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AIR COMMAND
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─── STUDENT REPORT ───

ACSC INTRODUCTION TO MICROCOMPUTERS
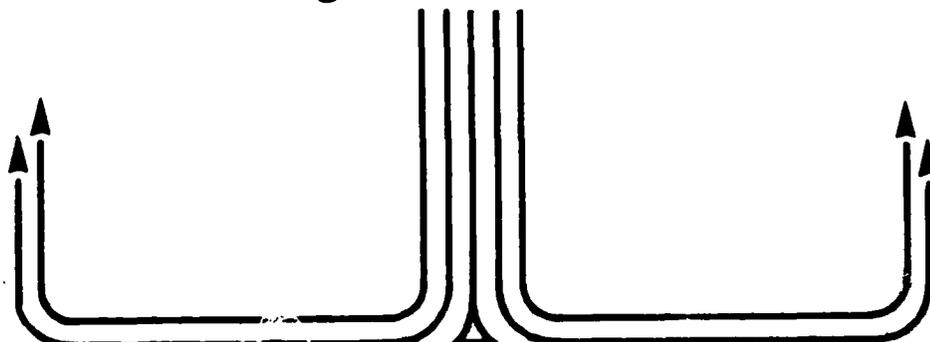FOR AIR FORCE LEADERS

MAJOR THOMAS G. JAMES JR.   87-1330

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REPORT NUMBER 87-1330

TITLE ACSC INTRODUCTION TO MICROCOMPUTERS FOR AIR FORCE
LEADERS

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SPONSOR LT COL MIKE STEWART, ACSC/EDM

Submitted to the faculty in partial fulfillment of
requirements for graduation.

AIR COMMAND AND STAFF COLLEGE
AIR UNIVERSITY
MAXWELL AFB, AL 36112

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-018*

1a. REPORT SECURITY CLASSIFICATION	1b. RESTRICTIVE MARKINGS
UNCLASSIFIED	

2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT
	STATEMENT "A"
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	Approved for public release; Distribution is unlimited.

4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
87-1330	

6a. NAME OF PERFORMING ORGANIZATION	6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
ACSC/EDCC		

6c. ADDRESS (City, State, and ZIP Code)	7b. ADDRESS (City, State, and ZIP Code)
Maxwell AFB AL 36112-5542	

8a. NAME OF FUNDING/SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS			
	PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO	WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)

ACSC INTRODUCTION TO MICROCOMPUTERS FOR AIR FORCE LEADERS

12. PERSONAL AUTHOR(S)

James, Thomas G. Jr., Major, USAF

13a. TYPE OF REPORT	13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 1987 April	15. PAGE COUNT 44

16. SUPPLEMENTARY NOTATION

17.	COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This study documents the needs assessment step of the Air Force Instructional System Development process for a microcomputer training course to be taught at ACSC as part of the core curriculum and the ACSC elective program. The study discusses the issues surrounding the training requirement, survey development and administration to ACSC class 1987, recommended course content, and the implementation of the developed course.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	UNCLASSIFIED

22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE (Include Area Code)	22c. OFFICE SYMBOL
ACSC/EDCC Maxwell AFB AL 36112-5542	(205) 293-2483	

DD Form 1473, JUN 86 — Previous editions are obsolete.

PREFACE

When I entered college in the late 1960's it was said that the computer age was coming to the business world and society as a whole. When I was teaching high school in the 1970's it was said that the computer age was coming to the education field. When I entered the Air Force in 1974 they said the computer age was here. Since 1960 I have dealt with computers in one form or another, from the big and slow machines of the 60's to the small, superfast number crunchers of today. When the world discovered that computers process information we no longer said the computer age is coming, we said rather that the information age was here. Since I have worked in the mixed fields of computers and education, and since computers require that a constant education process occur to keep pace with technology, the subject of computer training has always interested me. In the past Air Force leaders never had to deal with computer training, they just left it to the computer professionals. Our leaders have always been frustrated by the unresponsiveness, difficulty of use, and the large costs associated with computers; and have concentrated on the procurement of computers rather than the support aspects. The information age and the advent of small computers (microcomputers) has resulted in Air Force leaders becoming more like computer professionals. "End-user" processing, small computers in the office environment, is a fact of life which today's Air Force leaders must deal with. Professional military education has a bigger burden today in training tomorrow's leaders. This paper, hopefully helps the faculty of the Air Command and Staff College prepare for a curriculum dealing with microcomputers and the information age for all of its future graduates.

I want to thank my project sponsor and project advisor Lt Col Mike Stewart, for his help and guidance throughout this effort. I would also like to thank my wife Carol, for her patience and untiring devotion — thanks Carol.

Major Tom James
17 February 1987

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1

iii

A-1

ABOUT THE AUTHOR

Major James began his military career in 1966 when he was drafted into the U.S. Army. He served in various capacities as a rifleman in an infantry company with an assignment to Vietnam during the Tet offensive. Major James returned to the University of Arizona and earned his B.S. in Computer Science and Mathematics in 1972. He taught high school mathematics in Tucson, Arizona before entering the Air Force in 1974 through the Officer Training School. Major James' first assignment in the Air Force was as a computer systems program officer with the Air Force Avionics Laboratory at Wright-Patterson AFB, Ohio. While with the Avionics Laboratory, Major James was responsible for the maintenance of large software development efforts in support of advanced avionics systems. Also, Major James was responsible for predicting the software life cycle costs associated with airborne avionic systems. As a result of his work with software life cycle cost predicting models, Major James wrote and presented several technical papers at several computer conferences on the subject of software cost estimation. While with the Avionics Laboratory, Major James attended the Squadron Officers School in-residence. Major James was selected as a Flight Commander at the Officer Training School in 1978 where he commissioned over 200 officers in his three years as an instructor. Major James graduated from the instructor development course as a distinguished graduate, was awarded the master instructor rating, and selected as instructor of the month and quarter. He received his Masters Degree in Systems Management from St. Mary's University in 1981. Major James was assigned to the Air Force Logistics Management Center, Gunter Air Force Station, as a computer systems staff officer in 1982. During that assignment, Major James worked computer efforts to improve base-level logistics functions, most notable was the computer assisted transportation system now used throughout the Air Force on the Z-100 microcomputer. Major James was a member of the 1984 ADP Air Force Management Analysis Group cited in this paper and served as the project manager for the Small Computer Applications for Logistics Engineering (SCALE) project. He presented technical findings at the first and second annual Air Force Small Computer conferences. He left Gunter Air Force Station for Air Command and Staff College in August 1986. Major James has over three years experience developing software programs on the Z-100 microcomputer. He managed a logistics applications branch as the branch chief, which performed software development on mainframe, mini, and microcomputers. Major James is married to the former Carol E. Mantovani and they are the parents of two girls, Nicole and Kimberly. Major James' awards include the Bronze Star, Purple Heart, Meritorious Service Medal with two oak leaf clusters, Air Force Achievement Medal, Outstanding Unit Award with two oak leaf clusters, Combat Readiness Medal, the National Defense Service Medal and the Combat Infantry Badge.

iv

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

FIGURES

EXECUTIVE SUMMARY

Part of our College mission is distribution of the students' problem solving products to DoD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

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REPORT NUMBER 87-1330

AUTHOR(S) MAJOR THOMAS G. JAMES JR., USAF

TITLE ACSC INTRODUCTION TO MICROCOMPUTERS FOR AIR FORCE LEADERS

I. <u>PURPOSE</u>: To document the needs assessment step of the Air Force Instructional System Development Process for a microcomputer training course to be taught at ACSC as part of the core curriculum and ACSC elective program.

II. <u>PROBLEM</u>: Microcomputers are arriving throughout the Air Force and are being left at the door steps of offices. In some cases these microcomputers remain in the original boxes for weeks and months until someone in the office feels brave enough to open the box. Little or no training is given to the actual user, let alone to the managers of these electronic offices of today. The current Introduction to Desktop Computer Course taught by the ACSC elective program is one step in the right direction to getting the "boxes" opened sooner, however, the elective program could be improved. Several factors need to be considered when addressing the needs of today's leaders with regards to a microcomputer course for the ACSC population. First, the present elective course needs to expand the number of students allowed to attend. Second, the scope of the course content needs to address the management issues which will be faced by the ACSC graduate. Third, to account for the varying degrees of experience within the ACSC classes, the course developed should be self-paced and tailored to the individual student.

III. <u>DISCUSSION</u>: The paper looks at the problem from the point of view of the present student attending ACSC. In order to determine what the needs of the student are, a questionnaire or survey was developed and administered to the ACSC class of 1987. To arrive at the recommended content of the core ACSC

microcomputer training course, the data obtained from the survey was compared to current courses taught by the industry and the Air Force. In order to prepare good managers and leaders, this paper investigated the blend of acquiring a working knowledge of microcomputers along with the management factors surrounding their application. The needs of the students were viewed from the perspective of preparing them to assume middle management and leadership positions requiring the use of microcomputer technology and office automation techniques.

IV. <u>CONCLUSIONS</u>: The general findings of this paper can be stated and summed up as follows: the vast majority of students attending ACSC today are well aware of the efficiency which microcomputers can add to the accomplishment of their missions. To develop a course to meet the needs of all students is difficult since the level of expertise varies greatly depending on the subtopic, whether it be the acquisition and procurement of microcomputers, hands-on hardware operations, use of selected software packages, or the development of their own user developed application software packages. It can be stated that the students of ACSC need a microcomputer course which offers an understanding of the management factors surrounding the implication of microcomputers in the Air Force workplace, and which also allows more detailed specialized training in several selected software packages. As the technology changes, and as the needs of the students change with time, the task of ACSC will be to keep the course content in line with the student's needs.

V. <u>RECOMMENDATIONS</u>: In the near term, the elective, Introduction to Desktop Computers, should be emphasized and expanded to allow greater numbers of students to attend. In the long term, the ACSC curriculum should be expanded to include a goal or objective that all ACSC graduates will acquire a working knowledge of the fundamental skills to properly manage small computers in their work environment. This should be accomplished through a combination of core curriculum courses and the ACSC elective program, using self paced instruction which emphasizes the management functions for the proper utilization of microcomputer resources.

Chapter One

INTRODUCTION

BACKGROUND

Since 1982 when the Air Force Small Computer/Office Automation Service Organization (AFSCOASO) was founded within the Air Force Data Systems Design Center at Gunter AFS, Alabama, standard small computer systems, namely microcomputers, have been introduced in large numbers throughout the Air Force at all levels of management. Before the AFSCOASO was founded, the major Air Commands were buying microcomputers in relatively small numbers, however, the types and kinds of microcomputers varied from command to command. Lack of a standard microcomputer produced some obvious problems surrounding the use of different microcomputer hardware as well as software packages. The major problem as a result of not having a standardized microcomputer is the associated and recurring training costs when personnel are transferred. Another problem with the lack of standardization is the cost of computer software and the time and money being used to convert software from one machine to another. This paper addresses the training of Air Force personnel to perform their respective jobs using microcomputers, which has been somewhat simplified by this standardization of hardware and software packages. Another big problem that existed was the cost factor. It did not take the Air Force long to realize that if we, the Air Force, standardized on a microcomputer, and procured the machines in large numbers, we could realize a large cost savings. This cost savings would appear in the base price for the hardware as well as the software. Thus the formation of the office AFSCOASO with the primary mission of developing and administrating the Air Force standard microcomputer requirements contract. As a result of the growth of technology and the faster moving microcomputer market place, the single Air Force standard microcomputer contract has grown to a series of contracts. The most notable contract, and the first standard contract, was for a single stand alone microcomputer, which has become better known as the Zenith, Z-100 contract. Now we have several other Air Force standard contracts for portable microcomputers, TEMPEST hardware and follow-on contracts for the stand alone machine, which again is a Zenith machine, the Z-200.

What does this all mean to the future and present Air Force manager? Put simply, it means that the manager now has a standard microcomputer which can be used by them in the performance of their job. But, more importantly, it means they should expect that personnel who have been working with microcomputers in their previous assignments should not have to be retrained because XYZ command was using Apple Computers, and we now have the standard Air Force

1

microcomputer, the Zenith 100. Also the manager should quickly realize that programs (software packages) being used by someone else, or better yet, programs that they see in their travels around the Air Force can be exchanged (except for copyrighted material) and used throughout the Air Force as a result of common hardware. The picture is not quite as rosy as it should be, but things are improving. Several commands are still using command unique machines, however, these machines are slowly leaving the Air Force inventory as they age.

Many of us in the Air Force think of small computers (microcomputers) as small money and an area of little concern. The opposite may be more near the truth. Zenith Data Systems, a division of Zenith Electronics Corporation, through a competitive competition won the first of a series of standard requirements contracts for the Air Force stand alone microcomputer, and later won the follow on contract. This series of contracts, particularly over the last three years, have accounted for over $400 million in federal contract awards with a recent $242 million for the military's order of 90,000 machines and related products and services (1:103). This is a sizeable investment for the Air Force by any measure. Small computers do not mean small dollars. This also means that if officers in the Air Force expect to conduct their jobs and to remain proficient, they will probably come in contact with microcomputers and the Zenith Z-200. This is not to say that they will be using the hardware and software themselves, but they will most likely be working in a situation where the microcomputer is used or be supervising those who do use a microcomputer. Most managers in the past have planned for the procurement of the hardware and software, but few apply the proper planning when it comes to training personnel on the use of the procured hardware and software. An action plan was developed by HQ USAF/DPPE to improve the Air Force software management knowledge, referred to as "Project Bold Stroke" in November 1985. A major problem identified in this action plan was that a "general lack of awareness throughout the Air Force of the criticality of software and computer-based technology" was present (15:2).

PROBLEM STATEMENT

The Air Command and Staff College curriculum is designed to fulfill the College's six goals. Two particular goals are supported by this paper. First, to provide an environment for personal and professional growth. Second, to enhance professional skills required to command, manage, and lead aerospace force.

In order for us to be good managers of technology, one must acquire a working knowledge of that technology. The present ACSC elective program offers the ACSC student the only means of acquiring that knowledge dealing with microcomputers, to adequately address the needs of today's officers. The program provides relevant information and skills to face the challenges of applying microcomputers to the work environment. The four alternatives described below will be investigated:

2

1. Should all ACSC students be given some core instruction dealing with microcomputers during the early weeks of ACSC?

2. Should students be introduced to microcomputers solely through the elective program?

3. Should a combination of core and electives be developed to introduce ACSC future managers to the management issues facing the use of microcomputer technology?

4. Should ACSC be concerned with training ACSC students about microcomputers at all, either through the elective program or in the core curriculum?

SCOPE AND LIMITATIONS

Since the topic of microcomputer training is a very hot issue in today's Air Force, this paper will only address the idea of training ACSC students to deal with this expanding technology from potential users of basic computer functions, and as potential managers applying technology to their career fields.

ASSUMPTIONS

Several assumptions are recognized:

1. Microcomputers are being procured across functional areas not just by computer professionals.

2. Only Air Force Standard Microcomputer Systems (Zenith options) will remain in large numbers throughout the Air Force.

3. The majority of ACSC students will assume management type positions upon graduation from ACSC.

4. Few will receive any formal training on microcomputers beyond what is available here at ACSC.

These assumptions will have to be reviewed from time to time by those responsible for the final microcomputer curriculum. Because of the large attention being given to personal computers and microcomputers by the commercial industries and the Air Force several of these assumptions will change with time. Today, in the Air Force, the knowledge of microcomputers by Air Force officers is recognized as a needed trait. The Air Force is familiarizing officers and enlisted personnel with microcomputers through the various training technical centers. Students, both presently and for the next ten years, attending ACSC will not have benefited from microcomputer training at technical training centers.

OVERVIEW

The first place to start is by looking at the present method and needs of the students. Chapter Two will look at the present ACSC elective program for the introduction of desktop computers, and the future of ACSC by exploring the ACSC technology plan. Chapter Three will concern itself with the development, administration and the results of the student survey. The survey results from the ACSC AY-87 students will be examined to determine what the needs of today's majors are regarding microcomputer training. In order to determine what the training requirements are, the survey results will be compared to that knowledge base taught in most commercial introduction to microcomputer courses, in Chapter Four. Finally, Chapter Five will list the conclusions and recommendations of this study. The final product will lay the foundation for a course dealing with the use of microcomputers that will meet the needs of today's Air Force leaders. It may seem obvious to anyone familiar with microcomputers that these uses are endless; however, to one who fears that computers will take over the world, this may not be so. Hopefully, the recommendations of this paper, once put into action at ACSC, will make them less fearful and apprehensive, and better Air Force officers.

Chapter Two

PRESENT ACSC MICROCOMPUTER TRAINING PROGRAM

PRESENT ACSC ELECTIVE PROGRAM

The ACSC elective program was formed since the officers attending ACSC come from a broad spectrum of career fields and Air Force specialities and also have had a variety of job assignments over their ten to eleven years of commissioned service. The elective program was formed with the above fact in mind, and the college has enabled them to pursue courses in selected areas of special interest and need (3:1). As a result of interest, several courses dealing with microcomputers (desktop computers) were developed. The student is able to attend three different elective courses throughout the school year. Under the area of command/leadership/management electives, the microcomputer courses were incorporated into the elective program.

The first course offered during session one is entitled Introduction to Desktop Computers. The course objective is "to provide the student with sufficient operational knowledge of desktop computers and their associated software to enable the student to meet professional needs" (3:18). The course basically deals with an introduction to the characteristics and capabilities of the Z-100 and Z-158 microcomputers. Topics covered include the development of microcomputers, hands on operation of the Z-158, review and use of word processing software, and a quick look at data base management systems (3:18). Several problems exist with this course. First, in the ACSC Class of 87, 63 students requested the course; however, class size is limited to 15 students. This means that less than three percent of the class is allowed to attend this introduction course, which is the foundation for the use of microcomputers. Another problem, as seen by this author, is the fact that 48 students' "professional needs" were going unfulfilled. Also, the course objective to "enable the student to meet professional needs" is stating that there is a need by majors in today's Air Force for a basic knowledge concerning microcomputers, yet that need has not been documented. The results of this paper will serve to document the objective and the need for an introduction to microcomputer course to be taught to all ACSC students. The content of such a course will be discussed in Chapter Four of this paper.

The second course dealing with microcomputers, taught through the ACSC elective program, is entitled Introduction to Word Processing. The objective of this course is to introduce the student to the word processing software package WORDSTAR. This is an important course from the ACSC perception, since the Z-100's will be placed in all the seminar rooms for student use in FY-87.

5

Also, since all of the students here at ACSC are required to write several assignments during the year, and these assignments could be conducted easier using the WORDSTAR program, it would seem logical that all students should be familiar with, or at least given the opportunity to learn about the WORDSTAR program. This creates several problems. First, the elective is for a class size of no more than 15 students. This leaves 97% of the student body unable to attend the elective. The College should recognize that some students will already know how to use WORDSTAR, and a microcomputer for that matter, but that there may be a large student population which does not possess the skills required to use the microcomputers in the classrooms. Again, this paper will give the planners some idea as to the students' knowledge level upon entering ACSC in the form of the survey to be discussed in Chapter Three of this paper. In any case, it should be a foregone conclusion that the training on microcomputers will have to be expanded at ACSC.

The last of the electives dealing wth microcomputers taught at ACSC is the Introduction to Data Base Management Systems. The objective of this course is to introduce the student to the software data base management package called CONDOR (3:20). Again, the same shortcoming as identified above exists, that is, a class size of no more than 15 students. There can be arguments made as to whether this class should be taught at all and whether CONDOR, which is not available off the Air Force small computer requirements contract anymore, or the more popular data base management system dBASE should be taught. In either case, a manager of microcomputers in the Air Force should have a working knowledge of how data base management systems work, and how and what they should expect their personnel to be able to perform. This course would probably not be directly applied to the ACSC curriculum by the students as would the Introduction to Word Processing.

It is not meant for the reader to interpret the above comments as saying that the microcomputer courses taught at ACSC are not needed. The comments are made to stimulate the idea that the microcomputer elective is not meeting the needs of the students in two regards: first the class size is much too small and should be expanded; and secondly, the "professional needs" of today's Air Force majors need to be further explored. As mentioned earlier, microcomputers are going to be appearing within the College at all levels, and it should seem logical that the training dealing with this increase should also be expanded. This situation is appearing throughout the Air Force at all levels within various organizations.

PROPOSED ACSC TECHNOLOGY PLAN

"The ACSC technology plan outlines the procedures and methods for ACSC to integrate technology into the curriculum and management aspects of the school" (12:11). Within that plan the use of microcomputer technology plays a large role. The plan stresses that there is a need to establish a method to identify the student and faculty training needs, and a means to meet those identified needs (12:3). The plan also brings up some interesting points regarding the management of this new technology. The plan states, "phase managers who identify, secure, evaluate, and effectively procure equipment and/or

software" must know how to perform these functions and have a procedure to help them. ACSC students should also be acquainted with these methods and ideas, for they quite possibly will be responsible for conducting the same types of functions as managers of microcomputer resources at their next assignment.

Another interesting point brought up in the ACSC technology plan is the fact that the College must "establish a procedure for individualizing the resident school curriculum to meet each student's unique needs" (12:3). If this is an accepted goal of the college, then a method must be developed to assess the student's unique needs. That instrument will probably find a large disparity in the student population. Some students cannot even use a typewriter, which becomes a major handicap when using microcomputers. Other students will arrive at the College with years of experience on Z-100 microcomputers. This problem was recognized in the ACSC technology plan as seen in the statement "this influx of equipment and software means there will be a computer in every classroom and almost every office" (12:3). Thus, the associated problems (such as training) will be arriving much sooner than planned when the Strategic Planning Document was drafted.

The technology plan mentions that the technology (microcomputers) must be tied to the curriculum at ACSC (12:11). We can see this in some of the student research projects, ranging from interactive lessons on the microcomputer to simulation wargames, budgeting simulation, to research papers involving microcomputer training such as this one. If student and faculty needs are properly determined, then an extensive training method should be developed to take advantage of the microcomputer hardware and associated technology. The plan further mentions that it would be a mistake to assume that the need for basic computer skills will go away (12:14).

The present ACSC elective programs in microcomputers are in place, and the ACSC technology plan is a big step in fully realizing the potential of microcomputers in the Air Force. Both of these programs are steps towards making the ACSC student better able to deal with computer technology on the job. Training 15 students each year on the use of microcomputers is inadequate, and the content of the course must be evaluated to meet the needs of the students. The remainder of this paper will address the needs as perceived by the students themselves and what the course content should be like. Finally, the author will suggest some concrete ways of achieving the goal stated in the Introduction to Desktop Computers, "sufficient operational knowledge of desktop computers and their associated software to enable the student to meet professional needs" (3:18).

Chapter Three

SURVEY OF CLASS AY 87

REASONS FOR SURVEY

The official Air Force process for curriculum planning is called the Instructional System Development (ISD) process (5:1-1). This is a systems approach to the development of courses taught at ACSC which involves the following five basic steps: analyze the system requirements; define the education and training requirements; develop objectives and tests; plan, develop, and validate the instruction; and conduct and evaluate the instruction (5:1-1). The ACSC elective program dealing with microcomputer training never involved the detailed ISD process; in fact, a pure ISD approach using the first two steps of the process, analyzing the system requirements and defining the education and training requirements, was never conducted.

The first step in the ISD process is the hardest, analyzing the system requirements. This step plus step two of the process, defining the educational and training requirements, is what this author will call the needs assessment. So the basic question addressed was, "Is there a need for ACSC students to have a basic understanding and working knowledge of microcomputers, and if so, what should this knowledge base be, that is, what should be taught?" To answer the first question, a survey was developed and conducted as part of this research project.

The survey was developed in order to assess the needs of the ACSC student body and the survey was administered to the AY 87 ACSC class. The plan of this research project was to administer the survey to both the ACSC and Air War College (AWC) classes, and then compare the results. As a result of some unforeseen problems the AWC population was not included in the survey population for this research project. The reader will notice that in chapter five, a recommendation is made for an analysis and comparison of the AWC data and the ACSC data.

With these facts in mind, the survey was administered to serve two primary purposes. First, ACSC student experience levels were measured, thus laying the ground work for future curriculum development efforts. Second, the student needs were identified in two areas: the survey identified the number of students requiring a "general knowledge" of microcomputers for "career broadening," and the survey also identified students who feel this would make

9

them "better managers" of those who use microcomputers on the job. The survey was thus the primary instrument for defining the needs assessment step of the ISD process.

Ideally, the results of the survey as administered to the ACSC student body would then be compared to the results obtained from the AWC, thus obtaining the true system requirements. The reason for this is the fact that ACSC students are being "trained" to be successful, better field grade officers, who will be performing the duties and functions of their predecessors, the AWC students.

The survey conducted was called a "census" survey, and was administered to the entire group of ACSC students, the total population or "universe" (6:1). The purpose for sampling 100 percent of the population is to assure that there was minimal error due to an artificial sampling criteria. The survey was given to all ACSC students through their ACSC distribution boxes and returned via the evaluation boxes located in the ACSC break areas. Returning to the question of sample size, and why 100 percent of the students were surveyed; there is a risk level as it relates to the sample size which is specified by two interrelated terms, the confidence level and the precision range (6:23). "To minimize your risk you should have a high confidence (say 95 percent) that the true answer lies somewhere within a small interval (say plus or minus five percent) around your sample answer" (6:23). Since the total student population of ACSC was 572 students, and the confidence level desired was 95 percent with a plus or minus five percent precision level as the absolute minimum, using the formula below, it was only required that 230 students be surveyed. Since this survey involved all 572 students, it can be said that the results are well over the desired 95 percent confidence level with plus or minus five percent precision level.

$$n = (NZ^2 \times .25)/ ((d^2(N-1)) + (Z^2 \times .25))$$

where: n = sample size needed, in this case 230
           N = total population size, in this case 572
           d = precision level, 5% = .05
           Z = difference factor, in this case 1.96 (table in reference 6)

CONTENTS OF THE SURVEY

The survey or questionnaire consisted of eleven questions. The first eight questions were simply YES/NO type questions where the respondent answered by circling the answer. Questions nine through eleven were "intensity questions" and used the Likert-type answer scale (6:34). These questions were to allow the students to respond in one of several degrees of feeling about a statement, ranging from strongly agree to strongly disagree. The entire questionnaire is shown in Figure One. Two of the questions, numbers one and three, gather facts and numbers of students who have "hands-on" experience with microcomputers. They were developed to gather the experience base of the student body which already have the basic skills, typing, diskette

10

handling, hardware care and use skills required. These two questions will come into play in a greater degree in chapter four of this report when the order of subjects or topics taught will be discussed. Questions two and four are follow-up questions for questions one and three. That is, if it was determined that the students own and use a personal computer, it was desired to know how they used that computer. The same held true for question three. Question four was used to find out how they used the computer on the job. In questions two and four the students were asked to circle all the ways that they used the microcomputer. It should be added here, that throughout the survey or questionnaire the terms desktop, personal, and microcomputer were used interchangeably. It is beyond the topic of this paper to discuss what is a microcomputer. Volumes of books have addressed this subject. Small computers, microcomputers, desktop computers, laptop computers, portable computers, etc. all have the same basic characteristics which this paper addresses.

INSTRUCTIONS: Help your fellow ACSC student with his research project. Please take a minute to complete this questionnaire and return via the evaluation boxes located in the foyers of the 3824 and 3822 STUS, ASAP. All questions which refer to "job" are concerned with your assignment prior to coming to this school and your follow-on assignment after ACSC. The terms microcomputer, desktop computer, and personal computer are used interchangeable for this questionnaire. THANKS! Circle your answer(s). Check branch of service. ____USAF ____USA ____Navy ____Civ/IO

1. Do you own a microcomputer? YES NO (If NO go to question #3)

2. Do you use your personal microcomputer for: (can circle more than one)
GAMES WORDPROCESSING DATA MANAGER GRAPHICS SPREADSHEET OTHER NONE

3. Did you use a microcomputer in your previous assignment?
YES NO (If NO go to question #5)

4. Did you use your microcomputer on your previous job for: (can circle more than one)
WORDPROCESSING DATA MANAGER GRAPHICS SPREADSHEET OTHER NONE

5. Have you managed or supervised personnel who have used micro-computers in their performance of their duties? YES NO

6. Do you know of others in your career field who use microcomputers on the job? YES NO

7. Do you know of functions performed by you on the job which could be performed using an automated spreadsheet, data base management system or word processor? YES NO

8. Are you aware of the Air Force Standard Microcomputer efforts?
YES NO

For questions 9-11: 1=Strongly Agree, 2=Agree, 3=Undecided, 4=Disagree, and 5=Strongly Disagree

9. Microcomputers would help me make better, more timely decisions in the performance of my job.
1   2   3   4   5

10. A general introduction to microcomputers should be taught to everyone at ACSC.
1   2   3   4   5

11. Knowledge of microcomputers would make me a better manager and supervisor of those that do use microcomputers.
1   2   3   4   5

If you are Air Force, what is your primary AFSC _____.
Thanks again for your help! Please place this answer sheet in the evaluation boxes located on the first floor in the foyers of the 3824 and 3822 STUS.
ACSC SCN 87-7 Expires 17 May 87

Figure One
STUDENT QUESTIONNAIRE

When answering questions two and four the students were given certain selection/options to choose from. Word processing contains that class of software which helps the user edit, draft, type, spell, print and file large to small volumes of text material. Software packages in this class include such things as WORDSTAR, PEACHTEXT, EASYWRITER, etc. Which commercial word processing package selected is unimportant in determining the need, however, when developing the lesson plan to accomplish the teaching objective, this must be considered. Going from one word processing package to another can involve a lot of "un-learning"; however, basic skills do carry over. The term data manager referred to commercial packages designed to manage large volumes of data and simple manipulation of the data. Such programs included were CONDOR, dBASE II, dBASE III, etc. Which package is selected is unimportant for the needs analysis, but more detailed analysis is needed in actual lesson plan development. Graphics referred to the commercial packages, and possibly several Air Force developed packages, to chart data and text, examples being GRAPHTALK, DATACHART, and the Air Force program called CHART. Spreadsheets referred to the popular electronic spreadsheets which perform calculations to produce other numbers where the user defines the equations and operations to be performed such as LOTUS 1-2-3. The term OTHER was used to collect data on all the other programs written by users and organizations which perform unique functions.

Question five was used to gather information on the management aspects of the student body. A lot of Air Force personnel manage people who use microcomputers without any knowledge of the computer aspects of the job. Again, this will be important in developing the objectives of the core course, asking the basic question, "Should the course be geared toward the user or the manager of those that do actually use computers, or both?" Questions six and seven were to gather data on students who know of the power of a microcomputer from others in the field or from their own experiences. Question eight served as a knowledge type question. Question eight gathered information on the number of students who knew about the Air Force standardization efforts in microcomputers through Air Force microcomputer efforts, such as DIAL-A-LOG, Air Force/Navy Zenith contracts, and the Small Computer Technical Center (SCTC).

Questions nine through eleven were used to obtain the students' feelings on certain topics. Question nine asked the question, "Do microcomputers help you do a better job?" In the next section a comparison of this question with questions one and three will be shown; that is, do people who use microcomputers see them as helping or improving their performance. Question ten is the heart of this research effort and asks the students if they feel that all ACSC students should learn about microcomputers. Again, the results will be discussed in the next section of this report. Question eleven is very closely related to question nine. Question eleven asked, would knowledge of microcomputers help or make them better managers; where question nine asked, would computers help them make more timely decisions on their jobs?

RESULTS OF THE SURVEY

Historically, to receive over fifty percent of the surveys distributed for data analysis is considered a good response. The questionnaire on microcomputers was distributed to 572 students in the ACSC AY 87 class, 100 percent of the population. Of the 572 questionnaires distributed, 394 questionnaires were returned, for a return rate of 68.88 percent. If this return rate is compared to the number of the population size required for a confidence level of 95 percent with a plus or minus five percent precision level, which was 230, then it can be said the results represent the student population with a large degree of confidence.

First let's consider the raw data received. Looking at question one, 299 answered yes, they own a personal computer, with 95 stating they did not own a microcomputer. This results in 75.89 percent of the student body owning their own microcomputers with less than 24.11 percent, a quarter of the class not having any microcomputer experience. Question three asked whether they used a microcomputer on the job and 137 answered no, they did not use a microcomputer. Translated to percentages, 65.23 percent used microcomputers on their previous assignments, with 34.77 percent not interfacing with microcomputers on the job. These two facts taken together should tell the curriculum planners that the AY 87 ACSC student body is very "computer literate". Also, it is more than likely that the officer in today's Air Force will directly work with a microcomputer on the job.

Looking at the skills and uses that the microcomputer is being used for, there is a correlation between home use and office use. Responses to question two showed that of the people who owned home computers, 58.19 percent used them for playing games, 97.99 percent used them to perform word processing, 36.12 percent used a database management system, 37.79 percent performed some kind of graphics application, 32.78 percent used the spreadsheet programs, 9.39 percent performed some other function on their computer and .51 percent let their computers at home gather dust. If we look at how the microcomputer is used on the job, data indicates that 89.11 percent perform some kind of word processing, 48.25 percent do database management functions, 30.74 percent perform graphics applications, 29.57 percent use the spreadsheet functions, 23.74 percent perform some unique functions developed for their office. If we look at the order of use; that is, the highest percentage of use to lowest percentage of use, in both the home and office environments the function performed the most is word processing, followed by database management, graphics, spreadsheet, and unique applications in that order.

Question five, dealing with the management or supervision of personnel who use microcomputers on the job, 370 students or 93.91 percent of the students stated they supervise and manage microcomputers and personnel using microcomputers. Yet, looking at question eight, only 51.03 percent, 198 students are aware of the Air Force standard microcomputer program and the management issues surrounding the regulations regarding the management of small computers. Questions six and seven can be considered together.

14

Question six asked if they were aware of others in their career field using microcomputers; 370 students answered yes, for a percentage of 93.91, and 24 students answered no, for a percentage of 6.09. Regarding whether they could see other functions which could be done on a computer, 357 students answered yes, and 37 students answered no, for 90.61 percent and 9.39 percent respectively.

Considering the students' feelings; that is, questions nine through eleven, is considerably more difficult. Question nine asked, would microcomputers help them make better, more timely decisions on their jobs? The results were 117 students strongly agreed, 160 students agreed, 58 were undecided, 36 disagreed, and 18 strongly disagreed. This translates to percentages as follows: 19.7 percent strongly agreed, 40.61 percent agreed, 14.72 percent undecided, and 9.14 percent disagreeing and 4.51 percent strongly disagreeing. It is interesting to note, although comments were not asked for, several students wrote comments regarding this question. All comments were associated with the strongly disagree responses. Of the 18 students who strongly disagreed, two students wrote comments to the effect that decisions were made quicker with the use of a microcomputer, but the decisions were not necessarily better, (Not really the question, but it explained their response). It can be said from question nine that over 69 percent of the students felt decisions were helped through the use of microcomputers. Question ten asked the student if a general introduction to microcomputers course should be taught to everyone at ACSC. The responses again showed some interesting trends. One hundred and twenty six students answered that they strongly agreed, 108 were in agreement, 49 students were undecided, 68 students disagree, 42 students strongly disagreed. In percents, this translated to 31.98 percent strongly agreed, 27.41 percent agreed, 12.44 percent undecided, 17.26 percent disagreed and 10.66 strongly disagreed. Again several comments were received concerning this question. The comments fell into two general categories. First several comments said the course should not be technical in nature but more for managers and the knowledge required of managers; and second, all students should not have to take the course, only those students who do not already possess the skills. The author will address these comments in the recommendations section of this report, because these comments and the statistics are related and meaningful. Question eleven asked the students if knowledge of microcomputers would make them better managers and supervisors. One hundred and thirty three answered strongly agreed, 176 students responded with agreed, 42 students were undecided, 23 students disagreed, and 13 students strongly disagreed. Again the percentages were, 33.76 percent strongly agreed, 44.67 agreed, 10.66 undecided, 5.84 percent disagreed, and 3.30 strongly disagreed. Generally over 77 percent agreed that knowledge of microcomputers would make them better managers and supervisors. The raw numbers and percentages are presented in summary format in Figure Two.

15

Question #	Yes Raw #	Yes %	No Raw #	No %
1	299	75.89	95	24.11
3	257	85.23	137	34.77
5	288	73.10	106	26.90
6	370	93.91	24	6.09
7	357	90.61	37	9.39
8	198	51.03	190	48.97

*SEE NOTE

#	Games	WordP	DBMS	Graphics	Sps	Other	None
2	174/58.19	293/97.99	108/36.12	113/37.79	98/32.78	37/9.39	2/.51
4		229/89.11	124/48.25	79/30.74	76/29.57	61/23.74	13/3.30

#	1	2	3	4	5
9	117/29.7	160/40.61	58/14.72	36/9.14	18/4.57
10	126/31.98	108/27.41	49/12.44	68/17.26	42/10.66
11	133/33.76	176/44.67	42/10.66	23/5.84	13/3.30

Figure Two
STUDENT RESPONSES

NOTE: Questions 2, 4, 9-11; numbers shown as follows:
raw numbers/percentages

In summary, over 58 percent of the students felt that a general
introduction to microcomputers should be a part of the core curriculum and
taught to everyone at ACSC. On the other hand, over 77 percent felt that
knowledge of microcomputers would make them better managers and supervisors of
those that use microcomputers. Also significant is the fact that over 69
percent felt their decisions made on the job would be improved and more timely
using microcomputers. The results of the survey will be considered in the
rank ordering of the topics which should be covered in the course on
microcomputers taught at ACSC. Whether that course should be part of the core
curriculum or some form of an elective will be discussed in the recommendations
section of this report. The survey results should draw the reader to one
overriding conclusion; microcomputers are becoming a tool which all future
officers, regardless of career field or specialty, will have to use or deal
with in the future, regardless of assignment. If the student arrives at ACSC
without prior knowledge of microcomputers and the management issues
surrounding their use, the student should be given the opportunity to acquire
knowledge of this growing field and technology.

Chapter Four

TRAINING REQUIREMENTS

USES OF MICROCOMPUTERS IN THE AIR FORCE

In September 1984, the Air Force Management Analysis Group (AFMAG) on Data Systems Management and Manpower Impacts was commissioned by the Chief of Staff of the Air Force "to investigate the manpower growth in Data Systems Management" (21:2). Several issues or ideas were developed and investigated by this group which involve the use of small computers. One issue, in particular, which deals with the subject of this paper was titled, "computer training/literacy/proficiency" (16:16-1). The overall finding of this group was that "Commanders and senior managers must become literate in computer technology to more effectively manage Air Force resources" (16:16-1). This same study found that as the technology of small computers advances, and as a result of the large "back logs" in the software development process within the Air Force, most software developed in the future will be done by the end-users. This means that more often managers in today's Air Force will be developing or supervising workers in the development of software to operate on their own office microcomputers. This is sometimes referred to by computer personnel as a more distributed processing environment, that is, processing at the office level rather than on big Air Force mainframe computers. Another important finding by the AFMAG on ADP (Automated Data Processing) was "Information systems awareness and computer literacy vary widely across the Air Force" (17:21). The study further stated that, "The age of small computers has raised the level of computer literacy by younger officers, airmen, and civilians and that at about the Major or Lieutenant Colonel grade, computer literacy outside the ADP career field varies widely depending on personal interests" (17:21).

It was recommended by the 1984 ADP AFMAG that, "A major campaign should be conducted to improve the computer literacy of Air Force personnel, and this action is particularly important if the focus for the development of information systems is moved to the end user" (17:21). The AFMAG study group visited several Air Force installations and found that training was limited in scope at all organizational levels across all career field and functional levels (16:16-2). Stated as one of the AFMAG's findings was, "A need exists to develop short term ADP training courses for commanders and senior managers (Lt Col, GM 14, MSgt and above)" (16:16-2). More importantly to this research paper was the fact that "Professional military education (PME) schools, except the senior NCO Academy, are devoid of mandatory computer literacy training" (16:16-2). Several recommendations were made by the

17

1984 AFMAG on ADP. The recommendations concerning the use of small computers and microcomputers in particular can be summarized as follows: (1) develop a one-time short course to teach computer literacy to Air Force managers, (2) the course for Air Force managers should be five days in length and should be conducted semi-annually for two consecutive years, (3) "professional military education schools should be expanded to include mandatory computer literacy training" (16:16-3) and (4) "Air University should be tasked to develop appropriate computer literacy courses for SOS, ACSC, and Air War College" (20:10). An interesting note is that the study also recommended that a computer literacy course would be developed for senior management personnel (both officer and enlisted) not designated for PME. It should be evident from the remarks and recommendations of the study group that it is felt that all Air Force members regardless of rank and career field should become computer literate, and that a plan to undertake this training should be developed to train all present and future Air Force personnel.

The uses of microcomputers within the Air Force are as varying as the missions and jobs which we perform. To get a feel for how microcomputers are being used throughout the Air Force, all one has to do is look at one of the many software exchange methods used within the Air Force today. Air Force Communication Command through the Air Force Small Computer/Office Automation Service Organization operated the Air Force Small Computer Software Exchange System referred to as DIAL-A-LOG (11:2). DIAL-A-LOG is, "a menu-driven, on-line system for information exchange between Air Force small computer users" (11:7). Within the DIAL-A-LOG data base, small computer software programs developed by Air Force personnel to perform a variety of jobs are listed and shared with the rest of the Air Force. These software programs for microcomputers range from simple word processing, "templates" for developing Officer Effectiveness Reports (OER's) and Airmen Performance Reports (APR's), to complex programs such as mobility personnel planning programs. If you look at the programs in the DIAL-A-LOG data base, one can see that microcomputers are performing various functions from the squadron level to the headquarters level throughout the Air Force. To see how microcomputers are being used throughout the Air Force, the DIAL-A-LOG data base is but one source. Several of the functional users throughout the Air Force have established their own software exchange data bases for microcomputers; for example, the logistics community has developed and is using their system called the Small Computer Application for Logistics Engineering (SCALE) data base (6:1). The SCALE data base lists software programs developed by and for the logistics functions (supply, maintenance, contracting, transportation, and logistics plans) which are developed by Air Force personnel and operate on microcomputers. Again, the uses for which microcomputers are being utilized within the logistics community throughout the Air Force vary from simple programs such as CHART, which prepares and prints presentation graphs and text slides, to complex programs such as the Computerized Harvest Bare Asset Management Prototype (CHAMP) used by Logistics Planners for inventory management (5:18).

The point of the above discussion is to show that high level decision makers have found that the small computer is becoming an essential tool which Air Force managers at all levels, today and in the future, will have to

18

understand, apply, and manage to meet today's missions. The survey and questionnaire which was administered to the AY 87 class of ACSC supported the findings of the study mentioned above. The survey showed that 73 percent of the officers attending ACSC have managed and supervised personnel who have used microcomputers on the job, yet only 51 percent knew about the Air Force standard microcomputer program, which will be explained later in this chapter. As a class the questionnaire showed that microcomputers are being used to perform various functions on the job. Word processing applications constituted the largest majority with 89 percent of the people who use microcomputers on the job, using them to perform wordprocessing. Some form of data base management made up the next largest class of use for a microcomputer, with 48 percent of on the job use. The third largest use for a microcomputer in the work place was a close tie between some form of graphics applications and electronic spreadsheet use, both being used by 30 percent of the population. The final category of use for a microcomputer on the job was the class referred to as "other," with 23 percent. The "other" category of software was meant to refer to the software which was either written in some high-order language such as BASIC, by someone in the Air Force, or communication type software used to link two or more computers for data transfer. These uses of microcomputers in the work place will play an important role when it comes to the development of the course for today's officers.

COMPUTER LITERACY OF AY 87 CLASS

As mentioned earlier, the ADP AFMAG study group in April 1985 put together a final implementation plan for data systems management and manpower initiatives which was approved by the Assistant Vice Chief of Staff, Headquarters Air Force (20:5). In that plan the Air University was tasked to "develop appropriate computer literacy courses for SOS, ACSC and Air War College" (20:10). Further, ATC was tasked to develop an easy to teach computer literacy course to be taught at the bases, and to OTS and ROTC students entering the Air Force (20:10). This author was unable to find the course which was developed to meet the tasking mentioned above, it appears such a course has not officially been developed to satisfy the requirements cited above. What is to follow in the remainder of this chapter is the search for, and recommendation for, the course content of a course designed to meet the needs of all officers graduating from ACSC. This course will not address all the needs of the course tasked by the ADP AFMAG because it will be microcomputer orientated, not general ADP orientated. That is to say, the tasking by the ADP AFMAG and the Assistant Vice Chief of Staff of the Air Force is for a computer literacy course dealing with the manager of information management systems regardless of the size of computer, mainframe, minicomputer, and microcomputers. The course recommended for ACSC students would deal with small computers and microcomputers in particular. The title of this section implies and brings up a hotly contested issue in today's Air Force by the mere mention of the term "computer literacy". A good definition of what is meant by computer literate is lacking from any discussion of computers. For the purpose of this paper, computer literacy will mean, "that body of knowledge needed by today's officers to deal with microcomputers in the optimum way in the accomplishment of their missions." As the word literate implies, one may

19

be able to read, but you may not necessarily understand everything you read, the same should hold true for our definition of computer literate. The student of the recommended microcomputer course is not expected to be a technical expert, but rather have a working knowledge of the issues surrounding the use of and management of microcomputers in today's Air Force.

A number of organizations have recognized that the training of microcomputer users is the key ingredient to the successful utilization of microcomputer resources. The Department of Defense Computer Institute (DODCI) is a component of the National Defense University and was established to teach information resources management to military and civilian executives within the Department of Defense. "DODCI currently offers both resident and 'road show courses' in computer literacy for managers, and trains approximately 518 Air Force personnel per year" (16:16-2). Some examples of the courses taught by the DODCI and their complexity or length are: Automated Information Systems Management for Senior Executives, 15 1/2 hours, for three days; Automated Information Systems Management for Intermediate Executives, 61 1/2 hours, two weeks; Computer Literacy for Managers, On-Site only, 30 1/2 hours, one week; and Managing and Using Small Computers, four days in length (20:16-5). The Small Computer Training section located at Keesler AFB has developed a three day executive level training course which is closer to the needs of today's ACSC student (25:—). The course is available on diskette, and contains the objectives, sub-objectives, script, slides, and exercises which are to be used to familiarize Lt Cols and above with the issues and uses of the Zenith microcomputer. The course is a little out of date due to the fact that the requirement for the course was not officially developed, that is to say, the small computer training section at Keesler AFB saw a need for such a course and developed the course without official tasking. Due to manpower requirements for official projects, work was stopped on the executive level microcomputer course (24:—). The ACSC associate program has developed a course entitled "Microcomputer Literacy", course number 00034F, and like the resident ACSC microcomputer courses, it is an elective not a mandatory course (13:1). The ACSC associate programs course is a Zenith Z-100 microcomputer course, and again is a good introduction to the hardware and BASIC program language used on the Zenith microcomputer. Upon examination of the ACSC associate programs microcomputer literacy course, the only criticism which this author would make is that the course is too technical in nature to be called microcomputer literacy. The course is based on teaching the student the fundamentals of a microcomputer along with the BASIC programming language. As was seen from the survey of AY 87 ACSC class, the microcomputer can be put to good use in the office environment without doing any actual programming of the computer. Most computer applications were accomplished through the use of commercial application packages such as word processing and data base management systems. The latter approach has been taken by the ACSC in-resident computer courses. The electives taught at ACSC deal more with the commercial applications packages, one being a word processing package and the other being a data base management system. Upon examination of this course it

20

can be seen that the content does not address the management issues of a microcomputer but is more concerned with teaching the student how to use the microcomputer.

The course to be developed must meet two more criteria. The objectives must be expanded to encompass the issues facing the proper management of microcomputers, and the expanding technology of small computers in the office environment. The course developed must also keep pace with the technology which, in most cases, will be the most difficult step. The second fact mentioned above will be expanded upon in the recommendations section of this report, but just to clarify that point somewhat, whatever course is developed must be under constant review and revision to keep pace with the needs of the student and changing environment of microcomputers. An example of this changing environment is a look at the Air Force small computer requirements contract for the Zenith microcomputer   Since the contract was officially put into action, there have been over ten ammendments made to account for changes in technology of the hardware and software advances. These changes in hardware and software issues effect the management of these resources in the office, plus the ever changing management rules stated in the current 700 series regulations. All these actions have taken place since 1983, and if current literature is assumed true, the microcomputer technology will expand and change with major advancements at least yearly. The point being that whatever course is developed this year, it should be understood that the course will need a revision every year thereafter. The manager of microcomputers should be made aware that the ever changing technology of microcomputer hardware and software will involve repeating the acquisition process constantly. As a result, this will involve retraining their personnel and keeping themselves abreast of the evolving management issues facing the employment of microcomputers in the Air Force.

WHAT ARE THE STUDENTS' NEEDS?

The recommendations made within this section should be kept in mind when developing the course objectives which will meet the needs of today's ACSC students with regards to microcomputer issues for Air Force leaders, the topic of this research project. It cannot be overstressed that whatever course is taught by the in-residence ACSC staff, must be constantly updated to reflect the current management practices within the microcomputer technology field. Thus far the courses developed by the residence and associate ACSC programs have focused on the "hands-on" approach to microcomputers. This approach is most definitely needed in any course, but more importantly, and generally lacking, is the management aspects of employing microcomputer technology to the workplace. One high level recommendation for the content of a short term course on ADP was that the course include: survey of computers, computer fundamentals, programming process, storage and input/output devices, survey of software, programming languages, minicomputers and microcomputers, database administration, operating systems, teleprocessing technology, automated information system acquisition, database management systems, automated office, system performance evaluation, interactive systems, distributed processing, future looks, hands-on segment, and basic data

communications (16:16-8). This is a rather large list of topics and the informaton would not benefit a lot of managers whereas a general knowledge of these subjects is required of managers of large automated systems.

It is recommended that any course developed for Air Force leaders be developed along the following topic headings: the acquisition and procurement of microcomputers; managing the hardware and software in the office environment; hands-on orientation of standard Air Force microcomputer hardware; hands-on orientation of standard Air Force microcomputer software packages; and finally, issues facing the development of user applications software packages. The remainder of this section will be a discussion of the course content under each of the above headings.

First, the topic heading of the acquisition and procurement of microcomputers should deal with those issues facing the managers who are planning to acquire microcomputers in their office environment, as well as the steps needed for them to effectively plan for the use of this new technology. The primary source for material to be contained in this section would be AFR 700-26, Acquisition and Management of Small Computers (9:—). This is a new regulation and the process and policies surrounding the procurement of small computers is constantly changing. Managers need to know about the role of the MAJCOM Small Computer Technical Centers (SCTC) in the procurement process of microcomputers. Also, managers must know that "all small computer requirements will be satisfied with computer resources from the Air Force wide requirements contracts with few exceptions" (9:3). In this way, managers cannot use local funds to procure Apple or IBM PC microcomputer systems. The manager should be made aware of the requirement as stated in the regulation governing the use of small computers, AFR 700-26, as well as look at the MAJCOM supplements to this regulation before proceeding further. Also, the regulation should be viewed if the supervisor is taking over an office which already has microcomputers in place, for in all probability the person before them was unaware of this regulation and the requirements it places on the manager.

Secondly, under the topic heading of managing the hardware and software in the office environment, the students need to be aware of their responsibilities as senior managers. Again, AFR 700-26 provides guidance in this regard. Under this topic subjects such as site preparation for new microcomputers, furniture and accessory requirements, supplies such as diskettes and computer paper, acceptance testing procedures, maintenance and backup procedures, issues such as safety audits and security audits, plus disaster recovery plans should be addressed. These issues, while sounding unimportant, will be the biggest problems facing the new manager. If covered properly in the course, it would take little time to discuss each issue and pay big benefits in the proper management of microcomputer resources. The manager needs to know where to go to acquire supplies and the proper procedures to protect their investment of time and money, backing up the software, and security of the information and hardware. Submitting and obtaining the proper training for their personnel is an issue which managers must plan for, otherwise the Air Force assignment process will leave the capabilities of the microcomputer in the office useless.

22

The topic of hands-on hardware training has been addressed very well in most courses developed thus far. The ACSC associate program and the resident ACSC course both deal with this subject in depth. The only comment that can be made regarding this subject is that both programs should continue to use the Air Force standard hardware procured from the Air Force requirements contract for student hands-on experience. This is for obvious reasons, since the ACSC students will be managing and using Air Force standard equipment upon leaving ACSC.

The topic of hands-on microcomputer commercial software applications packages is closely related to the hands-on hardware topic. To accomplish the hands-on hardware use, standard commercial applications software, acquired from the standard requirements contract should be used. One of the first things a user of a microcomputer needs to understand is the concept of a computer operating system. This is a commercial software package which put quite simply, allows the user to communicate with the machine and controls the operation of all other software packages operating on the microcomputer. This is an important topic since a basic understanding of the operating system commands is essential to the operation of any further software. The operating system taught should be the system now shipped with all Zenith microcomputers, and the one almost universally accepted as the industry standard, MS-DOS. MS-DOS is a registered trademark of the Microsoft Corporation and is the operating system being shipped with all microcomputers ordered off the Air Force standard requirements contract. Several training documents have been developed which could be used as the basic text for this portion of the course, one such document is the AFLMC MS-DOS 2.0/Zenith-150 USER'S GUIDE, developed by the Air Force Logistics Center (8:--). When choosing the commercial software to be taught in the ACSC course two general rules should be followed. First, when it comes to Air Force commercially procured software the course developer must keep in mind what is available on the standard requirements contract. The software package selected should be available to everyone throughout the Air Force and officially supported by the Air Force. Secondly, the course developer should choose the most "popular" software packages. Most of the industrial standards are available off the requirements contract but a careful and current selection should be made upon each review of the course. The author will make recommendations and state briefly the reason for the selection of the commercial software packages which should be taught at ACSC. It is beyond the scope of this paper to justify or even discuss the advantages and disadvantages of each choice. Discussions of this topic can be found in the monthly computer magazines. The software program recommended for the course under the heading of word processors is the package called WordStar. Wordstar performs all the typical functions of any other word processor, but also adds the features required to help the more advanced users of microcomputers for application programming. Not only can the user create, edit, and print text documents, but the advanced users can develop their computer programs using all the edit features available in WordStar. An excellent document and user's guide for WordStar was developed by HQ USAF/LEXY and can be used as the course material (22:--). The software package recommended for the course under the heading of data base management systems is not an easy choice. Condor is an excellent data base management system and is

probably the easiest to learn, but the package has several drawbacks. First, the data base created using the Condor package is not as transportable as others. By this it is meant that the user developed data base is not easily taken from the developer's microcomputer and installed on other users' machines without a lot of intermediate steps. Secondly, Condor may not be available on the requirements contract for all Zenith type microcomputers. A data base management system which does not have these shortcomings is the commercial package called dBase II/III. DBase is a more sophisticated data base system which takes more time to learn, but the flexibility that the system offers will benefit the student more in the long run. Another excellent document and user's guide for dBase was developed by HQ USAF/LEXY (18:1). The graphics packages recommended for the course should be the Air Force developed program called CHART and the commercial graphics package called Graphtalk. The electronic spreadsheet recommended would be the popular Lotus 123. Modem 7 should be the communications software package first introduced to the students which allows microcomputers to talk to other computers. Under the heading of management of user developed applications software, the manager of microcomputers must understand the problems and advantages of developing their own unique software. Topics which should be discussed in the course would include as a minimum the following points. If you are going to develop your own software, AFR 700-26 requires the developer to take certain actions. The developer must first check with their small computer technical center to see if software already exists which performs the required functions, and to obtain approval of the programming language chosen by the developer. If the developed program is over a certain length (lines of code) then documentation must be developed. These are just a few of the points which need to be discussed in the course to enhance the future manager's awareness of the many issues facing development of their own software applications packages.

In summary, the course developed by ACSC should include four major objectives: (1) the acquisition and procurement of microcomputers, (2) hands on orientation for the microcomputer hardware, (3) hands on orientation of standard commercial software packages, (4) and the management factors involved in user developed software. Additionally, there should be a mandatory course developed to acquaint all ACSC students with the basic issues facing managers in today's Air Force regarding application of microcomputers. More detailed courses should be offered as electives to allow the students to expand their professional expertise in the area of microcomputer technology. A summary of the topics to be included is shown in Figure Three.

GENERAL OBJECTIVE	SUB-TOPICS	REFERENCES USED
Acquisition and procurement issues	-Small Computer Technical Centers	AFR 700-26
	-AF Requirements Contract	
	-Site preparation	
	-Supplies	
	-Training issues	
	-T/A's	
	-Regulations	
	-Safety	
	-Furniture Reqt's	
	-Backup procedures	
	-Security	
	-Software Exchange	DIAL-A-LOG, SCALF
Hands on hardware orientation	-Configuration	Zenith Manuals
	--CPU	and
	--Printer	AFLMC Z-100 User's
	--Disk Drive	Guide
	Floppy Drive	
	Hard Drive	
	--CRT	
	-Power Up/Down	
	-Equipment Care	
	-Operating System	Zenith Manuals &
	-- MS-DOS	AFLMC MS-DOS 2.0/
		Z-150 User's guide
Hands on Software orientation (commercial)	-Word Processor WordStar	Zenith Manuals
	-Data Base Management CONDOR	User's Manuals developed by HQ USAF/LEXY
	dBase II/III	-DBase
	-Spreadsheet	-WordStar
	Lotus 123 (19:--)	-Lotus 123
	-Graphic	
	CHART (4:--)	AFLMC CHART User's
	Graphtalk	Guide
	-Communications	
	Modem 7 (23:--)	Modem 7 User's Guide
	Compac (14:--)	(HQ PACAF/ADMS)
	-High Order Language	
	Basic (Microsoft)	Zenith Manuals
User Developed Application Issues	-Approved Languages	AFR 700-9
	-Development Cycle	AFR 700-26
	-Documentation	
	-Training	
	-Commercial/High order language	

Figure Three
COURSE CONTENT

25

Chapter Five

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

FINDINGS

The questionnaire administered to the ACSC class of 1987 yielded some surprising results. One point that was apparent from the questionnaire was that private ownership of microcomputers has risen dramatically over the past several years, with over 75 percent of the class owning their own personal computer. In an informal survey done by this author of a typical Air Force organization, generally not over 35 percent of the personnel assigned owned a personal computer back in 1984. This higher percentage of microcomputer ownership by the ACSC student body might be explained by the fact that the officers attending ACSC are probably in the forefront of their profession based on the ACSC selection process. One would expect that young, aggressive professionals would be applying the currently available technology to their professions, and to do this they have taken initiatives to acquire knowledge about microcomputers by starting in the home environment. Another fact that may contribute to this high percentage was their selection to attend ACSC. Through personal contacts with a few ACSC students, several remarked that their purchase of a microcomputer was fueled by their selection to attend ACSC. Another point that was apparent from the questionnaire was that over 65 percent of the officers attending ACSC have used a microcomputer on their job. Over the past several years the microcomputer explosion in the workplace has reached the Air Force, and microcomputers will continue to appear in larger numbers as prices fall, and technology expands and increases, at dramatic rates.

Another general finding of this research effort has been that the training programs for microcomputers have been aimed at increasing the technical knowledge of the user, with little or no focus on the acquisition, planning, and management issues surrounding small computers. The Air Force has delegated the training programs to the manager of the small computer resources without any prior training of the manager with regards to the issues. With the high percentages of microcomputers being utilized within the Air Force, is it expected that all Air Force middle-managers be experts in small computer technology? As the debate rages on over what is "computer literacy" and "how much knowledge is enough", a general agreement probably can be reached that all officers at some point in their careers should be made "aware" of how to better use microcomputers in their work environment. There is however, no general agreement on where this training should take place, what the training should consist of, and who should receive this training. Recommendations have been

27

cited in the preceeding chapters of this report from various study groups, with each group pointing the finger at the other. The expenditure of Air Force resources for small computers, is not small, $242 million for the current military order of Zenith microcomputers is a sizable investment by any standards. Microcomputers will continue to be used throughout the Air Force and the Professional Military Education system within the Air Force is about to enter the microcomputer technology arena in a big way. The Professional Military Education institutions will not be able to take advantage of this technology unless all officers entering the schools are already knowledgeable of this technology, or are required to take a course to acquire that knowledge.

Supporting the general findings of this research project was a recent survey conducted by ACSC of the graduating classes of 1980 and 1984. The question was asked if they personally use computers in their workplace to accomplish their primary mission. The class of 1980 answered as follows: 12% said they use them very frequently, 18% use them frequently, and 19% use them occasionally, for a total of 49% of the graduates of class 1980 using computers on the job. Similarly, the class of 1984 responded with 24% using computers very frequently on the job, 19% using them frequently and 27% using computers occasionally on the job, for a total of 70% of the graduates using computers on the job. Another question asked of the two graduating classes was whether or not they feel they require a working knowledge of computer operations to effectively interact with individuals who use computers. The class of 1980 answered as follows: 15% said they require a working knowledge of computers very frequently, 30% said they frequently require that knowledge, 27% said they occasionally require knowledge of computers, for a total of 72% of the class stating they feel they require a working knowledge of computers to perform their jobs. Similarly, the class of 1984 responded with 27% feeling they very frequently require knowledge of computers, 22% said they frequently require a working knowledge of computers, and 24% said they only occasionally require a working knowledge of computers, for a total of 73% of the class of 1984 feeling they require a working knowledge of computers to accomplish their jobs.

CONCLUSIONS AND RECOMMENDATION

CONCLUSION 1

ACSC should add to its already expanding curriculum, the goal that all ACSC graduates will acquire a "working knowledge" of the fundamental skills to properly manage small computers in their work environment.

RECOMMENDATION 1

The fundamental skills to acquire a "working knowledge" presented in chapter four, figure three of this report, should be incorporated into the curriculum of ACSC. The general objectives presented in figure three will need to be expanded and determined which are essential. ACSC should work closely with the small computer technical training section, Keesler AFB, to determine the best way to fulfill the minimum requirements for ACSC students.

CONCLUSION 2

The student knowledge of microcomputers, especially the Air Force standard microcomputers (Zenith microcomputers) will vary from ACSC class, and from student to student.

RECOMMENDATION 2

An ACSC pretest needs to be developed to determine the general class knowledge level concerning microcomputers and to identify students requiring basic training. The pretest should identify students who already possess microcomputer hardware, software, and management skills.

CONCLUSION 3

To meet the needs of the student body a combination of core curriculum courses and the ACSC elective program should be used as methods of instruction.

RECOMMENDATION 3A

Two seminar hours need to be developed and taught to all ACSC students to fully take advantage of the microcomputers placed in the ACSC classroom. The first hour will be to explain the ACSC microcomputer hardware and the basic operation skills and procedures to each student. The software available on the ACSC microcomputer should be discussed, along with student usage policies, and school procedures for information security. The second mandatory hour should cover the material in AFR 700-26, the management of small computers, discussing the current Air Force policies.

RECOMMENDATION 3B

The current ACSC desktop computer elective should use the closed circuit television system to reach a bigger audience during the elective hours. This way the instruction on the use of the software application package would be available to a class size of at least 50 students. Using the classroom television system the instructor could teach to a minimum of 10 seminar rooms, at one time, with faculty instructors (FI) as teaching assistants located in the classrooms.

CONCLUSION 4

To fully take advantage of the microcomputers at ACSC the research project format should be amended for microcomputer related topics.

RECOMMENDATION 4

The students attending ACSC have a lot of untapped microcomputer experience which can benefit the school and other functional areas in the Air Force. During the initial days of ACSC the students scoring high on the pre-test should be solicited for microcomputer curriculum development research projects. Applications of microcomputers using a commercial software package, or writing a program in a high-order language, and the current writing requirements for the research program do not foster software development efforts by the students. The research department should modify the research project requirements for these efforts. Computer Aided Instruction (CAI) and self paced instruction courses could be used as instruction methods by several areas of the ACSC curriculum.

CONCLUSION 5

ACSC faculty instructors should be trained on microcomputer fundamentals by the Air Training Command team.

RECOMMENDATION 5

ACSC and the Air Training Command small computer training section, should work closely together to incorporate an executive level training program on microcomputers for the ACSC faculty instructors. The faculty instructors will serve in the classrooms where the microcomputers and students will be interfacing and can serve as excellent training assistants. Since microcomputer operations is only learned through hands-on training, the FI must be able to assist in the operations and explain to the student the fundamentals.

CONCLUSION 6

Microcomputer technology will be a constantly changing environment, with new hardware and software being added to the Air Force standard requirements contract.

RECOMMENDATION 6

Since the microcomputer hardware procured by ACSC and the rest of the Air Force will be constantly changing, the course developed to meet the students' needs must be reviewed yearly for accuracy and currency. A standing research project for the review of the ACSC microcomputer curriculum should be established, and students solicited yearly to review and make recommendations.

CONCLUSION 7

The method or methods developed to meet the objective of training all ACSC students in the fundamentals of microcomputers needs close coordination with the other professional military education schools, SOS and AWC.

RECOMMENDATION 7

A small computer technical council with members from the schools be formed at Air University. Members should consist of the three primary schools, SOS, ACSC, and AWC (both the in-residence programs and associate programs), the Air University's Small Computer Technical Center, and the AU Cadre. The council should coordinate and function as a user's group/technical advisor to the commandants, with the goal of improving the utilization of microcomputer technology within the Air Force professional military education system and the establishment of training programs within their respective schools.

SUMMARY

This research project has addressed a difficult, often overlooked, subject. The Air Force prides itself on being in the foreground of applying current state-of-the-art technology to the accomplishment of its mission. The subject of small computers and the application of microcomputers to the performance of the Air Force mission is a very difficult topic at best, and the Air Force has made great strides towards this goal. The relationship between the application of microcomputers and the improvement in mission performance is a topic for many research efforts. How much improvement the use of microcomputers adds to the performance of the mission is very hard to address in quantifiable terms. On the other hand, the relationship between training the users of the microcomputer and the increased productivity of those users is a fact often overlooked. In the past the policy has been to leave the training issue to the user's organization. If this condition continues, the managers of these organizations will be faced with the training dilemma directly, or inherit the problem indirectly. ACSC students being the middle managers of the present and the senior leaders of tomorrow, must acquire the knowledge to deal with these issues. This paper has attempted to address the needs assessment for expanding the curriculum of ACSC to include microcomputer training for today's Air Force leaders at the mid-point of their careers. The Air Force has aggressively worked toward methods to acquire the microcomputer hardware and software to accomplish the mission. It is now time to aggressively work the support and training factors which are so important for the Air Force to realize the benefits of this advance technology. "Men alone, or machines alone, do not spell success: how men use machines in the combat environment, and the spirit of leadership that guides that use, spell victory or defeat" (25:2-4).

BIBLIOGRAPHY

A. REFERENCES CITED

Articles and Periodicals

1. "Zenith Personal Computer Family." DATAPRO Research Corporation, July 1986, CM11-997NO-201.

Official Documents

2. Air Training Command. Handbook for Air Force Instructors. Randolph Air Force Base, Texas: HQ ATC/OC, 1 April 1974.

3. Air University. ACSC Electives Program Handbook. Maxwell Air Force Base, AL: ACSC, AY 1987.

4. Air University. CHART User's Manual, Version 1.01. Gunter Air Force Station, AL: AFLMC/LGY, Nov 1984.

5. Air University. SCALE Software Catalog. Gunter Air Force Station, AL: AFLMC/LGY, Dec 1985.

6. Air University. SCALE User's Manual. Gunter Air Force Station, AL: AFLMC/LGY, Mar 1984.

7. Air University. Sampling and Surveying Handbook. Maxwell Air Force Base, AL: HQ AU/XPZ, 1977.

8. Air University. AFLMC MS-DOS 2.0/Zenith 150 User's Guide. Gunter Air Force Station, AL: AFLMC/LGY, Sep 1985.

9. Headquarters United States Air Force. AFR 700-26: Acquisition and Management of Small Computers. Keesler Air Force Base, MS: HQ USAF/SCPX (AFISDO), 30 April 1986.

10. Headquarters United States Air Force. AFM 1-1: Basic Aerospace Doctrine. Washington D.C.: HQ USAF/XOXID, 16 March 1984.

CONTINUED

Unpublished Materials

11. Air Force Communications Command. "Concept of Operations for DIAL-A-LOG's Software Exchange Catalog." Gunter Air Force Station, AL, AFSCOASO, undated.

12. Air University. "Proposed Technology Plan, ACSC Technology Plan." Maxwell Air Force Base, AL: ACSC (Maj Mike McKim), October 1986.

13. Air University. "Microcomputer Literacy, Course 00034F." Maxwell Air Force Base, AL, Associate Programs, ACSC, 1985.

14. Blue Ridge Software. "Comac, Version 1.00, Compac User's Manual, A Guide to Microcomputer Communications." Wetumpka, AL, 1984.

15. Bunn, Robert S., Maj, USAF. "Unit-Level Microcomputer Training Management." Research study prepared at the Air Command and Staff College, Air University, Maxwell Air Force Base, AL, 1986.

16. Headquarters United States Air Force. "Report on Data Systems Management and Manpower Impacts, Vol II." Washington, D.C., HQ USAF/IG, 1 Sep 1984.

17. Headquarters United States Air Force. "Report on Data Systems Management and Manpower Impacts, Vol I." Washington, D.C., HQ USAF/IG, 1 Sep 1984.

18. Headquarters United States Air Force. "DBase Introduction Using Z-100." Washington, D.C., HQ USAF/LEXY (Maj James Rolen), March 1985.

19. Headquarters United States Air Force. "Lotus 123 Introduction Using Z-100." Washington, D.C., HQ USAF/LEXY (Maj James Rolen), Oct 1984.

20. Headquarters United States Air Force. "Implementation Plan for Data Systems Management and Manpower Initiatives." Washington, D.C., HQ USAF/SIP, 5 April 1985.

21. Headquarters United States Air Force. "Report of Air Force Management Analysis Group (AFMAG) on Data Systems Management and Manpower Impacts." Letter dated 11 Sep 1984, Washington, D.C., HQ USAF/IG.

22. Headquarters United States Air Force. "WordStar Introduction Using
    Z-100." Washington, D.C., HQ USAF/LEXY (Maj James Rolen),
    July 1984.

23. Pacific Air Forces. "Modem 7 Documentation." Hickam Air Force Base,
    HI: HQ PACAF/ADMS (SCTC), 1 Sep 1983.

Other Sources

24. Telecom with the Small Computer Training Section, 3390 TTG/TTMKC.
    Keesler Air Force Base, MS: Nov 1986.

25. Three Z-100 floppy diskettes. "Executive Management Overview Course,
    Z-100." 3390 TTG/TTMKC, Keesler Air Force Base, MS: undated.

B. RELATED SOURCES

Books

Barden, William Jr., What Do You Do After You Plug It In? Indianapolis,
    IN: Howard W. Sams and Co., Inc., 1983.

Dravnieks, Dzintar E. IBM Personal Computer Handbook. Berkeley, CA:
    And/Or Press, 1983.

Leventhal, Lance A. and Irvin Stafford. Why Do You Need A Personal
    Computer? New York, NY: Hohn Wiley and Sons, Inc., 1981.

Segal, Hillel and Jesse Berst. How To Manage Your Small Computer.
    Englewood Cliffs, NJ: Prentice-Hall, Inc., 1983.

Official Documents

Naval Data Automation Command. Acquisition and Management of Small
    Computers. Washington, D.C., Naval Data Automation Command,
    March 1984.

CONTINUED

Unpublished Materials

Iverstine, Emile C., Maj, USAF. "Managing Microcomputers: A Survival Kit for Functional Managers." Research study prepared at the Air Command and Staff College, Air University, Maxwell Air Force Base, AL, 1984.

Slatter, Leland W. "Everything You Ever Wanted To Know About Microcomputers." AFSCOASO, Air Force Data Systems Design Center, Gunter Air Force Station, AL: Originally by NARDAC, Norfolk, VA, 8 Nov 82.

Air Force Communications Command. "Word Processing: Finding the Right Software." Air Force Data Systems Design Center, AFDSDC/DMTD, Gunter Air Force Station, AL, undated.

Air Force Communications Command. "Software Evaluation of Visicalc." Air Force Data Systems Design Center, AFDSDC/DMTD, Gunter Air Force Station, AL, undated.

Air Force Communications Command. "A Floppy Disk Handbook." Air Force Data Systems Design Center, AFDSDC/DMTD, Gunter Air Force Station, AL, undated.

Southern Company Services, Inc. "Personal Computer Handbook." Client Support Department, Gulf Power Company, 1985. Documentation of a personal computer course taught to employees of Gulf Power Company.

Zenith Data Systems Corporation. Z-100 User's Manual, Condor Relational Database Management System, Wordstar User's Manual and Peachtext 5000. Documentation supplied with the Z-100 computer by Zenith Data Systems, St. Joseph, MI: 1982.

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