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A SYNTHESIS OF ARMY OFFICER EDUCATION  
IN AUTOMATIC DATA PROCESSING

BY

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University of Florida, 1953

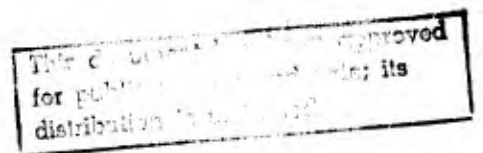
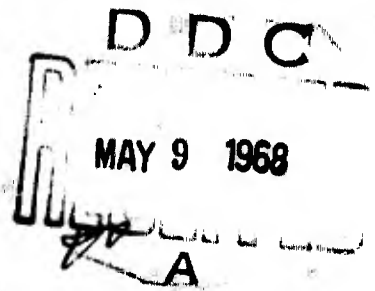
A Thesis Submitted to the School of Government and  
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8 May 1968

Dear Sirs:

This letter is to transmit my thesis which was accepted at the George Washington University as partial fulfillment of the requirements for the Degree of Master of Business Administration. The paper is unclassified in nature.

Consistent with the support given to me by the Army in accomplishing this graduate work, this thesis is thus made available for use to the Army by forwarding to the Defense Documentation Center.

Sincerely,

  
Gene T Sherron  
LTC Infantry  
USA

## PREFACE

In less than one Army career span, the computer has become a "fact of life" for all military personnel and a major influence in the military environment. Even the President calls attention to the fact that "the electronic computer is having a greater impact on us than any other product of modern technology."<sup>1</sup> And its growth as an industry has been almost unbelievable. In fifteen short years, this new industry of computer technology has grown from zero to a six billion dollar market.<sup>2</sup> It is for these reasons that people say "we are experiencing a computer revolution."

These "little black boxes" make airline reservations for thousands of passengers on hundreds of planes from dozens of cities--in hundredths of a second. They scan tax returns to detect errors and fraud. They post bank deposits, take inventory, flash stock quotations, read gas meters, bill customers, write checks, rate insurance risks, record traffic violations, predict election results, solve equations, test submarines, guide missiles, make up trains, diagnose diseases,

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<sup>1</sup>Memorandum from the Honorable Lyndon B. Johnson, President of the United States, to Heads of Departments and Agencies, Washington, D.C., June 28, 1966.

<sup>2</sup>"The 'Software' Snarl," Time, August 18, 1967, pp. 75-76.

play bridge, and regulate the operations of a thousand-acre refinery--to name a few.<sup>1</sup>

Yet for all its progress, the computer revolution still has its growing pains. Recently, much has been written about one of these problems--the manager's role in automatic data processing. Articles in periodicals have been generally critical of the managers' failings in this area.

For example:

Today's EDP installations are no more a powerful management tool than were their machine accounting counterparts of yesteryear, and this fault is rightfully laid on management's doorstep.<sup>2</sup>

Non-computer managers are not properly prepared for a successful working relationship with computerized data processing. Management is generally not obtaining desired results from computer services. Managers do not have the basic knowledge and understanding needed in order to obtain these results.<sup>3</sup>

Up to forty percent of all new computer installations have failed to deliver their expected benefits; in most cases, the blame has been laid on management's failure to learn the basic facts about EDP's nature and how it could best be used to meet the particular problems of their organizations.<sup>4</sup>

It is my conviction that poor results in progress toward better information systems have followed from poor placement of responsibility where specialists have had too

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<sup>1</sup>U.S., Department of Labor, Occupations in Electronic Computing Systems (Washington, D.C.: U.S. Government Printing Office, July, 1965), p. 1.

<sup>2</sup>Arnold E. Keller, "EDP--Power in Search of Management," Business Automation, June, 1966, pp. 48-52.

<sup>3</sup>Raymond M. Fergus, "The Preparation of Non-Computer Management for Working Successfully with Computerized Data Processing" (Unpublished Master's Thesis, University of Illinois, 1965), p. 9.

<sup>4</sup>Dick H. Brandon, "Management Education Advances," Systems, April, 1967, p. 16.

much and operating management has had too little responsibility in these systems.<sup>1</sup>

The focusing of attention on managers usually causes some type of effect, and so there is a new trend--the "education revolution." Some symptoms of this trend are: (1) in 1962, only four colleges or universities in the United States offered degree courses in computer sciences--today, one can earn such degrees at over 200 institutions; (2) in 1967, there were 58 percent more "in-house" training courses for EDP than there were in 1965; (3) in 1965, there were probably no more than ten men in top management who could write a program--today, there are at least 1,000 companies in which the president can write programs faster than trainees.<sup>2</sup>

In a few lines, then, the problem has been advanced and an indication of resolution is offered. As a graduate student in the field of ADP and a Regular Army officer, the researcher has been concerned by the thought, "If the business world has recognized this failing and is busy at the task of educating managers, what is the Army doing in this area?"

This is the background for the thesis research project, and provides the stepping stone into a more formal presentation of the problem in Chapter I.

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<sup>1</sup>Philip H. Thurston, "Who Should Control Information Systems," Harvard Business Review, November-December, 1962, pp. 135-39.

<sup>2</sup>Robert N. Farr, "EDP Education and the Objectives of Management," Systems, April, 1967, p. 13.

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## CHAPTER I

### INTRODUCTION

#### Purpose

The explosive and haphazard expansion of knowledge and technical capabilities in computer technology in more recent years has been a major deterrent to organized planning, or implementation of computer applications. In fact, new developments have followed each other at such a pace that it has become practically impossible for any but the most directly involved people to remain currently knowledgeable on the subject. This is particularly true of Army officers who, for the most part, have been fully occupied with keeping abreast of the revolutionary changes in their own special fields, as well as performing their operational duties in such places as Vietnam. Many feel that all of these factors have culminated into what could be called the automatic data processing (ADP) knowledge gap. Is it a fact that such a gap exists? If so, what is being done about it, and what will be its impact on the future?

These questions about knowledge or education point to the heart of this thesis research project, which covers the broad area of Army officer education in ADP. Therefore, as a means of homing in on the problem, a primary thesis question

has been posed: What is the present plan for the education of the Army officer in automatic data processing? Answering this question will afford an opportunity to bring together the many policies, regulations, programs, and activities that, as a total entity, make up the present plan or approach to ADP education. Yet this would tend to be a rather shallow treatise, for the matter of ADP education today has had its origin in decisions and actions taken from its first use in the Army in 1954. A study of what happened in these intervening years should serve to identify the problems overcome, as well as those that persist; and serve better to evaluate the present plans for ADP education. Therefore, subsidiary questions were formulated as follows: What has been the evolution of policy, responsibility, and organization in ADP education for the Army officer? What have recent studies on ADP education in the Army revealed? What are the recent developments which have produced today's approach to officer education in ADP?

By researching into these areas, the spectrum of officer education in ADP will be condensed into one paper which will span the past, present, and the near future, affording some opportunity to evaluate past actions and speculate on the status of the present education program.

#### Scope

In delineating the scope of this project, consideration was given to: the researcher's point of view, simplicity of vocabulary, and time span of the subject.

### Researcher's point of view

Regarding the point of view, this study, being made by a novice in the subject of ADP as far as experience is concerned, has allowed the probing and seeking of answers without preconceived notions or motives. The lack of first hand experience and involvement with Army ADP was hopefully translated into an advantage, by permitting an unbiased yet objective scope to the research.

### Simplicity of vocabulary

The intent of the study is to deal with the various aspects of the education problem, not as a technician but as a manager, using a vocabulary that would not confuse or frustrate the average Army officer who might read this paper.

### Time span

Certainly when expressing the scope of a project, the time period covered is of interest. The parameters of time for this study were the natural limits of the thesis question. It begins with the first business application of the computer in the Army in 1956 and carries forward to the near future, or 1970.

### Limitations

#### Active Army officer

This study is addressed to the active Army officer, and is not concerned with Army National Guard or Army Reserve officers.

### Pre-commissioned education

The point could be raised as to whether the pre-commissioning education is a part of the study, since knowledge gained in the few years immediately before commissioning is a significant part of the overall officer education inventory. Considering the four sources of commissions--the United States Military Academy (USMA), Reserve Officers' Training Corps (ROTC), Officer Candidate School (OCS), and direct commissions--only those that have a direct connection with college education (i.e., the Military Academy and ROTC) merit inclusion. The recent emphasis given to hands-on computer education at the Military Academy must be covered, for it will play a vital part in the total education picture of the officer for years to come.

### An unclassified study

The studies uncovered and subsequently reported on in this thesis are intended to represent all pertinent unclassified studies that are within the inclusive dates of the paper. Certain classified studies and reports were encountered during the research phase, but for the most part these classified papers were short-term in nature and dealt with a specific aspect of our National Defense.

### Methodology

The first step of research was the traditional approach of delving into books, periodicals, indexes, library card files, and book listings. This produced disappointing

results, but brought forth the realization that such a subject--growing faster than man's ability to write about it--could not be researched in a traditional library manner. The research topic was not only a contemporary subject, but was further complicated by the fact that it was oriented toward the military. Such thought led to the Army Registry of Special Educational Materials (ARSEM) maintained by the Adjutant General in the Pentagon.<sup>1</sup> Some progress was made at this juncture, at least enough to establish in the researcher's mind that sufficient material was available for a research project. Yet the big hope, for plentiful research, came with the suggestion to use the United States Defense Documentation Center (DDC)--a scientific and technical information retrieval center. Two retrieval requests produced only about a dozen good leads. No condemnation of the system is intended, in spite of the disappointing results, because the meager bibliography listing was attributed to the fact that too specific subject areas were requested. It was realized later that not much has been published on the subject of Army officer education in ADP.

During this phase of secondary-source research, it became apparent that advantage should be taken of the fact that considerable primary-source research was possible in the Washington area. From that point on, notable progress was made in gathering material by interviewing various officers

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<sup>1</sup>Pauline C. Ramsey, "Facts on Parade," Army Digest, November, 1967, pp. 20-21.

and officials of the Department of the Army (DA) staff. Many primary sources suggested inquiry into specific papers maintained in the various service libraries in the area. Among these were the Industrial College of the Armed Forces, the National War College, and the Army Library in the Pentagon. The final source of research was correspondence.

#### Definition of Terms

Several of the important words found in the thesis title and primary research question must be defined. Also, by defining terms, the scope and limitations of the study are clarified.

Key to the orientation of the principal thrust of this study is the word "education." As defined by the Army, "education is individual instruction given to personnel without regard to the student's assignment or specialty."<sup>1</sup> A better understanding is given to this definition when it is contrasted with the word "training," which is "individual instruction and supervised practice given for the purpose of providing the student with a particular skill or specialty."<sup>2</sup> The basic distinction has to do with when the student uses instruction. The Army thinks of education as learning that is to be used in the future. It is not necessarily tied to the next assignment; nor is it intended to create a specialist (although such is not prohibited in the definition).

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<sup>1</sup>U.S., Department of the Army, Military Education and Schools, Army Regulation No. 350-5 (Washington: U.S. Government Printing Office, 1966), p. 1.

<sup>2</sup>Ibid.

Some supervised practice is inherent in training; however, it is not necessarily a part of education. Wofsey provided a lucid differentiation when he wrote that education is considered to be comparatively long-range instruction intended to broaden generally the knowledge of the student. In contrast, training is comparatively short-range instruction designed to increase the knowledge of the student in a specific area.<sup>1</sup>

These definitions are not meant to show black and white, for certainly shades of gray will appear whenever the subject of education or training is studied. They are mentioned because, in the Army, "training" is generally used to denote the overall educational process, even though other regulations make a distinction between the two terms.

The phrase "automatic data processing," or its acronym "ADP," appears on many pages of this paper, and yet it means different things to many people. A basic definition is that of the Bureau of the Budget (BoB): "ADP is data processing performed by a system of electrical or electronic machines, so interconnected and interacting, as to reduce to the minimum, the need for human assistance or intervention."<sup>2</sup> Such a definition can be used to describe a sophisticated punched card machine (PCM) system so widely used prior to

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<sup>1</sup>Marvin M. Wofsey, Management of Automatic Data Processing (Washington: Thompson Book Company, 1968), pp. 109-10.

<sup>2</sup>U.S., Executive Office of the President, Bureau of the Budget, Automatic Data Processing Glossary (Washington: U.S. Government Printing Office, 1962), p. 40.

1955. EDP is defined as "data processing performed largely by electronic equipment, related to automatic data processing."<sup>1</sup> Confusion in the use of these two terms--ADP and EDP--is not uncommon. After several years of hearings, a member of Congressman Brooks' Government Activities Subcommittee was still sufficiently concerned over the misunderstanding that several pages of the Report were devoted to their definitions.<sup>2</sup> Thus, to avoid any misunderstanding, ADP and EDP will be used synonymously in this paper, with preference of usage going to ADP.

Confusion as to the meaning of ADP and EDP has also been widespread in the academic world. Today, phrases are more specific, such as: computer systems, computer technology, and computer sciences--which in turn lead to such developments as management information systems, total information systems, and information retrieval systems.

This background on the acronym--ADP--is designed to show that it can mean a computer and a small operating system of the 1950's or, as today, it can mean a multi-million dollar, real-time system spanning the length and breadth of the globe. It is therefore intended, in this study about the education of the Army officer, that ADP mean not only the computer but the concepts of its use and application, or, in the broader sense, the field of computer technology.

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<sup>1</sup>Ibid.

<sup>2</sup>U.S., Congress, House, Committee on Government Operations, Report on H.R. 4845, Automatic Data Processing Equipment, House Report No. 802, 89th Cong., 1st Sess., 1965, p. 2.

Terms and Abbreviations

Throughout this paper, abbreviations will be used which may be new to the reader. The first time a new term is used, its abbreviation will follow parenthetically. Subsequently, just the abbreviation will be used. To preclude the need for the reader to search back through the pages for the initial use of the term, these new phrases are alphabetically consolidated below for ready reference.<sup>1</sup>

<u>Abbreviation</u>	<u>Term</u>
ACSFOR	Assistant Chief of Staff for Force Development
ADP(S)	Automatic Data Processing (Systems)
ADPE	Automatic Data Processing Equipment
AERB	Army Educational Requirements Board
AG	Adjutant General
AIDS	Army Information and Data Systems
AMC	Army Materiel Command
AMETA	Army Management Engineering Training Agency
ASD(FM)	Assistant Secretary of Defense (Financial Management)
ASD(I&L)	Assistant Secretary of Defense (Installations and Logistics)
ASA	Army Security Agency
AWC	Army War College
BoB	Bureau of the Budget
CDC	Combat Developments Command
C&GSC	Command and General Staff College
COA	Comptroller of the Army
CONUS	Continental United States
DA	Department of the Army
DCSIT	Deputy Chief of Staff for Individual Training
DCSLOG	Deputy Chief of Staff for Logistics
DCSOPS	Deputy Chief of Staff for Operations
DCSPER	Deputy Chief of Staff for Personnel
DOD	Department of Defense
DODCI	Department of Defense Computer Institute

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<sup>1</sup>U.S., Department of the Army, Military Terms, Abbreviations, and Symbols, Army Regulation No. 380-50 (Washington: U.S. Government Printing Office, 1954).

<u>Abbreviation</u>	<u>Term</u>
EDP(S)	Electronic Data Processing (Systems)
EDPE	Electronic Data Processing Equipment
ICAF	Industrial College of the Armed Forces
JAG	Judge Advocate General
MOS	Military Occupational Specialty
OCS	Officer Candidate School
OCSA	Office of the Chief of Staff Army
OJT	On-the-Job Training
OPO	Office of Personnel Operations
P.S. 89-306	Public Law 89-306, Automatic Data Processing Equipment
PCM	Punched Card Machines
RA	Regular Army
ROTC	Reserve Officers' Training Corps
TAG	The Adjutant General
TAGO	The Adjutant General's Office
TD	Table of Distribution
TOE	Table of Organization and Equipment
USAAGS	U.S. Army Adjutant General School
USASCS	U.S. Army Signal Center and School
USCONARC	U.S. Continental Army Command
USMA	U.S. Military Academy

#### Organization of the Study

The study begins in Chapter II with an explanation of policy, responsibility, and organization. Of all the chapters, it will be the most historical in nature. In order to see ADP education in the proper context today, it is necessary to go back several years and examine the structure of its growth and development. Therefore, Chapter II begins with a survey of ADP policy and how it is developed, followed by a review of the chain of responsibility for education, which leads directly into the way education has been and is organized within the Army.

Because the Army became acutely aware of the ADP education gap in late 1964, many studies and seminars took place in 1965 and 1966. The reports or findings of these meetings will be presented in Chapter II, in order of their occurrence.

The documents reviewed in Chapter III resulted in recommendations to the Army Chief of Staff, who is the action official for such matters. Throughout 1966 and 1967, he made certain decisions affecting ADP education, and this is the heart of Chapter IV. As a prelude to this material, it will be appropriate to outline the role that these studies have established for the Army officer in ADP. This will provide a reference point when the inventory of talent and a forecast are presented later in the chapter.

Chapter V consolidates the summaries and offers certain conclusions on the part of the researcher. As is the case with most research activities, more interesting avenues were found than could be explored. Therefore, some suggestions are offered for additional research, which, had they been pursued, would have gone beyond the scope of the thesis. Finally, some implications for the Army Staff are offered.

## CHAPTER II

### POLICY, RESPONSIBILITY, AND ORGANIZATION FOR ADP EDUCATION

#### Historical Background

In early 1940 it became apparent to the Army that with the rising administrative workloads, new methods of processing data had to be explored. The concept of processing data faster with PCM was studied and soon approved. Then a vast program of converting from manual to mechanical methods of data processing was underway. The use of PCM by the war's end was general throughout the Army. During the period 1945 to 1956, annual rentals for PCM rose into the millions of dollars. This did not stem the administrative tide, however. The data processing system became more complex and demanded faster and more sophisticated methods of processing data.<sup>1</sup>

In 1954, The Adjutant General (TAG) directed that a study be made of his machine records system (PCM) in the Pentagon. With an objective of improving the existing system, some attention was given to a comparatively new technology of the time--the electronic digital computer. The only

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<sup>1</sup>U.S., Congress, House, Committee on Post Office and Civil Service, Use of Electronic Data Processing Equipment, Hearings before the Subcommittee, 88th Cong., 1st Sess., 1963, p. 70.

computer being operated by the Army at that time was the Electronic Numerical Integrator and Calculator (ENIAC) installed at the Ballistic Research Laboratory, Aberdeen Proving Grounds, Maryland. It had been in use since 1946 to compute complex firing tables.<sup>1</sup> The study initiated by TAG produced still another study. This time its purpose was to determine the feasibility of using ADP to accomplish the administrative functions of the Adjutant General in the Pentagon. Several months of study included manufacturer orientations (RCA and IBM), on the site examination of comparable applications in private industry, and considerable self-education in ADP by the study group members. After all this, the conclusion was made to "proceed with caution in obtaining a computer system."<sup>2</sup>

Now, the request was subjected to staffing by the Department of the Army. It was at this point in time that competition arose within the Army staff as to which branch or staff agency should exercise staff supervision over the acquisition and application of computers. The Signal Corps was deeply involved in data processing equipment (for the most part PCM maintenance) and suggested that, as a natural outgrowth of their present work, all computer responsibility

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<sup>1</sup>Lieutenant Colonel Donald F. Packard, "The Long Range Impact of ADPS on Headquarters, Department of the Army" (Unpublished thesis, Carlisle Barracks, Pa.: USAWC, 1965), p. 8.

<sup>2</sup>U.S., Department of the Army, "Application of Electronic Data Processing Machinery to The Adjutant General's Office Functions--Second Interim Report," Washington, D.C., August 17, 1955, p. 12 (in the files of the Department, TAGO).

be assigned to the Chief of the Signal Corps.<sup>1</sup>

During this same time frame, the United States Army Signal Supply Agency in Philadelphia, Pennsylvania, was also studying the feasibility of converting from PCM to ADP. Yet it was not bound by the same staffing procedures. Acting as any large business would in considering new techniques for inventory control, it decided to install this new concept of data processing. In mid-1956 this installation became the first business-type computer system in the Army.<sup>2</sup>

Another action was transpiring concurrently with the staffing of TAG's request for automation. The headquarters responsible for carrying out training and education in the Continental United States (CONUS) was the United States Continental Army Command (USCONARC). During this period of time, they deemed it necessary to establish some courses of instruction in ADP. Anticipating the onrush of all sorts of feasibility and applications studies, a course entitled "Automatic Data Processing Systems for Staff Officers" was offered at the United States Army Signal School in the fall

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<sup>1</sup>U.S., Department of the Army, "Proposal for Acquisition of Electronic Data Processing Equipment" (Interstaff memorandum between the Chief, Signal Corps and the Comptroller of the Army, Washington, D.C., December 10, 1955, p. 1 (in the files of the Department, COA).

<sup>2</sup>Gerald Sherman, "Staffing for Automation in the U.S. Army" (Unpublished thesis, Carlisle Barracks, Pa.: U.S. Army War College, 1965), p. 5.

of 1957 to qualify officers to participate in these future studies.<sup>1</sup>

During this staffing, without discussion or subsequent challenge, the Army Comptroller made his own unilateral decision as to the future importance of the computer. In January 1956, he officially established his agency as the ADP staff agency for the Army staff. He accomplished this by creating the "Office of Data Processing Systems to coordinate Army-wide programs for electronic data processing systems."<sup>2</sup>

In April 1956, the Assistant Secretary of Defense for Financial Management finally approved TAG's request to computerize their administrative operations in the Pentagon; in April 1957, the computer went "on the air."<sup>3</sup>

Figure 1 reveals the growth of the computer in the Army from those early years to the present. In the early days, the installations were single computer systems and, for that reason, one computer equaled one system. Today, an ADP installation often includes more than one computer, so Figure 1 is in terms of total computers, not the total

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<sup>1</sup>Thomas M. Golladay, "Computer Training in the Department of Command Communications" (U.S. Army Signal School, Fort Monmouth, N.J., May, 1965), pp. 2-3. (Mimeographed.)

<sup>2</sup>U.S., Department of the Army, "Establishment of the DP Systems Branch, Office of the Comptroller of the Army" (Office Memorandum No. 1), Washington, D.C., January 10, 1956, p. 1 (in the files of the Department, COA).

<sup>3</sup>U.S., Department of Defense, "Request from the Adjutant General's Office for ADPS" (Interagency memorandum, Washington, D.C., April 9, 1956), p. 1 (in the files of the Department).

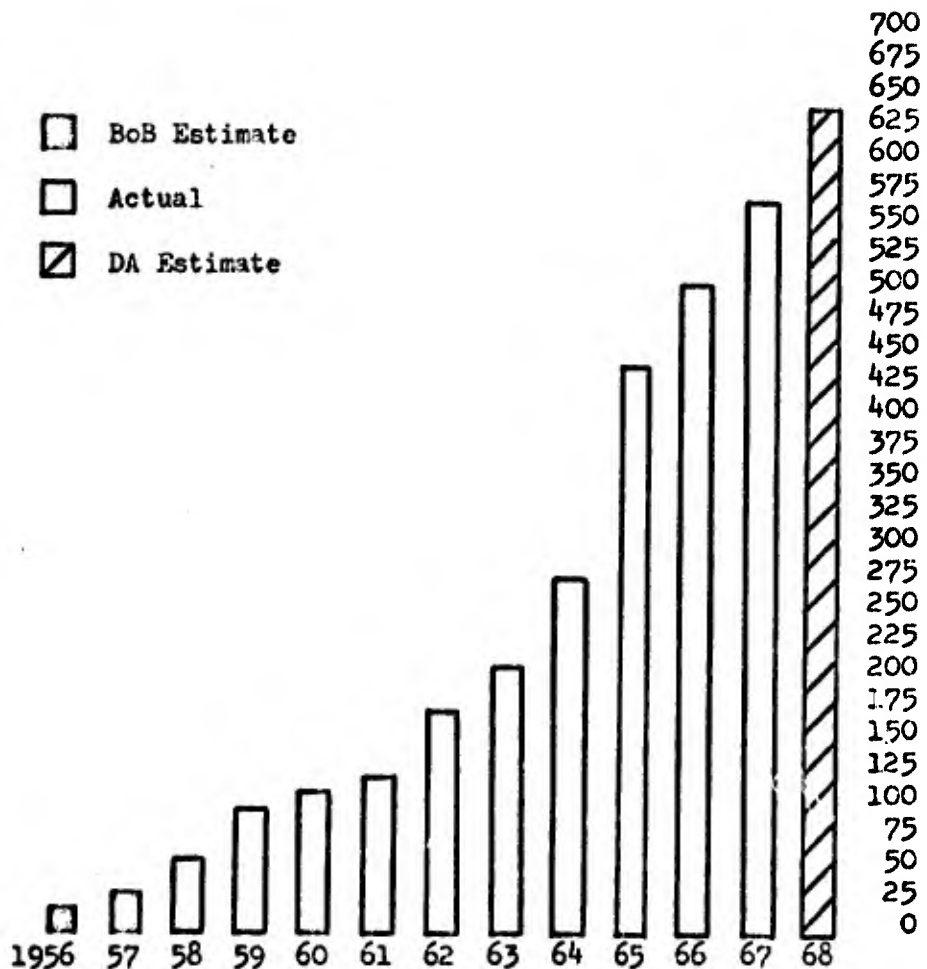


Fig. 1.--Growth in Number of Computers in the Army

Compiled from: U.S., Congress, House, Committee on Post Office and Civil Service, Hearings on the Use of Electronic Data Processing Equipment, 88th Cong., 1st Sess., 1963, p. 91; U.S., Executive Office of the President, Bureau of the Budget, Inventory of Automatic Data Processing Equipment in the Federal Government (Washington: U.S. Government Printing Office, July 1960), p. 17; U.S., Congress, House, Committee on Post Office and Civil Service, Hearings on Government Electronic Data Processing Systems, 89th Cong., 2d Sess., June, 1966, p. 144; Col. Felix Kampschroer, Progress in Managing ADP, A report presented at the 1967 Computer Summer Workshop (West Point, N.Y., August 1, 1967), p. 8.

number of systems of installations in the Army.

### Policy for ADP Education

The very origin of ADP education can be traced to that handful of officers who made the feasibility study for the computerization of the Adjutant General's Office. The knowledge they acquired was a result of orientation visits to several manufacturers and attendance of a computer conference sponsored by the American Management Association.<sup>1</sup>

For the next few years, the education program was quite unstructured. This was a period of time when those officers who had been with PCM became the managers of ADP installations. Their most sophisticated training was that provided by the manufacturers through courses and orientations, but for the most part they learned about computers on the job.<sup>2</sup>

In the fall of 1960, the Adjutant General Corps took the initiative in Army ADP education by sending five of its officers to the American University and the University of Arizona for Master of Business Administration degrees with a specialty field of ADP.<sup>3</sup> At this point there was still no

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<sup>1</sup>U.S., Department of the Army, "Report of the Special Electronic Conference, American Management Association, New York, N.Y., February 28-March 2, 1955," Washington, D.C., March 10, 1955 (in the files of the Department, TAGO).

<sup>2</sup>Interview with Major General K. G. Wickham, The Adjutant General, Department of the Army, Washington, D.C., September 19, 1967.

<sup>3</sup>Interview with Lieutenant Colonel Laurence D. Pence, OCSA, Department of the Army, Washington, D.C., September 11, 1967.

policy on education in ADP at the Department of the Army level.<sup>1</sup> The different branches, actually those most closely associated with computers (the Signal Corps and the Adjutant General Corps), were sending some of their officers to graduate school from this point on.<sup>2</sup>

The first ADP policy on education and training to be found in Army Regulations appeared in August 1962.<sup>3</sup> This was the beginning of at least some formal attention being given to the regulating of ADPS. This regulation bore the title "Army Data Processing Systems Program" and contained twenty-eight policy statements clearly labeled as such. The two that pertain to the subject of education are quoted as follows:

Adequate provisions will be made in advance for training of personnel needed in the conduct of ADPE feasibility and application studies. Such training can best be accomplished through Army-sponsored courses. When equipment selection has been determined, greater reliance on manufacturer's courses in production and operations becomes appropriate. A proper balance of trained personnel for each stage of preparation for ADPE as well as future requirements will be maintained at all times.

Planning for acquisition of ADPE will include an adequate program for orientation, recruitment and training of personnel, . . .<sup>4</sup>

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<sup>1</sup>Interview with Dr. R. L. Allen, Educational Advisor, DCSPER, Department of the Army, Washington, D.C., September 5, 1967.

<sup>2</sup>Interview with Major Robert B. Barrett, Department of Defense Computer Institute, Washington, D.C., September 11, 1967.

<sup>3</sup>U.S., Department of the Army, Army Data Processing Systems Program, Army Regulation No. 1-251 (Washington: U.S. Government Printing Office, August, 1962).

<sup>4</sup>Ibid., pp. 3-4.

One would expect that four years later, when this regulation was superseded, a new and more specific policy on education would appear, but such was not the case. The regulation, now called "Army Information and Data Systems, Objectives and Policies," has nine sections of policy, but not a word devoted to education.<sup>1</sup>

Yet the Army was not unique in this failing. The lack of attention to computer education was commonplace throughout the Federal Government during the period between 1956 and 1965. Testimony given to Congress in 1963 emphasized a number of points that needed careful attention in the various individual agencies that used computers. Six areas were listed, and only the last one even hinted at a need for knowledge about computers, but did not go so far as to suggest education.<sup>2</sup>

In 1963, the attention of certain committees of the Congress was focused on data sources, integrated systems, and measurement of costs and progress. But people were still enamored with applications and the installation of computers in their activity. One could describe in a single word-- systems--the thrust of that year's 200 pages of Congressional testimony. As perceptive as the Congress can be, in this

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<sup>1</sup>U.S., Department of the Army, Army Information and Data Systems, Objectives and Policies, Army Regulation No. 18-1 (Washington: U.S. Government Printing Office, February, 1966).

<sup>2</sup>U.S., Congress, Senate, Committee on Post Office and Civil Service, Hearings on the Use of EDPE, 88th Cong., 1st Sess., March, 1963, p. 5.

instance it typified the climate of that period with preoccupation in the installation of more and more equipment. Seldom was thought given to the education of people in the effective use of this new tool.

Two years later, the Government Operations Committee submitted a 100-page report to the President on the management of ADP in the Federal Government. This time, fourteen problems were listed as illustrative examples. Number thirteen said, in essence, that there had arisen a need for personnel in all phases of computer use to understand its potentialities and limitations.<sup>1</sup> Considering the total list of problems, the emphasis was not on education or systems (as was the case in 1963), but rather on hardware.

In the same year, 600 pages of hearings by the House Government Operations Committee scarcely gave mention to the problem of education.<sup>2</sup> Even though this was a report on hearings concerning a bill on ADPE (which was later to be known as the Brooks Bill), it revealed that almost everyone was still more concerned with equipment than with people.

The sponsor of this same bill conducted hearings in 1967 to evaluate the impact of his bill.<sup>3</sup> Congressman Brooks opened the 1967 hearings by saying that the 1965

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<sup>1</sup>U.S., Congress, Senate, Report to the President on the Management of ADP in the Federal Government, 89th Cong., 1st Sess., March, 1965, p. 3.

<sup>2</sup>U.S., Congress, House, Committee on Government Operations, Hearings on H.R. 4845, Automatic Data Processing Equipment.

<sup>3</sup>U.S., Public Law 89-306, October, 1965.

legislation was to "provide a coordinated, Government-wide management system for Government data processing equipment. . . . With effective management, with improved educational opportunities for Government decision makers into the mysteries of data processing . . . literally billions of the Federal Budget can be saved."<sup>1</sup> The very first testimony heard by the Committee was from the United States Comptroller General, and such an about-face in priorities was hard to believe. A brief extract is provided below:

In order to improve coordination and leadership in the field of ADP, accelerated training at all levels of the Government is required. The explosion that has taken place in information processing in the past 8 to 10 years has been so great and new developments are occurring at such a fast rate that extensive additional training programs for all levels of Government will be required if we are to make the most effective use of the new technology in the years ahead. . . .

In considering the problems that need further attention at this time, we would stress the following:

1. Training at all levels from top management down through systems designers, operators, and users of ADP systems products.<sup>2</sup>

This overview of the education problem in the early years of the computer is intended to show in documented form the very same problems that were found in the Army, as revealed primarily by interviews. The one aspect of the total process of successfully using computers that deserved more lead time than any other element--education--was not really identified as a problem until 1966. This was true

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<sup>1</sup>U.S., Congress, House, Committee on Government Operations, Hearings on Data Processing Management in the Federal Government, 90th Cong., 1st Sess., July, 1967, pp. 1-2.

<sup>2</sup>Ibid., pp. 6-7.

in the Governmental agencies and in the Army.

At about this time the ADP knowledge gap had reached such proportions in the Army that it was imperative that vigorous and immediate actions be taken to bridge this gap. Several important steps were taken in this direction between 1965 and mid-1967. However, because of the complexities involved, the efforts were directed mainly at defining the problems. The results of these efforts (which will be discussed in detail in Chapter III) were: the report of the Department of the Army Board of Review Army Officers' Schools (the Haines Board), the USCONARC study on Training for Army ADP Systems, the report of the West Point Seminar for Computer Educators and Directors, and others. These studies have led to conclusions and recommendations which have, in turn, been acted upon by the Army Chief of Staff. These, then, constitute the policy of ADP officer education. These "policies" have not yet been written down as such. For that reason, one of the later contributions of this thesis will be to distill these actions into what amounts to the Army's approach or policy in ADP education (see Chapter IV).

#### Responsibilities for Education

Closely connected to the problem of education is the question, "Who is responsible for education?" The question is actually a probe to explore what agencies, within the structure of the Army, are responsible for carrying out the education policies and programs. This discussion is inseparable from organization, so that which follows will be

an examination of both structure and responsibility. Using 1956--the year the first business-type computer was installed for the Army--as a starting point, the responsibility for ADP education will be reviewed to the present time.

In 1956, two Army general staff elements were responsible for education and training as shown by Figure 2. The Assistant Chief of Staff, G1, Personnel was responsible to the Chief of Staff for directing, supervising, and coordinating all matters pertaining to military education and manpower management. The Assistant Chief of Staff, G3, Operations had Army staff responsibility for all military training matters and activities of the Army Establishment.<sup>1</sup> During this period the G3 had staff responsibility for the Army school system, where much instruction in ADP could and did take place. So even though the G1 might have wanted to stress more ADP education in the schools, he was unable to direct it through his own resources. He had to convince the G3 to do so even though the G3 is typically more interested in tactical training.<sup>2</sup>

In April 1957, the G3 lost his direct supervision of the Army school system when the USCONARC commander assumed responsibility for education and training of Army Field Forces. The G1 still had responsibility for planning and

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<sup>1</sup>The Officers' Guide (Harrisburg, Pa.: The Military Service Publishing Company, 1954), pp. 18-20.

<sup>2</sup>Interview with George E. Western, OCSA, Department of the Army, Washington, D.C., September 21, 1967.

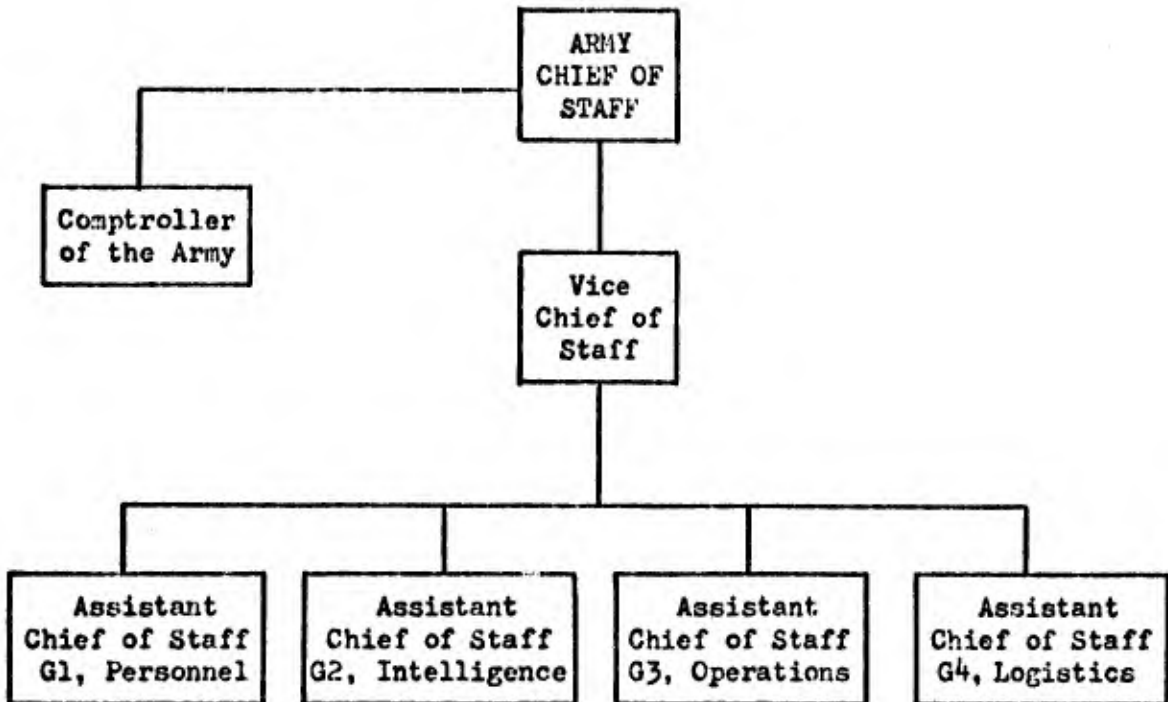


Fig. 2.--1956 Organization of the Department of the Army<sup>a</sup>

<sup>a</sup>U.S., Department of the Army, Organization and Functions, Department of the Army, Special Regulation No. 10-5-1 (Washington: U.S. Government Printing Office, 1955), pp. 14-15.

sending officers to graduate school (under the Civil Schooling Program).<sup>1</sup>

The Department of Defense Reorganization Act of 1958 changed a number of relationships in the Army, but in the case of ADP education, only the names of the staff elements were changed.<sup>2</sup> This is portrayed in Figure 3.

The next reorganization of the Army had its immediate roots in the Presidential campaign in 1960 when the Democratic party urged recasting the American Defense Establishment to improve military diversity, balance, and mobility.<sup>3</sup> In January 1963, President Kennedy approved of this reorganization plan.<sup>4</sup> This brought into being three new operating agencies.<sup>5</sup> This new organization is depicted in Figure 4.

The Deputy Chief of Staff for Personnel (DCSPER) was then out of the manpower management activities, except for the broad policy-type functions. The new Office of Personnel Operations (OPO) gained the responsibility for planning career education to include civil schooling.

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<sup>1</sup>U.S., Department of the Army, Organization and Functions, Department of the Army, Army Regulation No. 10-5 (Washington: U.S. Government Printing Office, May, 1957), p. 9.

<sup>2</sup>Gordon R. Young (ed.), The Army Almanac (2d ed.; Harrisburg, Pa.: The Stackpole Company, 1959), pp. 74-103.

<sup>3</sup>Martin Blumenson, Reorganization of the Army, 1962 (Office of the Chief of Military History, Department of the Army, Washington, D.C., September, 1964, p. 1. (Mimeographed.)

<sup>4</sup>Ibid., p. 79.

<sup>5</sup>Ibid., p. 118.

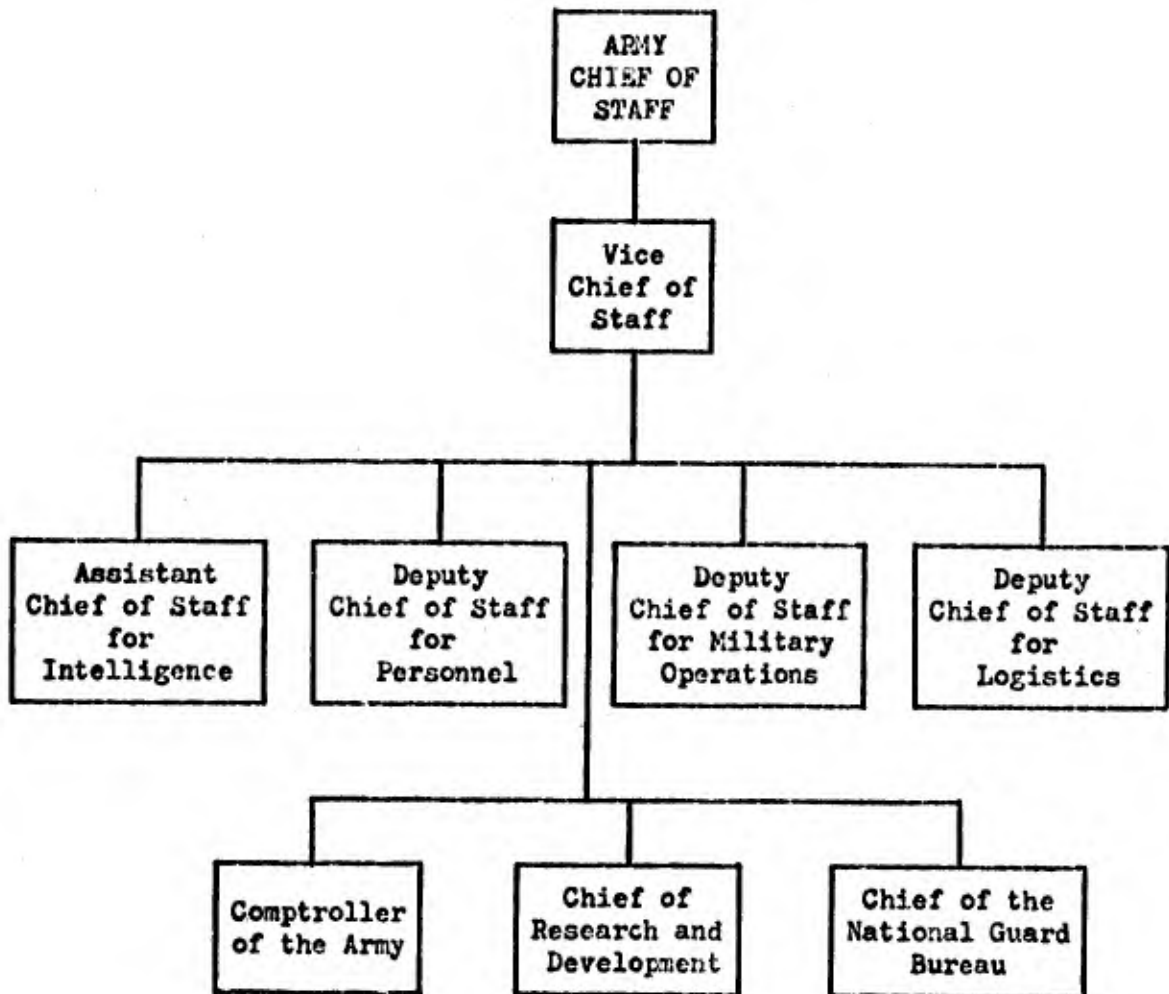


Fig. 3.--1957 Organization of the Department of the Army<sup>a</sup>

<sup>a</sup>Gordon R. Young (ed.), The Army Almanac (2d ed.; Harrisburg, Pa.: The Stackpole Company, 1959), pp. 81-82.

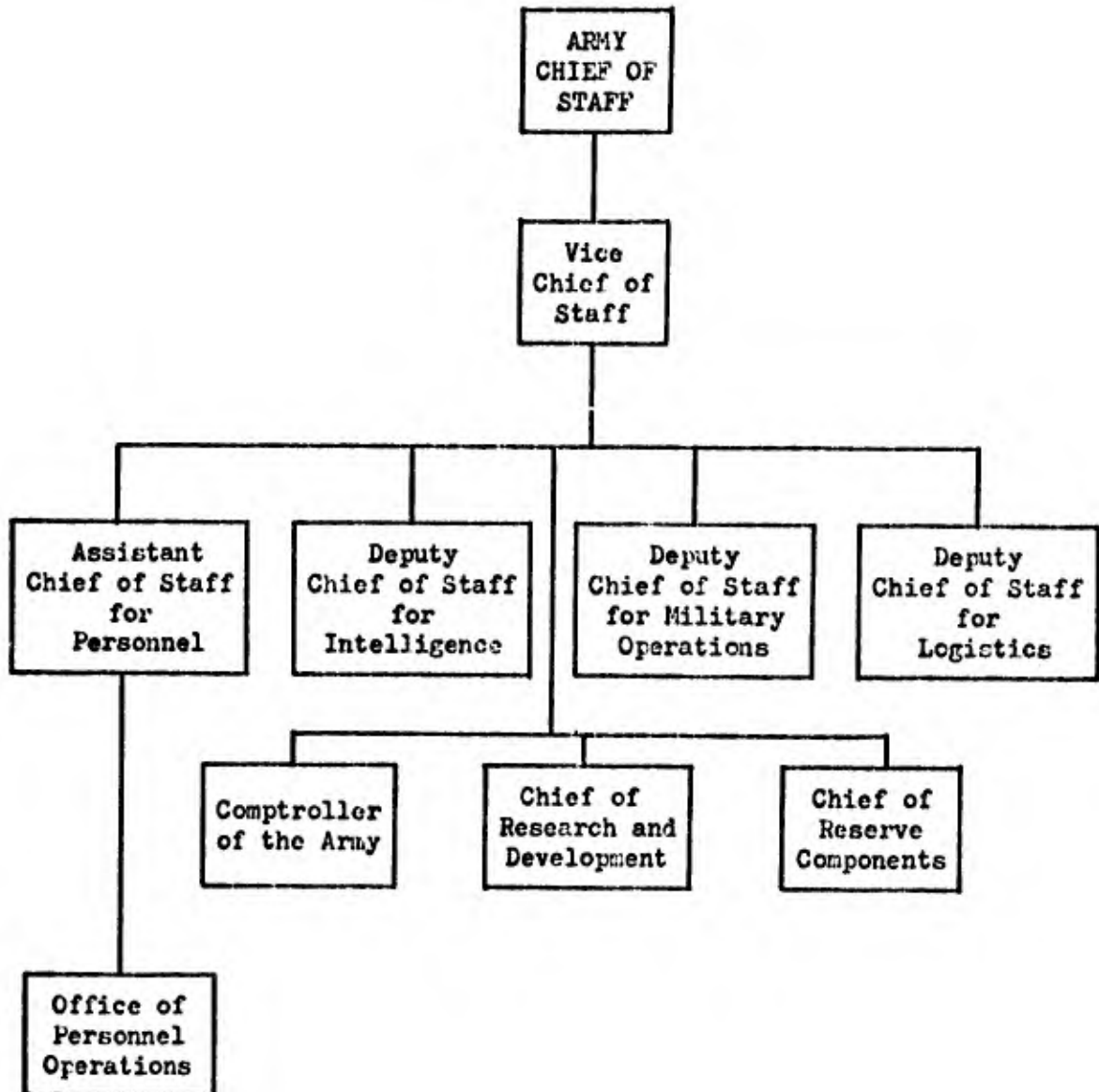


Fig. 4.--Reorganization of the Army--1962<sup>a</sup>

<sup>a</sup>Martin Blumenson, Reorganization of the Army--1962 (Office of the Chief of Military History, Department of the Army, Washington, D.C., September, 1964), p. 90. (Mimeographed.)

Figure 5 shows how, in February 1963, DCSOPS was divided in two, and a new staff agency was created: Assistant Chief of Staff for Force Development (ACSFOR).<sup>1</sup> This put all the training responsibility into the new agency and made them the focal point for establishing the requirements for training and education programs, Army-wide.

The Comptroller of the Army had been the focal point, self-appointed in 1956, for all automatic data processing matters within the Army. The responsibility for education and training in ADP rested with the different agencies mentioned previously, but the Comptroller was the coordinator between the need for knowledgeable people and the agencies responsible for their development.

While all of this reorganization was undoubtedly necessary, it appears to have had a nullifying effect on any significant achievements in computer education up to this point.

As mentioned earlier, prior to 1963 the role of the Department of Defense in influencing ADP education was negligible. In fact, this relates to the period of time when there was absence of even an awareness on the part of the Federal Government of the need for education. DOD began providing "informed guidance" to the Services by the publication of DOD Directive 5100.40 in 1963.<sup>2</sup> This document outlines

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<sup>1</sup>Ibid., p. 119.

<sup>2</sup>U.S., Department of Defense, Responsibility for the Administration of ADP Programs, DOD Directive No. 5100.40 (Washington: U.S. Government Printing Office, September, 1963).

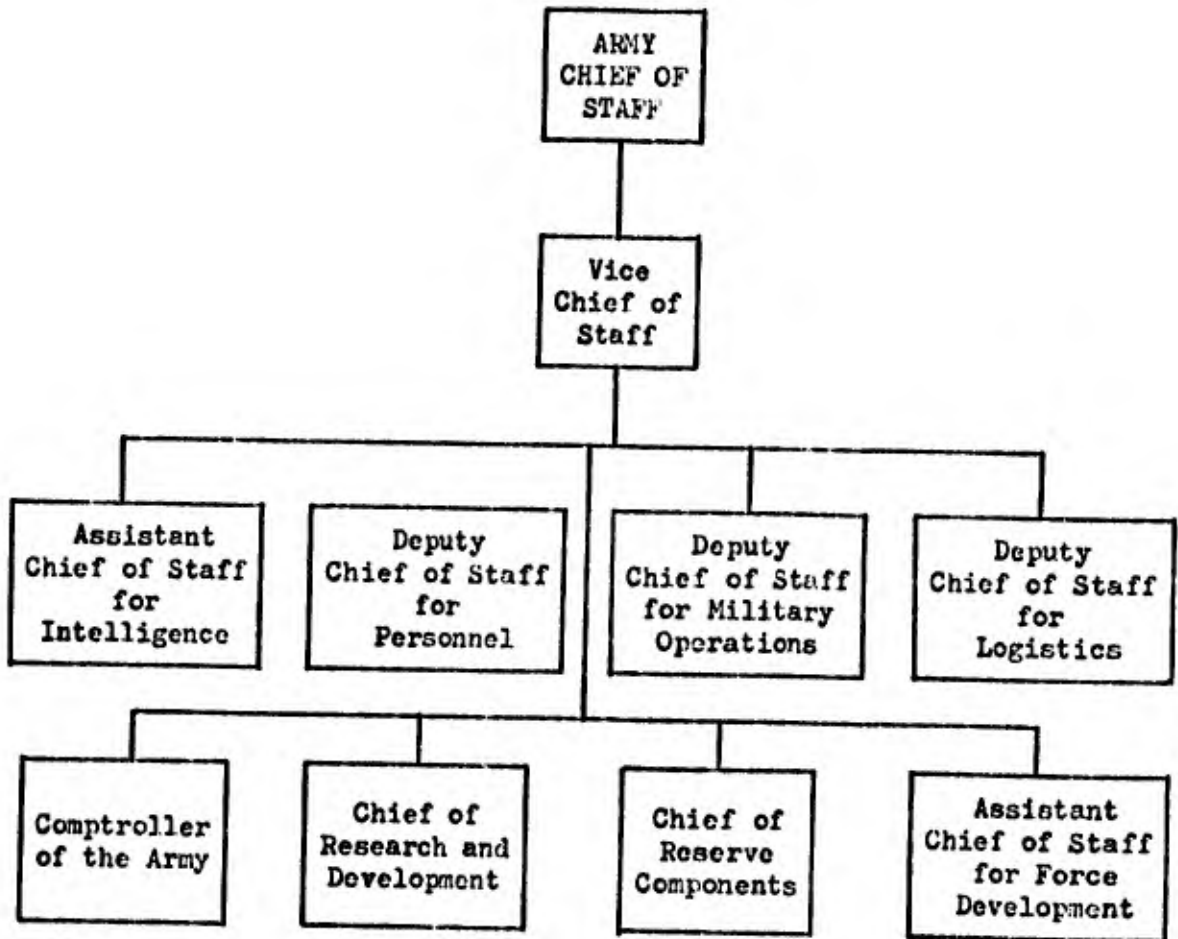


Fig. 5.--1963 Organization of the Department of the Army<sup>a</sup>

<sup>a</sup>Martin Blumenson, Reorganization of the Army--1962 (Office of the Chief of Military History, Department of the Army, Washington, D.C., September, 1964), p. 120. (Mimeographed.)

the DOD leadership position as the basic source of guidance for the separate military services in the management of electronic computer systems. A provision of this directive required the service secretaries to designate a senior official who would serve as a focal point within that service for all matters concerning ADP. The Secretary of the Army reacted to the DOD directive by shifting the position of the senior military official (at the grade of colonel) from the Office of the Comptroller of the Army to the Office of the Chief of Staff of the Army. This new position was upgraded to the rank of major general and was given the title, Special Assistant to the Chief of Staff for Army Information and Data Systems (AIDS). The elevation of this activity to the OCSA provided more effective management of the total Army information and data systems effort. In addition to monitoring the Army-wide data systems program and developing policy guidance for data processing installations, AIDS provided central control over the acquisition of data processing equipment. Being located at the very top echelon within the Department of the Army, its contact with DOD was assured through the chain of military command throughout the Army.<sup>1</sup>

For the first time, the computer had top management attention. Nevertheless, the requirements for officer personnel who were educated in computer technology grew at a steadily increasing pace. Current needs always exceeded

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<sup>1</sup>U.S., Congress, House, Committee on Post Office and Civil Service, Hearings on Government Electronic Data Processing Equipment, 89th Cong., 2d Sess., June, 1966.

trained officer resources. Plans for educating the officer in ADF were outdated and inadequate before they could be placed into effect.<sup>1</sup>

Two years after the creation of AIDS, staff level responsibility for individual education and training was to change hands again. On November 22, 1965, this responsibility was assigned to DCSPER.<sup>2</sup> Again this was a necessary realignment, but each reorganization tends to retard progress for a period of time--and the program was already years late in starting.

A dramatic reorganization in the Office of the Chief of Staff, Army (OCSA) took place in early 1967 which promises to bring about management changes again.<sup>3</sup> It sets up, among other things, the Office of the Assistant Vice Chief of Staff and four functional offices under a lieutenant general. Each office would contribute to the building of a modern, updated, integrated Army resources-planning-and-management system. One of these offices, the Directorate of Management Information Systems, replaced AIDS. The operating type functions of AIDS were transferred to COA. Strictly interpreted, this

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<sup>1</sup>Interview with Gilbert C. Jacobus, COA, Department of the Army, Washington, D.C., September 11, 1967.

<sup>2</sup>U.S., Department of the Army, "Memorandum on Manpower Management and Individual Training Functions in the Army Staff," OCSA, Washington, D.C., November 13, 1965 (in the files of the Department, OCSA).

<sup>3</sup>U.S., Department of the Army, "Memorandum on the Reorganization of the Office of the Chief of Staff," OCSA, Washington, D.C., March 28, 1967 (in the files of the Department, OCSA).

means that many aspects of education have remained with DCSPER, and some of the ADP specialists have been placed under COA.<sup>1</sup> This reorganization is shown in Figure 6.

Reflecting on the latest changes in organization that impact on ADP education, the current responsibilities can be summarized as follows: Responsibility for the education and training functions in the Army is shared by DCSPER, COA, and OPO. USCONARC is still charged with the preparation and supervision of training programs to fulfill Department of the Army training objectives. DCSPER has general staff responsibility for the development of training concepts, policies, and programs. It also coordinates plans pertaining to individual training in the United States Army schools. OPO has responsibility for determining total annual training requirements by Military Occupational Specialty (MOS) for the standing Army.<sup>2</sup>

In brief review, then, ACSFOR determines the overall organizational structure of the Army. It points out the personnel implications to DCSPER, which in turn resolves the personnel requirements in relation to the assets. DCSPER then passes on to OPO the actual number of people needed to be trained or educated to carry out the Army missions. OPO then determines, by name, who gets this training, and

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<sup>1</sup>Joseph L. S. Terrell, "New Army Top Management Level Seeks to Tap Information Flow," Armed Forces Management, May, 1967, pp. 37-39, 90-93.

<sup>2</sup>U.S., Department of the Army, "Description of the Present Personnel Management System," DCSPER, Washington, D.C., July, 1967 (in the files of the Department, DCSPER).

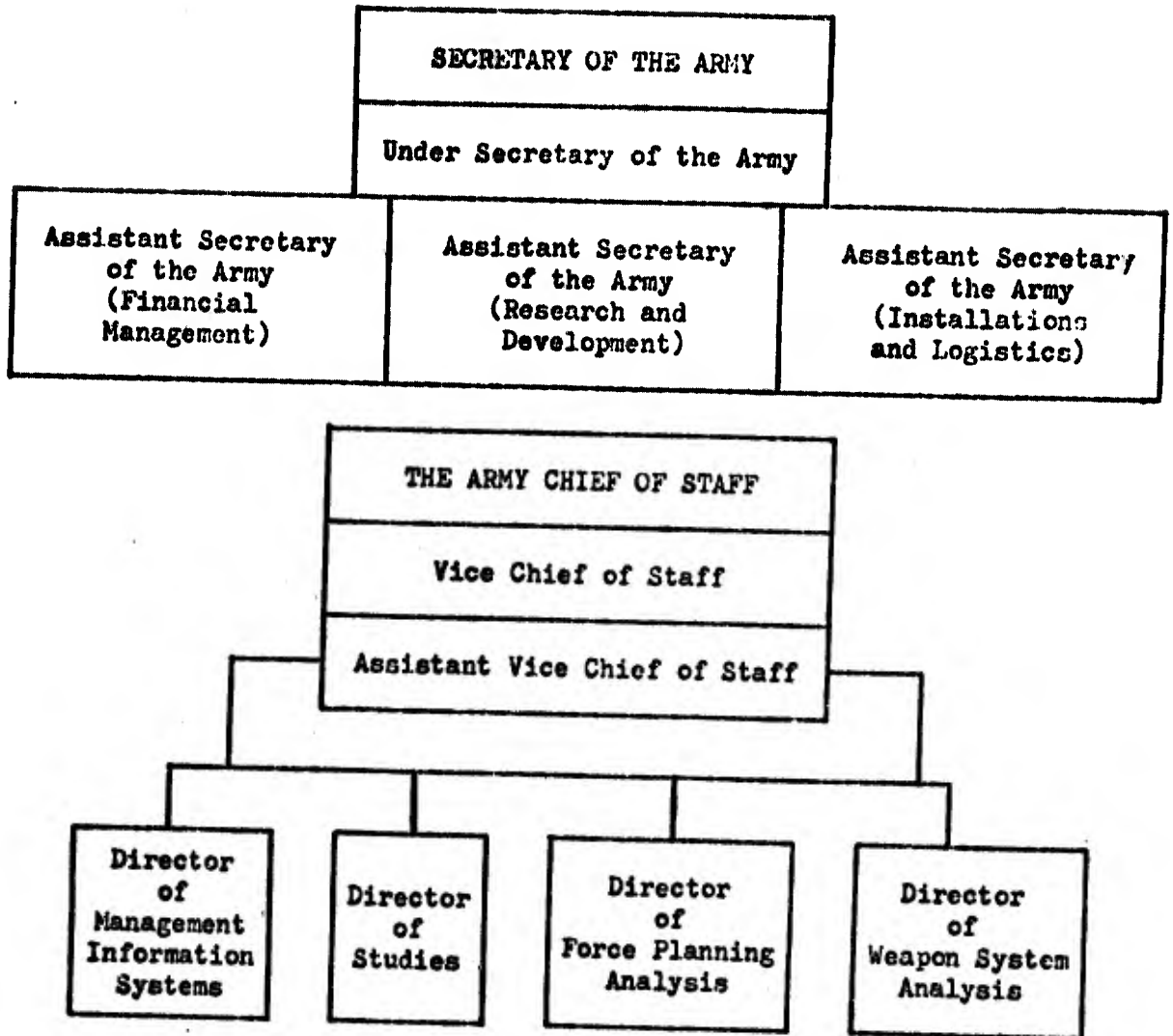


Fig. 6.--1967 Organization of the Office of the Chief of Staff, Army<sup>a</sup>

<sup>a</sup>U.S., Department of the Army, Organization and Functions, Department of the Army, Army Regulation No. 10-5 (Washington: U.S. Government Printing Office, September, 1966, with Change 1, dated May, 1967), p. 1.

schedules their training or education with USCONARC, or a university.

### Organization for Education

The Army Regulation entitled Military Education and Schools is the heart of Army education. It describes the United States Army school system and establishes general provisions governing the military education and individual training of all components of the Army.

The mission of the Army School System is to prepare selected individuals to perform those duties which they may be called upon to carry out in war or in peace, to conduct research, to participate in the formulation of military doctrine, and to promote the highest standards of professional military competence.<sup>1</sup>

At the Department of the Army level, responsibility for supervision of the Army school system is vested in a single general staff agency, DCSPER. USCONARC is the primary director of the Army school system and commands twenty-six Army schools.<sup>2</sup> This school system, with its attendant command and staff relationships, is shown in Figure 7.

Formal schooling is only one manner of developing an officer's capabilities, and must be considered against the backdrop of overall officer career patterns. Newly commissioned officers enter the Active Army from the United States

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<sup>1</sup>U.S., Department of the Army, Military Education and Schools, Army Regulation No. 350-5 (Washington: U.S. Government Printing Office, October, 1966), p. 1.

<sup>2</sup>U.S., Department of the Army, United States Army Installation and Major Activities in the Continental United States, DA Pamphlet 210-1 (Washington: U.S. Government Printing Office, August, 1967), p. 10.

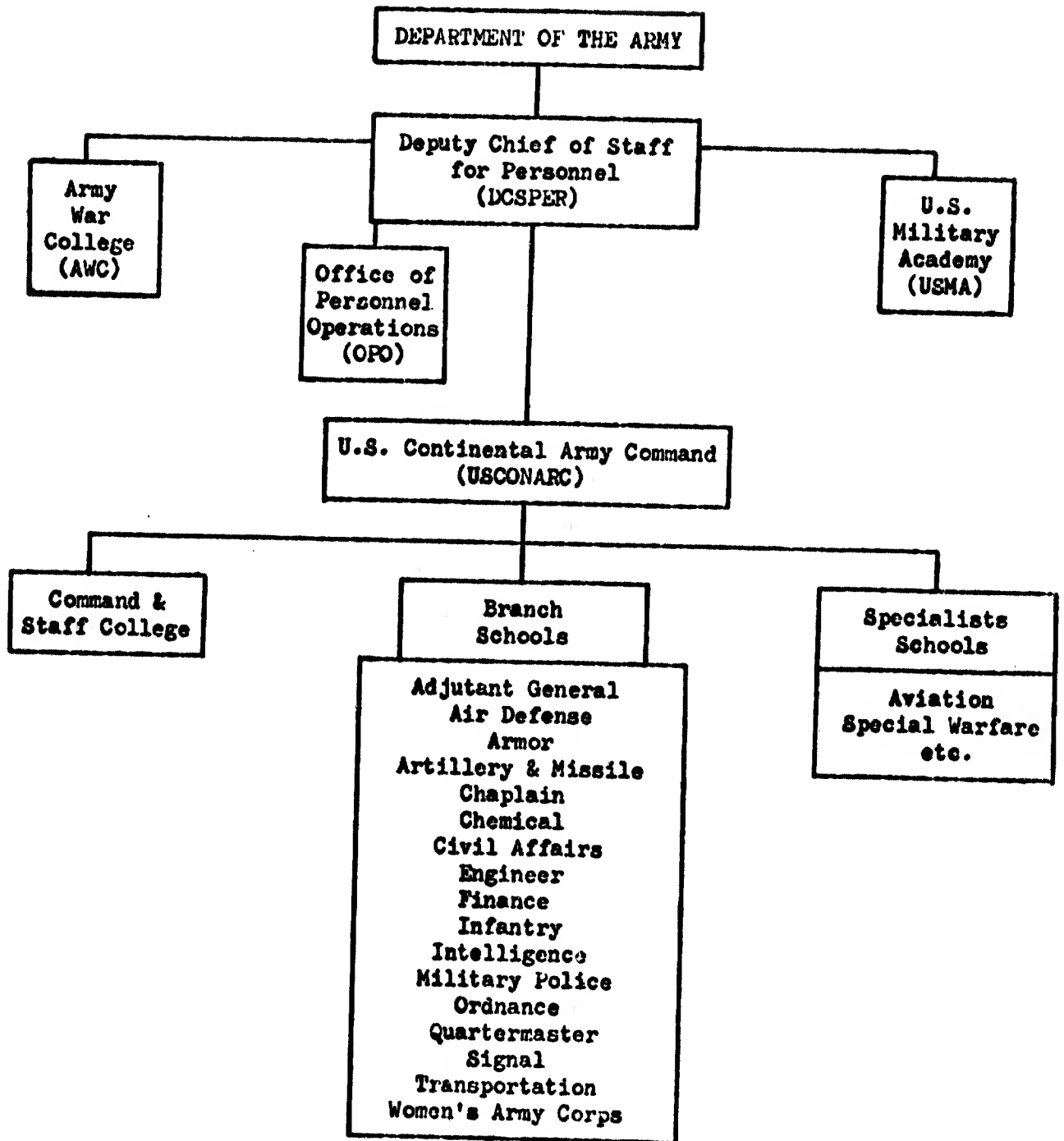


Fig. 7.--Organization Structure of the Army School System<sup>a</sup>

<sup>a</sup>U.S., Department of the Army, Military Education and Schools, Army Regulation No. 350-5 (Washington: U.S. Government Printing Office, October, 1966), p. 6.

Military Academy (USMA), the Reserve Officers' Training Corps (ROTC), Officer Candidate Schools (OCS), and by direct appointment.<sup>1</sup> All newly commissioned officers, except USMA and OCS graduates, must attend a basic branch course of about nine weeks in duration to prepare themselves for their first duty with troops. Normally between the third and eighth year of commissioned service, essentially all officers must attend a branch career course (recently changed back to being called the "advanced" course). All branch schools offer a regular career course which is a full academic year in duration. The purpose of the career course is to prepare officers for command and staff duties at company through brigade level. Officers may attend specialist (MOS producing) and functional (non-MOS producing) courses of varying lengths at any time in their career. Attendance at such courses is designed to prepare officers for specific assignments, skills, or specialties.<sup>2</sup> Selected officers receive training at civilian educational, commercial, or industrial institutions, whenever such training is not available in Army schools.<sup>3</sup> But officers will be trained under the Civil Schooling Program

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<sup>1</sup>U.S., Department of the Army, Officer Qualification and Classification, Army Regulation 611-103 (Washington: U.S. Government Printing Office, July, 1967), pp. 2-6.

<sup>2</sup>U.S., Department of the Army, Career Planning for Army Commissioned Officers, DA Pamphlet 600-3 (Washington: U.S. Government Printing Office, June, 1967), p. 14.

<sup>3</sup>U.S., Department of the Army, Training of Military Personnel at Civilian Institutions, Army Regulation No. 350-200 (Washington: U.S. Government Printing Office, April, 1965), pp. 1-5.

only to the extent necessary to meet the requirements validated by the Army Educational Requirements Board (AERB).<sup>1</sup> Approximately half of all Army officers who reach field grade (ranks of major, lieutenant colonel, and colonel) attend the Command and General Staff College (C&GSC). This institution prepares officers for service with divisions, corps, and field army operations. Attendance at C&GSC is for an academic year and comes between the eighth and fifteenth years of service. At the apex of the Army school system stands the Army War College. Of equal stature, but not Army operated, are the National War College and the Industrial College of the Armed Forces. Only a few hundred Army officers attend these colleges each year. The purpose of these colleges is to prepare officers for command and high level staff duties. Figure 8 shows in graphic form the pattern of officer education just described.

In varying degrees, an officer can gain some knowledge about ADP in each facet of the Army school system. A complete listing of these schools and their courses is described in a bulletin covering all training courses in automated information and data systems available to Army personnel.<sup>2</sup> It is not within the scope of this study to itemize the different hours of ADP instruction given at each school in the Army

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<sup>1</sup>U.S., Department of the Army, Military Personnel for Graduate Level Education. Army Regulation 621-108 (Washington: U.S. Government Printing Office, September, 1967), p. 1.

<sup>2</sup>U.S., Department of the Army, ADP Training for Military and Civilian Personnel, DA Technical Bulletin No. 18-8 (Washington: U.S. Government Printing Office, June, 1967).

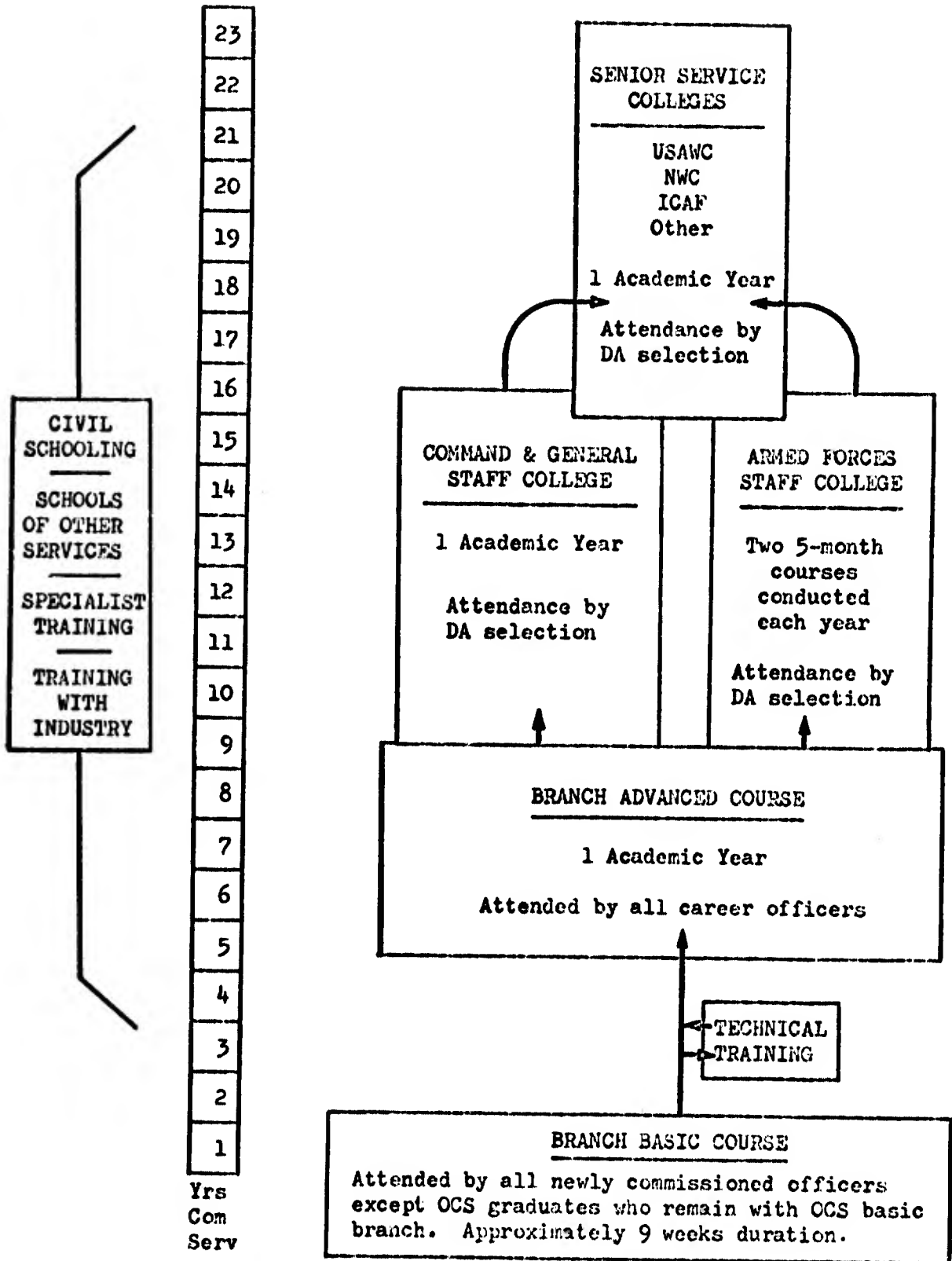


Fig. 8.--Army Officer Educational Pattern<sup>a</sup>

<sup>a</sup>U.S., Department of the Army, Career Planning for Army Commissioned Officers, DA Pamphlet No. 600-3 (Washington: U.S. Government Printing Office, June, 1967), p. 14.

school system. However, some time will be devoted to the salient aspects of instruction within the system in Chapter III.

As alluded to previously, there are other ways that an officer can be educated in ADP outside the Army school system. These other sources will now be presented in a manner similar to the school system.

A DOD Directive established the DOD Computer Institute in Washington, D.C., in early 1964.<sup>1</sup> The mission of the Institute is to provide computer orientation courses designed to acquaint senior military and civilian DOD executives with computer systems.<sup>2</sup> This is a unique educational facility, for it was created to "hurry up and put itself out of business."<sup>3</sup> Its job parallels the theme of this paper, to deal with the ADP education gap at the management level. Secretary McNamara saw the need to educate these managers in DOD, and to this end their courses are designed to provide a comprehensive view of the computer field. The several courses presented there, varying in length from one to three weeks, are aimed at: (1) teaching the fundamentals of digital computer capabilities, applications, and limitations; (2) planning and implementation of new digital computer systems and improving

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<sup>1</sup>U.S., Department of Defense, Department of Defense Computer Institute, DOD Directive No. 5160-49 (Washington: U.S. Government Printing Office, February, 1964), p. 1.

<sup>2</sup>Interview with Major Robert D. Phelan, Jr., DODCI, Washington, D.C., July 6, 1967.

<sup>3</sup>Interview with Captain F. N. Quinn, DODCI, Washington, D.C., July 5, 1967.

existing systems; and (3) enabling DOD to plan and operate its systems more independently of contractors.<sup>1</sup> So, as soon as the key executives have thus been educated, or the new ones come into their jobs with an adequate knowledge of computers through their college education, the doors to the Computer Institute will close unless its current mission changes.

The Army Management Engineer Training Agency (AMETA) at Rock Island Arsenal, Illinois, conducts several one-week courses in ADP management which officers may attend.<sup>2</sup>

As a cross-service agreement, some Army officers attend the United States Air Force Institute of Technology at Wright-Patterson Air Force Base, Ohio. Several short courses in management, and the capabilities and limitations of ADPE, are offered there.<sup>3</sup>

The Navy's Post Graduate School has been attended by some Army officers enrolled in special courses in the field of electronic digital computers.<sup>4</sup> Today, there is a trend toward a longer program which will be further discussed in Chapter IV.

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<sup>1</sup>DOD Directive No. 5160.49, pp. 2-4.

<sup>2</sup>U.S., Department of the Army, Formal Schools Catalog, DA Pamphlet No. 350-10 (Washington: U.S. Government Printing Office, February, 1965), pp. 4-7E-4 to 4-7E-8.

<sup>3</sup>U.S., Department of Defense, Defense Logistics Management Training, DOD Directive No. 5010.9-C (Washington: U.S. Government Printing Office, October, 1966), pp. 24-25.

<sup>4</sup>U.S., Department of the Navy, Catalog for 1966-67 (Monterey, Calif.: The Naval Post Graduate School, June, 1966), pp. 80-81, 101.

Therefore, it can be realized that education in ADP does not stem from one course in a single school. It is the result of an exposure to the subject over a period of time, at many different educational and training facilities throughout the Department of Defense.

#### Summary

Policies in ADP education were lacking in the Army, as well as in the remainder of the Federal Government, in the early years of computer operations. The concern during the years 1956 through 1966 was for almost every aspect except education. First, there was the vying for position as to who would get the first computer, and who would have staff responsibility for ADP. Later, the quest was for developing systems and putting to use this new status symbol. This marked a growing trend for more and more installations and was, accordingly, followed by the need to control the acquisition of ADP equipment. To this end, Public Law 89-306 was enacted, which provided for economic and efficient purchase, operation, and utilization of ADP equipment by the various Federal departments and agencies. But the one area which deserves more lead-time than any other planning aspect of ADP--education--was not really identified as a problem until late in 1965.

In the decade that the Army has been using the digital, business-type computer, the Department of the Army staff has undergone six major reorganizations. Each time, a different staff agency became responsible for Army education, and, at several points in time, two staff sections shared this

responsibility. This shifting of responsibility had a degenerating effect on the ADP education program. The reorganization had made a full circle by 1967, and DCSPER, in coordination with OPO, is now working on an educational program that could have been in its tenth year of implementation, had it not been for several intervening reorganizations.

Little top management guidance in the education program was evident in the formative years of computer applications. However, this was a common failing throughout the various Federal agencies during those early years of the computer. The computer and its product, the management information system, now have a top-level location in the Army structure. A chain of guidance has been established which originates in the Office of the Secretary of Defense and flows downward to the ultimate user in the Army.

The Army school system is the principal means of individual education and training for all Army officers. Yet, it must be realized that career development of Army officers is a highly structured interrelation between civil and military schooling, assignments, job performance, years of service, and promotion patterns. There are four levels of military career schooling: basic, advanced, command and staff, and war college. Attendance of each school is normally a prerequisite for attendance at the next higher level. Attendance at the branch basic and advanced courses is mandatory for essentially all officers. The two levels

of military colleges are attended by progressively fewer officers on a selective basis. Civilian schooling is received by about 1,000 officers a year as a supplement to military schooling.

The DOD Computer Institute was established within the last few years to address the problem of the executive's ADP education gap. Other services present special computer courses, of varying duration, which are attended by Army officers on a cross-service basis.

## CHAPTER III

### A REVIEW OF STUDIES CONCERNING ADP EDUCATION

#### Introduction

Army efforts to isolate and resolve the problems of providing a suitable ADP knowledge base for officers have been smothered in the mass of problems arising from the pressures of the Cold War, Vietnam, prevailing educational commitments, and the tremendous expansion of technological know-how in all fields, but particularly in those related to ADP and computers. The impact of the ADP knowledge gap in the officer ranks recently reached such proportions, however, that a determined attack on the problem became mandatory.

Because of the complexities involved, the actions taken in the recent past were mainly pointed toward defining the problems. The Adjutant General School made a study on ADP training in February 1965, in which it was proposed that all ADP training be centralized at one facility.<sup>1</sup> In June 1965, the Army conducted a seminar for computer educators and ADP directors at the United States Military Academy (USMA), which did much to clarify the issues, and provided direction

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<sup>1</sup>U.S., Department of the Army, ADP Training Study for Business-Type Data Processing (Fort Benjamin Harrison, Ind.: U.S. Army Adjutant General School, February, 1965).

for further efforts.<sup>1</sup> Shortly thereafter, in November 1965, USCONARC published a study which further examined the subject of ADP training and provided more concrete definition of problem areas.<sup>2</sup>

Another significant milestone was attained in February 1966 with the publication of the Haines Board Report.<sup>3</sup> Although this board was concerned with all aspects of officer education, the thoroughness with which it researched and analyzed the education field pinpointed many ADP training problems and provided specific guidelines for attacking them. Of equal importance was the fact that the findings of the board placed the ADP problems in proper context with other educational problems and focused attention on them at higher levels of authority. This resulted in a much needed increase in impetus and support for the USCONARC effort to train officers in ADP.

The most recent document which furthered the general effort was the Mattingly Study published by the Office of the Deputy Chief of Staff for Logistics (DCSLOG).<sup>4</sup> This study was

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<sup>1</sup>U.S., Department of the Army, Proceedings of the Seminar of Military Computer Educators and Computer Center Directors (West Point, N.Y.: USMA, June 14-17, 1965).

<sup>2</sup>U.S., Department of the Army, Training for Automatic Data Processing Systems, USCONARC Study (Fort Monroe, Va., November, 1965).

<sup>3</sup>U.S., Department of the Army, Board to Review Army Officers Schools (Haines Board), DA Study (Washington, D.C., February, 1966).

<sup>4</sup>U.S., Department of the Army, Requirements for the Department of the Army ADP/Supply Spaces and Personnel (Mattingly Study), DA Study (Washington, D.C., August, 1966).

more specialized in that it concentrated on the need for supply personnel who would be adequately equipped with ADP knowledge and skills. The study analyzed the ADP/Supply personnel needs within the context of the overall Army ADP and supply training picture. As a result, it produced additional insights on overall needs as well as valuable data on supply personnel requirements. Due to the classified nature of much of this study, it will not be reviewed, but some of its unclassified portions will be mentioned, as appropriate.

With this as an introduction, each of these studies will be reviewed in order of its publication. Each will be presented in a basic format (i.e., Background, Purpose, Highlights, Conclusions) which seems adaptable to the varied forms of the different studies. As has been indicated, all of these studies were far broader than the thesis subject itself. Therefore, this review will concentrate on only those aspects of the studies that are relevant to the research project.

### The Adjutant General School Study

#### Background

The Adjutant General Corps has been active in the development of data processing and the training of personnel in business-type data processing skills since 1940.<sup>1</sup> More recently, in 1964, the School initiated a re-evaluation of its

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<sup>1</sup>U.S., Department of the Army, ADP Training Study for Business-Type Data Processing, p. i.

capability to meet the expanding Army requirements for training in business-type data processing skills. The goal was to arrive at a proposal for the total approach to the Army's need in ADP training. At the time of the study, the Signal School was the only USCONARC school training officers in MOS 2402 (ADPS Plans and Operations Officer). The Adjutant General (AG) School was presenting a Systems Analysis course and a handful of non-ADP courses in which ADP instruction was included. The Finance School was teaching an ADPS Financial Management Systems course, and the Army Management Engineering Training Agency (AMETA) was offering eight courses of pure ADP instruction ranging in length from three days to eight weeks.<sup>1</sup>

### Purpose

The central purpose of the study was to determine the feasibility of designating a central training facility to perform the ADP training mission for business-type data processing within the Army.<sup>2</sup>

### Highlights

At the time of the study, the entire MOS-producing course at the Signal School was oriented toward one experimental ADP system called FIELDDATA. So the study's first observation was that there were a number of new computer applications under development (i.e., FIELDDATA, STARCUM, TECSTAR,

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<sup>1</sup>Ibid., pp. iv-vii.

<sup>2</sup>Ibid., p. 1.

etc.), but it indicated that it would be much more economical and practical to train personnel in the basic skills associated with business data processing, using systems presently in effect as the training vehicle rather than proposed systems. With this broad background, it was reasoned that the trained officer, with a minimum of additional training, could operate in any of these new systems, when and if adopted. Such an approach would permit the retention of maximum flexibility to react to both technological and systems changes.<sup>1</sup>

Also recognized was the requirement for middle management to have a working knowledge of ADP. The career officer finds an increasing need to be able to recognize the potential and limitations of this powerful tool. He should be able to communicate with supporting, data processing activities.<sup>2</sup>

As mentioned earlier, the only MOS-producing course at that time was the one of eleven weeks duration presented by the Signal School. This course was highly equipment oriented, and a considerable amount of time was spent in communication background subjects. The study proposed replacing it with a shorter course to be conducted by the AG School with emphasis shifted toward business data processing systems, planning, and operations. This would remove control of ADP training from the technical, hardware-oriented branch (the Signal School), and place it in the management field

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<sup>1</sup>Ibid., p. ii.

<sup>2</sup>Ibid., p. iii.

(the AG School) to serve a common base of personnel, finance, and administration.<sup>1</sup>

In the area of systems analyst training, courses were conducted at the Signal School, the AG School, and AMETA. Again, the Signal School was highly machine oriented; the AMETA course was perhaps too much language oriented, since 76 percent of its instruction concerned procedure-oriented languages. The AG School proposed to take the best of these by teaching a week of COBOL (which had recently been considered the DOD programming language for business applications). The remainder of their emphasis would be on systems, planning, and analysis and design techniques.<sup>2</sup>

The study also reflected that the familiarization of data processing at the middle management level was a need shared by all of the branches. At that time the various career (advanced) courses of the service schools differed greatly in the amount of data processing presented, from zero to 110 hours of instruction. This was primarily due to the fact that few service schools had instructors qualified in ADP, and on this account had little capability to present ADP material. The AG School had gained much experience and considerable feel for this problem, for it had developed and placed into operation a "road show" of instruction in ADP for senior officers at various Army posts on the east coast. Having gained this expertise in the type of knowledge the

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<sup>1</sup>Ibid., p. v.

<sup>2</sup>Ibid.

non-ADP officer most needs, the study recommended the development of a forty-hour, common block of ADPS instruction for all the service schools, monitored by the AG School. This would mean that the lesson plans and associated material would be developed by the experts, and then taught on a decentralized basis. This would assure a common base of knowledge for the Army's middle managers.<sup>1</sup>

In this connection, it was thought that the need for the traveling team would continue, and would serve a useful purpose of reaching the officers who were outside the school system for several years.<sup>2</sup>

### Conclusions

This eighty-page study did a thorough job of analyzing the training needs of the Army in ADP, because it was concerned not only with the training of officers but of warrant officers and enlisted men. In considerable detail, it examined the course content, instructor talent, approach, and facilities of every Army school that was presenting ADP instruction.

This study stands as a pioneer in this field, for it shows unique initiative on the part of one school to effect the shift of instruction in ADP away from the technical and hardware-oriented school to one with a business orientation.

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<sup>1</sup>Ibid., p. vi.

<sup>2</sup>Ibid.

The report came to the following conclusions:

1. ADP training should be centralized at the Adjutant General School for reasons of economy, coordinated and efficient training at all levels, avoidance of unnecessary duplication, and the achievement of maximum utilization of trained instructors.

2. The plan, long range in nature, and anticipative of total business-type ADP training needs of the Army, is capable of expansion to meet future needs with maximum flexibility.<sup>1</sup>

It will be noted that the study did not include for all schools specific conclusions concerning the preparation of a common block of instruction, or a traveling team for ADP instruction, or any other method.

The action taken by the Department of the Army, in this and other studies, will be covered in Chapter IV.

Seminar of Military Computer Educators  
and Computer Center Directors

Background

This was the first seminar dealing with computers ever to be conducted at the Military Academy, or in the Army for that matter. It was attended by representatives of the service academies, service schools, senior service schools, and specialized educational institutions.

A sequel to this 1965 seminar, called the 1967 Computer Summer Workshop, was held over the period July 17 to

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<sup>1</sup>Ibid., p. viii.

August 4, 1967. However, no report covering the event has been published as of this writing.<sup>1</sup>

### Purpose

In general terms, the seminar was held to provide an opportunity for the representatives of the Army school system to hear and learn from the experience of others, and exchange ideas, concepts, and techniques for meeting the educational challenge of computers.

The specific objectives concerned such goals as: coordinating programs of instruction, comparing methods of instruction, developing a consistent computer education philosophy, determining the level of computer knowledge desired for each type of Army school, analyzing service requirements for computer education, and identifying specific areas of weakness and strength in the present computer program.<sup>2</sup>

### Highlights

The conference itself had some interesting presentations, such as a remote computing demonstration and a demonstration of computers in presenting non-computer instruction. This was followed by presentations of representatives from each institution. These speeches revealed the status of

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<sup>1</sup>Letter from Lieutenant Colonel William F. Luebbert, Educational Resources and Technology Division, United States Military Academy, West Point, New York, August 11, 1967.

<sup>2</sup>U.S., Department of the Army, Proceedings of the Seminar of Military Computer Educators and Computer Center Directors, p. 4.

ADP education at the respective schools and the position or role of ADPS in the curriculum. A few of the more significant statements will now be summarized.

The Army War College.--It was the opinion of the College that the highest school level for instruction in ADPS, as a regular part of the curriculum, should be the Command and General Staff College, and that business-type application instruction should be covered at the Army's various specialized centers and schools. However, it was recognized that the College would find it necessary to include some coverage of ADPS for about the next five years.<sup>1</sup>

The Artillery and Missile School.--This School stated that the basic knowledge required by potential users of computers could probably be acquired best during the officer's formal education prior to his entering the military service. The ROTC universities must prepare the potential officers in computer fundamentals as a basis for their continuing development. Also, the branch schools should be required to further this basic computer knowledge in the specific areas of interest, and it should be the responsibility of the senior service schools to provide a higher level of computer knowledge dealing with capabilities, limitations, and employment of computer systems in general.<sup>2</sup>

The Chemical School.--The Chemical School adopted a similar philosophy toward computer education. It felt that

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<sup>1</sup>Ibid., p. 13.

<sup>2</sup>Ibid., pp. 71-72.

the system might be delineated as follows:

(1) Academies, Officer Candidate Schools, and ROTC Units. Provide basic fundamentals of ADP concepts.

(2) Branch Schools. Provide instruction in the effective use of supervision of ADP systems. Provide foundation as to the various types of applications to be encountered in future assignments. Provide applications and practical exercises.

(3) Senior Service Schools. Provide instruction in the use and management of data systems and the role each plays in the overall military structure. Indicate trends and new developments in the field.<sup>1</sup>

The Engineer School.--As far as the Engineer School was concerned, the officer need not become a skilled equipment operator, programmer, or analyst, but, rather, he should have knowledge of the basic principles and be able to direct effectively the efforts of skilled technicians. Further, the officer would have this knowledge by the time he left the branch school. The senior service schools should then expand on this basic knowledge and show the applications of computers in the higher staffs and larger units of the Army.<sup>2</sup>

The Infantry School.--This School stated clearly that it does not have the specific mission of providing computer training in any of its courses, yet feels that it may be desirable to provide some ADP orientation in its leadership courses during the next five or six years. After that time, the officer entering the Army school system will already have had his basic ADP education in college.<sup>3</sup>

The Military Police School.--This School had not felt any impact of computers on its curriculum, and stated that there existed little need for computer awareness on the part

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<sup>1</sup>Ibid., p. 75.

<sup>2</sup>Ibid., p. 77.

<sup>3</sup>Ibid., p. 106.

of the students. However, as computer use increases and instruction on military use of computers is increased, a need for computer awareness may be generated.<sup>1</sup>

The Transportation School.--This School was most content with the present arrangement of having the AG School's traveling team present a week's instruction to their advanced class each year.<sup>2</sup>

The Military Academy.--Having recognized earlier that pre-commissioned education was outside the scope of this study, it is felt that the education program in computers at the Academy is sufficiently outstanding to be an exception.

In December 1960, study began on the potentials of introducing the digital computer into cadet education. By December 1962, the Academic Computer Center was in operation. The heart of the program is the requirement that every Plebe (freshman) be required to learn how to analyze and program problems for computer solution, and to run them on the Center's computer. He would also be required to use the computer to solve problems in all of his major math, science, and engineering courses during each of his four academic years. When this cadet, who has worked with a computer for four years, becomes a senior officer, he may remember absolutely nothing about computers--technically; but he is not likely to regard computers with either the unreasoning suspicion or uncomprehending enthusiasm which so often mar

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<sup>1</sup>Ibid., p. 108.

<sup>2</sup>Ibid., p. 123.

the relationship between the civilian manager and the senior military officer who work with computers. Instead of being at the mercy of the computer and the computer specialist, he will be confident that he and the manager can properly control and supervise these potent new tools, and correctly evaluate the significance of computer-produced results.<sup>1</sup>

### Conclusions

Finally, the Seminar participants were divided into several working groups to discuss previously prepared topics, and consider such additional topics as were found to be of interest to the group. The professional knowledge and experience produced some noteworthy education policy recommendations. The applicability and utility of these recommendations would have to be evaluated by the authorities of the various schools represented. Their conclusions follow:

The senior service schools group.---This group reached a number of conclusions about the educational problems facing the Army. Initially, it pointed out that the Army's major problem area was more than just a problem of computer hardware and software; it was also one of education in the use of management science behind which the computer is perhaps the driving force. The problem was then broken down into two parts: (1) the "gap-filling" educational program in management science for the more senior officers, and (2) a longer range program which would make it possible by 1970 for all

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<sup>1</sup>Ibid., pp. 149-57.

officers entering the senior service schools to have previous computer education. Two general approaches were advanced to meet these problems. The first would program officers into special schools devoted to management science or its elements, such as DODCI, the Army's Logistics Management Center, and the AG School. The second stated that management science courses, including ADPS, should become a part of regular curricula at each of the senior service schools.

A final observation of the group was that most, if not all, of the discussion participants recognized both parts of this problem, but getting decision makers to act rationally is another matter--they sometimes go off the deep end, or ignore the problem hoping it will go away, or just pay lip service to a solution. It was concluded that the Army should have in its school system a graduated program, on a career pattern basis, for education in management science.<sup>1</sup>

The combat arms schools group.--Representatives of the Infantry, Armor, Artillery, Engineer, and Signal Schools produced the following positions:

With respect to the role of the computer in the curriculum, they felt that it would have an increasingly important role, and should soon occupy a major place in instruction presented in these schools. Attention to teaching ADP as a subject by itself would receive increased attention for the next few years and would be maintained until such time as the

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<sup>1</sup>Ibid., pp. 361-63.

bulk of the incoming students would be knowledgeable in computers.

They expressed interest in the potential of computers in simulation during war games as a means to increase student participation and opportunities in decision making.

In regard to the level of computer knowledge required by their graduates, they felt that they should have a general knowledge of the capabilities and limitations of automated techniques and know how to use the computer as a management tool. Their students should also have an awareness of the complexities of programming languages and know the present status and future trends in military applications of computers. All of this knowledge should later be reinforced at the command and general staff level schooling.<sup>1</sup>

The technical and administrative service schools group.--This group began by stating that every officer will have a need for at least a basic understanding of the capabilities and limitations of the computer, to include a familiarity with terminology so that the officer can communicate with people in the ADP field. Instruction will become increasingly important as present applications are refined and new applications are developed. Specific needs for computer education will vary between service schools.

Their most germane conclusion was that "there is a lack of guidance from higher headquarters--DOD, DA, and

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<sup>1</sup>Ibid., p. 373.

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UNCONARC--on the minimum essential ADP knowledge required by all officers."<sup>1</sup>

No specific action was taken on these findings; however, members of both study groups that followed took cognizance of their conclusions, and many aspects are found in the recommendations of these later reports.

### USCONARC Study on Training for Army ADPS

#### Background

As a result of the AG School Study, USCONARC prepared this follow-up study late in 1965 to serve as a vehicle to gain DA approval on their ADP recommendations. The study makes specific mention of the fact that heavy reliance was placed on the AG School Study, the Signal School's detailed comments on the AG Study, and the results of the USMA Seminar.

They prefaced the study by observing that, because of the accelerated growth of ADPS in the Army, several problems were confronting the training base. These included: (1) providing quantity of quality technicians; (2) overcoming "gaps" in ADP knowledge of staff personnel; and (3) properly scaling the level of ADP-related instruction in officer career schooling.<sup>2</sup>

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<sup>1</sup>Ibid., pp. 377-78.

<sup>2</sup>U.S., Department of the Army, Training for Automatic Data Processing Systems, p. 1.

Purpose

The stated purpose of the study was to determine which aspects of ADP require school training, where such training should be carried out, and what training equipment would be required.<sup>1</sup>

Highlights

The study acknowledged that the basic skill required is that officers understand what the computer is, and what it can and cannot do. This meant that the Army officer must, as a minimum, have sufficient understanding of the basic concepts and terminology of ADP to: (1) recognize the potential applications and limitations of ADP; (2) evaluate proposals for its use; (3) communicate with ADP managers; and (4) expand personal knowledge in ADP when the opportunity or need exists. It was generally accepted that all officers, regardless of rank or years of service, should have this basic knowledge. Yet, ADP is a dynamic field, and equipment and uses are undergoing significant changes which will require officers to have periodic updating of even this basic knowledge.<sup>2</sup>

In accordance with USCONARC policy of not establishing a minimum number of hours for common subjects, it was recommended that the following scope should be covered in each branch career (advanced) course:

Fundamentals and elements of an ADPS, to provide a general knowledge of the characteristic components of an

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<sup>1</sup>Ibid., p. 2.

<sup>2</sup>Ibid., p. B-1.

ADPS; the techniques and procedures of assembly language computer programming to include COBOL; the doctrine, objectives, and command considerations of the Army's procedures for acquisition and planning of ADP systems; the present applications and plans for future ADP systems including command control.<sup>1</sup>

It was believed that the immediate task of the various career school levels--branch, command and staff, and war college--was one of orientation and familiarization. However, by the early 1970's, service schools would be able to assume that their students had obtained at least the fundamentals, and could then shift from common subjects to progressive levels, as follows:

Branch Schools: Provide instruction in the effective use and supervision of ADP systems; provide a foundation as to the various types of applications to be encountered in future assignments; provide practical exercises.

Command & Staff and War Colleges: Provide instruction in the use and management of data systems and the role each plays in the overall military structure; indicate trends in the field.<sup>2</sup>

USCONARC agreed with the AG School that the MOS 2402 course should be realigned by reducing the communication and specific military application coverage. Additionally, endorsement was given to the concept of centralization of training in ADP at their facility.<sup>3</sup>

A notable achievement of this study was the development of qualitative requirements for officer ADP education. It proposed three skill levels:

1. For the Commander/Top Manager (having in mind a general officer or a colonel) the following skill requirement was determined:

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<sup>1</sup>Ibid., p. B-2.

<sup>2</sup>Ibid.

<sup>3</sup>Ibid., p. C-2.

Needs to have a general knowledge of the characteristics, capabilities and limitations of ADP equipment; of the procedures, techniques, and principles of systems analysis and design; and of basic ADP terminology; and of the command management and use of ADPS.<sup>1</sup>

2. The Staff Officer (somewhere between the rank of captain and lieutenant colonel) would require the following skill:

A general knowledge of the nature of data processing operations; characteristics, capabilities, and limitations of ADP equipment, including a full appreciation of the intricate details involved in programming; data processing terminology. An orientation on the most important management considerations in the employment of ADP systems.<sup>2</sup>

3. The final skill level would be that of the ADPS Plans and Operations Officer--MOS 2402. The recommendation here produced the following skills required for this MOS (note the difference between this skill level and that of the MOS Manual as extracted in Appendix A):

Needs a working knowledge of the characteristics, capabilities, and limitations of ADP equipment; machine and assembly language programming techniques and principles; the problem-oriented programming language currently approved for use within DOD; the principles and techniques to be employed in the performance of systems analysis and design studies for data processing applications; military ADP applications or systems; and management principles and techniques to be employed in planning for or managing an operating data processing activity.<sup>3</sup>

Using Department of the Army statistics, an estimate was then presented of quantitative ADP MOS training requirements for the period Fiscal Years 1967 through 1973. It was recognized that these figures would provide only broad

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<sup>1</sup>Ibid., p. C-5.

<sup>2</sup>Ibid., p. C-6.

<sup>3</sup>Ibid., p. C-7.

planning guides for use in the study. The requirements were as follows:

Estimated Training Requirements<sup>1</sup>

Fiscal Year	ADPS Plans and Operations Officer
1967 . . . . .	237
1968 . . . . .	260
1969 . . . . .	280
1970 . . . . .	310
1971 . . . . .	382
1972 . . . . .	498
1973 . . . . .	625

Conclusions

The study concluded that the logical USCONARC school to act as proponent for ADPS management and operations training, and as the focal point for ADPS MOS and training literature, was the Adjutant General School.

With the expansion of data processing into practically every facet of Army life, certain basic skills will be required of every officer. As a minimum, the officer must have sufficient grasp of the basic concepts and terminology to:

1. Recognize the potential applications and limitations of ADP.
2. Evaluate proposals for its use.
3. Communicate with ADP managers.
4. Expand his ADP knowledge when the opportunity or need exists.<sup>2</sup>

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<sup>1</sup>Ibid., p. C-124.

<sup>2</sup>Ibid., p. 3.

The immediate education task was recognized to be one of orientation and familiarization of the officer at the various career school levels. By the early 1970's, these schools would be able to assume a basic knowledge on the part of the student officer and, therefore, the schools could begin to present ADP education and training as follows:

Branch Schools: Provide instruction in the effective use and supervision of ADP systems; provide a foundation as to the various types of applications to be encountered in future assignments; provide practical exercises.

Command & Staff and War Colleges: Provide instruction in the use and management of data systems and the role each plays in the overall military structure; indicate trends in the field.<sup>1</sup>

Since many Army schools require assistance from ADP traveling teams, they concluded that the AG team should continue in operation to present the ADP common block of instruction, help develop in-house ADP training capabilities, and assist in the development and use of computer-aided instruction techniques.<sup>2</sup>

During the conduct of the next board to be discussed, the Haines Board, the Adjutant General School was given the responsibility for ADP training.

### The Haines Board

#### Background

From time to time, the Army has found it necessary to make a study of the overall officer education system. Since

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<sup>1</sup>Ibid., p. 4.

<sup>2</sup>Ibid., p. 5.

World War II, four such studies have been made. First, there was the Gerow Board in the fall of 1945, followed by the Eddy Board which presented its findings in 1948. In 1958, a similar study was completed known as the Williams Board.<sup>1</sup> The most recent study (and the very first one to mention ADP) was the Haines Board. The membership of this particular board included four general officers, six colonels, and a civilian educator.<sup>2</sup>

### Purpose

The purpose of the Board was to determine the adequacy and appropriateness of the current Army school system, and the education and individual school training of Army officers in light of responsibilities which would confront the Military Establishment for the foreseeable future. Further, it was to recommend such changes in the direction, structure, or operation of the system which would make the greatest contribution to the discharge of those responsibilities.<sup>3</sup>

The study examined the present system for education and training of Army officers of all components from the time of commissioning until retirement, at both military and civilian educational facilities. They also evaluated

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<sup>1</sup>U.S., Department of the Army, Report of the DA Officer Education and Training Review Board (Williams Board), DA Study (Washington, D.C., July, 1958).

<sup>2</sup>U.S., Department of the Army, Board to Review Army Officers Schools, p. 1.

<sup>3</sup>Ibid.

the system against the background of the current and projected world and Defense environment, the technological explosion, and military requirements across the total spectrum of conflict. Finally, they would recommend such changes in the system as were appropriate for the period 1966 through 1976.<sup>1</sup>

• Highlights

This 900-page report represented the most comprehensive of all reviews of officer education. It covered the entire school system in such detail that the selection of highlights was almost exclusively limited to ADP for the sake of brevity. One early exception to this concerns how the Board perceived the term "education." They recognized the danger of equating "education and training" with "schooling," and of studying formal schooling in isolation. They recognized that other developmental programs and approaches have an obvious impact on the need for schools and courses. The Board was conscious of the inherent values of on-the-job training, counseling, performance appraisal, job rotation, directed reading, effective promotion and elimination practices, and other planned experiences which have as an objective the deliberate development of a highly competent officer corps. Although the focus of the study effort was on formal schooling, the Board sought to retain a balance, and, in fact, touched on some matters enumerated above in the course of its investigation.<sup>2</sup>

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<sup>1</sup>Ibid., p. 2.

<sup>2</sup>Ibid., p. 27.

In making an analysis of the current system of education as related to the environment, the Board recognized that the explosive growth of ADP will probably continue unabated in the foreseeable future. Requirements for ADP personnel already exceed available trained resources and are expected to double within five years. New developments in computers and ancillary equipment, together with new systems applications, will affect the full spectrum of Army operations and bring many new officers, including those in the combat arms, into ADP assignments.<sup>1</sup>

The Board took the position that all Army officers are associated directly or indirectly with ADP, providing or receiving information processed by ADP equipment. Some reach decisions or take actions based on analyses of ADPS outputs, while others develop policies or procedures which alter ADP systems significantly. A smaller group, about 500 officers, is directly associated with data processing operations on a full-time basis. Their duties fall into three broad categories: (1) data processing installation operations, (2) systems design, and (3) overall ADP management. The type of training required varies from a brief orientation on ADP capabilities and limitations to extensive technical training.<sup>2</sup>

The Board reviewed the current ADP training to meet these requirements and found the status as follows:

Branch school courses.--In June 1965, ADP was added as a common subject for career and associate career courses

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<sup>1</sup>Ibid., p. 52.

<sup>2</sup>Ibid., p. 607.

at USCONARC branch schools, under responsibility of the Adjutant General School. A comparison of hours of ADP instruction is seen in Figure 9. Intensity of coverage, ranging from zero to 114 hours in career courses, shows the current degree of branch interest and usage of ADP.<sup>1</sup>

Service colleges.--Some ADP instruction was included in courses at the majority of the service colleges. The Command and General Staff College identified less than four hours in data processing instruction, and the War College provided twelve hours of material in ADP. In most cases, the objective was limited to developing student appreciation for ADP.<sup>2</sup>

Specialist courses.--The thirteen specialist or orientation courses taught by Army schools in Fiscal Year 1965 are listed in Table 1. Additionally, two senior officer ADP orientation courses were taught at the DOD Computer Institute.<sup>3</sup>

Graduate civil schooling.--The Army Educational Requirements Board validated fifty-six officer positions for graduate level training in ADP at civilian universities. Thirty-seven positions were for business-type ADP and nineteen were in ADP-engineering. Thus, forty-eight officers were pursuing graduate studies in the ADP field, for periods of a year and a half to two years, at fourteen different universities.<sup>4</sup>

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<sup>1</sup>Ibid.

<sup>2</sup>Ibid.

<sup>3</sup>Ibid.

<sup>4</sup>Ibid., p. 608.

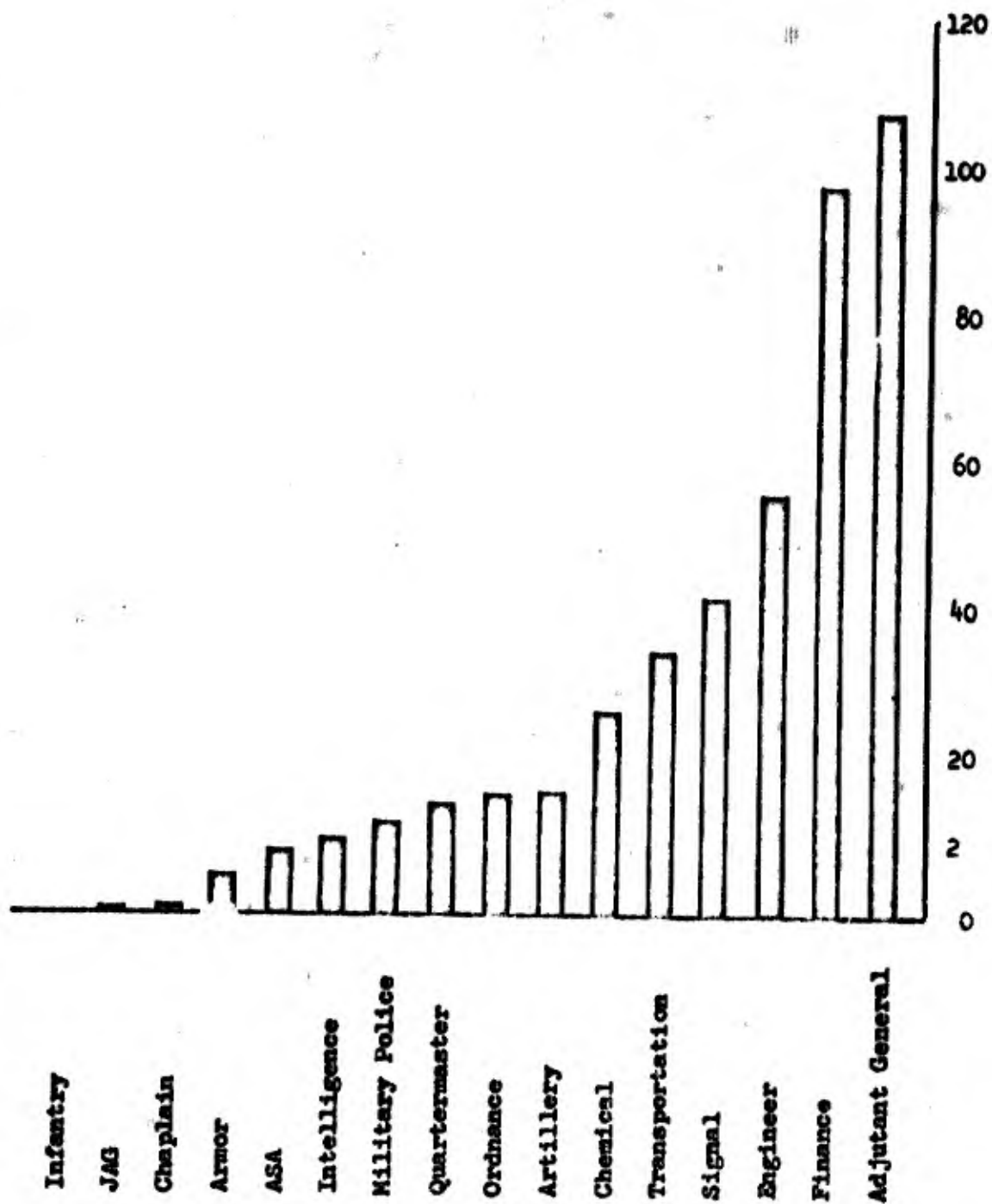


Fig. 9.--Career Course ADP Instruction in Hours<sup>a</sup>

<sup>a</sup>U.S., Department of the Army, Board to Review Army Officer Schools (Haines Board), DA Study (Washington, D.C., February, 1966), p. 459.

TABLE 1  
ARMY SCHOOLS WITH ADP OFFICER COURSES<sup>a</sup>

Course Title	School	Length in Weeks	FY 1966 No. of Classes	FY 1965 Officer Graduates
ADP Systems Analyst Officer	AG	4	6	90
Financial Management Systems-ADP	Finance	3	2	11
Auditing of ADP Systems	Finance	2	7	8
ADPS Plans & Operations Officer	Signal	11	2	55
ADPS for Staff Officers	Signal	3	9	175
Data Collection & Transmission	AMETA	1	3	5
ADP Applications	AMETA	1	12	34
ADP for the Systems Analyst	AMETA	2	8	2
AMC Systems Analyst	AMETA	8	3	1
Data Systems Analysis & Design	AMETA	3	2	19
Data Processing Profitability & Application Studies	AMETA	2½ days	0	2
Computer Installation Management Seminar	AMETA	3½ days	6	7
<b>Total - 12 courses</b>			<b>60</b>	<b>409</b>

<sup>a</sup>U.S., Department of the Army, Board to Review Army Officer Schools (Haines Board), DA Study (Washington, D.C., February, 1966), p. 606.

Other ADP training.--ADP instruction was available to Army officers at numerous other sources, including:

1. Army data processing activities, which schedule "in-house" training programs as required, normally for newly assigned personnel. Occasionally on special request, ADP "road shows" were presented on-site.
2. Other governmental or civilian agencies such as the Civil Service Commission, which offered twenty-two courses and seminars on a recurring basis; the Graduate School of the Department of Agriculture, which taught twenty-five courses; the General Services Administration Institute, which offered two data automation courses; the American Management Association, which conducts thirty-eight ADP workshops and seminars on a periodic basis.
3. ADP computer equipment manufacturers that offer a large variety of short courses without charge, ranging from half-day to eleven-week courses.<sup>1</sup>

### Conclusions

The conclusions reached by this study were most comprehensive and included the background of each problem, a brief discussion thereof, and suggested actions to resolve the situation. Hence, it is felt appropriate to quote these three ADP conclusions in their entirety.

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<sup>1</sup>Ibid., p. 608.

### Army Career Schooling Program.

Branch Career (Advanced) Courses. Despite USCONARC requirements for ADP common subject coverage at this level, some schools provide little or no ADP instruction in these courses. Upon graduation these officers will increasingly be in positions associated with ADP systems. Although the impact of ADPS on branches varies, career development considerations dictate the advisability of providing a foundation in ADP fundamentals at this level. From ten to forty hours of instruction should be provided, depending on branch ADP involvement, with primary emphasis on the effective use and supervision of branch-oriented ADP systems. In those cases where ADP has previously been offered in the basic course, the latest developments should be covered and sequential instruction introduced to provide wider exposure to branch-oriented information instruction and data systems. A progressive ADP elective program should be offered in all branch career courses, the C&GSC, and the AWC.

Command and General Staff College. Current ADP coverage is not considered adequate. With imminent expansion of ADP to the field army and its utilization in command and control and other operational roles, C&GSC graduates will increasingly use the output of information and data systems and influence the design of future automated systems. Approximately thirty hours of instruction, covering ADP hardware, software, systems analysis and tactical applications currently appears warranted. Some of this coverage can be integrated with other subject area instruction.

Army War College. Current ADP coverage is approximately half that considered desirable at this level of schooling. Instruction should include command, control, managerial, and analytical aspects of the major Army ADP systems in operation and under development, overall management of command information and data systems, and evaluation of the state of the art in hardware and software. Some experience in war gaming and simulation techniques might also be appropriate, integrated with other instruction.

### Army ADP Specialist Courses.

General. ADP specialist courses are conducted at four Army schools and at numerous CONUS installations by travelling teams. Because of this dispersion, larger instructional staffs are maintained than would otherwise be required. With the present backlog of training requirements and need for different types of ADP training, the plethora of training sources is probably necessary. However, action should be initiated to concentrate

common-type ADP specialist training at a single Army facility.

**Present Status.** Attendance at ADP specialist courses appears to be handled on a random, non-sequential basis. Courses often overlap and subject variations may be desirable, similarities in course titles are misleading to prospective students. Course content is not always modified promptly to incorporate the latest developments in ADP. Only one of the seventeen courses offered resulted in the award of a MOS. Insufficient attention is given to advanced planning for future systems applications. Training requirements by specialty categories must be developed and students programmed into appropriate courses in sufficient time to meet expanding Army ADP needs. Courses should be modified in both content and titles to eliminate unnecessary overlap, duplication and ambiguity, and to keep pace with growing complexities in ADP techniques and usage. When the ADP MOSs are revised, courses should be structured to provide for award of appropriate MOSs and attendance programmed to follow a logical sequence leading to progressively more responsible positions in the ADP field.

**Guidance.** Today, none of the courses develop well-rounded ADP officers qualified to assume full responsibility in major ADP assignments. The ADP field has tended toward fragmentation of subject matter into short, limited-scope courses. There are some advantages to narrowing courses to fit smaller homogeneous groups and concentrating instruction to meet immediate specialized needs; however, two-day courses are generally uneconomical. For some, the travel and disruption time exceeds course length. Particularly for field grade officers, there will be real advantage to combining complementary subjects into cohesive broader-scope courses. Instruction could then be related and a uniform approach provided for closely interdependent subject matter. Concentration of formal school resources on providing individuals with horizontal skills and knowledge would permit increased use of on-the-job narrower vertical training for lower level technicians. The eleven week ADPS Plans and Operations Officer Course, previously referred to, comes closest to meeting requirements. However, it needs to be lengthened and made more comprehensive to reach this goal. This revised course, not necessarily taught at its present location, could provide the basic in-house source to produce qualified officers for future ADP assignments. The course could be structured to offer standard training for all; or to provide a common block of instruction in ADP fundamentals and, after appropriate division of the student body, to devote the remaining time to the development of specialized ADP skills. The

senior officer orientation courses offered by DODCI are meeting a valid requirement to apprise these officers of the ramifications of ADP and its value at all echelons of the Military Establishment. Until ADP trained graduates of the Army school system enter the senior ranks, the need for attending these courses will continue.

Graduate Civil Schooling. Students selected for ADP graduate schooling in the past have been provided little or no Army guidance. The majority were not apprised of post-schooling utilization assignments and hence did not know which subjects merited special attention. OPO is taking steps to rectify this situation, but a close follow-up is essential. ADP instructor quality and course content vary widely at different universities. No formal evaluation is made on a continuing basis to determine which best meet Army needs. Consideration should be given to concentrating ADP graduate instruction at carefully selected universities whose curricula meet Army requirements.

Other ADP Training. Attendance at non-military source ADP training is normally random and unstructured. The quality of courses and instruction varies considerably; frequently titles are misleading and subjects duplicate material covered in previous training. Although convenient and often used in lieu of Army schools, computer manufacturer courses, especially above the technician level, tend to lose objectivity. While not feasible immediately, the Army should reduce long range dependence upon the majority of these courses by incorporating pertinent subject material into Army in-house courses. Participation in non-military courses should be controlled and periodically evaluated to insure courses meet Army needs.

#### Corollary Problems Affecting ADP Training.

Preparation of Common Instructional Material. Army schools, particularly those teaching ADP specialist courses, have been developing their own ADP programs of instruction and supporting materials or requesting assistance from various sources. This procedure has resulted in uneconomical, inefficient utilization of scarce ADP-trained resources, duplication of effort, and differing subject emphasis in comparably titled courses. Central preparation of all common type ADP training programs and materials under the aegis of a single agency would resolve this problem. Recent assignment of proponentcy for ADP common subject instruction in USCONARC branch school career courses is a step in the right direction. However, further expansion of proponentcy is desirable, both to other course levels and specialist courses, as an additional preliminary step toward

concentration of ADP training as a single facility. In assigning common subject responsibility, specialized aspects of technical operations such as ADP communications equipment repair should be excluded. In other cases where single agency responsibility is not appropriate, close coordination of effort between interested agencies should be encouraged.

**ADP Career Specialization.** The Army ADP field has had difficulty in attracting and retaining qualified officers. Some officers apply for ADP training and, after attaining proficiency, leave the service for lucrative positions with private industry. Others with fine potential are reluctant to apply for fear of being frozen in a narrow specialization field which might, in their opinion, seriously damage their military careers. Thus, continuous training requirements are generated to provide initial qualifications and to replace officers leaving ADP. This dilemma could be partially solved by the establishment of an ADP specialist program under the direction of the Deputy Chief of Staff for Personnel.

**ADP MOS Structure and Training Requirements.** Only one officer MOS has been established for ADP. This single MOS is too broad to identify the various skills and assignments of officers in the ADP field. Because of this deficiency, it is difficult to accurately identify requirements (positions), assets (officers), and qualifications (training). The use of the prefix 9 to identify ADP qualifications in combination with other MOSs is being considered. Early authorization of this prefix will partially alleviate the problem. Restructuring the ADP MOS into several different MOSs (three to six) is also required. These actions, in conjunction with the proposed specialist program, will enhance establishment of valid training requirements and structured schooling for ADP.<sup>1</sup>

### Summary

In the early years of ADP, the Army was too preoccupied with applications, hardware, and software to be concerned with education. But in the 1960's it became apparent that the applications were so basic that management would have to be educated in ADP before sophisticated systems would be developed. Cognizant that the manager had been neglected, the Army

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<sup>1</sup>Ibid., pp. 610-13.

first set about studying the ADP knowledge problem itself.

The very first study conducted was one by the Adjutant General School in 1965. This evaluation actually had as an underlying purpose the goal of wresting control of ADP from the Signal School. Yet the study was so logical in its approach that it provoked several other studies, all of which furthered the cause of ADP education. The AG School study called attention to the fact that up to this point, the MOS 2402 course had been producing an officer technically qualified but ignorant in business or management applications for the computer. It was this type of knowledge that the Army needed in order to gain efficiency with this new tool. It also took note of the inefficiency of offering ADP subjects at so many different schools in an unstructured, almost haphazard manner. Therefore, they proposed that all of this should be pulled together under one roof and concentrate on getting quality courses in ADP rather than conduct a bunch of "quickie" orientations.

The Military Academy became interested in the digital computer in 1960, and by 1962 had a computer center. Sparked by the interests and inventiveness of a disciple of the computer, Lieutenant Colonel William Luebbert, the Academy thought it would be mutually beneficial to bring together the ADP experts of all the Army educational institutions and talk about this new marvel. As part of the seminar each representative presented the thinking of his respective school. These different philosophies proved to be most interesting

even though divergent. Opinion varied widely as to who should instruct the Army officer about ADP and to what extent. It was rather disquieting to learn that several schools, including the largest branch in the Army, the Infantry, felt "no great need" for ADP to be a part of their curricula. Other institutions sidestepped the issue by speculating that the young officer would learn about the computer in college and that those already in the service would receive instruction at the senior service colleges. Of course, such an approach avoids the large body of officers in the middle who need this ADP knowledge now. Two schools made valid proposals on progressive education which would stress fundamentals, management, and practical work at the branch schools and the use of computers and management of data systems at the senior service colleges. The highlight of the seminar was the group discussion phase, where members of the staff and faculty of these schools were brought together in frank discussions, after having heard each other's formal presentations on ADP. What went on in these sessions was not recorded, but their conclusions were. It would appear that the properly grounded minority was able to sway the backward majority, for their findings were a milestone in the progress of computer education. The groups were in accord for:

1. A long-range program of making ADP and management science a regular part of the curriculum at each Army service school.

2. Continued use of the gap-filling courses provided by DODCI, AMETA, and other like facilities.

3. Officers gaining at the branch schools a general knowledge of the capabilities and limitations of automated techniques and knowing how to use the computer as a management tool, including an awareness of the complexities of programming languages and the present status and future trends in military applications of computers.

4. All of the above knowledge being reinforced at the command and staff college, where games and simulation could be added.

Finally, the groups observed the lack of guidance from higher headquarters--Department of Defense, Department of the Army, and United States Continental Army Command--on the minimum essential ADP knowledge required by all officers.

As a direct result of the early 1965 AG Study, USCONARC made an ADP study in late 1965. Their study also incorporated the work of the summer seminar at the Academy. USCONARC was the headquarters that needed to take official cognizance of the ADP education problem and so this study harvests the fruits of the previously mentioned studies. They produced both quantitative and qualitative findings to fill the ADP knowledge gap. They answered the basic question of the AG Study by recommending to the Department of the Army that the teaching of ADP courses should be centralized and that the Adjutant General School should become the proponent for ADPS management and operations training. Next, the minimum

knowledge required by all officers was quantified. They established that the officer should have sufficient grasp of the basic concepts and terminology to:

1. Recognize the potentials and limitations of ADP.
2. Evaluate proposals for its use.
3. Communicate with ADP management.
4. Expand his ADP knowledge when the opportunity or need exists.

They further established the immediate educational task and prescribed the scope of training required in ADP in the twenty-six schools under USCONARC control. The traveling ADP instructional team of the AG School was also endorsed for continued operation for the foreseeable future. Without specific reference to the description of the ADP MOS 2402 found in the Army Regulation, the study reduced the skill and knowledge required of the ADP Plans and Operations Officer to a much more attainable level.

The real professional study on Army officer education, which included a number of pages on ADP, was the 1965 Board to Review Army Officer Schools (the Haines Board). The depth and coverage of this type of study was to be so comprehensive that another such study would not be needed for a decade. The study did much to advance computer education, for it made numerous recommendations to the Army Chief of Staff which embodied the findings of previous ADP studies. The following summarized conclusions of the Board became the Army's approach to ADP education and training as they were acted upon by the Army Chief of Staff:

1. The Army career schooling program must include ADP instruction. This will start at the branch career course, and the schools were admonished not to give lip service to the scope of instruction provided them by USCONARC, but to teach from ten to forty hours as a minimum. The command and staff college ADP coverage was deemed to be inadequate, and they were enjoined to go to thirty hours to include hardware, software, systems analysis, and tactical applications. The war college also needed to double its ADP instruction and stress command, control, managerial, and analytical aspects of ADP. War gaming and simulation could be integrated with other instruction.

2. The present proliferation of ADP specialist courses was condemned and the single school approach by the AG School was heartily endorsed. They encouraged the development of the well-rounded ADP officer qualified in management and control of ADPS. The ADP MOS course was to be revamped by lengthening and making it more comprehensive. They also encouraged the continuation of the Defense Computer Institute as a means of schooling top management in ADP.

3. They encouraged a more deliberate approach to ADP graduate schooling. This would include not only more guidance to the student as to curriculum and proposed utilization tours, but the careful selection of universities to be sure the curricula meet Army requirements.

4. Prompted by the success of other Army officer specialist programs, the Board suggested such a career

program be established for ADP. This would encourage officers to stay in ADP and provide a growing pool of ADP talent for the Army's increasing ADP requirements.

5. Finally, the Board recognized the serious classification problem in the ADP MOS. With only one such MOS for officers, they suggested that the MOS be restructured and a number of different MOSs be created, so that valid training requirements could be established and schooling in ADP could be structured.

## CHAPTER IV

### THE CURRENT STATUS OF OFFICER EDUCATION IN ADP

#### Introduction

As a result of the studies and reports discussed in the preceding chapter, certain aspects of the problem become firmly defined. What follows now are some considerations as to the role of the Army officer in connection with the computer so that the question of the amount or degree of education required by him can be resolved. These considerations will be a synthesizing of the findings of the various studies and reports, coupled with interviews and other research.

#### The Role of the Officer

All Army officers today are associated directly or indirectly with ADP by providing or receiving information processed by this equipment. Some reach decisions or take actions based on analysis of ADP systems outputs; others develop policies or procedures which alter automatic data processing systems significantly. Expansion of data processing applications into every facet of Army operations necessitates a broad approach to the education of Army officers in the management and use of computers. The effective use of Army ADP capabilities in the future will require some degree of ADP knowledge or skill of most military personnel.

Datamation made this point rather succinctly when it pointed out that the period between 1965 and 1966 was a period of massive conversion jobs.<sup>1</sup> Now the emphasis is on new systems design, which means that there is a need for fewer but more talented and experienced personnel associated with computers.

Yet, regardless of rank or years of service, there are three generally recognized types of ADP education required for Army Officers: basic ADP knowledge, branch-oriented ADP knowledge, and ADP specialist knowledge and skills.

#### Basic ADP knowledge

All officers need a basic understanding of what the computer is and what it can and cannot do. This knowledge must be updated periodically. At the very minimum an officer must have sufficient understanding of the fundamental concepts of ADP to:

1. Recognize the potential applications and limitations.
2. Evaluate proposals for its use.
3. Communicate with ADP managers.
4. Expand his ADP knowledge when the opportunity or need exists.<sup>2</sup>

#### Branch-oriented ADP knowledge

There is a need for officers to have a knowledge of the ADP applications incorporated in the functions of his own branch. This must be in addition to the basic ADP knowledge

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<sup>1</sup>"News Briefs," Datamation, December, 1967, p. 73.

<sup>2</sup>U.S., Department of the Army, Training for Army Automatic Data Processing, p. B-1.

he has acquired, although it may be obtained during the same period of schooling or even incorporated in the same ADP course. The branch subject matter must be related to future assignments within the branch. This necessitates a unique approach at each of the branch schools, which in turn is an obstacle to a unified program throughout the Army school system. The general scope of this branch ADP knowledge can be defined as follows:

(1) The branch officer must understand the mechanics of ADP as used in branch functions to the extent of being able to analyze and approve operating procedures, and review and approve ADP output documents for both internal and external reporting.

(2) He must be sufficiently knowledgeable of the ADP processes to initiate actions to prevent degradation and to increase or maintain effectiveness of branch functions.

(3) He should understand such details as how input/output coding is accomplished and how data fields can be manipulated to produce branch functional intelligence.

(4) He must know how to interpret the products of ADP.<sup>1</sup>

#### ADP specialist knowledge

Officer ADP specialist training currently involves only one Military Occupational Specialty--MOS 2402. The following is a summary of the skills imparted by the MOS-producing course and of the duties required in the MOS 2402 ADPS Plans and Operations Officer (see Appendix A):

a. Directs or participates in studies to determine feasibility of processing data on stored program electronic computers.

b. Selects or assists in selection of specific computers, considering type data to be processed, existing systems and methods for processing data, and comparative

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<sup>1</sup>U.S., Department of the Army, Requirements for Department of the Army ADP/Supply Spaces and Personnel (Mattingly Study), p. 52.

- costs of existing and proposed data processing systems.
- c. Prepares plans for, and directs system analysis to determine and define type data to be processed by computer selected for installation.
  - d. Coordinates and consults with representatives of manufacturers and governmental agencies on design, development, and organization of ADPS.
  - e. Recommends changes and modifications to ADP equipment to improve operations and meet data reporting requirements.
  - f. Directs installation and implementation of ADPS.
  - g. Directs establishment of detailed instructional programs for processing raw data into completed reporting requirements.
  - h. Directs conduct of debugging tests to determine validity of programs processed by the system.
  - i. Designs formats for records and reports, maintains performance charts, and establishes work flow controls.
  - j. Inspects and evaluates operations of ADPS and coordinates ADPS activities.
  - k. Must have extensive knowledge of electrical and electronic data processing equipment.
  - l. Must have thorough knowledge of techniques and procedures required for programming for stored program electronic computers.<sup>1</sup>

#### Staff officer knowledge

It is suggested that there may be a fourth category of officers requiring ADP education, and this individual's level of education would be located between the knowledge required for the branch oriented officer and the ADP specialist. This officer, by virtue of his rank and experience, would be serving as a staff officer in any one of the many levels of the Army's staffs. He is called a general staff officer, and it would have to be assumed that he already possessed the basic and branch knowledge mentioned previously. So the question to be resolved is, how much of the specialist's

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<sup>1</sup>U.S., Department of the Army, Manual of Commissioned Officer Occupational Specialties, Army Regulation No. 611-101 (Washington: U.S. Government Printing Office, January 25, 1966), p. 80.

knowledge must he acquire? In general terms, he would have to feel comfortable about:

1. Participating in feasibility studies.
2. Coordinating and consulting with representatives and other Government agencies on design, development and organization of ADPS.
3. Managing a data processing organization or staff, if required.
4. Preparing instructions on the processing of raw data into reports required.
5. Formatting of reports, records and other material for output presentation.
6. Evaluating the operations of an ADP system.
7. Understanding programming, in general terms, in several languages.

#### The roles defined

Accordingly, the role of the officer--the Army's manager--in ADP can be grouped into four categories. First, the young officer beginning his career will (hopefully) have some knowledge of computers from his college education (the U.S. Military Academy or ROTC universities). For the most part he will not be associated with ADP directly. However, he could be assigned to post level ADP activities, work in a large computer installation, or serve as a staff officer with some minor ADP function. On this account, he would need the knowledge listed as "basic ADP knowledge" as a minimum.

Next, with several years of service and probably in the grade of captain, the officer is more than likely to be working in his branch specialty field. There his role is certainly one of staff officer, or perhaps he is a commander needing the output of some information and data system. In this instance the applications unique to his branch have been made a part of his understanding via the "branch-oriented

knowledge" gained at his branch service school. Again, his role may cause him to be more deeply involved than his particular level of education has prepared him. In this case, he may be bolstered by special ADP courses, self-study, or graduate work.

The ADP specialist is the third category, and certainly the least debated as to how much knowledge should be possessed. He is the expert, the acme of officer education in ADP. His talent demands that he be placed in data processing operations on almost a full-time basis. His duties would fall into three broad categories: data processing installation operations, systems design, and overall ADP management. In rank and experience he could range in grade from lieutenant to brigadier general. He would be what is called MOS qualified--in this case, MOS 2402.

The fourth category, suggested by the researcher, is perhaps the focal point of the ADP officer education problem today. He is the typical field grade officer (major through colonel) who is already beyond the basic, branch, and C&GSC courses. He has missed out on the formal, classroom ADP education now a part of the Army schools system. Yet he needs education to open his eyes to the larger potentials of ADP, so he may perceive potential improvements in the systems with which he is now associated, and thus be able to work effectively with systems developers. This officer may not presently be associated in any direct way with a data processing system; nevertheless, he should be educated to recognize

new potentials for his activities and communicate his interests to the data processing professionals.<sup>1</sup> While the Army manager may have a reasonable appreciation of hardware, the equivalent appreciation of procedural aspects of the automated system is even more important. As a result of systems design, the manager will be exposed to systems logic charts which contain a wealth of distilled knowledge about how his organization or a functional area therein really operates. In short, as this officer becomes more familiar with the systems, he will have less tendency to establish unreasonable requirements and the system will be geared to respond to his true requirements.<sup>2</sup>

With the knowledge required and the different roles of the Army officer in ADP having been portrayed, it is time now to present the action resultant from the studies reviewed in Chapter III. These actions have resulted in today's approach to ADP education.

#### Decisions on the Approach to Education

The increasing officer involvement in ADPS makes it essential that all officers receive ADP orientation, with length of instruction and depth of coverage related to individual branch usage and anticipated subsequent assignments. Practical "hand-on" instruction, selectively initiated and

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<sup>1</sup>Schwartz, "Training and Education in Electronic Data Processing," p. 2.

<sup>2</sup>Address delivered by Major General J. E. Landrum, AIDS, OCSA, Department of the Army, at the DODCI Senior Executive Course, Washington, D.C., September, 1965.

structured sequentially to insure progressive development, should be an integral part of officer career schooling.<sup>1</sup> The Army Chief of Staff took action on the Haines Board recommendations to implement this philosophy of education. The following then became the current approach to education in ADP.

#### Basic level education

It must be recognized that in certain functional areas, junior officers may expect ADP-associated assignments prior to the time they attend advanced level courses. This must be determined, however, by each individual branch school. In such cases, some general orientation must be provided at the basic course level in order to provide the necessary foundation for the branch-oriented ADP instruction required. This instruction need not cover a great amount of detail but should be tailored to meet the minimum requirements of the branch which could be up to forty hours. In the case of the AG, Finance, Signal, and Women's Army Corps Schools, twenty to forty hours of instruction are recommended.<sup>2</sup> On this basis, it should be treated as an integral part of the branch-oriented ADP instruction.

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<sup>1</sup>U.S., Department of the Army, Board to Review Army Officer Schools (Haines Board), p. 614.

<sup>2</sup>U.S., Department of the Army, Memorandum from OCSA, Subject, "Report of the Department of the Army Board to Review Army Officer Schools," Washington, D.C., July 6, 1967, p. 35.

### Branch-oriented level education

In response to the findings of various studies and Department of the Army guidance, USCONARC instituted a program which will provide an opportunity for career officers to acquire this level of knowledge. The initial step directed that instruction in ADP be added to the advanced course curriculum. The specific number of hours may vary between ten to forty, depending on branch ADP involvement, but the scope of the instruction will include:

Fundamentals and elements of an ADPS, to provide a general knowledge of the characteristic components of an ADPS; the techniques and procedures of assembly language computer programming to include COBOL; the doctrine, objectives and command considerations of the Army's procedures for acquisition and planning of ADPS; the present applications and plans for future ADP systems including command control.<sup>1</sup>

In execution, it is envisioned that the branch ADP subject matter would be integrated with other branch subjects so that all of the branch systems might be taught as a unit. Computerized simulations, as a teaching device, would be extremely useful here.

### Responsibility for ADP

Before going on to the next level of education, it is necessary to insert a comment about the assignment of school responsibility for ADP training within the Army. As mentioned in Chapter III, the Army's Adjutant General School, for reasons of economy, improved coordination and efficiency

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<sup>1</sup>U.S., Department of the Army, USCONARC Training Directive, Annex Q, p. 1.

in training, reduction of duplication, and greater flexibility, recommended that all specialist ADP training be centralized at their school, and, further, that the AG School be responsible for ADP management and operations training and related activities. This request was approved by the Department of the Army in late 1965. In so doing, the USAAGS became responsible for:

- (1) Formal courses of instruction to meet all ADP qualitative training requirements.
- (2) Development and review of ADP instructional material for all branch career courses.
- (3) Monitoring current MOSs in ADP for necessary revisions, deletions, and additions.
- (4) Assisting other schools develop in-house ADP instructional ability, to include the use of traveling instructional teams within their capability.<sup>1</sup>

The centralizing of these specialist courses, which were previously conducted at four different schools and at numerous installations by traveling teams, was another recommendation of the Haines Board which has met with approval. This would mean that the larger instructional staff could be reduced and the overall resource of talented instructors centralized.<sup>2</sup>

#### ADP specialist level education

With the amalgamation of ADP specialist training at the AG School, the ADP student officer could then receive a concentrated week program with a shift of emphasis toward business data processing systems planning and operations.

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<sup>1</sup>U.S., Department of the Army, Letter from Headquarters, DA to USAAGS, Subject: "Proponency for ADPS Management and Operations Training," Washington, D.C., December 28, 1965.

<sup>2</sup>U.S., Department of the Army, Board to Review Army Officer Schools, p. 614.

This MOS-producing course is designed to create officers qualified to manage, operate, and design ADP systems throughout the Army. The diversity of ADP equipment and applications in the Army, however, generates a major problem in determining course content which can be given within the time available for teaching. At present, the only solution which is feasible is to provide a thorough technical grounding and depend on on-the-job training for specific applications. A related problem is that of providing the specialist with sufficient knowledge of the Army function which his particular ADP function is to serve. Again, experience on the job appears to be the most feasible solution.<sup>1</sup>

#### Staff officer level education

The range of training and education for this group is clearly quite broad. The student body encompasses the ADP professionals, the present user of ADP systems, the prospective or potential users of ADP, and high ranking officers. In subsequent paragraphs, the different educational opportunities will be explored. Some sources of education will be sufficient to handle this educational task independently. However, others will only be of sufficient duration to whet the appetite and will hopefully cause the officer to partake in some self-study ADP education.

Graduate civil schooling.--Each year the Army Educational Requirements Board meets to recommend the validation

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<sup>1</sup>Letter from Major William A. Fickett, Data Processing Department, USAAGS, Fort Benjamin Harrison, Indiana, August 22, 1967.

of certain position requirements for military personnel with graduate level education. It is appropriate at this point to clarify that there is a distinction between ADP--Business and ADP--Engineering. As a matter of identification, the AERB establishes a three-digit training area code for each special field of education. The first digit is the major area of designation, i.e., all 300 numbers are Business and all 400 numbers are in the field of Engineering. Thus, the two codes for ADP--one in Business, 324, and the other in Engineering, 451. Based on these positions that are annually validated by the AERB, officers are selected to attend universities and, in the case of ADP--Business, earn Master of Business Administration degrees with a specialty in ADPS. Although the Civil Schools Program dates to the National Defense Act of June 1920, it was not until 1965 that ADP--Business became a part of the authorized major subject fields.<sup>1</sup> In that year the Board approved thirty-seven positions for graduate training in ADP.<sup>2</sup> The growth of computer usage in the Army is reflected by the authorization of seventy-seven positions in 1966.<sup>3</sup> The 1967 Board has

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<sup>1</sup>U.S., Department of the Army, Military Personnel Requirements for Graduate Level Education, Army Regulation No. 621-108 (Washington: U.S. Government Printing Office, December, 1965), p. 1.

<sup>2</sup>U.S., Department of the Army, Army Educational Requirements Board Proceedings (OPO) (Washington, D.C., December 20, 1965), p. 36.

<sup>3</sup>U.S., Department of the Army, Army Educational Requirements Board Proceedings (OPO) (Washington, D.C., October 17, 1966), p. 36.

just recommended that 176 positions be authorized for this level of training.<sup>1</sup>

This schooling is not intended to produce an ADP specialist in the sense of MOS proficiency. Yet, it will create within the officer a depth of knowledge in the total field of computer technology with emphasis on data and information rather than hardware. It is fairly well accepted that this training will produce an officer who fulfills all the requirements of an ADP staff officer. After six months on the job his ability will approach the skill level of the ADP specialist.<sup>2</sup> However, it is intended that this Master of Business Administration graduate will work at the executive or upper management level and not be expected to possess the detailed knowledge of the specialist.

In connection with the Civil Schools Program, the Haines Board made this observation: "Students selected for ADP graduate schooling were provided little guidance at the university as to the curriculum they were to follow and how it related to Army needs."<sup>3</sup> This lack of rapport between the Army and the universities participating in the program was caused by the fact that fourteen universities were being used with wide variances in curricula. Consequently, a formal

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<sup>1</sup>U.S., Department of the Army, Army Educational Requirements Board Proceedings (OPO) (Washington, D.C., October 13, 1967), p. 55.

<sup>2</sup>Interview with Major General K. G. Wickham, The Adjutant General, Department of the Army, Washington, D.C., September 19, 1967.

<sup>3</sup>U.S., Department of the Army, Board to Review Army Officer Schools, p. 612.

evaluation was initiated to determine what type of curriculum best met the Army's needs.<sup>1</sup> The study recognized that the future requirement for business-oriented ADP officers will be for those who are well grounded in management information needs, as well as being well versed in the area of management science. In other words, the Army wanted a curriculum that was evenly divided between business and ADP subjects. For this purpose the Army selected schools with good faculties and facilities, and also with sufficient flexibility in their present graduate degree program to meet the Army's particular need. In August 1967, five universities were selected that best meet the Army's requirements. Those selected include: The George Washington University, University of Georgia, Texas Technological College, University of Pennsylvania, and the United States Naval Postgraduate School.<sup>2</sup> A similar study prepared for the Marine Corps in 1966 examined the computer and information sciences field as included in the curricula of fifty colleges and universities.<sup>3</sup> This study concluded that sixteen schools satisfied their criteria. Among them were The George Washington University, United States Naval

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<sup>1</sup>U.S., Department of the Army, OPO Study, Subject: "ADP Advanced Civil Schooling," Washington, D.C., December 16, 1966.

<sup>2</sup>Texas Technological College and the U.S. Naval Postgraduate School were selected for ADP--Engineering students. Interview with Lieutenant Colonel John W. Swaren, Civil Schools Branch, OPO, Department of the Army, September 21, 1967.

<sup>3</sup>U.S., Department of the Navy, "Analysis of Computer Curricula in American Colleges and Universities," prepared by Bruce J. Arrett and Bruce N. Hahn (Washington, D.C.: Headquarters U.S. Marine Corps, August, 1966).

Postgraduate School, and the University of Pennsylvania. These findings tend to corroborate the conclusions reached in the Army study, concluding that a program thus conceived, which concentrates on a limited number of selected universities closely monitored by the Department of the Army, will produce ADP graduates in the future which are more grounded in computer technology and better prepared to fulfill the Army's requirements for ADP managers.

ADP elective program.--Not every Army officer can go to graduate school; in fact, the Secretary of the Army is restrained by law to keep the number below 8 percent of the authorized Regular Army officer strength.<sup>1</sup> Therefore, to further enhance the officer education program in ADP, USCONARC started a program in the branch schools to make available additional ADP instruction to be taken on a voluntary basis.<sup>2</sup> ADP is just one of ten such electives in the Communicative Arts Elective Program. The student officer must select at least one of these electives. This represents a new approach in presenting course subject matter and requires some re-appraisal of school instruction in order to fit in the electives properly. For approximately five years the branch advanced school and the Command and General Staff College courses will offer the same types of common electives. At the

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<sup>1</sup>U.S. Code, Title 10 (Armed Forces), Sec. 4301, August 10, 1956.

<sup>2</sup>Interview with Lieutenant Colonel King J. Coffman, Civil Schools Branch, OPO, Department of the Army, Washington, D.C., May 6, 1967.

end of that period, it is anticipated that those officers in the normal career pattern will have received their ADP knowledge base, and the C&GSC course can then shift to a progressive-type presentation pertinent to a higher career level.<sup>1</sup> If the pilot progressive elective program in Communicative Arts proves to be successful, C&GSC would be the proponent agency for approximately 100 hours of instruction at each of the upper three levels of career schooling, as follows: advanced courses would concentrate on computer programming, C&GSC would concentrate on ADP systems analysis, and the Army War College would emphasize advanced ADP systems analysis.<sup>2</sup> This progressive instruction philosophy reflects the findings of the Haines Board.<sup>3</sup>

There are two versions of the initial ADP common elective course as prepared by the ADP proponent, USAAGS, in close coordination with the Signal School (formerly the ADP MOS-producing facility).<sup>4</sup> Packet A has forty hours of lesson material in five segments; Packet B contains eighty-five hours of lesson material in eleven segments. USCONARC suggests that the schools use as much of this material as they individually require to meet their elective needs. The major difference

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<sup>1</sup>U.S., Department of the Army, Letter from USCONARC, Subject: "Officer Advanced Course," Fort Monroe, Va., November 10, 1966.

<sup>2</sup>Memorandum, "Report of the DA Board to Review Army Officer Schools," p. 35.

<sup>3</sup>U.S., Department of the Army, Board to Review Army Officer Schools, pp. 614-15.

<sup>4</sup>Letter from Major Norman E. Archibald, ADPS Branch, USASCS, Fort Monmouth, N.J., September 19, 1967.

between the two packets is the depth to which the subject is treated.<sup>1</sup> Appendix B contains a brief summary of the contents of each packet.

Orientation teams.--One of the more significant activities effective in reducing the ADP knowledge gap is the use of orientation teams. At present, there are three USCONARC ADP Orientation Teams which visit Army installations on request, both in the United States and overseas. These teams are similarly organized to provide lecture and demonstration-type material, using a variety of teaching aids, including transportable computers and closed circuit television. The course is designed as an orientation for Army senior officer and civilian personnel and is offered for five- or ten-day periods as desired. It is comparable to those conducted by the DOD Computer Institute.<sup>2</sup>

Other ADP training.--ADP instruction is available to Army officers at numerous other sources. Army data processing installations schedule in-house training programs as required normally for newly assigned personnel. Other Governmental or civilian agencies provide instruction, such as the Civil Service Commission, which currently offers twenty-two courses and seminars on a recurring basis; the Graduate School of the Department of Agriculture, which teaches twenty-five courses;

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<sup>1</sup>U.S., Department of the Army, Letter from USAAGS, Subject: "Material to Support Advanced Course Elective Program," Fort Benjamin Harrison, Indiana, December 27, 1967.

<sup>2</sup>Letter from William A. Fickett, Data Processing Department, USAAGS, Fort Benjamin Harrison, Indiana, November 21, 1967.

the General Services Administration Institute, which offers two data automation courses; the American Management Association, which conducts thirty-eight workshops and seminars on a periodic basis. ADP computer equipment manufacturers also give a large variety of short courses without charge, ranging in time from one-half day to eleven weeks.

A variety of higher level management-type courses incorporating ADP are offered by such agencies as the United States Army Logistics Management Center, United States Army Management Engineering Training Agency, Armed Forces Staff College, DOD Computer Institute, and the United States Army War College.<sup>1</sup>

#### Recent Actions Affecting ADP Education

Because of the very size and the transient nature of the officer corps, not to mention the personnel implications relevant to the war in Vietnam, the ADP officer education gap is not susceptible to easy resolution. As was alluded to previously, it is not possible to halt everyone and give him a quick dose of ADP knowledge.

This chapter, for the most part, is concerned with the current approach to dealing with the education side of the problem, but there is naturally more to it than that. Concern must also be given to these people who will receive this education, and to their motives in becoming a part of the computer revolution. It is for this reason that steps

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<sup>1</sup>U.S., Department of the Army, ADP Training for Military and Civilian Personnel, DA Technical Bulletin No. 18-8 (Washington: U.S. Government Printing Office, September, 1967).

have recently been taken to formalize the structure of the ADP field in the Army. As was the case in the section concerning the role of the officer and his education, no one element closes the gap. However, in bringing all of these actions together into a program, it is quite possible to overcome the problem and even gain some synergistic effect.

These steps are in some cases tied to one another, but in most instances they are not specifically related. What follows, then, will be a non-sequential presentation of Department of the Army actions noted in the last dozen or so months, which deal with the ADP problem.

#### The ADP officer program

The Army has had difficulty in attracting and retaining qualified ADP officers. Some officers apply for ADP training, only to leave the service after attaining proficiency for lucrative business positions. Others with fine potential are reluctant to apply for fear of being frozen in a narrow specialization field which, in their opinion, seriously damages their military careers. This dilemma was partially solved by the establishment of an ADP specialist program in November 1966 as an outgrowth of one of the findings of the Haines Board.<sup>1</sup> It became the twelfth such voluntary special career program for Army officers.<sup>2</sup> The objective of the

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<sup>1</sup>U.S., Department of the Army, Board to Review Army Officer Schools, p. 615.

<sup>2</sup>Briefing delivered by Colonel Jay Thomas, Director ADP, COA, Department of the Army for Assistant Secretary of the Army (Financial Management) the Honorable Eugene M. Becker, Washington, D.C., June 22, 1967.

program is to identify and develop commissioned officers of proven ability for assignment to ADP positions within the Department of the Army and the Department of Defense. This program should provide a measure of long-range relief in the officer personnel area. It provides, by means of alerting assignments, opportunities for officers to maintain their branch qualification (without which promotion is improbable) while they are at the same time specializing in the ADP field.<sup>1</sup> There are eight prerequisites for membership in this program, but the significant criteria to mention here is the one concerning educational background. To be eligible the officer must:

Have a baccalaureate or higher degree. The degree preferable should be in such fields as: Automatic Data Processing, Information Sciences, Engineering (ADPS), Mathematics, or Business Administration (ADPS). However, possession of any baccalaureate degree is qualifying if the officer has received equivalent military experience.<sup>2</sup>

The program has been well received, as is evidenced by the growing number of officers who were accepted throughout 1967 (see Table 2). With this type of growth, one might question when it will level off. When compared with similar specialist programs and their growth patterns, no plateau is in sight.<sup>3</sup> It is probable that ultimately there will be 900

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<sup>1</sup>Briefing delivered by Lieutenant Colonel Joel E. Stone, ADP Br., COA, Department of the Army at the Army Educational Requirements Board, Washington, D.C., September 13, 1967.

<sup>2</sup>U.S., Department of the Army, Automatic Data Processing Program, pp. 3-4.

<sup>3</sup>Interview with Lieutenant Colonel William H. Crane, Specialist Programs, OPO, Department of the Army, Washington, D.C., August 8, 1967.

TABLE 2  
GROWTH OF THE OFFICER ADP PROGRAM IN 1967<sup>a</sup>

Month	Cumulative Number Accepted
January	3
February	15
March	45
April	68
May	100
June	120
July	142
August	152
September	165
October	177
November	189
December	195

<sup>a</sup>Interview with Lieutenant Colonel William H. Crane, Specialist Branch, OPO, Department of the Army, Washington, D.C., December 29, 1967.

participants in the program.<sup>1</sup>

An integral part of the specialist program is the practice of identifying key ADP positions throughout the Army. Once the guidelines of this program were established, major commanders were encouraged to recommend designation of key ADP positions within their organizations that required the talents of the ADP experts.<sup>2</sup> To be a key position, the incumbent would have to fit one of the following criteria:

(1) Commands an ADP installation servicing a large post, field army or major command; or directs a planning staff in a similar situation.

(2) Is in a position involved in a high degree of individual responsibility and authority at the ADP policy making level.

(3) Is in a position so critical to the ADP mission that improper accomplishment of his duties would jeopardize the mission.<sup>3</sup>

In the first annual review of the suggested key positions, 303 positions were approved and designated key ADP positions.<sup>4</sup> The data that this list provides will make possible the accurate and timely determination of total Army-wide requirements for ADP managers. It will also serve as a guide to recruiting efforts for the ADP program, and

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<sup>1</sup>Address delivered by Colonel Felix Kampschroer, ADP Mgt Div, COA, Department of the Army, at the 1967 Computer Summer Workshop, West Point, N.Y., August 1, 1967.

<sup>2</sup>U.S., Department of the Army, Officer Specialist Career Program Position Report, Army Regulation No. 616-115 (Washington: U.S. Government Printing Office, June, 1967), p. 1.

<sup>3</sup>U.S., Department of the Army, Letter from HQs DA, Subject: "Key ADP Positions," Washington, D.C., June 1, 1967.

<sup>4</sup>Interview with Ralph M. Seay, ADP, COA, Department of the Army, Washington, D.C., September 14, 1967.

to personnel officers concerned with the filling of the individual positions. Further, it will provide a measure of the effectiveness of the ADP program by showing whether or not program members are actually filling key positions.

Officer qualification  
prefix 9

In the business world, the consistency of information about ADP personnel suffers from the proliferation of titles used to describe them. No doubt, efforts to provide training for people in the business world, and the recruiting of qualified personnel, suffer from a lack of uniform descriptions of ADP jobs.<sup>1</sup> The Army, until 1966, had just the opposite problem--only one title or Military Occupational Specialty (MOS) code existed for officers performing ADP work.<sup>2</sup> ADP requirements of Army positions and the qualifications of officers to fill them were identified by this single MOS.

Some relief from this problem was gained when the concept of adding a prefix--in this instance, the number 9--to the MOS structure was initiated. The current MOS for ADPS Plans and Operations Officer (MOS 2402) was provided for classification of positions and personnel involved solely in

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<sup>1</sup>Dick H. Brandon, "Jobs and Careers in Data Processing," Computers and Automation, September, 1966, pp.24-28.

<sup>2</sup>U.S., Department of the Army, Manual of Commissioned Officer Military Occupational Specialties, Army Regulation No. 611-101 (Washington: U.S. Government Printing Office, January, 1966), p. 4.

ADP as a full-time duty. The progressively increasing use of ADP, however, has generated positions that require personnel who are qualified in both ADP and a separate non-ADP type skill. When the dual qualification is required in all positions that comprise a particular MOS, it can be identified by that MOS. An example of such an MOS is Supply Management Officer (MOS 4201), which requires knowledge of ADP as well as of supply management. Conversely, when the dual qualification is required in only some of the positions which comprise a particular MOS, it cannot be identified by that MOS alone since the latter must also identify other positions that do not require ADP qualification. Among the positions involved the extent of ADP qualification tends to vary, ranging from a general familiarity in some to comparatively advanced knowledge in others. For the present and immediate future, a prefix digit used with the basic four-digit MOS will provide the necessary skill identification under the conditions indicated. Initially, however, the digit was defined as broadly as possible to insure identification of a maximum number of positions, and to facilitate later redefinition or provision of such additional identification of ADP skill as may be required, such as an expansion of the present single ADP MOS into several different ADP MOSs.

In order for a position to be established as a prefix 9, it must meet the following criteria:

Prefix 9--Automatic Data Processing is provided for classification of positions which require assignment of personnel qualified to supervise, plan, assist, or

otherwise participate in feasibility determination, initial application, and continuing employment of automatic data processing in any function or activity.<sup>1</sup>

On the other side of the ledger, for an officer to qualify for a prefix 9, he must fulfill these prerequisites:

Prefix 9 will be awarded to officers who have satisfactorily completed 6 months experience in a position requiring the ability to plan for, analyze, and design program input for ADPS, and the capacity to manage or administer ADP and who are serving in an MOS that does not require ADPS qualification. Holders of bachelor's degree or higher, who specialize in ADP (Code 324, AR 621-108) [the code number established by the Army Educational Requirements Review Board] qualify for the award for the prefix regardless of the amount of experience.<sup>2</sup>

It should be noted that these two descriptions convey that the knowledge about ADP necessary for the prefix 9 is certainly not as detailed as that associated with the MOS 2402 (refer to Appendix A).

There is no limitation on the MOS to which the prefix may be added other than to exclude those MOSs, such as ADPS Plans and Operations Officer (MOS 2402), Supply Management Officer (MOS 4201), and Electronics Engineer (MOS 7601), which require ADP qualification in all positions classified in that MOS. All other MOSs are open to the addition of prefix 9, depending upon the requirements of the specific position or the qualifications of the officers holding the MOS.

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<sup>1</sup>Ibid., p. 5.

<sup>2</sup>U.S., Department of the Army, Officer Qualification and Classification, Army Regulation No. 611-103 (Washington: U.S. Government Printing Office, July, 1967), p. 4.

All positions coded as 324 under AR 621-108 and certified by the Army Educational Requirements Board as requiring graduate level training will have prefix 9 added to the assigned MOS code unless the MOS description includes an ADP qualification requirement (i.e., MOSs 2402, 4201, or 7601).<sup>1</sup>

Once the directives on a program such as this are published, the execution takes place on a decentralized basis. By action on the part of the individual officer, the unit personnel officer, or the commander--an officer who meets the aforementioned qualification--is officially awarded the prefix. Likewise, the commander will make periodic evaluation of his organization as reflected in his Table of Organization and Equipment (TOE) or Table of Distribution Authorization (TDA) and have certain changes effected, such as the addition of prefix 9 to certain of his units' duty positions. Since an officer's individual record (DA Form 66) is changed by a single local level entry and the TOE or TDA is changed only with Department of the Army approval, it is understandable that the number of duty positions with prefix 9 will always lag behind the number of officers who possess the prefix 9. Additionally, due to alternating assignments, attendance at schools, and other needs of the Service, the Army always needs more than one officer for each skill position in the Army.

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<sup>1</sup>U.S., Department of the Army, Implementation of Change 13, AR 611-101, Army Circular No. 611-3 (Washington: U.S. Government Printing Office, February, 1966), pp. 1-2.

The growth of the prefix 9 concept is seen in Figure 10. It will be noted that within six months (June 1966) after the establishment of the classification, a number of officers had been awarded the prefix (the upper line), and that some commanders had taken fast action and even received approval to add the prefix to some of their organizational positions (the lower line). Projection of these lines has not been attempted due to the limited reporting period of the prefix program; however, it appears that both talent and requirements will double in the next like period, or by December 1968.

The rapid acceptance of this program can also be seen in the Key ADP Positions program. For example, 53 of the 303 positions mentioned previously as key positions carry the prefix 9. Conversely, the remainder are not all MOS 2402, for it is noted that there are only 175 of these positions on the list requiring this top level ADP knowledge, and less than a dozen are the MOSs which have ADP skill as part of the MOS qualification.<sup>1</sup> However, this does not mean that only 175 MOS 2402 officers are needed in the Army. The figure 175 represents only the key officials who need this skill. More on this subject follows.

Automatic data processing  
MOS structure

This illustration of key positions highlights the ADP officers' MOS problem, for if the position is neither

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<sup>1</sup>U.S., Department of the Army, Army Information and Data Systems, Army Technical Bulletin No. 18-10 (Washington: U.S. Government Printing Office, June, 1966), pp. 12-13.

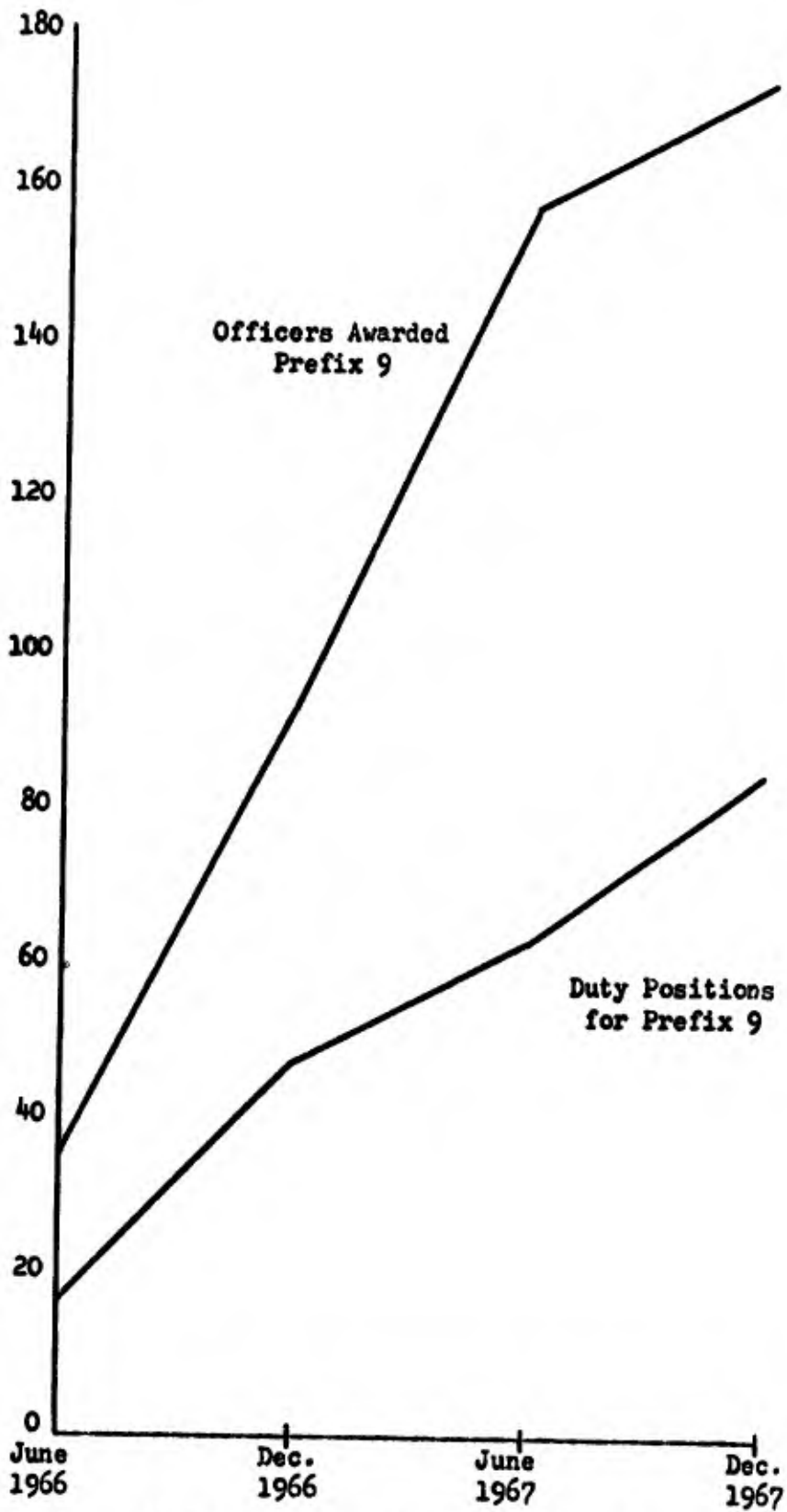


Fig. 10.--Growth in the Prefix 9 Program<sup>a</sup>

<sup>a</sup>U.S., Department of the Army, Commissioned and Warrant Officer Tabulation within MOS by Control/Monitor Branch (Short Title: DCSPMR-62), (Washington, D.C., June, 1966-December, 1967). (Computer printout by U.S.A. Data Support Command.)

prefix 9 nor MOS 2402, yet declared to be a key ADP position, how is the required talent or skill indicated?

A military occupational specialty is provided to identify the skill requirements of duty positions and to identify personnel who possess corresponding skills. As such, the MOS serves as an objective for occupational training and as a means of effecting assignment of personnel who possess the qualifications that the respective positions require. Accordingly, the key to determining the adequacy of an existing MOS, or the need for a new one, is the duty position and the skills that it requires. The duty position, in turn, is similarly reflective of the organization in which it is authorized, and the mission of that organization.

The only ADP MOS in existence describes the officer who has reached the acme of knowledge in computer technology (see Appendix A). But what of the officer who has not yet reached this high plateau? Lacking the requisite experience or knowledge, does he become lost to the Army as an ADP resource because he falls short of the qualities of a true 2402? Under the present MOS structure, the answer to these two questions is in the affirmative.

There is a distinct difference between the knowledge and skills required to (1) manage a computer installation, (2) do system analysis and design, and (3) serve as an ADP staff planner or ADP project manager at a high staff level. Yet, with the single MOS, these various skills or assignments cannot be distinguished. Because of this deficiency, it is

obviously difficult to identify accurately the requirements (positions), assets (officers), and qualifications (education and training).

The Haines Board recommended a restructuring of the MOS into three to six different MOSs.<sup>1</sup> Others feel with some confidence that precisely three are required.<sup>2</sup> First, an MOS for managers of data processing installations (DPI) or an officer in charge of a major segment of a large DPI. Next, there is a need for a systems analyst's MOS at the staff or DPI level. And finally, an MOS should exist for the ADP staff officer at an Army headquarters, USCONARC, or DA level. The first category would be machine oriented, the next one would be systems oriented, and the last group would be management oriented. Until several such ADP military occupational specialty levels are created, the establishment of valid training requirements and structured schooling for ADP can not be achieved.

The Army Staff has not yet acted on this particular Haines Board recommendation. In fact, there is no indication of interest in changing this MOS at any foreseeable time.<sup>3</sup> The reasons for this could be legion, but it is safe to speculate that two major ones exist. On the one hand, the

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<sup>1</sup>U.S., Department of the Army, Board to Review Army Officer Schools, p. 613.

<sup>2</sup>Interview with Colonel Felix Kampschroer, ADP Management Division, COA, Department of the Army, Washington, D.C., January 18, 1967.

<sup>3</sup>Interview with Lieutenant Colonel Carl G. Benson, OPO, Department of the Army, Washington, D.C., January 19, 1967.

prefix 9 has probably gone a long way toward alleviating the problem as studied by the Haines Board, and on the other hand, such a change in MOS structure requires a considerable effort, and OPO is not likely to act in this matter unless directed to do so.

As a wrap-up to the MOS question, a brief résumé will be presented on its growth. In 1943, the MOS 2401--Machine Records Officer--officially came on the scene.<sup>1</sup> For some currently unknown reason, it was changed to MOS 2402 in 1946.<sup>2</sup> And with the advent of the electronic computer the MOS 2401 was reestablished as the Machine Records Officer in 1960 and MOS 2402 became the ADP MOS as we know it today.<sup>3</sup> In that year, 1960, a number of the Machine Records Officers qualified for the ADP MOS, and the growth of that MOS has been depicted in Figure 11. As in the preceding figure (Figure 10), the upper line shows the number of officers who carry this as one of their military occupational specialties, and the lower line is the number of positions in the Army requiring this MOS.

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<sup>1</sup>U.S., Department of the Army, Officer Classification, Army Technical Manual No. 12-407 (Washington: U.S. Government Printing Office, October, 1943), p. 9.

<sup>2</sup>U.S., Department of the Army, Commissioned and Warrant Officer Personnel Military Occupational Specialties, Army Special Regulation No. 605-10-5 (Washington: U.S. Government Printing Office, February, 1946), p. 24.

<sup>3</sup>U.S., Department of the Army, Manual of Commissioned Officer Military Occupational Specialties, p. 36.

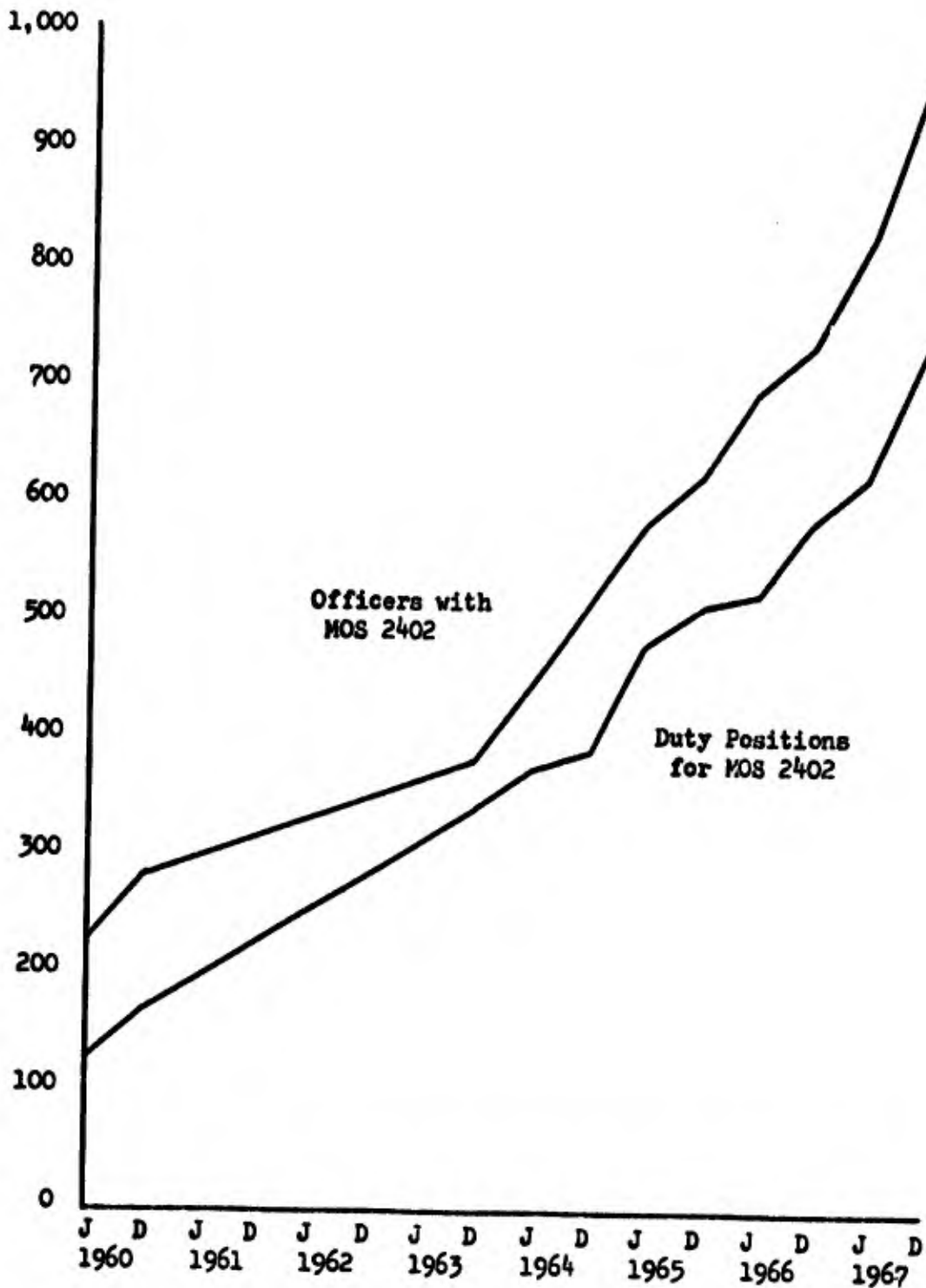


Fig. 11.--Growth of MOS 2402--ADPS Plans & Operations Officer<sup>a</sup>

<sup>a</sup>U.S., Department of the Army, Commissioned and Warrant Officer Tabulation within MOS by Control/Monitor Branch (Short Title: DCSPER-62), (Washington, D.C., June, 1960-December, 1967). (Computer printout by U.S.A. Data Support Command.)

### An Inventory and a Forecast

Starting with the premise that the Army--like the rest of the Federal Government and the business world, for that matter--was faced with an ADP knowledge gap, it has been shown in this chapter that the Army has identified different levels of education and is now taking action to educate to these levels. But are the actions adequate?

Although some facts and figures have been presented in several places thus far in this paper, it would seem appropriate to bring as much data together at this point as feasible to provide some insight of the adequacy of the current plan for ADP education. Figures that are of an historical nature will be included so that some trends can be shown with validity. In the following sections, first thought will go to portraying the growth of ADP in the Army, followed by data on the current status, which will lead to a short-range forecast. However, due to their interrelation, most of the representations will include data as to the past, present, and future.

#### Computers

Since the computer itself is the tangible item that causes the need for personnel in the first place, it will be given first consideration.

The sustained growth of computers, as seen in Figure 12, reflects the continual blending of this tool into the Army management process. The forecast represents today's best estimates. Yet, time and again, estimates made in

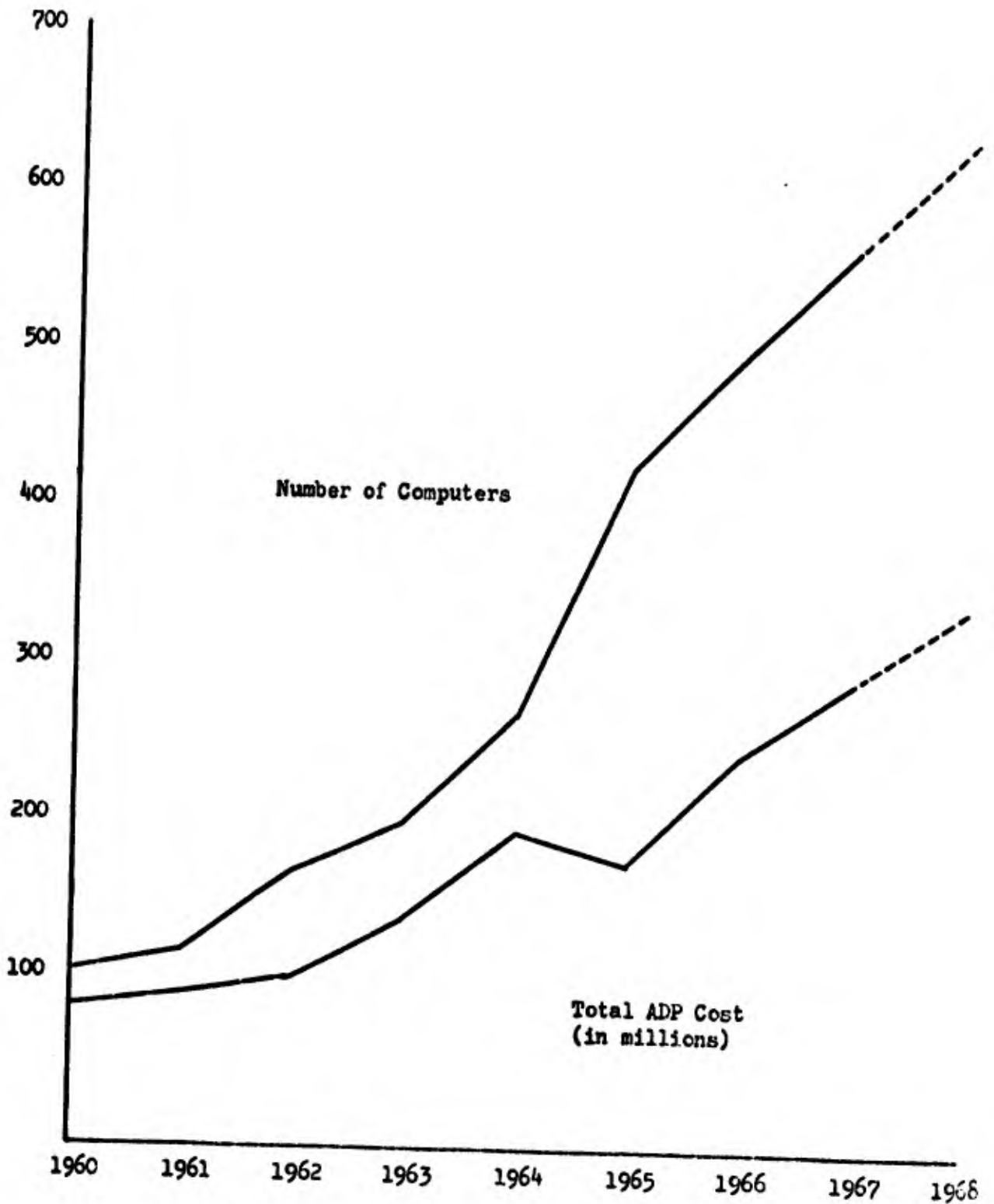


Fig. 12.--Army Trends in Automatic Data Processing<sup>a</sup>

<sup>a</sup>Colonel Felix Kampschroer, "Progress in Managing ADP" (a report presented at the 1967 Computer Summer Workshop, West Point, N.Y., August 1, 1967), p. 6.

previous years have fallen short of the actual growth. At best, it can only be said with confidence that such figures have grown and will continue to grow dramatically.

But inventories of computers fail to take into account three important aspects of computer development. First, the efficiency of the modern computer in the performance of its primary function, arithmetic computation, had increased by 1961, according to Forrester, by a factor of 100,000 to 1.<sup>1</sup> Technological improvement is an elusive thing to measure, but Knight calculates there has been an average improvement of 87 percent per year in commercial computation.<sup>2</sup> Secondly, a single modern computer sharing its capability with many users, is able, under ideal circumstances, to serve a hundred or more customers. The day of the computer utility is almost upon us.<sup>3</sup> Finally, a single calculation in 1953 cost a thousand times as much as a calculation today, and there is no reason to believe that this downward trend in costs will not continue for some time to come.<sup>4</sup>

As the foregoing suggests, the business of counting machines may have about reached the limit of its usefulness. If changes are not made in the methods of taking inventory,

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<sup>1</sup>Jay W. Forrester, Industrial Dynamics (New York: M.I.T. Press and John Wiley & Sons, Inc., 1961), p. 5.

<sup>2</sup>Kenneth E. Knight, "Changes in Computer Performance," Datamation, September, 1966, p. 54.

<sup>3</sup>Kenneth O. Fisketjon, "Basic Considerations in Time-Sharing," Data Management, April, 1966, pp. 14-18.

<sup>4</sup>R. L. Patrick, "Ten Years of Progress?" Datamation, September, 1967, pp. 22-24.

in order to consider the types of computers being counted, these carefully gathered statistics will soon be of only passing interest to readers. The first step to improve inventory methods came with the publication of the 1966 inventory of automatic data processing equipment in the Federal Government,<sup>1</sup> which recognized the need for a "classification system which can distinguish the essential differences among computer installations."<sup>2</sup>

### Personnel

In 1964, only one general officer in the Army devoted full time to ADP. By 1966, there were four generals working full time in ADP positions. The number of general officers devoting full time to ADP by 1971 is expected to be in the area of fifteen.<sup>3</sup> At the present time there are over 550 officers performing full-time duties in ADP.<sup>4</sup> The Haines Board suggested that this figure would double within five years.<sup>5</sup> However, a more accurate portrayal of the ADP management picture can be seen in Figure 13. In this representation,

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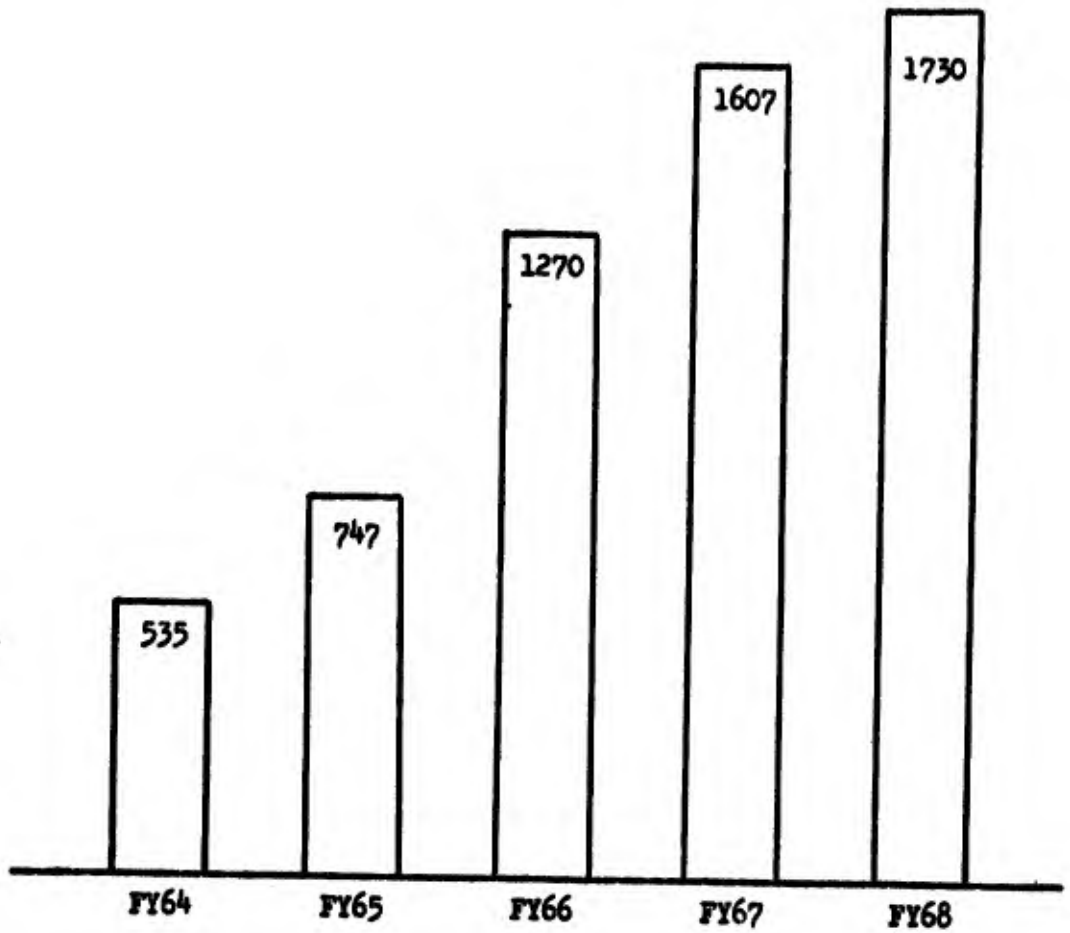
<sup>1</sup>U.S., Bureau of the Budget, Inventory of Automatic Data Processing Equipment in the Federal Government (Washington: U.S. Government Printing Office, July, 1966).

<sup>2</sup>U.S., Congress, Senate, Committee on Government Operations, Report to the President on the Management of ADP in the Federal Government, p. 13.

<sup>3</sup>U.S., Department of the Army, Board to Review Army Officer Schools, p. 605.

<sup>4</sup>Address by Colonel Kampschroer at the 1967 Computer Summer Workshop.

<sup>5</sup>U.S., Department of the Army, Board to Review Army Officer Schools, p. 605.



**Fig. 13.--Military and Civilian Management Staffs in ADP  
(Expressed in Man-Years)<sup>a</sup>**

<sup>a</sup>Colonel Felix Kampschroer, "Progress in Managing ADP" (a report presented at the 1967 Computer Summer Workshop, West Point, N.Y., August 1, 1967), p. 7.

the officer and civilian ADP managers have been combined into man-year figures. As a point of reference, to give the reader some feel for the ratio of the officers involved as compared to civilian managers, there were 557 officers and 313 civilians performing full-time ADP management functions in the Department of the Army in 1966.<sup>1</sup>

Perhaps more revealing than absolute numbers or man-years is the rate of increase in the Army ADP workforce. Between 1964 and 1966 the annual increase in the ADP management field has been 15 percent.<sup>2</sup> Exactly how much the requirements for officers in ADP will grow in the future has not been predicted. Yet, estimates of personnel requirements through 1970 indicate that the Government will continue to add significant numbers of managers to the Federal workforce.<sup>3</sup> Figure 14 is an outlook of Civil Service Commission estimates in what is termed "Systems Administrators," which is a title used to cover managerial and support occupations.

A more exacting forecast was recently made by the Department of the Army for the training of officers in MOS 2402 (ADPS Plans and Operations Officer).<sup>4</sup> Requirements for

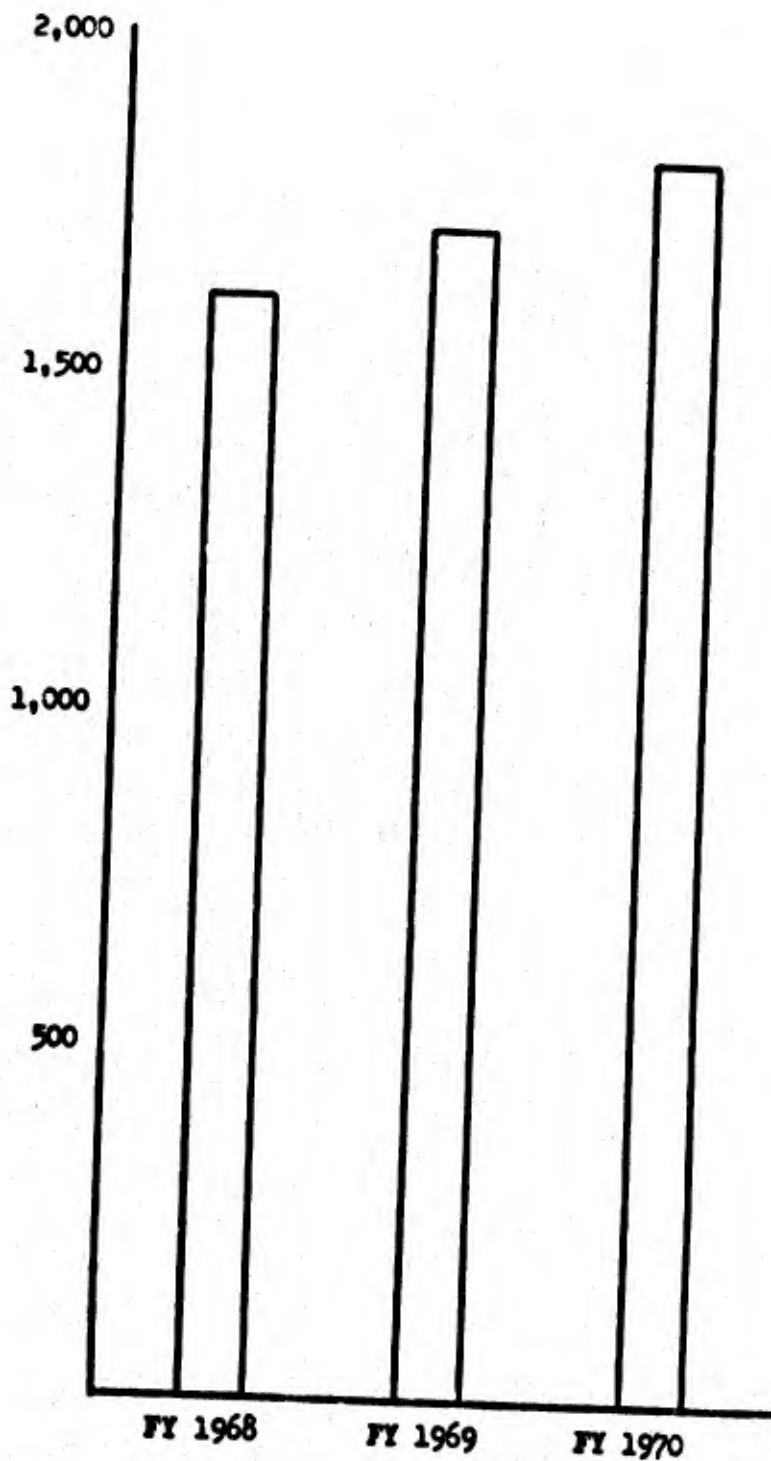
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<sup>1</sup>Address delivered by Colonel Jay Thomas, ADP Division, COA, Department of the Army, at the Army-Wide Comptroller Conference, Washington, D.C., October 30, 1967.

<sup>2</sup>Address by Colonel Kampschroer at the 1967 Computer Summer Workshop.

<sup>3</sup>U.S., Congress, House, Committee on Government Operations, Hearings on Data Processing Management in the Federal Government, p. 110.

<sup>4</sup>U.S., Department of the Army, Requirements for Department of the Army ADP Supply Spaces and Personnel (Mattingly Study), p. C-124.



**Fig. 14.--Forecast of Systems Administrators  
in the Federal Government**

<sup>a</sup>U.S., Congress, House, Committee on Government Operations, Hearings on Data Processing Management in the Federal Government, 90th Cong., 1st Sess., July 1967, p. 110.

new concepts and developing field Army systems were included in Figure 15, only to the extent known at that time. These, of course, are only the training figures for the ADP officer specialist, but they convey a corollary need for other ADP officer education.

As was the case in the forecast on computers, it appears safe to say only that there will be an increased need for officers with a knowledge of ADP systems. In fact, for years the figures on computers and personnel have seemed to grow in a parallel manner. Yet, is it correct to assume the same relationship will continue in the future? In 1966, the Civil Service Commission reported to Congress that these ratios (see Figures 16 and 17), dating back to 1959, indicate that "as an agency staff becomes more experienced, a reduction of computer personnel per new application is foreseen."<sup>1</sup> A natural conclusion would be that without a change in computer technology, a slowing but continued decline in man-years per computer would be expected. Yet, two recent innovations in computer development would work against the opposite ends of the personnel scale and leave the future direction of the line in Figure 17 in doubt. In reality, they make the aggregation of the facts needed for extending the chart nearly meaningless. First, there have been recent developments in small "inexpensive" computers, with the promise that many who were unable to justify an expenditure of hundreds of thousands

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<sup>1</sup>U.S., Congress, House, Committee on Post Office and Civil Service, Hearings on Government Electronic Data Processing Systems, p. 63.

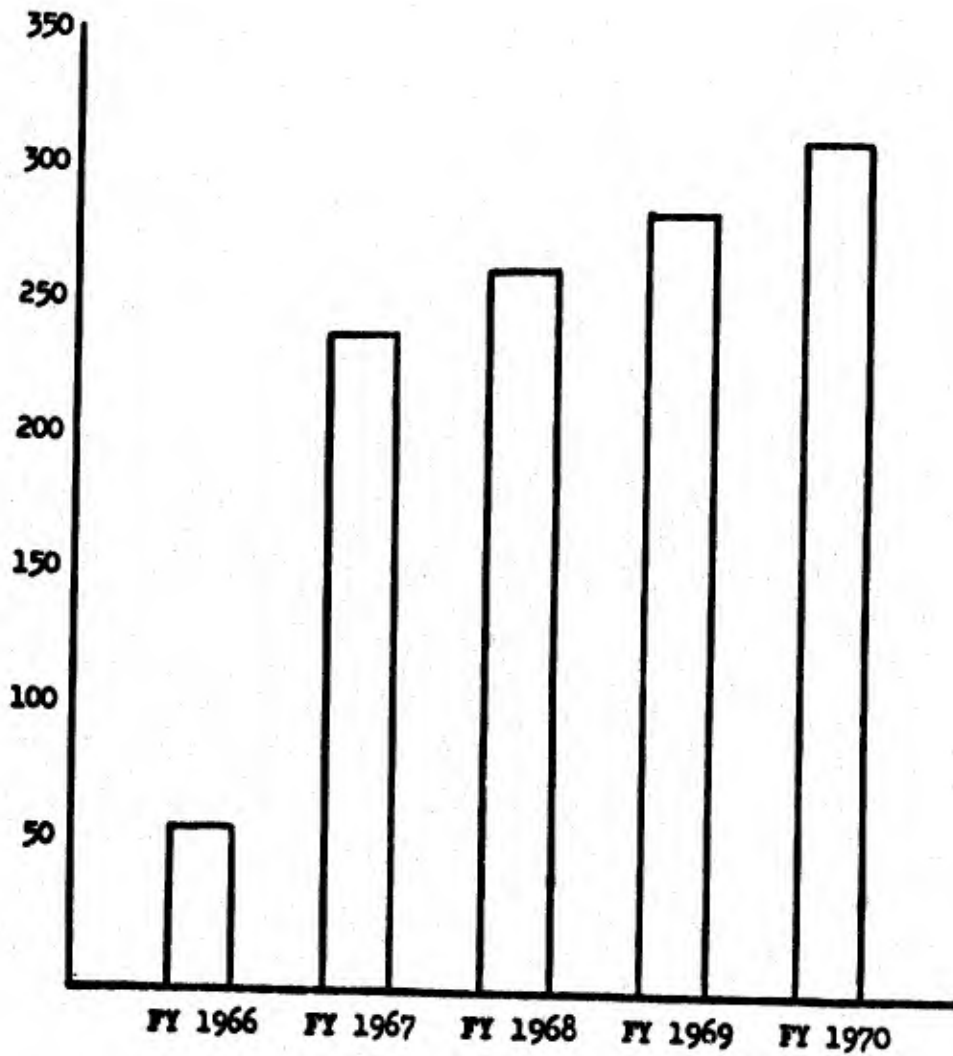


Fig. 15.--Estimated Training Requirements for MOS 2402<sup>a</sup>

<sup>a</sup>U.S., Department of the Army, Training for Automatic Data Processing Systems, USCONARC Study (Fort Monro, Va., November, 1965), p. C-124.

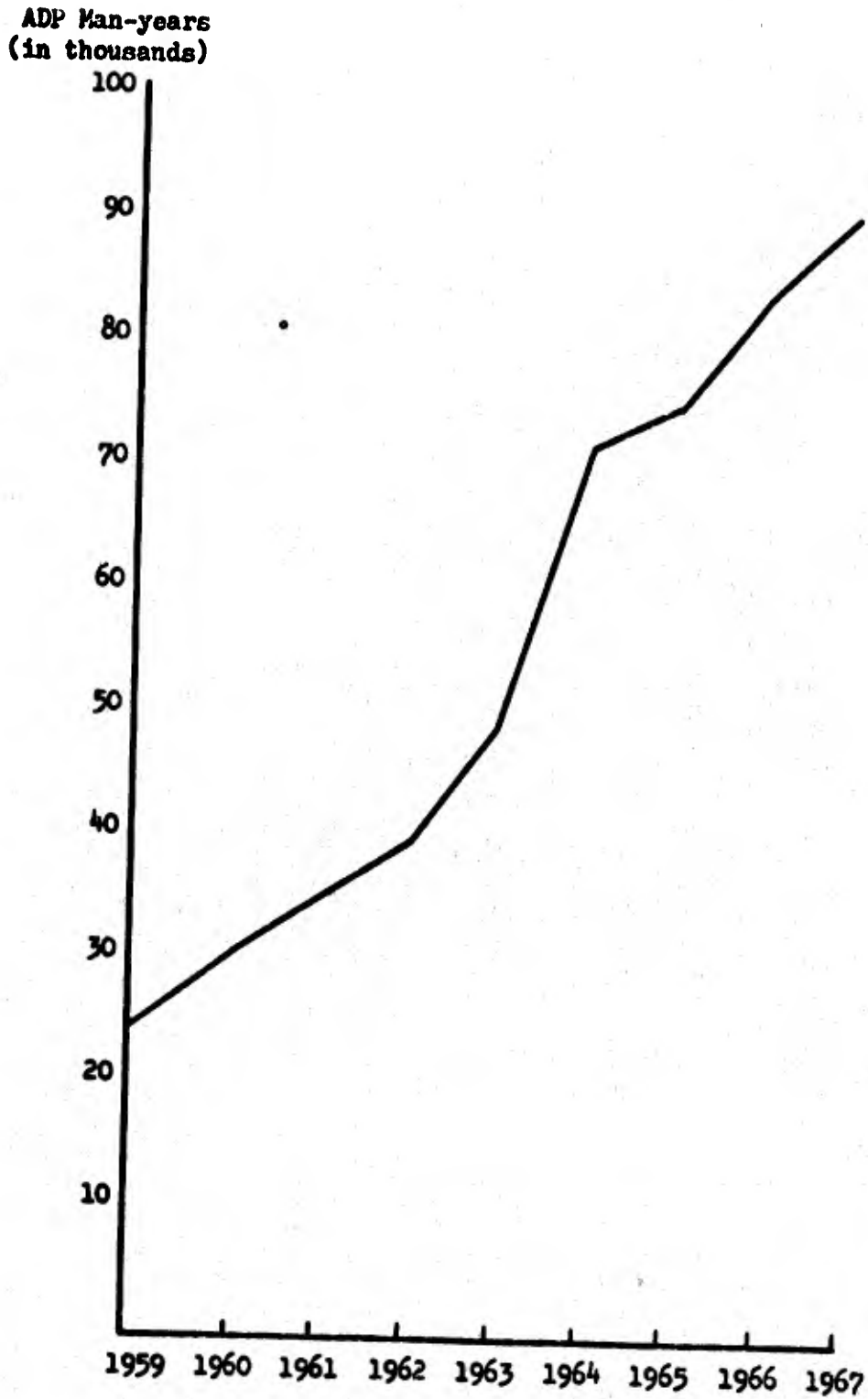


Fig. 16.--ADP Man-Years<sup>a</sup>

<sup>a</sup>U.S., Congress, House, Committee on Post Office and Civil Service, Hearings on Government Electronic Data Processing Systems, 89th Cong., 2d Sess., June, 1966, p. 63.

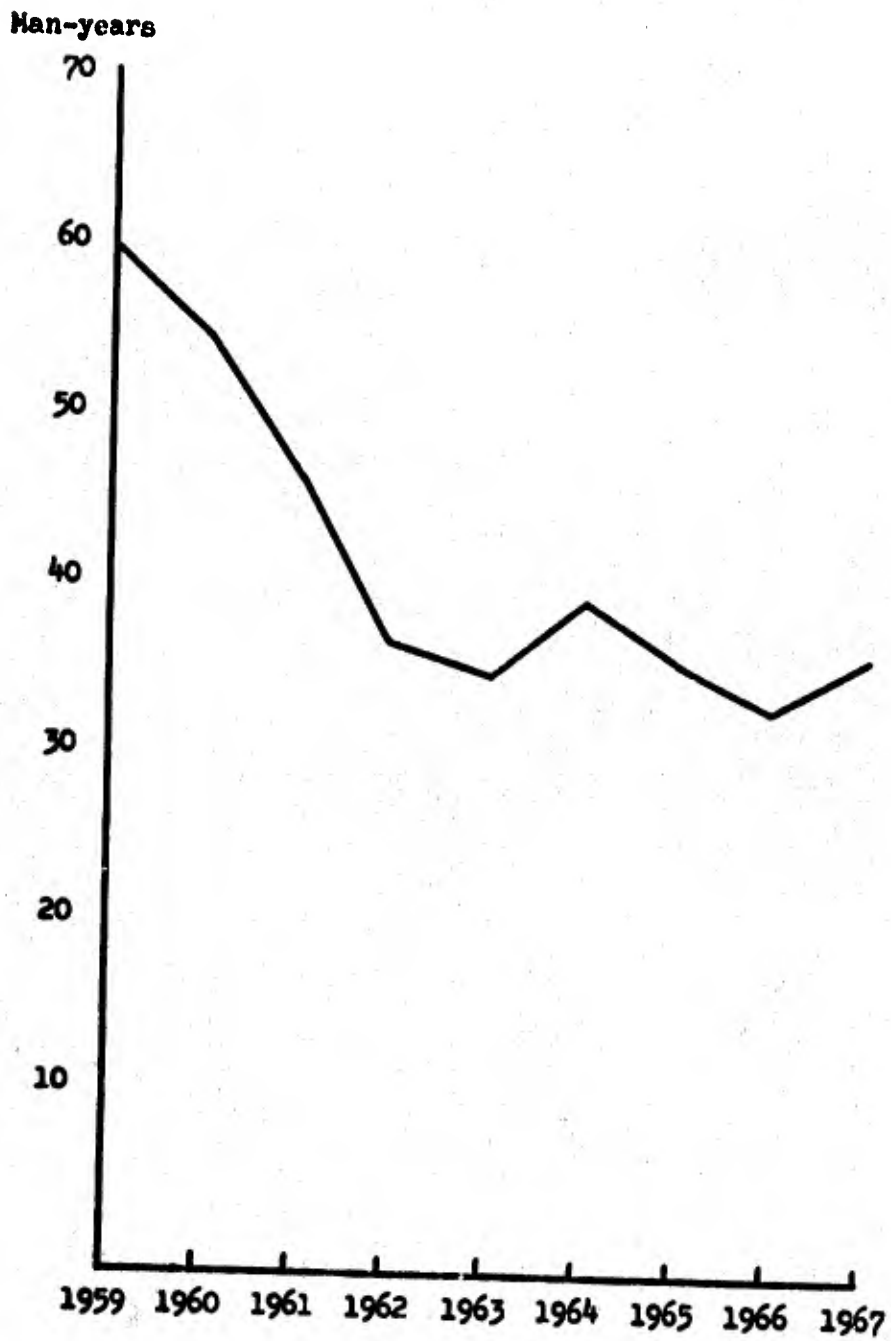


Fig. 17.--ADP Man-Years Per Computer<sup>a</sup>

<sup>a</sup>U.S., Congress, House, Committee on Post Office and Civil Service, Hearings on Government Electronic Data Processing Systems, 89th Cong., 2d Sess., June, 1966, p. 64.

of dollars on a computer will now be able to have a smaller, less expensive but highly flexible system. Fewer people would be required to operate this type of system.<sup>1</sup> Second, large-scale models of third generation computers will permit the servicing of several, perhaps hundreds of users with a single computer. The expenditure of man-years per computer may rise into the hundreds; in fact, the mark of an efficient computer of the near future may well be its ability to deal gracefully with several hundred users.<sup>2</sup> In short, while Figure 17, so far, seems to show that people have learned to deal more efficiently with computers, any further extension of the line may show by an upturn that computers now deal more efficiently with people.

#### Summary

Properly implemented, the program of education described in this chapter will provide an acceptable overall ADP orientation for the bulk of the Army's officers, and also will produce a select group of officers who will be extremely knowledgeable in the subject. On the surface, it appears to be the most feasible approach. There possibly will be a few officers who will not follow the normal career pattern. This, however, should be a rare exception and probably would be handled on an individual basis. There are others who have

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<sup>1</sup>Gordon B. Davis, An Introduction to Electronic Computers (New York: McGraw-Hill Book Company, 1965), pp. 488-503.

<sup>2</sup>Angeline Pantages, "Advances in Computing," Datamation, August, 1967, pp. 59-60.

passed the point in time where they would be attending such schools. Many of these, however, will be attending the senior level educational institutions or orientation team presentations and will receive some ADP instruction, while the remainder will probably fade out of the picture through normal attrition.

The estimated length of time needed (four to five years) to accomplish this program is not unreasonable for such an undertaking. Although it would be desirable to complete the initial phase in much less time, alternatives to speed up the process would entail such drastic and expensive measures as the developing of special courses at a number of locations, followed by the force feeding of students through them at an accelerated pace. This does not seem to be an acceptable solution in view of the cost of instructor personnel and facilities, as well as the expense of disrupting normal Army activities.

There is one fundamental weakness in this five-year education program, however; there is no assurance that all officers will receive the same quantity or quality of ADP instruction, or even attain some specified minimum acceptable level of ADP knowledge. This arises from the fact that, of necessity, it is USCONARC's policy to abstain from setting minimum or maximum standards for course content or hours of instruction. In a phrase, it would be imprudent to think that one general officer could operate on a centralized basis of all the twenty-six Army schools. Presently, each one is

managed by a major general. Under the present system, the branch school commandant decides how much time is to be devoted to a given subject, and what subject matter will be taught, based on branch or functional needs.

The ADP officer program is a long-term personnel management concept. It is not a solution to short-term problems or immediate personnel shortages. Yet, based on the participation seen to date, gradual but significant improvement is being made in the Army's ability to meet its requirements for officers skilled in ADP technology. The officer himself also benefits by having this opportunity to become a part of a professionally challenging and rewarding career in data processing.

The officer qualification and classification problem still requires a solution. Substantial progress was made in this area with the establishment of a prefix designation for non-ADP MOSs. In so doing, both the officer's talents and the position can bear the mark which signifies a need for ADP expertise, yet not to the degree required of the ADP specialist. Already, this descriptor has caused scores of positions to be so designated in order that ADP requirements, assets, and qualifications can be more accurately identified.

A monumental step will be signaled when the single ADP officer MOS is expanded into three or more MOSs. Only then will it be possible knowingly to assign the proper talent to the particular position. So long as there is but one MOS in ADP, its correspondingly skilled officer is likely to find

himself being used like the proverbial sledge hammer that pounds the tack in at least half of his assignments.

The sketchy nature of information about the growth of computing suggests strongly that there is not yet available a means for determining in any realistic way what the gross requirements really are for the Army in the field of ADP education.

There are at any given moment activities that are actively considering the automation of some portion of their work but have not yet committed a reportable quantity of resources to the effort, nor are they prepared in any way to commit themselves to a project which is at best somewhat tentative. No survey of the future of ADP is likely to uncover all of these developing projects; but the projects will develop, and next year there will be a request for ADP managers and specialists, a training course, and a computer complete with air conditioning. The computer population explosion will continue for the foreseeable future. New developments in computers, ancillary equipment, and software, together with new systems applications, will affect profoundly the full spectrum of Army operations. Lower cost, smaller-sized computers, and breakthroughs in data link transmission and input/output devices will result in increased ADP usage, particularly at the lower echelons, and bring many new officers, including those of the combat arms, into ADP assignments.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

#### Summary

##### Policies for ADP education

Policies in ADP education were lacking in the Army as well as in the remainder of the Federal Government in the early years of computer operations. The concern during the years 1956 through 1966 was for almost every aspect except education. First, there was the vying for position as to who would get the first computer and who would have staff responsibility for ADP. Later, the quest was for developing systems and putting this new status symbol to use. This marked a growing trend for more and more installations and was, therefore, followed by the need to control the acquisition of ADP equipment. To this end, Public Law 89-306 was enacted, which provided for economic and efficient purchase, operation, and utilization of ADP equipment by the various Federal departments and agencies. But the one area which deserves more lead-time than any other planning aspect of ADP--education--was not really identified as a problem until late in 1965.

##### Responsibility for education

In the decade that the Army has been using the digital, business-type computer, the Department of the Army

staff has undergone six major reorganizations. Each time, a different staff agency became responsible for Army education, and, at several points in time, two staff sections shared this responsibility. This shifting of responsibility had a degenerating effect on the ADP education program. The reorganizations had made a full circle by 1967, and the Deputy Chief of Staff for Personnel (DCSPER), in coordination with the Office of Personnel Operations (OPO), is now working on an educational program that could have been in its tenth year of implementation had it not been for all the intervening reorganizations.

Little top management guidance in the education program was evident in the formative years of computer applications. However, this was a common failing throughout the various Federal agencies during those early years of the computer. The computer and its product, the management information system, now have both a top level location in the Army structure, and a chain of guidance which originates in the Office of the Secretary of Defense and flows downward to the ultimate users in the Army.

Reflecting on the latest changes in organization that have an impact on ADP education, the current responsibilities can be summarized as follows: Responsibility for the education and training functions in the Army is shared by DCSPER, the Assistant Chief of Staff for Force Development (ACSFOR), and OPO. The United States Continental Army Command (USCONARC) is still charged with the preparation and supervision of

training programs to fulfill Department of the Army training objectives. DCSPER has general staff responsibility for the development of training concepts, policies, and programs, and the coordination and execution of plans pertaining to individual training in the United States Army schools. OPO has responsibility for determining total annual training requirements by Military Occupational Specialty (MOS) for the standing Army. ASCFOR develops the force structure that the Army will man within the total troop ceiling limitation, and determines personnel requirements for selected MOSs. USCONARC then has the responsibility for consolidating all the training requirements passed down to it, and schedules the actual courses at the various Army schools.

As a review, ASCFOR determines the overall organizational structure of the Army and points out the personnel implications to DCSPER, which in turn resolves the personnel requirements in relation to the assets and passes on to OPO the actual number of people needed to be trained or educated to carry out the Army missions. OPO then determines, by name, who gets this instruction and schedules their schooling with USCONARC or a university.

#### Organization for education

The Army school system is the principal means of individual education and training for all Army officers. The Army Regulation entitled Military Education and Schools is the heart of the Army education because it describes the entire system, and establishes general provisions governing

the military education and individual training of all components of the Army.

Yet it must be realized that career development of Army officers is a highly structured interrelation between civil and military schooling, assignments, job performance, years of service, and promotion patterns. There are four levels of military career schooling: basic, advanced, command and staff, and war college. Attendance at each school is normally a prerequisite for attendance at the next higher course. Attendance at the branch basic and advanced courses is mandatory for essentially all officers. The two levels of military colleges are attended by progressively fewer officers on a selective basis by the Department of the Army. Civilian schooling is received by about a thousand officers a year as a supplement to military schooling.

#### Studies concerning ADP education

In the early years of ADP, the Army was too pre-occupied with applications, hardware, and software to be concerned with education. But in the 1960's, it became apparent that the applications were so basic that management would have to be educated in ADP before sophisticated systems would be developed. Cognizant that the manager had been neglected, the Army first set about studying the ADP knowledge problem itself.

Adjutant General School Study.--The very first study conducted was one by the Adjutant General School in 1965. This evaluation actually had as an underlying purpose the

goal of wresting control of ADP from the Signal School. Yet, the study was so logical in its approach that it provoked several other studies, all of which furthered the cause of ADP education. The AG School study called attention to the fact that up to this point, the MOS 2402 course had been producing an officer technically qualified but ignorant on business or management applications for the computer. It was this type of knowledge that the Army needed in order to gain efficiency with this new tool. The AG School Study also took note of the inefficiency of offering ADP subjects at so many different schools in an unstructured, almost haphazard manner. Therefore, they proposed that all of this should be pulled together under one roof, and then concentrate on getting quality courses in ADP rather than conduct a bunch of "quickie" orientations.

Seminar of Military Computer Educators and Computer Center Directors.--The Military Academy became interested in the digital computer in 1960, and by 1962 had a Computer Center. Sparked by the interest and inventiveness of Lieutenant Colonel William Luebbert for the computer, the Academy thought it would be mutually beneficial to bring together the ADP experts of all the Army educational institutions and talk about this new marvel. As part of the seminar each representative presented the thinking of his respective school. These different philosophies proved to be most interesting, even though divergent. Opinion varied widely as to who should instruct the Army officer about ADP, and to what extent. It

was rather disquieting to learn that several schools, including the largest branch in the Army, the Infantry, felt "no great need for ADP to be a part of their curricula." Other institutions sidestepped the issue by speculating that the young officer would learn about the computer in college and that those already in the service would get instruction at the senior service colleges. Of course, such an approach avoids the large body of officers in the middle who need this ADP knowledge now. Two schools made valid proposals on progressive education which would stress fundamentals, management, and practical work at the branch schools and the use of computers and management of data systems at the senior service colleges. The highlight of the seminar was the group discussion phase, where members of the staff and faculty of these schools were brought together in frank discussions, after having heard each other's formal presentations on ADP. What went on in these sessions was not recorded, but their conclusions were. It would appear that the properly grounded minority was able to sway the backward majority, for their findings were a milestone in the progress of computer education. The groups were in accord for:

1. A long-range program of making ADP and management science a regular part of the curriculum at each Army service school.
2. Continued use of the gap filling courses provided by DODCI, AMETA, and other like facilities.

3. Branch school student officers acquiring a general knowledge of the capabilities and limitations of automated techniques, knowing how to use the computer as a management tool, including an awareness of the complexities of programming languages, and the present status and future trends in military applications of computers.

4. All of the above knowledge being reinforced at the command and staff college, where games and simulation could be added.

Finally, the groups observed the lack of guidance from higher headquarters--Department of Defense, Department of the Army, and United States Continental Army Command--on the minimum essential ADP knowledge required by all officers.

USCONARC Study on Training for ARMY ADPS.--As a direct result of the early 1965 AG Study, USCONARC made an ADP study in late 1965. Their study also incorporated the work of the summer seminar at the Academy. USCONARC was the headquarters that needed to take official cognizance of the ADP education problem, so this study harvests the fruits of the previously mentioned studies. They produced both quantitative and qualitative findings to fill the ADP knowledge gap. They answered the basic question of the AG Study by recommending to the Department of the Army that the teaching of ADP courses should be centralized and that the Adjutant General School should become the proponent for ADPS management and operations training. Next, the minimum knowledge required by all officers was quantified. They established that the officer should

have sufficient grasp of the basic concepts and terminology to:

1. Recognize the potentials and limitations of ADP.
2. Evaluate proposals for its use.
3. Communicate with ADP management.
4. Expand his ADP knowledge when the opportunity or need exists.

They further established the immediate educational task and prescribed the scope of training required in ADP in the twenty-six schools under USCONARC control. The traveling ADP instructional team of the AG School was also endorsed for continued operation in the foreseeable future. Without specific reference to the description of the ADP MOS 2402 found in the Army Regulation, the study reduced the skill and knowledge required of the ADP Plans and Operations Officer to a much more attainable level.

The Haines Board.--The real professional study on Army officer education, which included a number of pages on ADP, was the 1966 Board to Review Army Officer Schools (the Haines Board). The depth and coverage of this type of study was to be so comprehensive that another such study would not be needed for a decade. The study did much to advance computer education, for it made numerous recommendations to the Army Chief of Staff which embodied the findings of previous ADP studies. The following summarized conclusions of the Board became the Army's approach to ADP education and training as they were acted upon by the Army Chief of Staff:

1. The Army career schooling program must include ADP instruction; this will start at the branch career course. The

schools were admonished not to give lip service to the scope of instruction provided them by USCONARC, but to teach from ten to forty hours as a minimum. The command and staff college ADP coverage was deemed to be inadequate, so they were enjoined to go to thirty hours to include hardware, software, systems analysis, and tactical applications. The war college also needed to double its ADP instruction and stress command, control, managerial, and analytical aspects of ADP. War gaming and simulation could be integrated with other instruction.

2. The present proliferation of ADP specialist courses was condemned and the single school approach by the AG School was heartily endorsed. They encouraged the development of the well-rounded ADP officer qualified in management and control of ADPS. The ADP MOS course was to be revamped by lengthening and making it more comprehensive. They also encouraged the continuation of the Defense Computer Institute as a means of schooling top management in ADP.

3. They encouraged a more deliberate approach to ADP graduate schooling. This would include not only more guidance to the student as to curriculum and proposed utilization tours, but also the careful selecting of universities to insure that the curricula met Army requirements.

4. Prompted by the success of other Army officer specialist programs, the Board suggested such a career program be established for ADP. This would encourage officers to stay

in ADP and provide a growing pool of ADP talent for the Army's increasing ADP requirements.

5. Finally, the Board recognized the serious classification problem in the ADP MOS. With only one such MOS for officers, they suggested that the MOS be restructured and a number of different MOSs be created, so that valid training requirements could be established and schooling in ADP could be structured.

#### Approach to education

Properly implemented, the program of education described in Chapter IV will provide an acceptable overall ADP orientation for the bulk of the Army's officers, and also produce a select group of officers who will be extremely knowledgeable in the subject. On the surface, it appears to be the most feasible approach. There possibly will be a few officers who will not follow the normal career pattern. This, however, should be a rare exception and probably would be handled on an individual basis. There are others who have passed the point in time where they would be attending such schools. Many of these, however, will be attending the senior level educational institutions or orientation team presentations and will receive some ADP instruction, while the remainder will probably fade out of the picture through normal attrition. The estimated length of time needed (four to five years) to accomplish this program is not unreasonable for such an undertaking. Although it would be desirable to complete the initial phase in much less time, alternatives

to speed up the process would entail such drastic and expensive measures as the developing of special courses at a number of locations, followed by the force feeding of students through them at an accelerated pace. This does not seem to be an acceptable solution in view of the cost of instructors and facilities, and the expense of disrupting normal Army activities.

Recent actions affecting  
ADP education

The ADP officer program is a long-term personnel management concept. It is not a solution to short-term problems or immediate personnel shortages. Yet, based on the participation seen to date, gradual but significant improvement is being made in the Army's ability to meet its requirements for officers skilled in ADP technology. The officer himself also benefits by having this opportunity to become part of a professionally challenging and rewarding career in data processing.

The officer qualification and classification problem still requires a solution. Substantial progress was made in this area with the establishment of a prefix designation for non-ADP MOSs. In so doing, both the officer's MOS and the MOS of the position he might occupy can bear the mark which signifies a need for ADP expertise, yet not to the degree required of the ADP specialist. Already this descriptor has caused scores of positions to be so designated in order that

ADP requirements, assets, and qualifications can be more accurately identified.

A monumental step will be signaled when the single ADP officer MOS is expanded into three or more MOSs. Only then will it be possible knowingly to assign the proper talent to the particular position. So long as there is but one MOS in ADP, its correspondingly skilled officer is likely to find himself used like the proverbial "sledge hammer pounding the tack" in at least half of his assignments.

#### An inventory and a forecast

The sketchy nature of information available about the growth of computing suggests strongly that there is not yet available a means for determining in any realistic way what the gross requirements really are for the Army, in the area of ADP education.

There are at any given moment activities that are actively considering the automation of some portion of their work, but have not yet committed a reportable quantity of resources to the effort, nor are they prepared in any way to commit themselves to a project which is at best somewhat tentative. No survey of the future of ADP is likely to uncover all of these developing projects; but the projects will develop, and next year there will be a request for ADP managers and specialists, a training course, and a computer complete with air conditioning. The computer population explosion will continue for the foreseeable future. New developments in computers, ancillary equipment, and software,

together with new systems applications, will affect profoundly the full spectrum of Army operations. Lower cost, smaller-sized computers, and breakthroughs in data link transmission and input/output devices will result in increased ADP usage, particularly at the lower echelons, and bring many new officers, including those of the combat arms, into ADP assignments.

### Conclusions

Policies.--At one time ADP policies existed. Few policies, especially those concerning ADP education, are written as such today. However, many studies have been made recently, and their findings have been acted upon. These have thus become the "new policies" in ADP education and should be consolidated and published in policy format to serve as a tool to foster the advancement of ADP education Army-wide.

Responsibility.--Even though subjected to a half dozen reorganizations, the ADP education program is not centrally controlled or coordinated. The Deputy Chief of Staff for Personnel, the Management Information System Directorate, the Office of Personnel Operations, and the Comptroller of the Army all have varying degrees of interest and responsibility. This mitigates against unity of command and progress that is necessary to catch up with the dynamic growth of computer technology.

Organization.--The Deputy Chief of Staff for Personnel is the general staff agency at the Department of the

Army level responsible for supervising the Army school system. Operation of the system itself is the responsibility of the commander of the United States Continental Army Command. This includes the command and control of twenty-six Army schools. The school system is functioning adequately, effecting changes in programs; however, the curricula appears to be overly bureaucratic. Since USCONARC is charged with the responsibility to run the schools, it should do just that. When decisions are required, they should be made promptly, and the Department of the Army advised later as a matter of informational courtesy.

Officer education.--The expansion of data processing applications into practically every facet of Army operations necessitates a broad approach to the education of the Army officer in the management and use of computers. As a first step, each officer must understand what a computer is and what it can and cannot do for him. The officer, at the very minimum, needs sufficient grasp of the basic concepts and terminology of ADP to (1) recognize the potential applications and limitations of ADP, (2) evaluate proposals for its use, (3) communicate with ADP managers, and (4) expand his ADP knowledge when the opportunity or need exists. Since ADP is a relatively new field, the immediate training task of the various career school levels (basic, advanced, command and staff college, and war college) is in the area of orientation and familiarization. These schools must assume that the student is a neophyte in ADP matters, and gear their

instruction accordingly. Practical hands-on instruction, selectively initiated, and structured sequentially to insure progressive development should be an integral part of officer career schooling in the next few years. In the early 1970's, service schools will be able to assume that their students have obtained basic instruction in ADP at the USMA or ROTC universities so that the ADP education and training roles of the various level Army schools can shift to a higher plane of ADP education.

Road-show teams.--Senior officer ADP orientation courses, such as the Adjutant General School's traveling team, are required until ADP-trained graduates of the Army school system permeate the senior officer grades.

Specialist courses.--Even though the Army Chief of Staff directed that, as soon as practicable, common-type ADP specialist training would be centralized at the Adjutant General School, four Army schools are still conducting ADP courses. Centralization at a single facility appears to be a fairly long-range objective.

Graduate schooling.--The Army has taken steps to insure that ADP graduate schooling is more closely related to Army requirements. Further, university curricula have been studied, and three universities are now selected to teach Army officers in ADP (business). This selection requires periodic re-evaluation, and each of the selected universities needs examination to insure that they are actually producing the skills which were promised by the institution.

ADP officer program.--There has always been a reluctance for officers to become involved in a narrow, dead-end specialization. With the establishment of a formal ADP officer program, which will assure alternating ADP and branch assignments, the participating officer is assured a challenging specialty and commensurate growth professionally.

MOS structure.--Only one officer MOS has been established for the ADP field. This single MOS is too broad to identify the various skills and assignments of officers in ADP. Because of this deficiency, it is difficult to identify accurately the requirements, assets, and qualifications. The use of the prefix 9 to identify ADP qualification, in combination with other MOSs, is helping to alleviate this problem. However, the restructuring of the ADP MOS into several different ADP MOSs is required to enhance the establishment of valid training requirements and structured schooling for ADP.

#### Suggestions for Additional Research

Requirements for hardware.--The growth of ADP education and training is generating requirements for additional hardware as teaching aids and training devices. In addition to hardware quantity, there is a definite increase in the capabilities (quality) of the hardware. Thus, a valuable area of study would be one which would evaluate the requirements for hardware--quality and quantity--in the field of education and training in ADP and non-ADP subjects within the Army school system.

Individual school studios.--ADP effort has reached a crucial stage where it must be forcefully contained and expanded as a unified program, or risk a loss of impetus and direction, which will have a disproportionately bad effect on progress. It is obvious that the complexity of the ADP requirements and possibilities, and the pressure of immediate action, have precluded a fully coordinated attack. This is evidenced by the diversity of interests and efforts to be found at the individual schools and among staff agencies. The glaring and extremely urgent need is for systematizing the entire operation as a coordinated and unified effort. This would require that each service school initiate a series of studies, in depth, to define detailed requirements (and within functional areas) for all ADP associated education and training activities. These studies would encompass the entire spectrum of ADP related activities, such as ADP training requirements for the functional area and computer assisted instruction applications. These studies should approach the school ADP activities as total systems. The systems approach would assure consideration of all factors including interface with other functions, precluding a piecemeal and uncoordinated approach, and providing for orderly development of the desired capabilities.

Long-range study.--So far, of necessity, efforts and plans have been concentrated more on overcoming the known shortage of trained personnel based on current and relatively short-range needs. It is urgent, however, that more detailed

long-range plans be developed to overcome the predictable long-range shortage. Before long-range plans can be developed in any detail, it will be necessary to obtain a more definitive prediction of ADP training needs. This will require investigation of all known (and predicted) ADP projects and systems, such as those listed in five-year plans, those being developed for the Army in the field, and those of other commands, e.g., the Army Material Command and the Combat Developments Command.

Need for specialists in ADP.---There is also a need to make a detailed study of the trend in ADP to provide a valid projection of future training needs, particularly for the ADP specialists field. There are indications that future requirements may increase to such an extent, and so rapidly, that the shortage of specialists may seriously jeopardize operations. There are the following implications: (1) the possible need for more ADP specialist training facilities, and (2) the need for an expanded ADP career field.

#### Implications for the Army Staff

MOS structure.---Army officers possessing ADP skills are in very short supply. To insure effective use of this scarce manpower resource, these officers must be accurately identified. Yet, the Army has not addressed the ADP MOS problem since it was first established in 1960. This seems almost incredible in the light of the spectacular expansion of ADP in the Army and the dynamic nature of the field itself.

It was beyond the scope of this study to make a comparison of the status of the officer classifications in ADP in the other Services, but to demonstrate the untenable position of the Army ADP MOS structure, a few figures are worthy of note. The United States Marine Corps has three officer ADP classifications--Data Processing Installation Officers, Analysts, and Systems Designers. The United States Air Force uses two MOS classifications--Staff Officers and EDP Officers; and two prefixes--Analysts and Designers. The United States Navy has nineteen classifications for officers in this field, which include Analysts, Administrators, Maintenance Officers, Programmers, and Systems Managers. The Army Staff should direct that the ADP officer MOS structure be restructured as soon as possible. And since the Adjutant General School has the monitorship responsibility for this MOS, they are the logical agency to undertake this project.

Prefix 9.--At the present time, the Army has identified only 950 officers (either prefix 9 or MOS 2402) as qualified in ADPS. Yet, the Army has over 550 computers in operation. These figures show an obvious disparity between need and recognized talent. It is apparent that many of the officers who are operating in ADPS have not been so identified. As a matter of Army Staff action, commanders and heads of staff agencies should be urged to examine the positions under their control to determine those which should be classified with prefix 9, and take prompt action to initiate such changes in their TOEs and TDAs. Additionally, personnel

officers and others charged with classification of officers should be directed to review the officers' records maintained by them to insure that each officer who meets the criteria contained in Army Regulations is identified, and that the ADP prefix is promptly awarded by adding the prefix to the qualified officers' primary and awarded MOSs.

Role of the WAC officer.--For all that has been written about the scarcity of manpower, no study has explored the possibility of making use of womanpower--the Women's Army Corps (WAC)--in Army data processing. It would appear that women would be well suited to this type of work. Further, they might have less fear of being frozen in a possibly narrow specialty field, which has been mentioned before as the cause for many officers to shy away from a career in ADP. According to the Army Education Review Board, not one WAC is programmed for education in ADP. The Director of the Women's Army Corps should give consideration to encouraging WAC officer participation in ADP.

ADP policies.--As ADP policies were once spelled out in Army Regulation 1-251, when it was published in 1962, so should policies be made a part of the 18-series of Army Regulations covering ADP. This is especially relevant to the policies that have been created as "a result of the Army Chief of Staff's actions on the Haines Board recommendations." Many of the findings concerned ADP education, and the path to achieving these education goals would be much easier to follow if the entire Army knew of these new policies.

## APPENDIX A

MOS CODE 2402

### ADPS Plans and Operations Officer

**Summary:** Plans and directs installation and operation of automatic data processing.

**Duties:** Directs or participates in studies to determine feasibility of processing data on stored program electronic computers. Selects or assists in selection of specific computers, considering type data to be processed, existing systems and methods for processing data, and comparative costs of existing and proposed data processing systems. Prepares plans for and directs systems analyses to determine and define type data to be processed by computer selected for installation. Coordinates and consults with representatives of manufacturer and Governmental agencies on design, development, and organization of ADPS. Recommends changes and modifications in ADP equipment to improve operations and meet data reporting requirements. Directs installation and implementation of ADPS. Directs establishment of detailed instructional programs for processing raw data into completed reporting requirements. Directs conduct of debugging tests to determine validity of programs processed by the system. Designs formats for records and reports, maintains performance charts, and establishes work flow controls. Inspects and evaluates operation of ADPS and coordinates ADPS activities. Advises commanders and staff officers on application of ADPS to operational and reporting problems.

**Qualifications:** Must be able to perform duties described above, and possess the following special qualifications:

Must have extensive knowledge of electric and electronic data processing equipment. Must have thorough knowledge of techniques and procedures required for programming for stored program electronic computers. Must have had appropriate training or equivalent military or civilian experience in installation and operation of ADPS.

**Examples of Duty Positions for Which Qualified:**

ADPS Plans and Operations Officer  
ADPS Operations Officer  
ADPS Planning Officer

Civilian Source Jobs:

<u>DOT Code</u>	<u>DOT Title</u>
0-68.505 . . . .	Project Planner
0-69.985 . . . .	Systems Analyst <sup>1</sup>

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<sup>1</sup>U.S., Department of the Army, Manual of Commissioned Officer Military Occupational Specialties, Army Regulation No. 611-101 (Washington: U.S. Government Printing Office, January, 1966), p. 80.

## APPENDIX B

### SUMMARY OF ELECTIVE MATERIAL PREPARED BY USAAGS<sup>1</sup>

#### Packet A

Consists of 40 hours of common elective lesson plans, in five segments.

1. Introduction to Data Processing (5 hours).
2. Computer Languages, Media, and Equipment (6 hours).
3. Data Storage Media and Central Processing Unit Operation (7 hours).
4. Computer Programming (14 hours).
5. Introduction to Systems Analysis and Army Applications (8 hours).

#### Packet B

Consists of 85 hours of common elective material, in eleven segments.

1. Introduction to Data Processing (9 hours).
2. Automatic Data Processing Equipment (8 hours).
3. Computer Concepts (5 hours).
4. Block Diagraming (4 hours).
5. Introduction to Computer Programming (13 hours).
6. Data Transmission (5 hours).
7. ADP System Analysis (14 hours).
8. Operations Research (4 hours).
9. Army Applications in ADP (13 hours).
10. The Army Statistical and Accounting System (3 hours).
11. Division Data Processing (6 hours).<sup>1</sup>

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<sup>1</sup>U.S., Department of the Army, Letter from USAAGS, Subject: "Material to Support Advanced Course Elective Program," Fort Benjamin Harrison, Indiana, December 27, 1966.

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