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DEFENSE SYSTEMS MANAGEMENT COLLEGE

STUDY TITLE: MANAGING THE INSTALLATION OF MODIFICATIONS TO FIELDED ARMY EQUIPMENT

STUDY PROJECT GOALS:

(1) Identify current and emerging Army policy and procedures governing the planning, implementing, and controlling of modification installations on fielded equipment.
(2) Examine significant past/potential problem areas related to the management of modification installations.
(3) Evaluate the impact of emerging policy and procedures on recognized problem areas and/or develop recommendations for avoiding or mitigating these problems.

STUDY REPORT ABSTRACT:

The purpose of this study is to identify what the manager of an Army Product Improvement Program should know about managing the installation of modifications to fielded Army equipment. A review of current and emerging policy and procedures is accomplished to determine the specific actions and interfaces that are essential to the planning and accomplishment of a product improvement installation. Several recognized/potential problem areas pertaining to the management of modification installations are examined and recommendations for avoiding or mitigating these problems are discussed.

The study concludes that the Army's new policy and procedures for managing the installation of modifications should lead to substantial improvements. By emphasizing thorough planning and coordination, problems should be surfaced at an early point in the program and resolved. However, the most important factor in determining the success of any given project is the product improvement manager himself. This individual must be involved in all phases of planning and implementing the modification.

Key Words: Product Improvement
Modification
Retrofit

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DEFENSE SYSTEMS MANAGEMENT COLLEGE

PROGRAM MANAGEMENT COURSE
INDIVIDUAL STUDY PROGRAM

MANAGING THE INSTALLATION
OF MODIFICATIONS TO FIELDED
ARMY EQUIPMENT

STUDY PROJECT REPORT
PMC 76-2

Robert J Ruth
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FORT BELVOIR, VIRGINIA 22060

MANAGING THE INSTALLATION OF MODIFICATIONS

TO FIELDED ARMY EQUIPMENT

Study Project Report

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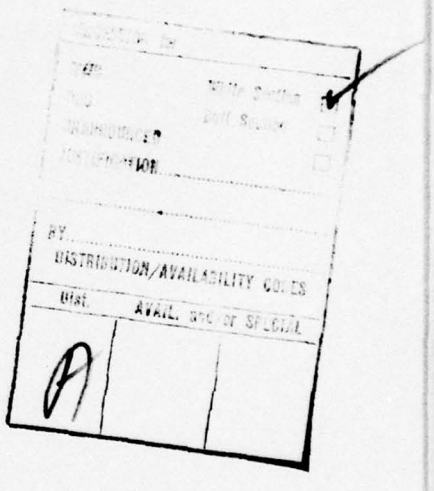

by

Robert J Ruth
GS-12 DAC

October 1976

Study Project Advisor
Wayne Schmidt

EXECUTIVE SUMMARY

The modification of existing equipment to incorporate design improvements has become increasingly important to the Army both as a method of maintaining force readiness and as an effective alternative to new development. Correctly managed, modification programs offer significant potential savings in both time and money. However, over the past several years, the Army has encountered numerous management problems with its modification programs. In particular, many modifications have not been installed in a timely manner.

This paper examines the management of Army product improvement installations to fielded equipments from the perspective of the manager of an Army Product Improvement Program. A review of current and emerging policies and procedures is accomplished to determine the specific actions and interfaces that are essential to the planning, implementing, and controlling of product improvement installations. Several recognized/potential problem areas pertaining to the management of modification installations are examined in terms of recent policy and procedure changes, and recommendations for avoiding or mitigating these problems are discussed.

The report concludes that the Army's new policies and procedures for managing the installation of modifications should lead to substantial improvements. However, the most

important factor in determining the success of any given project is the product improvement manager himself. It is essential that this individual be involved in all phases of planning and implementing the modification.

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CHAPTER I

INTRODUCTION

Purpose of the Study Project

One of the important ways in which the Army seeks to maintain force readiness and to meet new materiel requirements is through the improvement of existing equipment. Evidence of the growing significance of this concept to the Army's overall materiel acquisition strategy is illustrated by the dramatic increase in expenditures for product improvements over the past six years. During the period covering Fiscal Years 1972 to 1977, the Army's annual budget for product improvements has increased from approximately $125 M (1:13)[1] to over $550 M (2). In a 1974 Statement of Principles for *Department of Defense Research and Development*, the Director of Defense Research and Engineering stated: "In selecting programs, we must insure that ... greater emphasis is placed on product improvement as a potentially effective alternative to new development." (3:inside cover)

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[1]This notation will be used throughout the report for sources of quotations and major references. The first number is the source listed in the bibliography. The second number is the page in the reference.

The management of product improvement/modification projects is of critical importance to the Army. If properly managed, these projects provide timely resolution of operational problems and rapid development and fielding of new capabilities. On the other hand, management errors in these programs can significantly degrade operational readiness, performance, and supportability of operational equipment upon which field units are dependent.

Product improvement management poses many perplexing problems. Working within the constraints of an existing configuration, the manager must develop, test, procure, install, field, and provide support for the required modification in a relatively compressed time frame. A typical project may require the services of virtually every discipline and require funding support from all four appropriations (i.e. Research Development Test & Evaluation, Procurement, Operation & Maintenance, and Stock Fund). Due to the critical impact of these projects and the relative management complexity, the Army is finding it necessary in an increasing number of cases to exercise intensive management control. Thus, there are now twenty three project/product managed product improvement projects in the Army including systems such as the M60 tank, the M551 Sheridan, the Cobra, and the Hawk Missile System.

This report will focus on the one particular aspect of the product improvement process which is uniquely different

from the other materiel acquisition alternatives - the installation of the improved hardware to the existing equipment. It is in this final phase of program accomplishment that many of our most perplexing problems arise. Thus, the purpose of this paper is to identify what the manager of an Army Product Improvement Program should know about managing the installation of modifications to fielded Army equipment.

Specific Goals of the Project

The goals of this paper are to identify the specific actions and interfaces that are essential to the successful planning, implementing, and controlling of product improvement installations on fielded equipments and to highlight significant problem areas. Current and emerging Army policy and procedures governing product improvement/modifications will be identified and several existing and potential problem areas will be discussed. Finally, the impact of emerging policy and procedures on recognized problem areas will be evaluated.

Definitions

Product Improvement: A formally proposed configuration change or modification of an item of materiel, type classified as standard or limited production, which involves substantial engineering and testing. (See AR 70-15 for further elaboration). Product improvements are proposed, funded, and

accomplished as separate projects.

Modification: Any after production alteration of a permanent nature (other than special purpose/special mission alterations) made to an end item, component, or assemblage of materiel on a mandatory basis. (4:A7) All future modifications should result from approved product improvement projects.

Modification Work Order (MWO): "A Department of the Army publication providing authority and instruction for the modification of Army materiel." (5:A3)

Retrofit: "An alteration of a configuration item to incorporate changes made in later production of a similar item." (6:A3)

Limit and Scope

This paper will only address those mandatory alterations (modifications) which result from approved product improvement projects within the Army. Information was gathered from existing regulations and guidance documents, reports generated by GAO and AAA investigations, and by conversations with Department of the Army, US Army Development and Readiness Command (DARCOM), and DARCOM Commodity Command personnel. Information was not obtained from other Army field commands due to the constraints on time.

CHAPTER II

BACKGROUND

Purpose of Product Improvements/Modifications

Product Improvements which result in modification of fielded equipment are initiated to accomplish one or more of the following:

> Assure the safety of personnel, prevent damage to equipment through operational use, or provide safeguards for security. (5:1-2)
>
> Insure compatibility with newer equipment with which it will be operated or with personnel who will operate it. (4:3-1)
>
> Increase significantly combat or operational effectiveness or reduce significantly requirements for its logistic support. (4:3-1)

It is the Army's policy to limit modifications to those which are necessary and demonstrate significant improvements. Modifications are to be carefully reviewed and coordinated with the user's representative to assure the validity of the requirement.

Buildup of Uninstalled Modification Kits

Although the requirements for many of the Army's modifications have been carefully documented and the cost effectiveness determined by economic analysis, the realization of these benefits has often been substantially delayed or forgone altogether due to the failure to install the modifications in

a timely manner. In July of 1974, the Army reported a backlog of uninstalled modifications that required in excess of five million manhours to accomplish. (7:1) Some of these modifications had been authorized since as early as 1969.

Failure by the Army to accomplish modification applications in a timely manner not only deprives operational units of needed improvements, but also tends to increase the cost of the modifications through extended storage, handling, damage, and loss of modification hardware (kits) required. Furthermore, potential cost savings through reduced maintenance actions or reduced logistics support may be forgone.

The Army has sustained a sizeable backlog of unapplied modifications since before 1970; however, there still does not appear to be common agreement as to the cause or the solution. In a recent report on the Army's modification program, the General Accounting Office stated:

> The Army believes that the prime reason for these delays (delays in installing modifications) is the lack of necessary personnel. We believe that the primary reasons are that
> --equipment requiring modification is not promptly inducted into the maintenance activities,
> --required materials are not effectively controlled and therefore not available at the right place at the right time, and
> --the management information systems are not reliable to insure effective planning and scheduling. (7:3)

A previous report issued by the Army Audit Agency in 1973 on the subject of the Army Aircraft Modification Program concluded that manpower shortages were primarily responsible for

uninstalled modifications in Vietnam, but that the situation was rapidly changing and in many cases Direct Support Units and General Support Units had ample capability to apply kits. The report stated: "We do not believe it is sound management to award contracts for the application of field-level modifications without first determining whether there is in-house capability, particularly at the GSU (General Support Unit) level." (8:32) The report also pointed out that control of modification materials needed improvement and that the reporting system was slow and inaccurate.

Congressional Interest and Action on Backlog

The Congress has been concerned over the accumulation of uninstalled modifications for several years. This concern was clearly reflected by the Senate's in-depth questioning of MG Bush on the subject in 1972. (9:1562) On at least three occasions since 1970 the Congress has received reports on the subject from the General Accounting Office. In the 1973 Defense Appropriation Bill the Congress directed that modification installations be funded by the Operation and Maintenance Appropriation rather than the Procurement Appropriation. It was apparently the sense of the Congress that the use of Procurement funds may have obscured necessary planning and contributed to the backlog of uninstalled kits. Recently, Congress has moved to reduce the Army's FY 77 budget for

modification installation. This action may be intended to force the Army to rely more on field level personnel for modification.

Department of the Army Actions on Backlog

In mid 1974, reports indicated that there was an "Army-wide MWO (Modification Work Order) backlog requiring an application effort in excess of 5 million manhours." (10:2) The bulk of this backlog was at the Direct Support/General Support level and was thought to exceed both the current and future capacity of these activities. Responding to this situation, the Department of the Army (DA) tasked the Development and Readiness Command (DARCOM) to develop a time phased plan to eliminate and prevent the recurrence of the MWO backlog. In subsequent guidance, DA suggested that the plan be structured in three phases as follows:

> Phase I - Establish quantitatively the volumn of unapplied current modification work orders.
> Phase II - Eliminate unnecessary unapplied current modification work orders.
> Phase III - Future modification control. (11:1)

DA also stipulated that DARCOM be responsible for programming, funding, scheduling and application of both current and future modification workloads.

DARCOM Actions to Control Modifications

In response to the Department of the Army's direction,

DARCOM developed a three part plan to: 1)identify unapplied modifications and eliminate those which were not essential, 2)apply those remaining modifications by September 1978, and 3)implement improved management controls over future modifications. Following coordination with all major commands, this plan was approved on 17 July 1975.

Phase I of the approved program has been completed. This phase included a physical inventory of unapplied modifications by field commands, correction of configuration status accounting data, reevaluation of the requirement for unapplied modifications by DARCOM's commodity commands, and the rescission of modifications which are no longer necessary or essential.

Efforts are now underway to eliminate the backlog identified under phase I. Under this phase, personnel from DARCOM commodity commands will visit user commands to plan modification installations and will negotiate formal Memorandums of Understanding for the agreed upon modification program. These memorandums will specify who will install the modifications, schedule, delivery and storage of kits, administrative and other support to be furnished by the user or DARCOM, application reporting procedures, and required funding. Application may be performed by DARCOM depot team, contractor team, or by user command personnel when feasible. When user command personnel perform the work, DARCOM will furnish required funds (except for military personnel salaries). (12:3)

All modifications authorized by Modification Work Orders published after 1 July 1975 are to be managed under the guidance of phase III. AR 750-1 is currently being revised to reflect this guidance. In addition, a new DARCOM regulation (DARCOM-R 750-50) is being developed to provide supplementary guidance. Chapter III will discuss the current and emerging policy for application of modifications.

CHAPTER III

CURRENT AND EMERGING POLICY

Introduction

Within the Army there are three applicable, interrelated sets of guidance, each defined by separate regulation, which relate to the reconfiguration of materiel. These are delineated in AR 70-37, Configuration Management; AR 750-1 (Chapter 3), Army Materiel Maintenance Concepts and Policies (Alteration of Materiel); and AR 70-15, Product Improvement of Materiel. The requirements of each of the above regulations must be satisfied for the accomplishment of a product improvement which results in the modification of existing equipment.

Configuration Management is concerned with defining the configuration (form, fit, and function) of equipment, controlling changes to the configuration, and accounting for the current configuration throughout the equipment's life cycle. Changes to the defined configuration are proposed by means of an Engineering Change Proposal (ECP) in accordance with MIL-STD-480 & 481. This document delineates the proposed change, describes the impact of the change on the equipment, and identifies the specific equipments to which the change will apply. Approved ECPs are implemented by means of a directive or request issued by the approving authority. All changes to hardware and documentation are strictly accounted

for and recorded in Configuration Status Accounting Records and Reports.

An Engineering Change may be approved for incorporation in future procurements, current production items, or previously produced items (retrofit). When an approved ECP requires the retrofit of existing equipment, the retrofit action is accomplished in accordance with AR 750-1 (Chapter 3). Mandatory retrofit actions (modifications) are implemented by publication of a Modification Work Order (MWO) or by appropriate instructions in Depot Maintenance Work Requirements (DMWR) and contract work statements. These documents include specific instructions and time compliance requirements for accomplishing the modification and authorize the performance of the work. Alterations for special mission or special purpose, and minor alterations which are not mandatory, are not identified or issued as a MWO. (4:3-8) Minor alterations are treated as routine maintenance actions and are disseminated through normal maintenance publications.

Both the approved ECP and the approved MWO (or DMWR/ contract work statement) may be viewed as a license to proceed with a specific action. However, these documents do not interface directly with the budget process to provide the necessary funds. One of the prerequisites for ECP approval is that funding authorization be made available concurrent with approval. If this can not be done, AR 70-37 states that the

ECP should be disapproved or reduced in scope. If the equipment to be changed is in production, an ECP may be funded from the procurement line item for the equipment (provided sufficient funds are available) and implemented through a contractual change. However, when the equipment to be changed is not in production or the scope of the change is such that it must be accomplished as a separate project, funding becomes a problem. Moreover, if operational equipment is to be modified, funding must be accomplished from two or more appropriations. In the 1973 Department of Defense Appropriation Bill, the Congress recommended an immediate policy revision to require financing weapon system and equipment modification kit installations in the Operation and Maintenance Appropriation. Thus, it is now necessary to acquire separate funding for modification installation.

The Product Improvement Program established by AR 70-15 provides the procedures for obtaining approval and funding for configuration changes which involve substantial engineering or modification of existing items type classified as standard or limited production. Under the Product Improvement Program, substantial configuration changes or modification actions are proposed as separate projects via the Product Improvement Proposal (PIP).

In January 1976, DA directed that all future retrofit actions be accomplished under an approved PIP. (13:5) DARCOM

Development and Readiness Commands can approve PIPs up to a ceiling of $2 M per fiscal year for five years (10 M) for items out of production and $5 M per fiscal year for five years (25 M) for items in production. (5:1-3) These limits apply to all new PIPs relating to a specific end item. An approved PIP provides the authorization for entering requirements in the budget. It should be noted, however, that approval of the PIP is not synonymous with funding the project. The approved project must compete with all other approved projects within the DOD budget for available funds. In addition to providing budget input, the approved PIP serves as a planning document for project accomplishment. Thus, it includes the schedule milestones, funding outlay, and method of implementation. Upon receipt of funding, the PIP proponent will proceed with the development and testing of the improvement. If the improvement is successful, one or more ECPs will be processed to update the technical data package. If existing items are to be retrofitted, the revised technical data will be used to procure the necessary modification kits. Application of the modification will be implemented by the appropriate document (MWO, DMWR, or contract work statement). The contract work statement is used if the mods are installed by contractor, whereas the Depot Maintenance Work Request is used for work done in depot. Modification by direct support/general support units is authorized by the Modification Work Order. Actual

reports of applications will be fed back and incorporated in the Configuration Management Status Accounting Records so that the actual configuration of each individual item is known. Figure 1 illustrates the general sequence of events required for the accomplishment of a product improvement effort which results in the modification of fielded equipments.

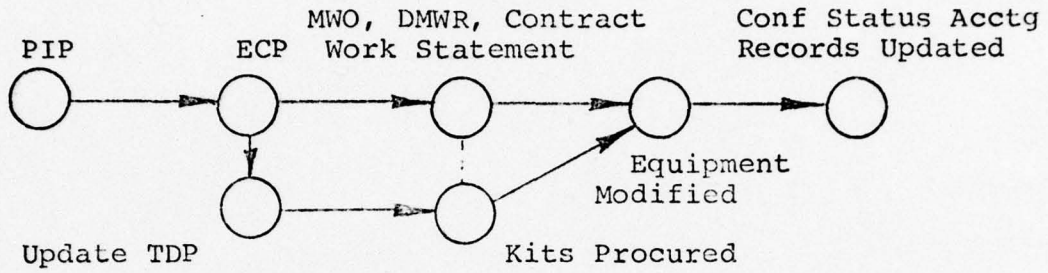

Figure 1

The preceding discussion briefly described the interrelationship of the three principal policy documents which impact on modification management and introduced the key elements for program approval and accomplishment. As can be seen, the Product Improvement Proposal is used for initiating the project and serves as a project planning document. Normally, the engineering and development of the modification is funded and accomplished in accordance with the PIP. The Engineering Change Proposal documents the improved design and provides the basis for determining whether or not the project will proceed beyond the development phase. Thus, in the context of an Army product improvement project, ECP approval is synonymous with the decision to implement the change. Finally, the

Modification Work Order (or alternate authorizing document) releases the modification for application to fielded equipment.

The remainder of this chapter will address the key actions which must take place in order to insure the successful accomplishment of a product improvement installation. Before proceeding, however, it should be noted that not all modifications have equal priority. Modifications are classified as urgent, limited urgent, and normal. The classification urgent is only used when the condition it is intended to correct is such that the equipment can not be operated until the modification is applied. Limited urgent is used when the equipment can continue to be operated for only a limited time, not to exceed 120 days. Obviously, urgent and limited urgent modifications must be expedited and many of the routine actions will be bypassed, or accomplished on an informal basis with after the fact documentation. These type actions, however, are certainly in the minority and will only be treated briefly in this paper. Thus the following discussion will focus on the accomplishment of normal modifications. Discretion and specific guidance in AR 70-15, AR 750-1, and AR 70-37 should be used to tailor one's actions to fit the situation when urgency is a factor.

Modification Application Planning

Planning is an essential element of any project. To be

useful, however, it must be tailored to the specific needs of the project. Also, it must be kept current and it must have an appropriate degree of flexibility built into it.

Modification planning is an iterative process which begins with the development of the initial proposal and evolves into a detailed plan prior to publication of the Modification Work Order or other authorizing document. At program initiation, the implementation concept should be established in general terms to facilitate the development of project cost estimates and design objectives. This broad planning is reflected in the Product Improvement Proposal. The PIP includes the quantity of kits to be procured and installed; a preliminary schedule for procuring, receiving, and installing kits; estimated dollars by fiscal year; and a statement on the method of implementation. The basic PIP data are normally updated twice annually; however, there is no specific requirement to include actual detailed back up data.

In order to develop a realistic modification application plan, it is necessary to gather specific data from several sources. The development and retrieval of this data also requires a degree of planning and coordination and should therefore be considered early in the project. Some of the important steps in modification application planning are:

--Identify the actual quantity and location of kits. This may turn out to be a moving target. Thus, it is important to

stay current. Initial data furnished by item managers should be verified by user commands. Requirements for other services and for Foreign Military Sales must be ascertained.

--Identify the actual configuration of items to be modified. It is not unusual to find more than one configuration in the field. All too frequently, modifications which were previously issued are only installed to a portion of the equipments. This condition could seriously effect the modification being developed.

--Determine special equipment or tools required to perform the modification. Assure that the personnel who will perform the work have access to these tools or equipments.

--Determine whether maintenance floats will be required and identify source of equipment for necessary floats. If the modification requires the equipment to be down or away from the unit for an extended time, it may be necessary to provide substitute equipment in order to maintain the operational readiness. Possible sources for floats include depot stocks and local installation stocks.

--Determine the skill levels required to install the modification.

--Identify where work will be performed and who will perform the work.

--Identify transportation requirements.

--Establish schedules based on equipment availability,

modification kit availability, facility availability, personnel availability, etc. Schedules should be designed to preclude the accumulation of unapplied workload (except when one-time buy has substantial economic benefits).

The above considerations are not intended as an exhaustive list but are representative of the data and decisions which must be compiled in order to develop a solid plan for implementation which will assure timely application, minimize downtime, insure adequate configuration control and hold costs to a reasonable figure. Recently, DARCOM has directed the initiation of a formal Modification Application Plan for future modification programs. (14:5)

Planning for product improvement installation is the responsibility of the DARCOM sponsoring agency, and specifically the designated manager for the Product Improvement Project. This planning can not, however, be accomplished in a vacuum. Inputs must be obtained from the item manager, engineering, maintenance, procurement, and the actual user. To facilitate the coordination and planning with the user, DA has directed that formal Memorandums of Understanding will be developed. These memorandums will constitute an agreement between the user and the DARCOM sponsoring agency and will define specific responsibilities for modification installation. Thus, the Memorandum of Understanding (MOU) should play a key role in future planning. It should be noted, however, that

the MOU for modifications is a new concept which the Army is attempting to implement for the first time this year.

Funding

An approved Product Improvement Program may be thought of for funding purposes as progressing in three successive stages: engineering development & testing, procurement of modification hardware, and installation of the improvement. Each stage is separately funded. Thus, for an investment item, hardware will be purchased by the Procurement Appropriation and installation will be funded by the Operation & Maintenance-Army (OMA) Appropriation. This "split" funding often gives rise to problems. For example, a schedule change in development or procurement will necessitate a change in the application schedule. However, since the Procurement budget is reviewed independently of the OMA budget, there is no automatic transfer of information and adjustment of funding. Thus, unless carefully administered, program funding can get out of balance. It should be noted that OMA funds are appropriated on a one year basis. If OMA funds are not obligated in the year for which they were programmed, they are withdrawn. Since the normal budget process takes about two years, the only way to gain additional funds for either the current fiscal year or the next year is to divert them from another approved, funded project.

In July of 1975, the Department of the Army assigned DARCOM the responsibility of programming and funding all aspects of future modifications. (12:3) Prior to this time, funding for Direct/General Support level modification application was accomplished by field commands. Under the new guidance, DARCOM will negotiate application requirements with the user. If the user has the capability to perform the installation and agrees to do so, this agreement will be formalized in a Memorandum of Understanding (MOU). This MOU will specify the work to be performed and the required funding (excluding service personnel salaries). DARCOM must program these funds and reimburse the user. If for any reason the user is unable to complete the work within the required time compliance period, the DARCOM sponsoring agency must make alternate arrangements for installing the modification. Modification installations performed by contractor or depot personnel will be funded directly by DARCOM.

The designated manager for the product improvement project must assure that the funding requirements for his program are accurately reflected in the various budget documents. To accomplish this for the OMA funded portion of his program, he must work with the Comptroller and the Maintenance Plans and Programs Office of the sponsoring agency. OMA requirements should be incorporated in the commodity command's input to the Program Objective Memorandum, the Army Materiel Plan, the

Command Budget Estimate, the Command Operating Budget, and the Ops 25 form which goes forward as budget backup. The requirements reflected in these documents should be kept current and in agreement with the actual program plan.

Under current policy, OMA funds allocated to sponsoring agencies for application of modifications are provided directly to the US Army Depot Support Command (previously designated the Major Items Data Agency) by DARCOM. The sponsoring agency provides the Depot Support Command (DESCOM) with modification requirements stratified by DARCOM depot and commodity command/field team. DESCOM then disburses funds at the direction of the sponsoring agency from specific Procurement Request Order Number (PRON) accounts to the contractor, command organization, or agency performing the work. (15:Appendix G) Thus, DESCOM performs a banking function for the commodity command.

User Coordination

The basic objective of any product improvement or modification is to improve the equipments' utility to the user. With this in mind, and recognizing that the user is dependent on operational equipment to perform his mission, good early coordination is a must. Thus, all Product Improvement Proposals must be coordinated prior to PIP approval with the user's representative, the US Army Training and Doctrine Command (TRADOC), or other combat developers as appropriate to insure

that proposed improvements are compatible with materiel, training, and operational support objectives.

As the project progresses through development and testing, the user, or appropriate representative, should be kept apprised of project developments. This continuing coordination will culminate in the development of formal Memorandums of Understanding between the major Army commands and the sponsoring agency which will define specific responsibilities for modification installation. These MOUs will address the following areas:

Identify Application Team
Schedules
Delivery and Storage of Kits
Support to be furnished to DARCOM by user commands
Application reporting procedure
Funding to be furnished to User (12:3)

Configuration Status Accounting

Tracking the configuration status of equipment is the responsibility of the sponsoring agency and is vital to the successful completion of a product improvement/modification project. To facilitate the maintenance of Configuration Status Accounting Records, personnel performing installations are required to report on modification accomplishment by completing DA Form 2407 and forwarding one copy to the sponsoring agency and one copy to the US Army Depot Support Command (DESCOM). (15:Appendix C) For those equipments upon which

serial number controls are imposed, modification installation reporting will identify the items modified by serial number. For equipments which are not controlled by serial number, the sponsoring agency will identify a new, unique National Stock Number for the modified equipment. Conversions to this new NSN are reported by location as installations are accomplished. Upon receipt of modification accomplishment reports, the sponsoring agency must update its data to reflect the new configuration. If status accounting records reflect that modification installations are not being accomplished in a timely manner, the product improvement manager should take corrective action.

Product Improvement Installation Management Process

Figure 2 represents the primary actions required for the successful planning and accomplishment of a product improvement installation. A brief description of each activity is given below.

1. Prepare PIP: The Product Improvement Proposal is developed by the Project/Product Management Office or designated lead activity of the sponsoring agency. Preparation of the PIP is a coordinated effort and includes inputs from the functional elements of the sponsoring agency and from the user's representative. The PIP includes estimates of the quantity of items

PRODUCT IMPROVEMENT INSTALLATION

MANAGEMENT PROCESS

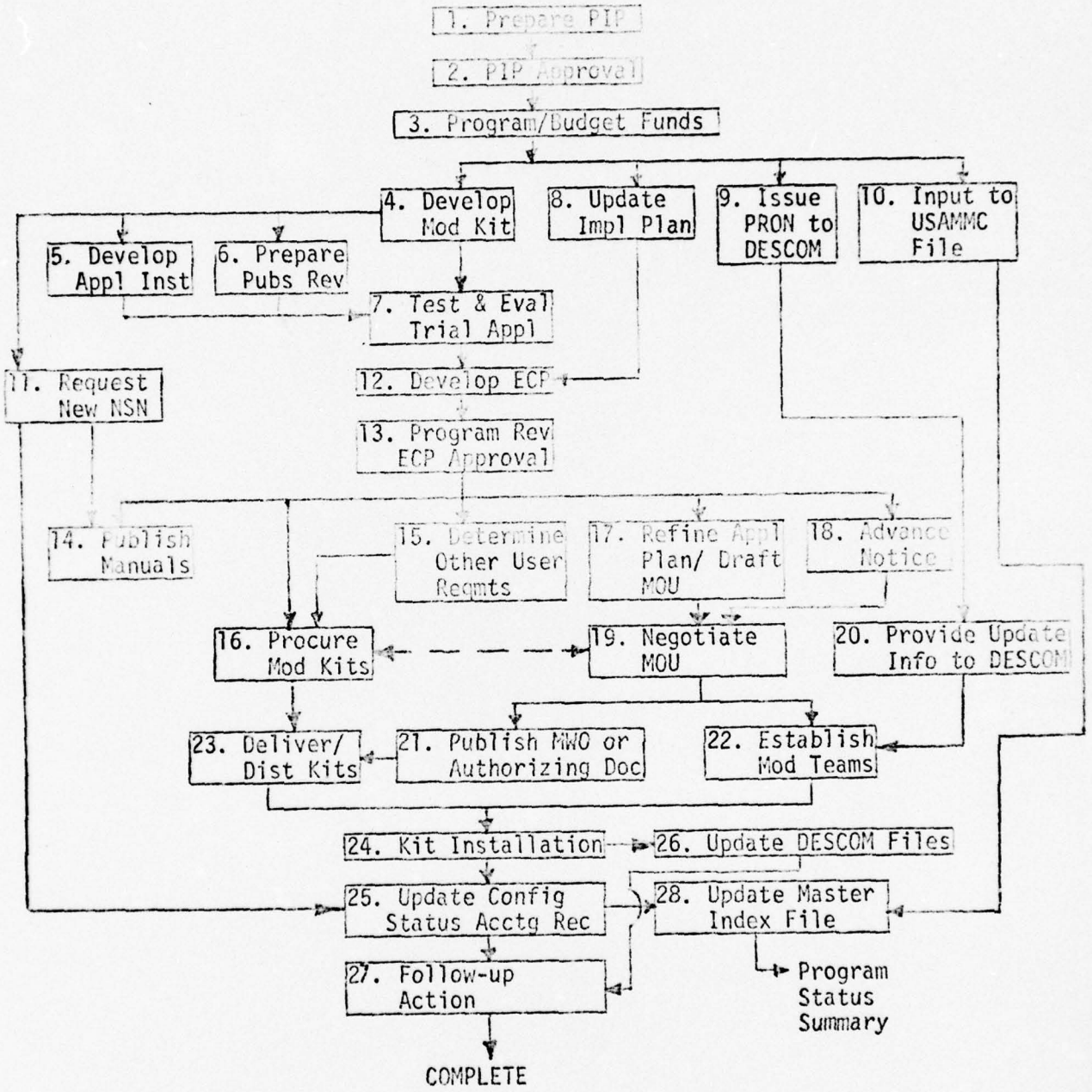

Figure 2

to be modified, the schedule, cost, and method of implementation.

2. PIP Approval: PIPs are reviewed by a multi-disciplined Configuration Control Board for approval determination. Concurrence by the user's representative is mandatory for an approval decision. PIPs which exceed the prescribed dollar ceilings for approval by DARCOM commodity commands are forwarded through DARCOM to DA for approval.

3. Program/Budget Funds: Approved PIP requirements for all years should be entered in the appropriate budget documents as soon as possible. The PM or lead activity for the PIP should follow up with functional elements to assure that requirements are properly budgeted. It should be noted that programming and budgeting is not a one time activity. As requirements are adjusted and estimates refined, it will often be necessary to update budget data. In addition, it is essential to maintain coordination between appropriations. This becomes critical when funding availability differs from initial program planning.

4. Develop Modification Kit: This activity represents the development of the improved hardware and supporting documentation (drawings and specifications). The development of a product improvement is administered in the same manner as any other Army materiel development effort, except for funding. However, there is one important constraint which the designer must not lose sight of. The improvement must be installed on existing hardware which is fully assembled and operational.

The details of the design can have a tremendous impact on the installation effort!

5. Develop Application Instructions: Detailed installation instructions are required for the personnel who will install the modification. These instructions are developed during hardware design, usually in the form of a Modification Work Order manuscript.

6. Prepare Publication Revisions: Draft revisions/changes are developed for maintenance manuals and other publications affected by the modification.

7. Test & Evaluation/Trial Application: Testing of the improved system is performed to verify that the desired improvement has been achieved. The sponsoring agency is required to coordinate with the Operational Test & Evaluation Agency (OTEA) to determine the need for operational testing. Testing will include a trial application of the prototype modification to prove out feasibility of design and adequacy of the application instructions. Application time data are developed for use in cost estimates and scheduling.

8. Update Implementation Plan: Quantities and location of assets will be refined. Preliminary requirements from other services and foreign users may be estimated. Support requirements and quantities are determined.

9. Issue PRON to DESCOM: Operation and Maintenance funds for modification work are disbursed by the Depot Support Command

(DESCOM). Sponsoring agencies identify manhour requirements and schedules for modifications by means of a Procurement Request Order Number (PRON). A PRON is generated for each Modification Work Order number/national stock number combination and includes funding guidance for the budget year and four out years. Sponsoring agencies should forward PRON to DESCOM as soon as requirements become known. This is normally accomplished by the Maintenance Directorate of the sponsoring agency.

10. Input to USAMMC file: The US Army Maintenance Management Center has the responsibility for tracking the Army Wide MWO status and publishing quarterly DAMWO Program status summaries. Sponsoring agencies must notify USAMMC as soon as a Modification Work Order is projected and identify requirements.

11. Request New NSN: New National Stock Numbers must be requested from the Defense Supply Logistics Center for new or modified parts, modification kits, and modified end items as appropriate.

12. Develop ECP: The lead activity or PM office will develop one or more Engineering Change Proposals in accordance with MIL-STD-480. The ECP(s) will describe the proposed change in detail and cost out all aspects of its implementation including retrofit and support.

13. Program Review/ECP Approval: Following development and testing of the modification, a program review is conducted to determine whether or not to continue into procurement and

fielding of the modification. The ECP provides an excellent format for conveying the information required for this review. Hence, the ECP is normally prepared in advance and reviewed by a Configuration Control Board. Approval of the ECP constitutes approval to proceed with the project as outlined in the approved ECP.

14. Publish Manuals: Changes and/or revisions to publications effected by the modification must be published prior to modification installation. Ideally, the publications would be accomplished concurrently with publication of the Modification Work Order.

15. Determine Other User Reqmts: Requirements of other services, National Guard, Coast Guard, and Foreign users of equipments should be determined prior to procurement of kits when possible and incorporated in the buy.

16. Procure Modification Kits: Hardware required for modification of end items and spares and support of modified equipments is procured through normal channels. Procurement quantities should take into account Foreign Military Sales and service requirements. In addition, special test and diagnostic equipments and special tools must be procured in a timely fashion to facilitate follow on kit installation.

17. Refine Plan/Draft MOU: The application plan should be updated as required to reflect the approved program. Based on this updated plan, the PM or lead activity will work with the

Maintenance Directorate of the sponsoring agency to prepare a draft Memorandum of Understanding.

18. Advance Notice: The sponsoring agency is required to notify the major Army commands and other users immediately upon approval of urgent modifications and within 30 days after approval of normal modifications. (4:3-4) The purpose of this notification is to facilitate advanced planning and budgeting for logistics and operational support of modifications.

19. Negotiate MOU: The Maintenance Directorate of the sponsoring agency, supported by the PM or lead activity, will take the lead in negotiating Memorandums of Understanding with the various user commands.

20. Provide Update Information to DESCOM: A copy of the negotiated MOU is furnished to the Depot Support Command (DESCOM) by the sponsoring agency. DESCOM, in response to direction from commodity commands, will use this document as a basis for establishing modification teams (as required) and funding applications.

21. Publish MWO or Authorizing Document: The authorizing document (Modification Work Order, Depot Maintenance Request, or statement of work) is formally released to authorize modification installation. All required funding for installation should be in the funded portion of the budget prior to releasing a MWO.

22. Establish Modification Teams: This activity represents

finalization of personnel planning and workloading for installation of modifications.

23. Deliver/Distribute Kits: Kits are delivered from the contractor to locations designated in the contract. The kits must then be distributed to installation sites in accordance with the Memorandum of Understanding. Arrangements must be made to track kits to their final destination.

24. Kit Installation: This activity represents performance of the modification. Upon completion of a modification, personnel performing the work are required to send a report (Form 2407) to the sponsoring agency and to DESCOM.

25. Update Configuration Status Accounting Records: Upon receipt of Form 2407, the sponsoring agency configuration manager must update the Configuration Status Accounting Records. These records should be monitored by the manager for the product improvement project to assure timely installation. Quarterly progress reports are input to USAMMC.

26. Update DESCOM Files: DESCOM is responsible for disbursing funds for modification installation. Upon receipt of Form 2407, DESCOM accounts and records are updated.

27. Follow-up Action: The DARCOM sponsoring agency has final responsibility for the timely application of modifications. If modifications are not being accomplished as planned, the sponsoring agency must take action to correct the situation. This action could include fielding a separate modification team

(contractor or depot) to accomplish the work. The sponsoring agency product improvement manager is also responsible for assuring that modifications perform properly. Sample data collection and physical validation may be used to assure completion and proper functioning.

28. Update Master Index File: The US Army Maintenance Management Center (USAMMC) will publish status summary reports for the entire DA MWO program quarterly.

CHAPTER IV

POTENTIAL PROBLEM AREAS

Introduction

As discussed in Chapter II, the most prevalent issue confronting the Army's modification program in recent years has been the failure to install modifications in a timely manner. Although there has not been universal agreement on the cause(s) of this failure, several major problem areas have been identified. This chapter will examine these and other recognized/potential problem areas pertaining to the management of modification installations in terms of recent policy and procedure changes.

Equipment Availability

Timely accomplishment of modifications is dependent (among other things) on equipment availability. Even when modifications are free-issued and contractor or depot modification teams dispatched, it is up to the user to make his equipment available for modification. Since the user is dependent upon operational equipment to perform his mission, the operational readiness of the equipment is of primary importance. Thus, unless the user is fully convinced of the need for the modification, he is likely to be reluctant to

allow his equipment to be placed in an inoperative condition while the modification is accomplished. Even when the need for the modification is undisputed, it is essential to minimize downtime.

Recent policy and procedure changes have not relieved the field commander of his responsibility for operational readiness. However, the negotiated Memorandum of Understanding should force the necessary advanced planning required to minimize downtime and establish a commitment on the part of both the user and the developer to comply with the plan.

The Memorandum of Understanding for modification is still a new and unproven concept. It may be that the primary problem of the future will be negotiating the MOU. There are, however, several actions which can and should be taken to promote user acceptance and cooperation and facilitate planning. First, coordinate with the user early to assure the validity of the requirement. Second, adequately test the improvement to demonstrate that it satisfies the requirement. Finally, plan the application effort to minimize downtime and make arrangements for equipment floats when required.

Modification Kit Control

Inadequate control of modification kits has been a recurring problem in the Army modification program and continues to be a potential problem area for future consideration. In

numerous cases, kits have been lost or shipped to the wrong location. To preclude this problem, modification kit transportation and handling, destinations, and control procedures should be made the subject of early planning and included in the Memorandum of Understanding.

Installation of Prior Modifications

In some instances, installation of a new modification is dependent upon configuration changes made by previously issued modifications. If these prior modifications have not been incorporated in the equipment, it may be physically impossible to install the new modification, or worse, the equipment may not function properly with the new modification. For this reason, it is extremely important to maintain accurate Configuration Status Accounting Records. During the planning stage, it should be determined whether or not prior modifications have been issued and their impact on the new design assessed. If it is determined that there are previously issued modifications which must be installed prior to the new modification, arrangements should be made with the user to validate the configuration status of the equipment. Planning and programming should include the necessary time and resources to install previously issued modifications when required.

Management Reports Inaccurate

In order to effectively plan and control modification installation, management data relating to quantities, location, configuration status, and modification accomplishment must be accurate. Frequently it has not been. In some instances, the field has inaccurately reported modification accomplishments and DARCOM has not effectively processed data into the data base. During the past year, the Army has attempted to validate many of its modifications. However, after-the-fact visual validation is often impossible without tearing equipment down. In planning future modification, reporting should be an important consideration and should be clearly established in the MOU. In addition, sponsoring agencies should assure that configuration status accounting data track with data in the US Army Maintenance Management Center MWO files. The user should be required to verify the accuracy of quantities and locations of equipment set forth in the MOU.

Overloaded Field Level

In some instances in the past, particularly during the Vietnam era, the number of field level modifications issued apparently exceeded the available manpower for application. However, under the new policy and procedures, this should not occur. Under the Department of the Army Guidance issued in July 1975 (12:3), DARCOM must negotiate field level modifi-

cations with the user to assure that adequate manpower is available. In addition, DARCOM is responsible for budgeting the necessary funds and assuring application within the time compliance period.

Modification of Spares

Arrangements must be made to support modified equipment. Thus, it is often necessary to modify spare parts in the inventory concurrently with the modification of fielded equipments. In the future, modified components will be assigned a new national stock number which is incorporated in revised publications. It should be noted, however, that unmodified spares must be retained in the inventory until all of the equipment is modified. Maintaining the proper balance between modified and unmodified spares and controlling these spares can present a significant problem. Careful planning and monitoring of support aspects is required throughout the modification program.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The installation of modifications to fielded Army equipment has, over the past several years, been a significant management problem. However, the Army has recognized this problem and has taken action to improve management visibility and control over its modification programs.

Recent changes in policy and procedures pertaining to Army modification programs have focused primarily on the approval process and on planning and control. In January of this year, the Department of the Army directed that all future retrofit actions be accomplished under an approved Product Improvement Proposal. This action should effectively limit the proliferation of modifications. In July 1975, DA assigned to DARCOM total responsibility for funding modifications and insuring timely accomplishment of modifications. In addition, DA directed the use of a negotiated Memorandum of Understanding between the user commands and the DARCOM sponsoring agency to document planning requirements and responsibilities. By consolidating funding under one agency and developing a formally agreed upon plan for implementation, many of the old problems should be avoided.

At the present time the Army is actively engaged in implementing the above policy changes. Both AR 70-15, Product

Improvement of Materiel, and AR 750-1, Army Materiel Maintenance Concepts and Policies, are being revised to reflect these policy changes. In addition, DARCOM is developing a supplementary regulation (DARCOM-R 750-50) to provide detailed guidance for implementing AR 750-1. It remains to be seen, however, whether these new policies and procedures will work as well in practice as in theory. The Memorandum of Understanding, for example, may prove very difficult to negotiate. The user must still be concerned about the operational readiness of his equipment and may not be willing to commit himself to "hard" schedules for modification.

This author believes that the new Army policies and procedures for managing the installation of modifications should lead to substantial improvements. However, the new policy does not constitute a "fool-proof" cook book for modification management. Many of the old traps still exist. The emphasis under the emerging policy is simply to surface these problems at an early point in the program and plan for them. In the final analysis, the success of any given project will be determined by the human factor. There is no substitute for direct contact and follow-through. The product improvement manager must be involved in all phases of planning and implementing the modification.

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