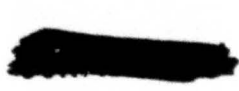


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APPENDIX 8
**REPORT
OF THE
M16 RIFLE REVIEW PANEL**

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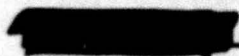


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1 JUNE 1968

REVIEW AND ANALYSIS OF THE ARMY ORGANIZATIONAL STRUCTURE
AND MANAGEMENT PRACTICES FOR THE DEVELOPMENT, TESTING,
AND PRODUCT IMPROVEMENT OF SMALL ARMS RIFLE SYSTEMS

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REPLY TO
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1 FEB 1981

MEMORANDUM FOR THE RECORD

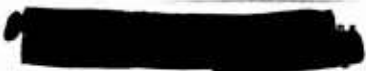
SUBJECT: Declassification Action - Report of the M16 Rifle Review Panel (C)
dated 1 June 1968. [REDACTED]

1. The Report on the M16 Rifle Review Panel dated 1 June 1968 was prepared for the Office of the Chief of Staff of the Army, by the Office of the Director of Weapons System Analysis. The Ground Combat Systems Division, Office of the Director of Weapons Systems, Office of the Deputy Chief of Staff for Research, Development and Acquisition, is the successor to the originator of the report.
2. This office has completed a review of subject report and appendices 1 through 11 and has determined classification of Confidential is no longer needed. The report is now Unclassified. Selected extracts of the report are at Enclosure 1.
3. Notification of this declassification will be forwarded to all distribution addressees and a declassified copy will be forwarded to the Defense Technical Information Center, Cameron Station, for file.

1 Encl
as


WILLIAM O. COOMER
Colonel, GS
Chief, Ground Combat Systems
Division

file



Appendix 8

Review and Analysis of the Army Organizational Structure and Management Practices for the Development, Testing, and Product Improvement of Small Arms Rifle Systems

Att in file



1 June 1968

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Appendix 8

Review and Analysis of the Army Organizational Structure
and Management Practices for the Development, Testing,
and Product Improvement of Small Arms Rifle Systems

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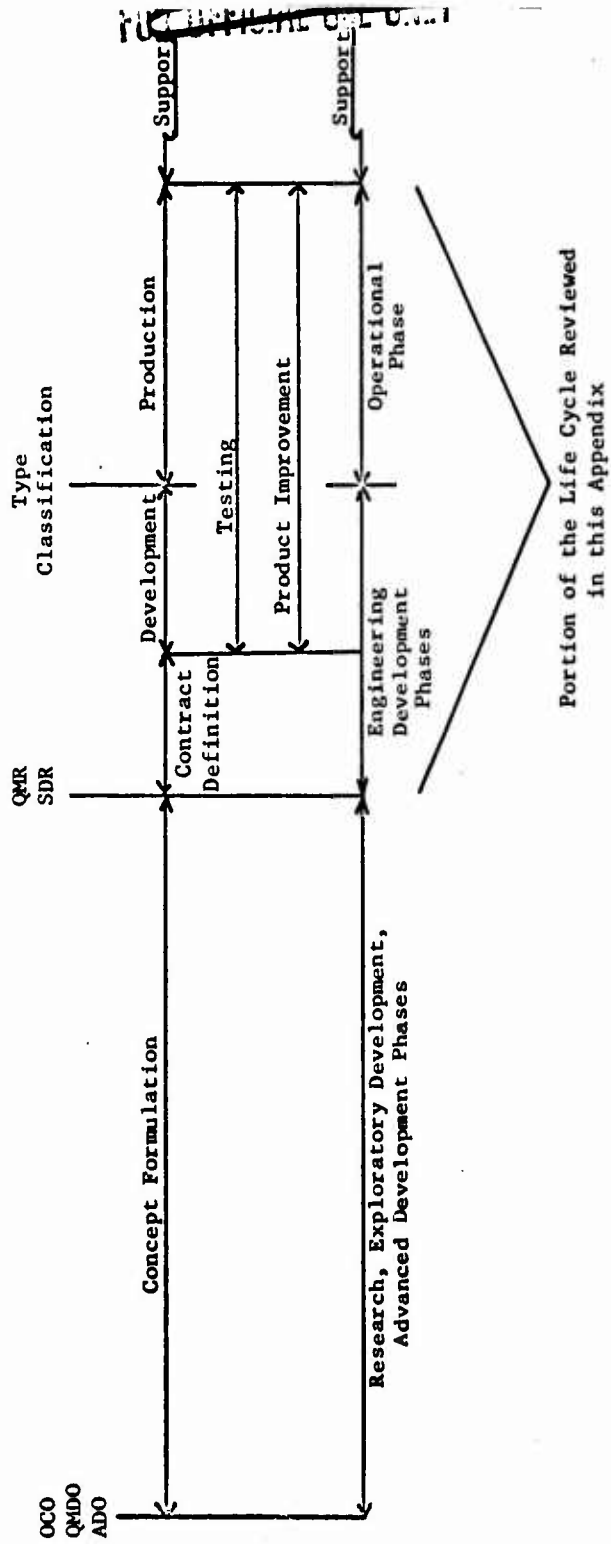
APPENDIX 8

A. Introduction

This review is limited to the engineering development phase and operational phase of a small arms system life cycle; it deals with the rifle system from the time a decision is made by Headquarters, Department of the Army, to proceed from advanced development to engineering development to after the time when the rifle system is issued to troop units. The review discusses current and future organizational structure and management practices rather than those in effect when the M16-M16A1 rifle was adopted. (See Figure 8-1.)

The actual number of organizational elements within the Army, that is the commands, staff activities, and operating agencies, that contribute to the development, testing, and product improvement of small arms rifle systems is surprisingly large. In addition to the principal Department of the Army staff agencies, such as the Assistant Chief of Staff for Force Development (ACSFOR), Chief, Research and Development (OCRD), Deputy Chief of Staff for Logistics (DCSLOG), and Deputy Chief of Staff for Personnel (DCSPER), the U.S. Continental Army Command (USCONARC), the U.S. Army Combat Developments Command (USACDC), and the U.S. Army Materiel Command (USAMC) as well as their subordinate commands to include the CDC Experimentation Command (CDCEC), Institute for Land Combat (ILC), Institute of Systems Analysis (ISA), Combat Arms Group (CAG),

Figure 8-1 LIFE CYCLE DEVELOPMENT



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Combat Services Support Group (CSSG), Weapons Command (WECOM), Project Manager, Rifles (PM-RS), Munitions Command (MUCOM), Test and Evaluation Command (TECOM), Ballistic Research Laboratories (BRL), Human Engineering Laboratory (HEL), and their included agencies, boards, arsenals, armories and laboratories all contribute in one respect or another to the development and testing of small arms systems.

The trigger that initiates engineering development is the decision issued at the DA organizational level, and the forces that push the work are the management practices used by the participating organizations. Some of the management techniques and organizations concerned with small arms are currently being revised in accordance with changes recommended by the DA Board of Inquiry on the Army Logistics System and approved by the Chief of Staff, Army.

This discussion will include the current organization and management used in the development, testing, and product improvement of small arms systems, as well as changes to the organizational structure and management practices under consideration which are in the planning stage. Because the M16-M16A1 rifle system has been classified as Standard A, the only parts of this discussion that pertain to the M16A1 system are the proposal, testing, and adoption of product improvements.

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B. Present Army Organizational Structure

The organizations having a primary role in the development, testing, and product improvement of rifle systems are identified below. Each contributes to the cycle in its own functional area (see Figure 8-2). A more detailed review of these commands and their specific staff elements is included in Inclosure 1 to this appendix.

Department of the Army approves requirements; authorizes, approves, and monitors developments, selected tests, and product improvements; and budgets for these actions. Headquarters, Department of the Army, also manages the Army Small Arms Program.^{1/}

USACDC prepares the requirements for the rifle system, the doctrine that guides the employment of the system and the organizational basis within which the system operates. USACDC also monitors the development of the system and any product improvements thereto, and approves the service test plan of the system.^{2/} USACDC represents the user in all of these actions. The subordinate USACDC groups, agencies, institutes, and the Experimentation Command contribute to the preparation of the USACDC position through detailed work, studies and experimentation.

¹ AR 10-5, Organization and Functions, Department of the Army, Aug 66.

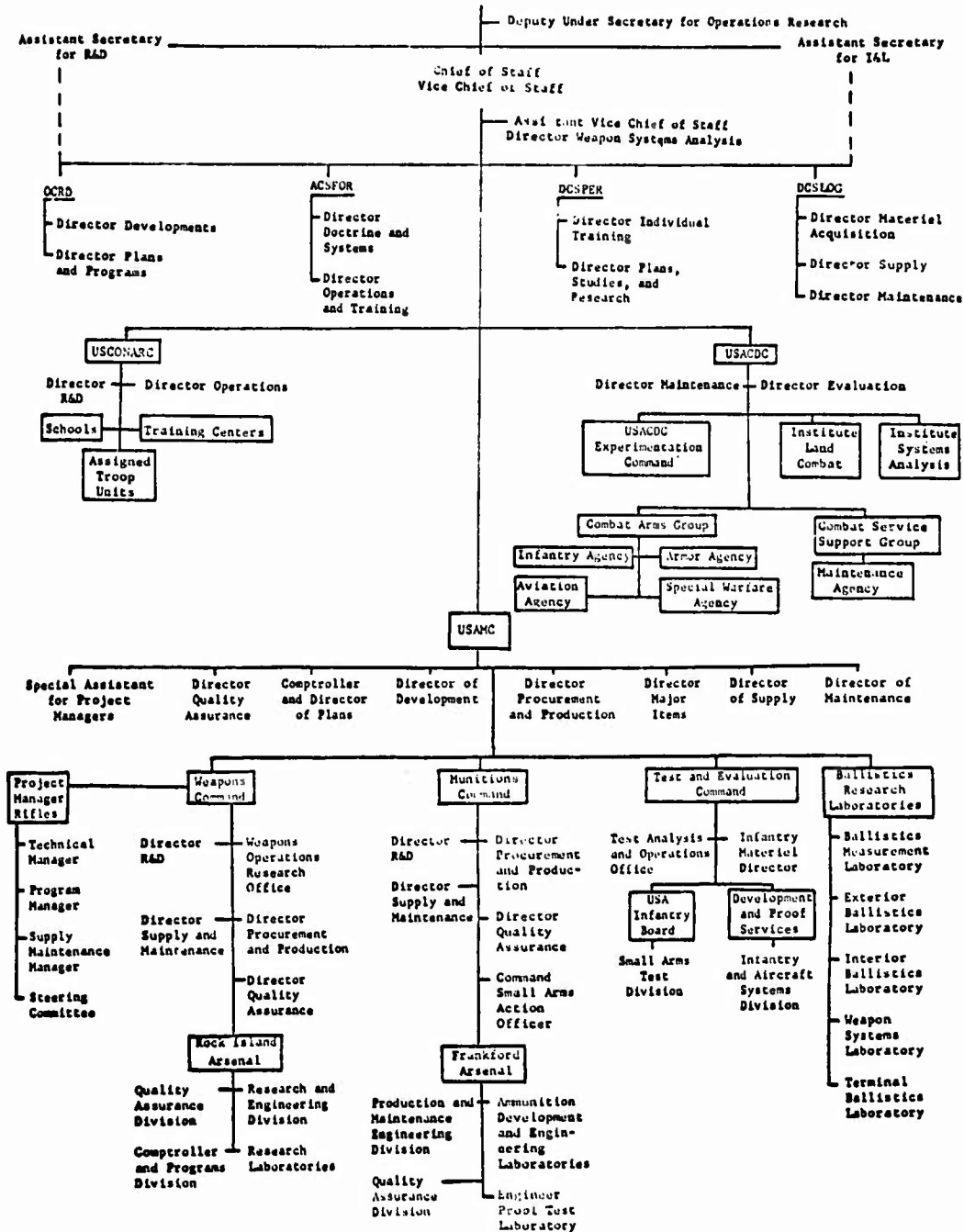
² AR 70-10, Draft, Test and Evaluation During Development and Acquisition of Materiel, Feb 68.

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Figure 8-2 U.S. ARMY COMMAND AND STAFF ORGANIZATION FOR SMALL ARMS

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Secretary of the Army
 Under Secretary of the Army



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USAMC acts as the developer, tester, and product improver of rifle systems, to include the testing of product improvements. In order to centralize the management of rifle systems, the Commanding General, USAMC, appointed a project manager for rifle systems.^{3/} The project manager, in turn, plans, directs, and controls the tasks assigned to USAMC subordinate commands and civilian contractors.

USCONARC is responsible for participating in combat developments and monitoring materiel developments pertaining to individual and unit training, for the combat readiness of assigned troop units, and for advice, assistance, and direct support to the Commanding Generals of USAMC and USACDC in these areas.^{4/} In addition, USCONARC is responsible for participating in the development of human factors engineering programs in support of rifle systems development.^{5/}

³ AR 70-17, System Project Management, Nov 65.

⁴ AR 10-7, Organization and Functions, U.S. Continental Army Command, Jan 68.

⁵ AR 602-1, Man Materiel System, Human Factors Engineering, Mar 68.

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C. Management Practices

This section identifies and briefly describes the present management practices used by the Department of the Army in the development, testing, and product improvement of small arms weapons systems. The primary aspects of management examined are planning, controlling, and directing. The discussion is limited to examination of how the management practices are designed to operate; how the practices actually operate is reviewed in the next section. Recommendations of study groups and boards that have been approved by the Chief of Staff, Army, are considered to be official U.S. Army policy even if the approved recommendations have not yet been published in Army regulations.

Planning

The process of planning encompasses the definitions of goals, the determination of resources required to accomplish the goals, the assignment of responsibilities to carry out tasks identified in the plan, determination of feasible alternative courses of action, and estimates of the time required to accomplish the various phases or tasks. The major plans which provide the framework for development, testing, and product improvement of rifle systems are the System Development Plan and the Project Manager Master Plan. These two are not single plans but are collections and summaries of specific detailed plans, as discussed below.

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The System Development Plan is required by Department of the Army, and will normally include the following items: the Qualitative Materiel Requirement (QMR) a brief of the Development Plan, the Primary Issues, The Management Plan, The Financial Plan, Schedules, The Contract Definition Phase Plan, System and Subsystem Characteristics, Associated System Characteristics, The Reliability and Availability Plan, The Maintainability Plan, The Configuration and Data Management Plan, The Coordinated Test Plan, The Logistics Support Plan, The Facilities Plan, The Procurement Plan, The Foreign Technology Plan and The Technical Documentation Plan.^{6/} The System Development Plan and contract definition are required for all projects which are estimated to require cumulative expenditures of greater than \$25 million in Research, Development, Test, and Evaluation funds or \$100 million in production investment funds, and are prepared and executed by USAMC.

The project manager is responsible for the preparation and submission of the project management master plan to USAMC. This plan, a compilation and summarization of individually approved planning documents, is accomplished by the project manager with the assistance of participating organizations and contractors, and places in context the plans, schedules, costs, scope of work, and resources utilized in the attainment of the project objective. The project

⁶ AR 705-5, Army Research and Development, Apr 68.

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management master plan includes seven parts: general description; work breakdown structure; program; logistic support plans; personnel staffing plan; transition plans; and an approved planning documents index. The master plan, when approved by the Commanding General, USAMC, becomes directive in nature.^{7/}

Controls

Controls placed on the development, testing and product improvement of small arms rifle system include Department of the Army, USAMC, and USACDC regulations and policies pertaining to rifle systems; approved QMR's; programs and budgets established for specific projects; reviews of system development progress, such as the in-process review (IPR) and system status evaluations (SSE); program and budget reviews; progress reports; and provision for methods to coordinate system development, testing, and improvement among concerned agencies. Coordination devices include conferences, committees, in-process reviews, systems status evaluations, and visits. These controls are exercised at each level of organization described in section B above. Department of the Army prepares and publishes regulations and policy on such subjects as project management, test and evaluation, reliability and maintainability, human factors engineering, type classification actions, and product improvements. These policies provide guidance, constraints, and direction for the engineering and

⁷ AMCR 11-16, Vol. 3, Project Management, Master Plans and Reports, Oct 66.

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operational development phases of rifle systems. In addition, Department of the Army monitors and reviews the Army Small Arms Program, prepares and executes budgets, sets priorities,^{8/} requires that in-process reviews and system status evaluation be conducted, and specifies that reports be provided on the progress accomplished in developing rifle systems. Actual progress is monitored by the Department of the Army staff agencies through updating of System Development Plans; Quarterly Research, Development, Test and Evaluation Progress Reports; visits; conferences; and correspondence. Coordination during the development phases is accomplished through conferences, committees, visits, correspondence, and during inprocess reviews held at specific selected critical points in the development cycle. DA has placed further controls and constraints on the development of rifle systems by allowing the representatives of trainer agencies (USCONARC), user agencies (USACDC), and logistics agencies to vote at in-process reviews and system status evaluations, and by requiring that USACDC approve the Service Test Plan for rifle systems.^{9/}

USAMC, the agency responsible for development, testing and product improvement of rifle systems, has placed additional controls on rifle systems projects in the form of detailed regulations and

⁸ The Army Small Arms Program (ARSAP), ACSFOR, Dec 67.

⁹ AR 705-5, Army Research and Development, Apr 68.

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policy, instructions for internal USAMC coordination, and detailed requirements for programming, budgeting, testing, evaluation and reports. USAMC has published specific regulations and policies on concepts, control techniques, procedures used in project management, preparation of project management master plans, general procedures and requirements for development and testing of weapons systems, and on testing of product improvements. Control techniques and procedures include the use of PERT^{10/} and PERT/COST, configuration management, and reporting systems. USAMC also reviews development, test, and product improvement programs and budgets, and prepares and publishes project manager charters. The charters specify the project manager's mission, authority, responsibility, interfacing and participating agencies, assigned tasks, communication channels, location, and administrative support arrangements.^{11/} Development, testing, and product improvement progress is monitored by USAMC through weekly and monthly project manager master plan reports and test reports.

Directing

Department of the Army directs rifle system development through policy guidance published in regulations, through the establishment and continuation of programs and budget allocations, and by

¹⁰ Program Evaluation and Review Techniques.

¹¹ AR 70-17, System/Project Management, Jan 68.

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providing decisions and directives at key development, test, and product improvement points. For example, Department of the Army approves the establishment of a development project; sets priorities and allocates funds for the project; approves the in-process reviews and system status evaluations; approves type classification actions; approves product improvement projects that are estimated to cost more than specified levels;^{12/} establishes DA Systems Staff officers when appropriate; and approves establishment of System or Project Management as necessary.

USAMC directs projects by similar approval, allocation, and directive actions at the USAMC level of command.

Management Process

The organizational, planning, controlling, and directing aspects of management are integrated in the process of developing, testing, and improving rifle systems.

When a QMR is reviewed for DA approval, ACSFOR will determine whether or not the item will be nominated for DASSO monitorship; and if so will obtain Chief of Staff approval. Systems also may be recommended for DASSO monitorship at any later time in the life cycle. A DASSO will be appointed for every system which undergoes contract definition. Other systems may be designated for DASSO monitorship when:

¹² AR 700-35, Product Improvement of Materiel, Nov 63.

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1. The system is critical in relation to the Army's operational requirements or materiel modernization objectives.

2. The system has significant impact on Army doctrine, organization, force structure, training programs, personnel requirements or facilities.

3. Unusual management interest in the system has been expressed by the President, Congress, Secretary of Defense or Secretary of the Army.

4. High dollar cost (\$25 million or above PEMA) is involved.

5. The system is unusually complex or presents major problems.

The DASSO functions as the DA point of contact to monitor the development and life cycle of a system and he is helped by assistant DASSO's who are the primary point of contact in principle DA staff agencies.^{13/}

Subsequent to Department of the Army approval of a QMR, USAMC is responsible for preparing the preliminary System Development Plan and an associated program change request, and for reviewing those documents, together with the QMR, at an in-process review. If a new production project, or new engineering and operational system development has one or both of the following characteristics it will be managed by a project manager:

1. Are rated in the BRICK-BAT category on the Department of Defense Master Urgency List of military requirements.

¹³ AR 71-4, draft, Department of the Army Systems Staff Officer System, May 68.

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2. Are estimated to require total cumulative RDTE financing in excess of 25 million dollars, or are estimated to require a total production investment in excess of 100 million dollars.

Other projects may be designated for project management by the Secretary of the Army when they possess one or more of the following characteristics:

1. Have a significant effect on U.S. military posture.
2. Involve unusual organizational complexity or technological advancement.
3. Require extensive interdepartmental, national, or international coordination or support.
4. Present unusual difficulties which need expeditious handling to satisfy an urgent requirement.
5. Two or more related projects which taken collectively, would qualify for project management under the threshold established in . . . above, and are to be conducted on a substantially concurrent basis, particularly when significant technical problems are anticipated.

When the development, production, and support of a new materiel system will impact on the fundamental national interest, or redirect basic national policy for an extended future period, a Department of the Army system manager, in addition to the project manager, may be designated by the Secretary of the Army. In determining whether a system manager is required in addition to a project manager, one or more of the following criteria must apply:

- a. The development and deployment of such a system would significantly influence elements of the national interest other than the purely military for an extensive period in the future.

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b. The subelements or components of the hardware system are anticipated to require exceptional and prolonged study and experimental effort.

c. Nonmateriel subelements of the system under development cannot yet be optimized.

d. Definitive cost and schedule data depend on tradeoff studies that cannot yet be undertaken.

e. The development and deployment of a system having major impact on the national interest also involves significant participation by another service or by an ally of the United States.^{14/}

The project manager will be assigned responsibility for preparing the preliminary system development plan and the preliminary program change request.

The minutes and proceedings of the in-process review are considered at a system status evaluation (SSE), and the SSE findings and recommendation are considered by Department of the Army in arriving at a decision to proceed with contract definition, with further development, or to terminate the project, as appropriate.

Upon approval of project initiation, the Chief of Research and Development assigns a number and a priority to the project, states the need for formal in-process reviews, and establishes funding for the project. The Research, Development, Test, and Evaluation Program, including the funding and priorities of elements, projects,

¹⁴ AR 70-17, System/Project Management, 19 Jan 68.

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and tasks, is reviewed annually by an OCRD review board. USAMC is assigned executive management responsibility for rifle system development projects, and USACDC, USCONARC, and the Logistics Doctrine and Systems Agency (LDSA) act in the capacity of advisers during all phases of the development process.^{15/}

The project manager prepares and submits the project management master plan to USAMC after approval of project initiation. The plan integrates those features of time, cost, and performance requirements that cover the system from concept formulation to disposal and is reviewed by the Comptroller and Director of Programs of Headquarters, USAMC, and approved by the Commanding General, USAMC.^{16/} The project management master plan, and other required plans, such as logistic support plans and training plans, are updated and completed as the system is developed. The initial project management organizational effort is directed toward preparing, coordinating, and securing approval of required planning documents for system development and testing. Thereafter, plans are updated and modified, as appropriate, but only after coordination within USAMC interested commands, and between USAMC, USACDC, and LDSA, and after approval by Headquarters, USAMC or DA. One of the planning documents which provides input to the master plan is

¹⁵ AR 705-5, Army Research and Development, Apr 68.

¹⁶ AMCR 11-16, Project Management, Master Plans and Reports, Oct 66.

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the coordinated test plan. This plan lists and discusses the objectives of all tests that are to be performed on the system being developed, insofar as they can be foreseen. The testing accomplished during development performs the dual role of (1) providing data to guide further development and future production and (2) providing data for assessment in order to determine the suitability of the system for inclusion in the Army inventory.^{17/}

For projects requiring contract definition,^{18/} the project definition phase is completed with the contractor or in-house developer prior to entering actual engineering development of the system. The goal of contract definition, between USAMC and the contractor, is achievable performance specifications backed by firm fixed price or fully structured incentive proposals for full scale development.^{19/} Department of the Army permission to conduct contract definition constitutes a conditional decision to proceed with the development of a major system. A contract definition IPR and a contract definition SSE follow contract definition and provide recommendations to (1) contract for engineering development, (2) keep alternate approaches open, (3) continue further definition, (4) defer or abandon further development, or (5) proceed with further exploratory or advanced

¹⁷ AR 70-10, Draft, Test and Evaluation During Development and Acquisition of Materiel, Feb 68.

¹⁸ Contract definition is required for projects estimated to cost more than \$25 million in RDTE funds or more than \$100 million in production investment funds.

¹⁹ AR 705-5, Army Research and Development, Apr 68

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development.^{20/} DA approval of SSE recommendations for further development permits the development contract to be awarded and engineering development to start.

When system engineering development actually begins, the Army managerial emphasis shifts from planning to execution of assigned development tasks; updating plans; reporting and monitoring developmental progress; and direction of adjustments or corrective actions when actual progress deviates from scheduled development. The project manager assigns specific tasks to commodity commands, laboratories, and contractors; provides periodic progress reports to USAMC and DA; coordinates and adjusts the development efforts; insures that logistic support plans and training plans are completed; insures that scheduled testing is completed; initiates actions to correct deficiencies discovered during testing; and provides information and data for in-process reviews.^{21/} Actual development and testing are accomplished by completion of time-phased tasks derived from PERT and milestone scheduling. Three additional formal in-process reviews normally follow the contract definition IPR: the prototype systems characteristics review; the development acceptance review; and the production validation review. The

²⁰ AR 705-5, Army Research and Development, Apr 68.

²¹ AMCR 11-16, Project Management, Concepts and Policies, Feb 66.

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minutes of each of these reviews are considered by a system status evaluation and the SSE recommendations are provided to ACSFOR. DA approval of SSE recommendations constitutes approval to continue the next developmental step. The successful completion of the production validation in-process review and SSE leads to a recommendation for type classification, which must be approved by DA.^{22/} Approval of type classification constitutes approval of the engineering, service, and initial production tests, and the suitability of the system, as well as approval to procure and produce the developed system. Subsequent to type classification, the previously prepared procurement and production, logistic support, and training plans are executed; initial and follow-on units are equipped with the new system; confirmatory tests, as appropriate, are conducted; and modifications, as directed by DA (ACSFOR), are incorporated in further production.

Product improvements may be incorporated into the system during the operational phase of the life cycle. A product improvement to a weapons system is defined as a modification or an engineering change after type classification which accomplishes one or more of the following purposes:

- (1) To assure safety of personnel.
- (2) To correct a proven performance deficiency discovered during troop use which prohibits use of an item

²² AR 705-5, Army Research and Development, Apr 68.

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for its intended purpose.

- (3) To prevent serious damage to equipment.
- (4) To break a serious production bottleneck.
- (5) To reduce significantly total cost considering all logistical functions.
- (6) To increase significantly combat or operating effectiveness of equipment.
- (7) To increase significantly reliability or durability.
- (8) To significantly improve or simplify maintenance.
- (9) To achieve greater equipment and component standardization.
- (10) To simplify design or operation.
- (11) To increase significantly the efficiency in use of materials.
- (12) To make equipment compatible with newer equipment with which it will be operated.
- (13) To enable an item to be utilized in a new role providing there is no degradation of the items' capability to perform its original role.^{23/}

Product improvements recommended by USAMC, USACDC, USCONARC, LDSA or field commands are reviewed and evaluated by Headquarters, USAMC, coordinated with USACDC to insure that recommendations are

²³ AR 700-35, Product Improvement of Materiel, Nov 63.

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compatible with material and operational objectives, and if the improvement is estimated to cost more than specified levels it is submitted to DA for approval. DCSLOG has DA staff responsibility for product improvement programs.^{24/} If extensive research and development effort is required for product improvement, responsibility is assigned to OCRD, although this is not normal. Upon determination of the requirement for a product improvement by ACSEFOR, DCSLOG formulates, establishes, approves, and supervises product improvement programs above specified funding levels. The Commanding General, USAMC, has directed that all approved product improvements that change performance characteristics, effectiveness, or operational capabilities of the system to any substantial degree, or improvements that have a significant impact on funding, must be tested. Further, the test results must be evaluated by the Commanding General, USATECOM, as to suitability prior to release of the improved system for issue to troop units.^{25/}

24 AR 700-35, Product Improvement of Materiel, Nov 63.

25 USAMC Ltr, Release of Equipment, 15 Jul 67.

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D. Analysis of the Army Organizational Structure and Management Practices for Small Arms Weapons Systems

The Army organizational structure concerned with small arms is large, and diverse, and is complicated by a division of responsibilities among organizational elements and a physical separation of participating elements. The management practices used by the Army have been adapted to compensate for these problems.

The Army has three organizational approaches to the management of materiel development: functional management, project management, and commodity management.^{26/} All three approaches are used for the development, testing, and product improvement of small arms weapons systems. The staff agencies of the Department of the Army staff and the staff directorates of the USAMC staff are organized along functional lines. The Project Manager for Rifles was established below the Headquarters, USAMC level to manage systems which cut across commodity command lines.

Functional management is oriented to specialized services rather than to the items of materiel to which the services apply. The management responsibility for a particular item, such as a small arms system, is divided among specialized elements and no one element has exclusive, comprehensive, responsibility for the

²⁶ FM 38-7, Materiel Development Management, Nov 66.

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development, improvement, and testing of a single system. Each element retains responsibility for planning, directing, and controlling projects in its own area or responsibility.

Headquarters, Department of the Army

On the Department of the Army Staff the functions of research and development are represented in the Office of the Chief of Research and Development (OCD); the functions of procurement and production in the Office of the Deputy Chief of Staff for Logistics (DCSLOG); and the functions of development of materiel objectives, determination of feasibility of proposed developments, and establishment of operational priorities and requirements for procurement of materiel in the Office of the Assistant Chief of Staff for Force Development (ACSFOR). ACSFOR also has been given the additional staff responsibility for life cycle management of materiel items^{27/} although this responsibility is not yet comprehensive or well defined. For example, OCD retains the primary staff responsibility for preparing and publishing testing policy during development, DCSLOG has retained primary staff responsibility for preparing and publishing testing policy pertaining to production and post production testing,^{28/} and ACSFOR has been assigned responsibility^{29/} for user testing. (See Appendix 1.) Thus, no

²⁷ AR 10-5, Organizations and Functions, Department of the Army, Aug 66.

²⁸ AR 70-10, Draft, Test and Evaluation During Development and Acquisition of Materiel, Feb 68.

²⁹ AR 71-3, User Field Tests, Experiments, and Evaluations, 19 Mar 68.

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Other functions, such as financial management, are common to all agencies, although the Comptroller of the Army (COA) has primary overall responsibility in this and other areas. COA is responsible for: compilation and dissemination of Army program and budget guidance to major Army field commands; budgetary, cost analysis and management analysis activities of the Army; independent review and analysis of Army programs; management systems of the Army; study of systems problems crossing organizational or functional lines; and continuing and independent analysis of Army organizations, functions and procedures.^{30/}

The functional activities of research and development, procurement and production, and financial management are also reflected throughout each subordinate echelon of USAMC and its commodity commands.

At the Department of the Army level, the functional approach has the advantage of providing flexibility in handling a wide range of technical tasks, concentrating skills in specialized areas, and allowing the DA staff to focus attention on functional areas. However, this approach requires detailed and constant coordination and supervision as any one system moves through the development, improvement, and testing phases of the life cycle. In addition, because a wide variety of specialized skills are dispersed through

³⁰ AR 10-5, Organizations and Functions, Department of the Army, Aug 66.

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several organizational elements, it is difficult to coordinate the activities of these organizational elements and to see clearly the whole status of any one project and its relationship to associated projects. System development, testing, and product improvement is also hampered at the DA and USAMC level by the lack of an individual or staff element with comprehensive directive authority over the system.

The management techniques used by DA in planning directing, and controlling small arms systems have not satisfactorily solved these problems in the past. This was recognized by the Army staff which conducted studies to determine ways to solve these problems.^{31/} One study effort included the detailed examination of the Army organization and management practices for the acquisition of materiel and the other effort was directed at establishing an Army program for small arms. Several steps, designed to reduce the above listed problems, were recommended by the study efforts and approved by the Chief of Staff, Army.

The first step was the introduction, in 1967,^{32/} of the concept of a disciplined, step by step, management model for the life cycle management of all materiel systems. The model describes the management processes, their interrelationships, and the ordered sequence for the engineering development and operational development

³¹ CSM 67-81, Report of the Department of the Army Board of Inquiry on the Army Logistics System, Vol III, Acquisition Management, 1 Mar 67 and CSM 67-96, Army Small Arms Program, 8 Mar 67.

³² Ibid.

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phases of a system life cycle. The model also provides guidance for the orderly transition of a developmental system from one phase of the life cycle to the next. ACSFOR was assigned responsibility for coordinating and integrating development, deployment, and related support activities, including responsibility for assuring the accomplishment of the internal DA activities required for planning, controlling, and directing the development, production, and support of materiel systems. This responsibility is carried out by DASSO's and assistant DASSO's when directed. In addition, system managers may be appointed to manage systems when necessary. Thus, a framework was approved which provided for centralized DA Staff management of a weapons system throughout its life cycle.

The second major step taken by the Department of the Army was the official publication of the Army Small Arms Program (ARSAP) on 26 January 1968.^{33/} The program was conceived and developed during 1967 in response to the problem of providing complete visibility to small arms projects and it is designed to allow a comparative evaluation of all on-going projects (see Appendix 10).

This program assembles in one package all of the small arms developmental objectives and activities, current and planned, of the various laboratories, subordinate commands and agencies of USAMC, USACDC, and

³³ ACSFOR Ltr, 28 Jan 68, sub: Army Small Arms Program.

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USCONARC. It provides the current and planned funding of each of these efforts, with priorities assigned to assist in new budgetary allocations and in reprogramming within current budgets. It affords far greater visibility than has existed in the past at DA level. It provides a semi-annual forum for exchange of information (among DA staff elements, major commands and their subordinate commands) regarding development progress, and for highlighting problems for resolution at the various developmental echelons.^{34/}

Representatives from DA staff agencies, USAMC, USCONARC, and USACDC attend two conferences a year to review the ARSAP. In addition, the program was proposed as a separate RDTE and PEMA line item in the Army budget, starting with the FY 1960 budget. Overall responsibility for the program was assigned to ACSFOR.^{35/}

Each of these major steps should facilitate the Department of the Army staff management of small arms systems while allowing the staff to retain its functional organization. However, many of the recommendations of the DA Board of Inquiry on the Army Logistics System were still in the draft stage as of 1 May 1968, and the first Small Arms Conference was held in February 1968. It will be some time before the combined results of these two steps produce significant synergistic improvements in the management, development, testing, and product improvement of small arms systems.

³⁴ ACSFOR Memo for Chief of Staff, U.S. Army, 8 May 68, sub: Army Small Arms Program.

³⁵ ACSFOR Ltr, 28 Jan 68, sub: Army Small Arms Program.

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U.S. Army Materiel Command

Below the Department of the Army staff level, USAMC must accomplish the actual development, product improvement and testing of small arms systems in response to requirements generated by USACDC, USCONARC, and DA.

The USAMC headquarters staff directorates face the same problems that the DA staff agencies face in that the USAMC staff directorates are organized on functional lines, but the management of the development, improvement, and testing of small arms systems cut across these lines. One example of the difficulties faced by the USAMC staff elements is pointed out in the conclusions of a USAMC study on standards of testing:

AMC does not have a coordinated test and evaluation program for the life cycle of materiel.

AMC does not have a staff activity responsible for the coordination of such a program.^{36/}

The study recommended that one staff directorate be assigned primary staff responsibility for testing to include staff planning, controlling, and directing functions in order to solve the problem of separation of staff responsibilities. Final action has not been taken by Headquarters, USAMC, on this recommendation.

The two major steps (execution of the recommendations of the DA Board of Inquiry on the Army Logistics System and the establishment of the Army Small Arms Program) taken by headquarters,

³⁶ Briefing to CG, USAMC, re: Standards of Testing for AMC Materiel, 21 Dec 66.

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Department of the Army, when applied by the USAMC staff directorates, should also assist the USAMC staff directorates to manage the development, testing, and improvement of small arms systems.

The primary USAMC elements concerned with small arms systems are the U.S. Army Weapons Command, the U.S. Army Munitions Command, the U.S. Army Test and Evaluation Command, the U.S. Army Ballistics Research Laboratories, and civilian contractors. These organizations are separated by functional mission, interest, and physical distance. The Commanding General, USAMC, has created a project manager for rifle systems to provide technical and business management for assigned systems. The project manager is vested with centralized management authority and is responsible for planning, directing, and controlling the definition, development, production, and initial logistical support of his projects subject to Headquarters, USAMC, approval. He is also responsible for making certain that planning is accomplished by the organizations responsible for the complimentary functions of logistic and maintenance support, personnel training, operational testing, and activation or deployment of his systems.^{37/} The project manager is supported by functional organizations which are responsible to him for specifically assigned project tasks. Although the Weapons Command and the Munitions Command

³⁷ Project Manager, Rifles, Charter, 11 Dec 67.

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have established engineering organizations specifically oriented toward the accomplishment of their responsibilities for rifles and ammunition, the project manager is still faced with the problem of functional and physical separation of the four main supporting organizations and further organizational and physical separation within these organizations. In an effort to solve these problems and to foster an integrated systems approach in the specific case of the M16A1 rifle system, the project manager established a field office at Frankford Arsenal in 1967 and organized a USAMC M16 Steering Committee in February 1968. The field office is designed to provide a point of contact for ammunition activities. The steering committee is composed of representatives from USAWECOM, USAMUCOM, Frankford Arsenal, USATECOM, and the Ballistic Research Laboratories, and is designed to provide technical advice and close coordination of all appropriate USAMC agencies on system tasks.^{38/} The committee will also serve as a coordinating device to cut administrative lead time by keeping representatives of key USAMC commands informed on the status of all current and proposed tasks. The Project Manager, Rifles, is also the chairman of a Joint Service Technical Coordinating Committee which provides a vehicle for interservice coordination of M16-M16A1 technical activities.

Analysis

The establishment of the life cycle management model and the Army Small Arms Program by Department of the Army, and the establishment

³⁸ Project Manager Briefing to the USA, 21 Feb 68.

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of an M16-M16A1 Steering Committee and project manager field office at Frankford Arsenal by the project manager are all steps taken to reduce past management problems. The problems grew out of the difficulties faced by an Army structure essentially organized along functional and commodity lines that attempted to manage the development, testing, and improvement of small arms systems that cut across these lines. The establishment of the project manager field office to serve as a point of contact for ammunition activities at Frankford Arsenal, for example, represents an effort to improve coordination between the project manager and Frankford Arsenal. The project manager has also included a representative of Frankford Arsenal on the M16 Steering Committee. Because ammunition is an integral part of a rifle system, it would appear that a stronger, more flexible, and more responsive project manager organization would result from the establishment of a deputy project manager at Frankford Arsenal and the creation of task teams, responsive to the deputy project manager, to accomplish ammunition associated tasks. Other techniques available for use in the management of small arms systems at DA level include the establishment of System management and a DASSO. These techniques have not been used to date because the criteria for the establishment of the techniques has not been fulfilled.

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None of these corrective actions require an overall change in organizational approach or management practices at the Department of the Army or USAMC level, but are step by step adjustments of the organization and management in being. All of the steps taken together, in particular the establishment of the Army Small Arms Program, are designed to bring increased coherence and unity of the organizational and management practices used in the development, testing, and product improvement of small arms weapons systems. It will take some time for all of the combined steps to take effect to reduce significantly the problems associated with the management of the development, testing, and product improvement of small arms systems. The recent organizational and management changes incorporated by DA should be given sufficient opportunity before major changes are imposed.

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E. Conclusions

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E. Conclusions

1. The Army Small Arms Program can provide the management tools which will establish visibility of small arms research and associated development, provide for a more realistic evaluation of all small arms systems, identify areas that require investigation or correction, and constitute a basis for the coherent, unified development, improvement, and test of future systems.

2. The ARSAP, when fully operational, could help to overcome the organizational problems inherent in managing a system in a functionally oriented organization. However, management of the Army Small Arms Program at this time is primarily exercised through the indirect means of funding authority. Clearly established lines of authority and responsibility within the program are not adequately defined.

3. The Project Manager, Rifles has been assisted through the creation of committees to facilitate control and coordination of system development, improvement, and testing.

4. The Department of the Army staff organization has been appropriately modified to facilitate system management over the life cycle.

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Review of the Army Organizational Structure and Functions

A very large number of commands and staff elements have an interest in small arms weapons systems. (See Figure 8-3.) The role of these commands and their functions are reviewed below.

Headquarters Department of the Army

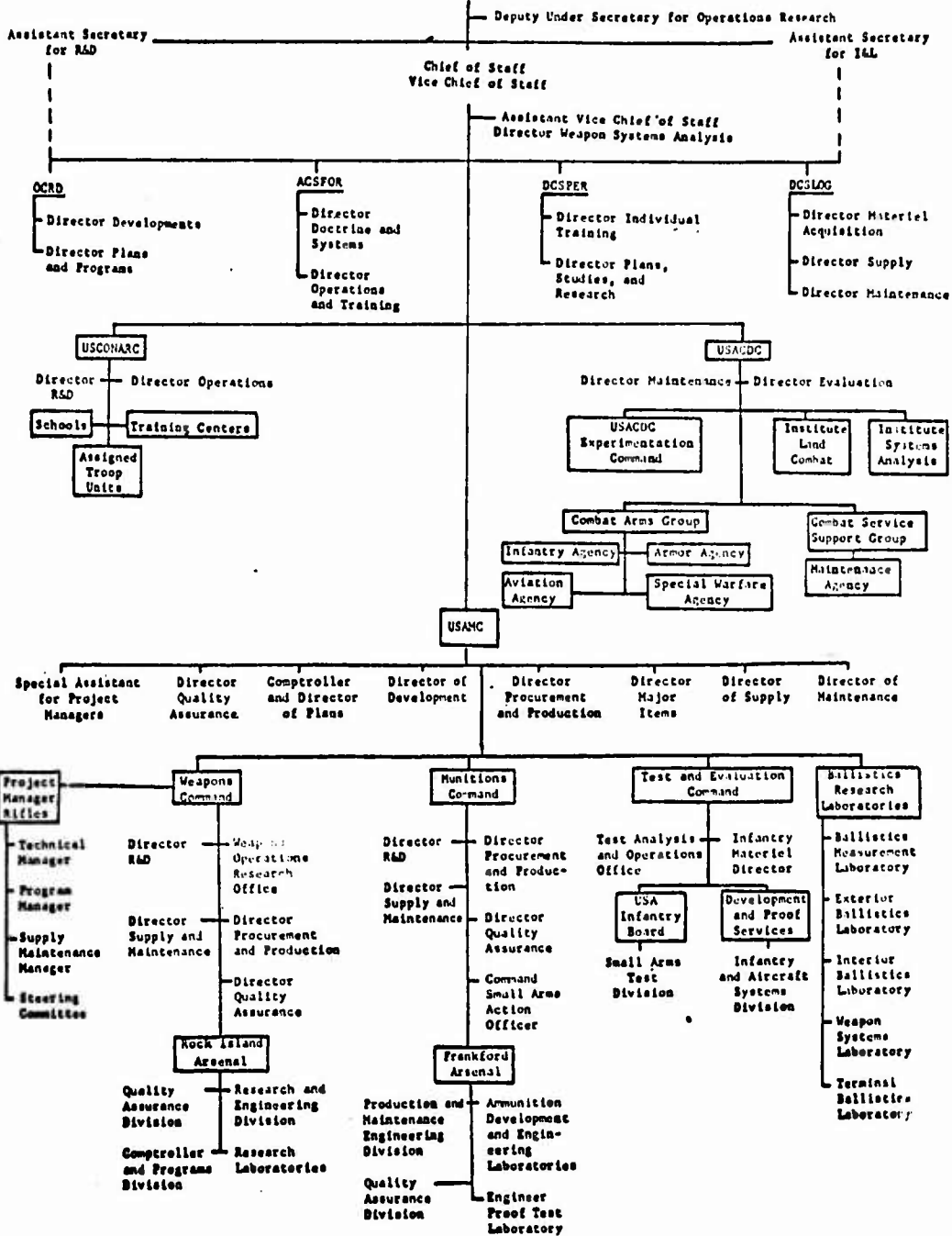
The Department of the Army staff agencies concerned with rifle development, testing, and product improvements are OCRD, ACSFOR, DCSLOG and DCSPER. (See Figure 8-4.)

ACSFOR is responsible for the supervision of the life cycle of rifle systems. The Directorate of Doctrine and Systems of ACSFOR carries out this responsibility through the Combat Arms Systems Division and the Systems Management Division. The Systems Management Division receives, coordinates, secures approval of, and distributes requirements documents such as QMR's and SDR's. The division also prepares, coordinates, and publishes approved Department of the Army policy on Development and testing of rifle systems related to the life cycle. The division also receives, coordinates, and secures approval of type classification requests. The Combat Arms Division supervises the actual development, testing, and product improvement of rifle systems; and when necessary furnishes a Department of the Army Systems Staff Officer (DASSO) who provides centralized DA staff management of the rifle systems.^{39/} Staff responsibility

³⁹ AR 10-5, Organization and Functions, Department of the Army, Aug 66.

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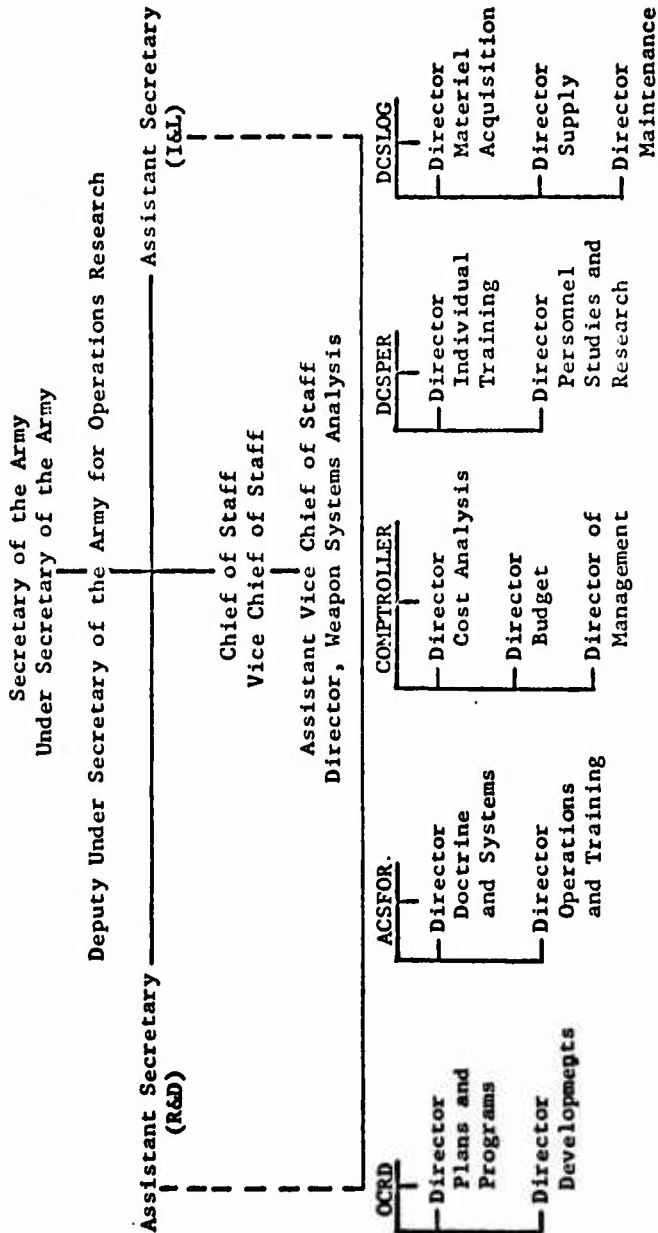
Secretary of the Army
Under Secretary of the Army



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Figure 8-4 HEADQUARTERS DEPARTMENT OF THE ARMY
ORGANIZATIONAL STRUCTURE FOR SMALL ARMS



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for training aids, training literature, and training devices is assigned to the Operations and Training Directorate.

The OCRD is responsible for planning, coordinating, and supervising the development, testing, and product improvement (when high technical risk exists) of rifle systems. The CRD is also responsible for providing policy guidance, programming guidance, and funding for the rifle systems in engineering development. These responsibilities are executed by the Director of Developments and the Combat Materiel Division for the rifle systems and through the Director of Plans and Programs and the Management, and the Programs and Budget Divisions for program, funding, and policy guidance.^{40/}

DCSLOG is responsible for the programming, budgeting, and policy guidance of the operational development phase of the life cycle, which includes the procurement, production, product improvement (when little or no technical risk is involved), and testing of these product improvements. DCSLOG also monitors the development of rifle systems in order to program the acquisition of the system and form a maintenance standpoint. These functions are carried out through the Directors of Materiel Acquisition, of Maintenance, and of Supply. DCSLOG also approves product improvements above certain funding levels.^{41/}

⁴⁰ AR 10-5, Organization and Functions, Department of the Army, Aug 66.

⁴¹ AR 700-35, Product Improvement of Materiel, Nov 63.

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The DCSPER monitors rifle systems development in order to prepare and program individual training and training films on the system and prepares and publishes policy pertaining to development, testing, and product improvement from a human engineering standpoint.^{42/} The Director of Individual Training and the Director of Personnel Studies and Research execute these functions.

The Comptroller of the Army is responsible for independent review and analysis of Army programs; budgetary, cost analysis, and management analysis activities of the Army; management systems of the Army; study of systems problems crossing organizational or functional lines; continuing and independent analysis of Army organizations, functions, and procedures; and compilation and dissemination of Army program and budget guidance to major Army field commands. The Directorates of the Budget, of Cost Analyses, and of Management perform these functions as they pertain to small arms systems.^{43/}

The Weapon Systems Analysis Directorate monitors and guides operations research and systems analysis efforts, Army-wide, that pertain to small arms; conducts studies whose purpose is to provide insights regarding decisions involving small arms; and monitors all system efforts which may be used to support decisions on small arms.

⁴² AR 602-1, Human Factors Engineering Program, Mar 68.

⁴³ AR 10-5, Organization and Functions, Department of the Army, Aug 66.

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The Deputy Under Secretary of the Army for Operations Research provides a capability for in depth review and analysis of selected problems including those related to small arms systems, for the Office of the Secretary of the Army.

The U.S. Army Combat Developments Command

USACDC responsibilities are carried out by USACDC headquarters staff elements and USACDC subordinate commands. (See Figure 8-5.) The primary headquarters staff concerned with rifle development, testing, and product improvement are the Materiel Directorate and the Evaluation Directorate. The Materiel Directorate is responsible for:

Checking the feasibility of and administering QMDO's, QMR's, and SDR's;

Representing USACDC at IPR and Technical Committee Meetings;

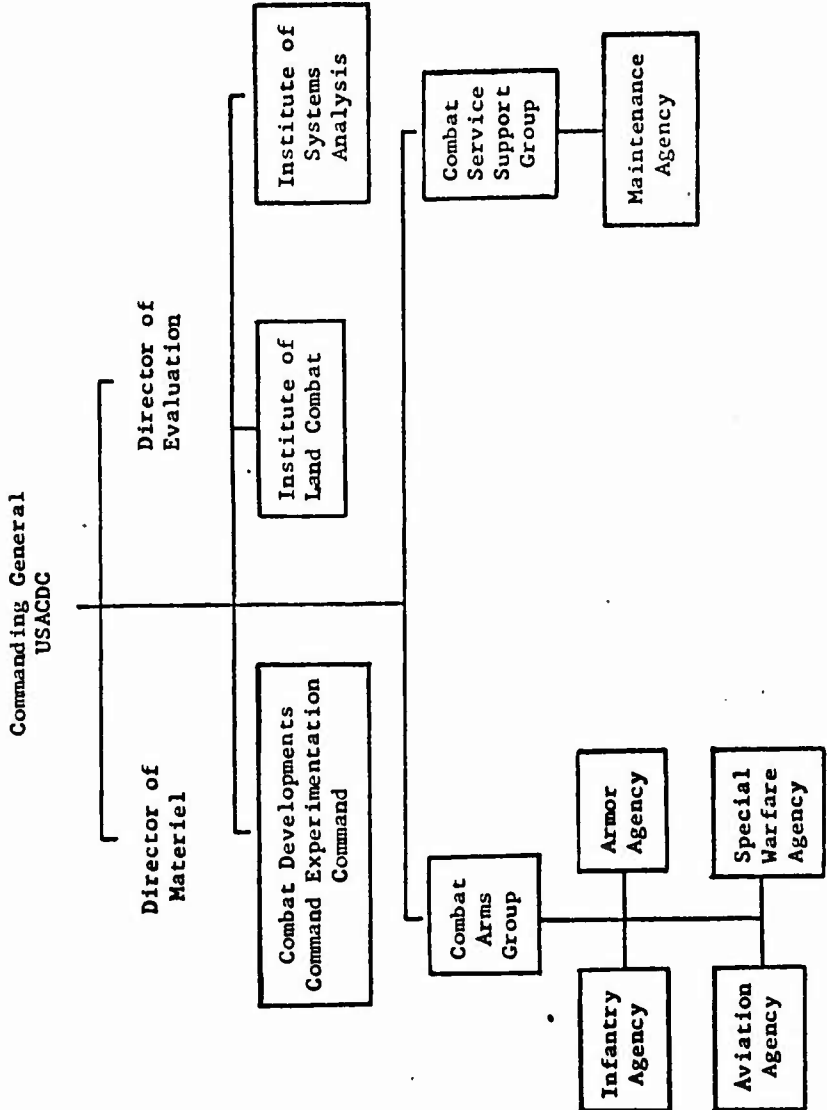
Monitoring the work of development agencies;

Providing the point of contact for the DASSO.^{44/}

The Director of Evaluation is responsible for maintaining the evaluation phase of the USACDC program which is composed of field experiments and evaluations, troop tests, combat evaluations, operations research, and special projects evaluation.

⁴⁴ USACDC Pam 10-2, Organization and Functions, Oct 67.

Figure 8-5 USACDC ORGANIZATIONAL STRUCTURE FOR SMALL ARMS



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The USACDC subordinate commands that contribute directly to rifle development include the Combat Arms Group (CAG) and the Combat Service Support Group which provide mid-level management and coordination of subordinate agencies; the Infantry Agency and the Maintenance Agency. The Infantry Agency develops, evaluates, prepares, and recommends OCO's, QMDO's, QMR's, and SDR's for rifle systems. The agency also monitors RDTE on infantry equipment to insure that it is developed in response to user requirements.^{45/} The maintenance agency reviews ET/ST plans and reports, prepares and revises equipment maintainability and reliability criteria and prepares, reviews and coordinates the USACDC position on maintenance support plans.^{46/}

Other subordinate USACDC agencies and institutes contribute indirectly to rifle system development, testing, and product improvement. USACDCEC conducts scientific experiments pertaining to organization and doctrine of units that use rifle systems; the institute of Land Combat provides the framework of future rifle system requirements; the Institute of Systems Analysis makes studies and analyses of rifle systems; and the Armor Agency, Aviation Agency, and Special Warfare Agency all review and comment on rifle systems development, testing, and product improvement from their functional standpoint.

45 USACDC Inf Agency Pam 10-2, Organization and Functions, Mar 68.

46 USACDC Maintenance Agency Pam 10-2, Organization and Functions, Oct 67.

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The U.S. Army Materiel Command

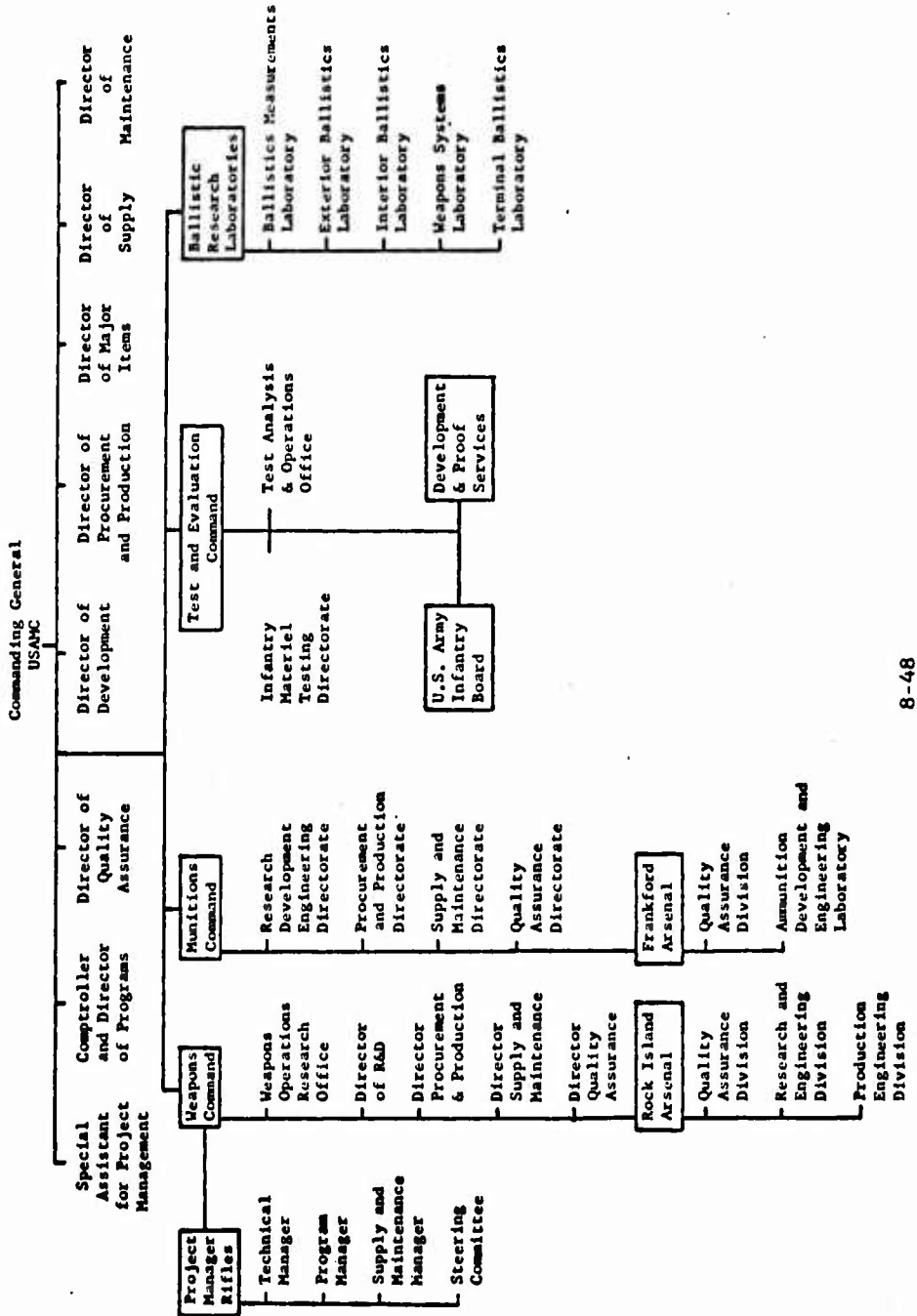
The functions of developing, testing, product improvement, and the testing of product improvements are exercised by the U.S. Army Materiel Command. The primary USAMC staff elements and subordinate command and staff elements concerned with these functions are shown on Figure 8-6. The principle USAMC headquarters staff sections concerned with the development, testing, and product improvement of rifle systems are the Directors of Development; of Procurement and Production; of Major Items; of Supply; of Maintenance; and of Quality Assurance; and the Comptroller-Director of Programs; and the Special Assistant for Project Managers.^{47/}

The Special Assistant for Project Managers prepares project manager charters, provides information on project managers activities to the Commanding General, USAMC, and coordinates actions between project managers, headquarters, USAMC, and subordinate USAMC commands. The Comptroller-Director of Programs, in executing his broad functions of controlling USAMC resources and information procedures and measuring accomplishments, carries out the specific functions of evaluating systems on a cost-effectiveness basis, evaluating the RDTE and PEMA programs, analysing QMDO's and QMDR's, and reviewing project-managed programs, including evaluation of project manager master plans, USAMC staff guidance to project managers, and evaluation of critical areas, imbalances, and progress.

⁴⁷ ANCR 10-2, Organization, Mission, and Functions, Hq USAMC, 1 Jul 66

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Figure 8-6 USAMC ORGANIZATIONAL STRUCTURE FOR SMALL ARMS



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The Director of Developments directs and controls the USAMC RDTE and related programs, approves the USATECOM test program, directs the USAMC Technical Committee, has primary USAMC staff responsibility for activities pertaining to type classification, and provides assistance and support to project managers. Thus, the primary USAMC staff responsibility for development, testing, and developmental product improvements for rifle systems belongs to the Director of Developments.

The other directorates which have functions relating to the development, testing, and product improvement of rifle systems include the Quality Assurance Directorate, the Procurement and Production Directorate, the Major Items Directorate, the Supply Directorate, and the Maintenance Directorate. The Quality Assurance Directorate is responsible for establishing policy for quality assurance procedures within USAMC, for staff supervision of quality assurance procedures through the life cycle of rifle systems beginning with the QMR, and for providing the project manager and commodity commanders assistance in the establishment of quality assurance procedures. The Procurement and Production Directorate has the staff responsibility for developing USAMC procurement and production plans and thus must monitor rifle system development in order to plan for the entry of the system into the Army inventory. The Major Items Directorate as well as the Supply Directorate are both concerned

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with the entry of the rifle system into the Army inventory. The Major Items Directorate is assigned the functions of staff supervision of USAMC major item materiel activities, inventory management activities, and major and secondary PEMA program and budget management activities for rifle systems, including ammunition. The directorate also acts as a point of contact with the project manager for rifles and for USAWECOM and USAMUCOM, recommends equipment for confirmatory testing and provides guidance for product improvements funded by the PEMA program. The Directorate of Supply is responsible for directing and controlling the USAMC materiel inventory management operations for secondary items and repair parts and for providing budget support for PEMA program repair parts for rifle systems. The Director of Maintenance is responsible for developing policy and criteria to attain maintainability and reliability of Army materiel and for providing maintainability and reliability input to and participation in in-process reviews during the development, testing, and product improvement of rifle systems.

In order to manage centrally the development, testing, and product improvement of rifle systems, the Commanding General, USAMC, created a project manager for these systems. The Project Manager, Rifles is responsible for the management of the M16/M16A1 rifle, the XM177-E1 and E2 submachine gun, rifle grenade launchers,

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alternate rifle systems, the Special Purpose Individual Weapon, (SPIW), current standard rifles, and accessories, components, and ammunition peculiar to these rifle systems until the ammunition is type classified A. After the ammunition is type classified A, the project manager retains the overall responsibility for gun and ammunition compatibility. Management includes responsibility for planning, directing, and controlling the definition, development, production, and initial logistical support of the assigned systems. The project manager is also responsible for assuring that planning is accomplished and that it is executed by organizations concerned with logistic and maintenance support, personnel training, operational testing, and activation or deployment of his systems. Other functional commands of USANC are responsible to the project manager for the execution of specifically assigned project tasks. The project manager reports through the Commanding General, USAWECOM, to the Commanding General, USANC.⁴⁸

The weapons organizations that are connected with rifle systems development, testing, and product improvement include the U.S. Army Weapons Command and the U.S. Army Rock Island Arsenal. The USAWECOM functions are carried out by the headquarters staff elements of the Weapons Operations Research Office, the Director of Research and Development, the Director of Procurement and Production,

⁴⁸ Project Manager, Rifles Charter, 11 Dec 67.

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the Director of Supply and Maintenance, and the Director of Quality Assurance. Their responsibilities include:

Provide full technical and administrative support to PM-RS;

Provide staff assistance to USAWECOM subordinate elements in identification, formulation, and solution of internal problems;

Plan, execute, direct and supervise development programs and projects for assigned materiel;

Plan and conduct tests of assigned materiel;

Direct and accomplish procurement and production of assigned materiel;

Accomplish product, production, and maintenance engineering;

Provide wholesale inventory management, stock control, and supply control for commodity managed items; and

Plan, direct, and execute quality assurance and reliability programs during the life cycle of materiel.^{49/}

Rock Island Arsenal carries out the functions of design, development, product and production engineering, value and maintenance engineering, procurement, production, quality assurance, and technical evaluations in support of the arsenal and Headquarters, USAWECOM, for individual weapons. The arsenal also provides technical and logistic support for the project manager for rifles. These functions are executed by the Comptroller and Programs Office, the

⁴⁹ USAWCR 10-1, Organization and Functions, USAWECOM, Jul 65.

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the Quality Assurance Division, the Research and Engineering Division, and the Procurement Division. Rock Island Arsenal also has the capability, in its research laboratories and ranges at Rock Island and Camp McCoy, Wisconsin to conduct development projects, testing, and test evaluations of rifle systems.^{50/}

The munitions organizations that are concerned with small arms rifle systems development, testing, and product improvement include the U.S. Army Munitions Command and Frankford Arsenal. USAMUCOM supervises the engineering development and operational development of all small caliber munitions (up to .60 cal) to include testing, evaluation, and product improvement of small caliber munitions. The headquarters staff functions are assigned to the Engineering Division and the Ammunition Division of the Research, Development and Engineering Directorate of Headquarters, USAMUCOM. The Procurement and Production Directorate, the Supply and Maintenance Directorate and the Quality Assurance Directorate of USAMUCOM are assigned the same type of staff functions for munitions as their counterparts in USAWECOM are assigned for weapons.^{51/} The Commanding General, USAMUCOM has assigned responsibility for the execution of munitions programs and projects to Frankford Arsenal. Frankford Arsenal

⁵⁰ RIAR 10-3, Mission, Organization and Functions, RIA, 1 Feb 68.

⁵¹ USAMUCOM R 10-1, Organization and Management Manual, U.S. Army Munitions Command, 28 Mar 66.

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is responsible for performing design, development, product, process, and maintenance engineering and quality assurance engineering for small caliber munitions. The Ammunition Development and Engineering Laboratories of Frankford Arsenal are assigned the specific functions of planning, directing, and appraising the execution of engineering development; testing; evaluation; product improvement engineering design; and execution of ballistic testing for product engineering, production control, and acceptance testing.^{52/} In order to exercise centralized control of small arms munitions, the Commanding General, USAMUCOM, has appointed a USAMUCOM action officer, located at Frankford Arsenal. The command action officer has executive authority over planning, direction, control, and acquisition of small caliber ammunition, including engineering, procurement, production, testing, distribution, and logistical support of his assigned ammunition.^{53/}

The U.S. Army Test and Evaluation Command has been assigned the functions of planning, conducting, and evaluating engineering, service, check, confirmatory, and initial production tests. In addition, USATECOM conducts engineering design, production, acceptance, renovation, military potential, and product improvement tests and

⁵² FAR 10-1, Organization and Functions of Frankford Arsenal, 27 May 66.

⁵³ USAMUCOM Action Officer Charter, Small Arms Ammunition, 13 May 67.

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evaluations as a service for commodity commanders and project managers. The USATECOM staff responsibility for planning, directing, reviewing, evaluating, and supervising testing of small arms and related ammunition is assigned to the Infantry Materiel Directorate. The engineering tests are conducted by the Infantry and Aircraft Weapons Division of Development and Proof Services and service tests are conducted by the Small Arms Test Division of the U.S. Army Infantry Board.^{54/}

The U.S. Army Ballistic Research Laboratories perform scientific investigations seeking advances in weapons technology, evaluations of Army weapons systems through systems analysis and operations research. They also provide consulting services and related assistance to USAMC. The Ballistic Research Laboratories are available to assist the project manager in the development, testing, and product improvement of rifle systems by scientific investigations, studies, and evaluations of problem areas as requested by the project manager.^{55/}

U.S. Continental Army Command

USCONARC has been assigned the mission to:

Participate in combat developments and monitor materiel developments which pertain to individual and unit training, combat readiness of assigned troop units. . . . and provide coordinative advice

54 USATECOM PAM 10-1, Hq USATECOM Organization and Management Manual, 1 Mar 66.

55 AMCR 10-29, Mission and Major Functions, USABRL, 12 Feb 63.

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and assistance and direct support to the Commanding Generals of the United States Army Materiel Command and the United States Army Combat Developments Command in these areas.^{56/}

In addition, the Commanding General, USCONARC, has been assigned the function of participating in the development of human factors engineering programs in support of small arms systems developments.^{57/} The USCONARC primary staff responsibility for executing this mission was assigned to the Research and Development Directorate of the Deputy Chief of Staff for Individual Training.

During the engineering development of small arms systems, USCONARC prepares and completes detailed plans for instruction and instructional materiel including training aids for use in Army schools, Army training centers, and troop units assigned to USCONARC.

⁵⁶ AR10-7, Organization and Functions, USCONARC, 28 Jan 68.

⁵⁷ AR 602-1, Human Factors Engineering Program, Mar 68.

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Figure 8-7 USCONARC ORGANIZATIONAL STRUCTURE FOR SMALL ARMS

