personnel to respond as needed.

e Requirements for maintenance manpower, repair parts, and other resources should be consistent with the logistic concept, capabilities of the support hardware, software, and personnel.

6. Conclusions.

a. The FYTP and TSARC process is an adequate mechanism for acquiring supplementary troop support for user testing and developmental testing.

b. There is a need for each DARCOM test activity to maintain a staff of experienced SOMTE personnel representing the full spectrum of user and maintainer skills associated with the kinds of systems tested by that activity.

c. The TDA of each DARCOM test activity should designate spaces as primary SOMTE spaces. Such personnel would be available for full-time assignment to SOMTE and SOMTE-related activities.

d. The TDP should clearly delineate and give specific guidance for SOMTE involvement in any given test situation. SOMTE personnel can be effectively utilized for early contractor testing.

e. A clear distinction must be made in evaluating logistic supportability. The testing of the SSP is not to be confused with those logistic functions performed to provide test continuity. The planned logistic support which should be tested is that to be provided with the fielded system to determine the capability of planned support to sustain operations in the field.

f. Logistic supportability evaluations are not meeting the intent of current acquisition policies which require that weapon systems and their respective logistic systems be evaluated at milestone decision points to assess suitability characteristics and project operational readiness.

g. Test programs conducted prior to Milestone II have been oriented toward "proof of design concept" with little emphasis on logistic supportability.

h. Test plans and policies should take account of the fact that not all elements of logistic support will be available in their mature configuration for testing prior to Milestone III.

i. The SSP should be identified early in the life cycle program as a distinct entity and should be clearly stated as such in all contracts for both prototype and production items.

j. One of the key problems related to logistic supportability is the lack of weapon systems prototype availability during the development phases to prepare required manuals and other essential logistic programs. This problem can be resolved by providing an additional prototype of the weapon system which would be devoted solely to logistic supportability testing during the FSED phase.

k. Sufficient hardware, time, and planning are not assigned to PT/LD. Sufficiently matured versions of SSP are not provided for test; and thus, logistic supportability testing never seems to end because it is spread out over the developmental time span.

l. Concepts presented in this study will require changes to regulatory guidance related to logistic supportability testing and evaluation.

m. For logistic supportability testing to be given proper attention and emphasis, it would be highly desirable to conduct a dedicated nonwaiverable Logistic Support Evaluation (LSE) as a subtest of both DT II and OT II. Emphasis would be directed to testing a complete SSP or those elements of the SSP not previously tested.

n. Life cycle logistic support testing conducted prior to the Logistic Support Evaluation (LSE) should be limited to that effort needed to assure sufficiently matured elements of support are available at the time of the LSE. Early logistic testing efforts could well be considered as an integral part of the end item tests and not scored separately.

7. Recommendations. It is recommended that:

a. Each DARCOM test activity designate certain positions on their TDAs as SOMTE spaces. These positions are to be further categorized by their commitment to SOMTE activities such as: primary, auxiliary, or temporary; or by the level of their qualifications as senior, intermediate, or junior.

b. The TDP clearly define SOMTE responsibilities in any given test situation.

c. At least two prototypes be procured for the FSED phase of the acquisition cycle, the second prototype to be dedicated exclusively for SSP/SPA

purposes to insure that logistic supportability and training programs proceed at the pace required for testing and implementation of the logistic and training functions.

d. Each contractor be required to prepare and execute a Logistic Support Analysis (LSA) plan which provides LSAR output summaries at the appropriate time to support preparation of draft documentation.

e. With the availability of a dedicated prototype for SSP purposes, insure that a satisfactory PT/LD is performed using MOS qualified personnel, the PT/LD to be performed using validated, baseline LSAR output reports and draft copies of TMs, ETMs, PLs, and MACs.

f. A dedicated nonwaiverable Logistic Support Evaluation (LSE) be conducted as a subtest of both DT II and OT II, emphasis to be placed on testing those elements of the SSP not previously tested.

g. SOMTE personnel be utilized for early contractor testing.

h. Logistic Support Evaluation (LSE) test results be submitted for consideration of an IPR which would assess the impact on planned deployments, assign corrective actions, and inform DARCOM and Army management.

i. Regulatory guidance related to logistic supportability test and evaluation be changed as presented in Appendix A.

APPENDIX A

PROPOSED CHANGES TO REGULATORY GUIDANCE

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PROPOSED CHANGES TO REGULATORY GUIDANCE

1. AR 1000-1, Basic Policies for System Acquisition, 1 May 1981.

a. Recommend that the following statement be added to Paragraph 2-10n:

> The System Support Package (SSP) should be identified early in the life cycle program as a distinct entity and should be clearly stated as such in all contracts for prototype and production items.

b. Recommend that the following statment be added to Paragraph 2-20k:

> The Coordinated Test Program (CTP) and Test Integration Working Group (TIWG), if one is planned, should be established prior to contract award. The CTP must specifically document SSP requirements and should be included as part of the system contract.

2. DARCOM-R 700-15, Integrated Logistic Support (ILS), 26 November 1979.

a. Recommend that the following statement be added to Paragraph 1-7, General Policies:

> The System Support Package (SSP) should be identified early in the life cycle program as a distinct entity and should be clearly stated as such in all contracts for both prototype and production items.

b. Add to Paragraph 1-7e:

> Each contractor should be required to prepare and execute a Logistic Support Analysis (LSA) plan which provides LSAR output summaries at the appropriate time to support the preparation of draft documentation.

3. DA Pamphlet 700-127, Integrated Logistic Support Management Model and Glossary, April 1979.

a. Recommend that the following be added to D-5, Event 45.2: Physical Teardown:

> A dedicated prototype and qualified troops are required to support a satisfactory Physical Teardown/Logistic Demonstration (PT/LD). The PT/LD should be conducted using validated, baseline LSAR

output reports and draft copies of Technical Manuals (TMs), Extension Training Materials (ETMs), Provisioning Lists (PLs), and Maintenance Allocation Charts (MACs).

b. Recommend that the following statement be added to D-14. Event 51/52. Specifically under Description: Paragraph b:

For logistic supportability testing to be given proper attention and emphasis, it would be highly desirable to conduct a dedicated nonwaiverable Logistic Support Evaluation (LSE) as a subtest of both DT II and OT II. These assessments would be conducted within the normally prescribed settings already established for conducting DT/OT II but would emphasize and be dedicated to logistic supportability problems.

APPENDIX B

REFERENCES AND BIBLIOGRAPHY

APPENDIX B

REFERENCES AND BIBLIOGRAPHY

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2. AFR 80-14, Test and Evaluation, 19 July 1976.

3. AMSAA Technical Report No. 274; System Support Package (SSP) Completeness, Timeliness, and Adequacy for Army Testing; O'Connor, William A., Jr. and Shaffer, David J., August 1979.

4. AR 70-1, Army Research, Development, and Acquisition, 1 May 1975 with Change 1.

5. AR 70-10, Test and Evaluation During Development and Acquisition of Materiel, 29 August 1975.

6. AR 70-27, Outline Development Plan/Development Plan/Army Program Memorandum/Defense Program Memorandum/ Decision-Coordinating Paper, 17 March 1975.

7. AR 71-3, User Testing, 8 March 1977.

8. AR 71-9, Materiel Objectives and Requirements, 7 February 1975.

9. AR 700-127, Integrated Logistic Support, 1 April 1981.

10. AR 702-3, Army Materiel Reliability, Availability, and Maintainability (RAM), 15 November 1976 with Change 1, 15 December 1979.

11. AR 702-9, Production Testing, 7 March 1977.

12. AR 750-1, Army Materiel Maintenance Concepts and Policies, 1 April 1978 with TRADOC Supplement thereto, 28 June 1979.

13. AR 1000-1, Basic Policies for Systems Acquisition, 1 May 1981.

14. DA Pamphlet 11-25, Life Cycle System Management Model for Army Systems, May 1975.

15. DA Pamphlet 70-21, The Coordinated Test Program (CTP), May 1976.

16. DA Pamphlet 700-127, Integrated Logistic Support Management Model and Glossary, April 1979.

17. DARCOM Materiel Acquisition Management Guide, 1 June 1977.

18. DARCOM Pamphlet 700-XX, Integrated Logistic Support, Guide for Logistic Supportability, Demonstration, Test and Evaluation, January 1980.

19. DARCOM Regulation 11-27, Life Cycle Management of DARCOM Materiel, 30 June 1977.

20. DARCOM Regulation 700-13, Integrated Logistic Support Performance Evaluation Report (ILSPER) (RCS DRCRE-308), 2 December 1977 with Change 1.

21. DARCOM Regulation 700-15, Integrated Logistic Support (ILS), 26 November 1979 with change.

22. TRADOC Regulation 71-9, User Testing and Evaluation, 1 October 1978.

APPENDIX C

GLOSSARY OF TERMS AND ABBREVIATIONS

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GLOSSARY OF TERMS AND ABBREVIATIONS

A

AAH	Advanced Attack Helicopter
AEGIS	A Naval Missile System
AMSAA	Army Materiel Systems Analysis Activity
AR	Army Regulation
ASARC	Army System Acquisition Review Council
ASL	Authorized Stockage List

C

COEA	Cost and Operational Effectiveness Analysis
CTP	Coordinated Test Program
CTP I	Coordinated Test Program I (Validation Phase)
CTP II	Coordinated Test Program II (Full Scale Development Phase)
CTP III	Coordinated Test Program III (Product and Deployment Phase)

D

DA	Department of the Army
DARCOM	US Army Materiel Development and Readiness Command
DCGMR	Deputy Commanding General for Materiel Readiness
DS	Direct Support
DSARC	Defense System Acquisition Review Council
DT	Developmental Testing
DT/OT	Developmental Testing/Operational Testing
DT/OT I	Developmental Testing/Operational Testing I
DT/OT II	Developmental Testing/Operational Testing II
DTP	Detailed Test Plan

E

EER	Enlisted Efficiency Report
ETM	Extension Training Materiel

F

FA-IPT	First Article-Initial Production Test
FORSCOM	US Army Forces Command
FSED	Full Scale Engineering Development
FY	Fiscal Year
FYTP	Five Year Test Program

G

GS	General Support

H

HFE	Human Factors Engineering
HQ DARCOM	Headquarters, US Army Materiel Development and Readiness Command

I

IE	Independent Evaluation
IEP	Independent Evaluation Plan
IER	Independent Evaluation Report
ILS	Integrated Logistic Support
IOC	Initial Operational Capability
IPR	In-Process Review

L

LCMM	Life Cycle Management Model
LO	Lubrication Orders
LSA	Logistic Support Analysis
LSAR	Logistic Support Analysis Record
LSE	Logistic Support Evaluation
LSO	Logistics Studies Office

M

MAC	Maintenance Allocation Chart
MOS	Military Occupational Specialty
MRC	Materiel Readiness Command
MRSA	US Army Materiel Readiness Support Activity
MTSP	Maintenance Test Support Package

N

NCO	Noncommissioned Officer

O

OT	Operational Testing
OT I	Operational Testing I
OT II	Operational Testing II
OTEA	US Army Operational Test and Evaluation Agency
OTP	Outline Test Plan

P

PAC	Parts Allocation Chart
PATRIOT	A Term Used for an Army Surface-to-Air Missile System
PIL	Preferred Items List
PLL	Prescribed Load List
PM	Project Manager
PMO	Project Manager's Office
PT/LD	Physical Teardown/Logistic Demonstration

R

RAM	Reliability, Availability, and Maintainability
R&D	Research and Development
RDT&E	Research, Development, Test and Evaluation
RPSTL	Repair Parts and Special Tool List
RS	Resume Sheet

S

SDC	Sample Data Collection
SINGARS	Single Channel Ground and Airborne Radio Subsystem
SOMTE	Soldier/Operator/Maintainer Test and Evaluation
SPA	Skill Performance Aids
SSP	System Support Package
SQT	Skill Qualification Tests

T

TDA	Table of Distribution and Allowances
TDP	Test Design Plan
TDY	Temporary Duty
T&E	Test and Evaluation
TECOM	US Army Test and Evaluation Command
TEMP	Test and Evaluation Master Plan
TIWG	Test Integration Working Group
TM	Technical Manual
TMDE	Test, Measurement and Diagnostic Equipment
TO&E	Table of Organization and Equipment
TRADOC	US Army Training and Doctrine Command
TSARC	Test Schedule and Review

U

USASA	US Army Security Agency

APPENDIX D

DEFINITIONS

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DEFINITIONS

Major Systems - Major systems include those which qualify for decision by the Defense Systems Acquisition Review Council (DSARC), and others which are critically important to the Army, are complicated, expensive, or controversial, or for any reason would involve the top management of the Army (AR 1000-1). These programs normally have Research, Development, Test and Evaluation (RDTE) costs in excess of $75 million or procurement costs in excess of $300 million.

Nonmajor Systems - Systems which do not meet the criteria for designation as major systems and which normally undergo In-Process Review (IPR) are divided into the following categories for Operational Testing (OT) management:

- *Category I.* Systems selected by DCSOPS in coordination with the US Army Operational Test and Evaluation Agency (OTEA) for which OT is conducted by OTEA. Materiel acquisition decisions supported by this OT will be approved by HQDA or higher authority. These systems normally have RDTE costs less than $75 million or procurement costs less than $300 million.

- *Category II.* Systems which have Chief of Staff, Army (CSA) or higher interest, potential high cost or support requirements, potential escalation to a major system or a Category I nonmajor system designation, or close ties with assigned OTEA system, and which have OT conducted by the US Army Training and Doctrine Command (TRADOC), US Army Communications Command (ACC), The Surgeon General (TSG), or other designated operational testers. These systems normally have combined RDTE and procurement appropriations which exceed $25 million threshold.

- *Category III.* Systems which normally have combined RDTE and procurement appropriations between a $10 and $25 million threshold.