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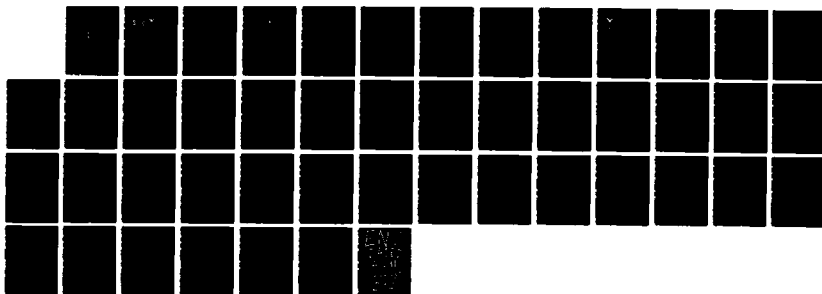
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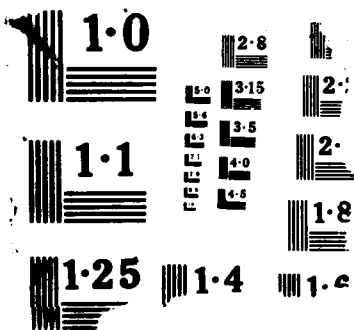
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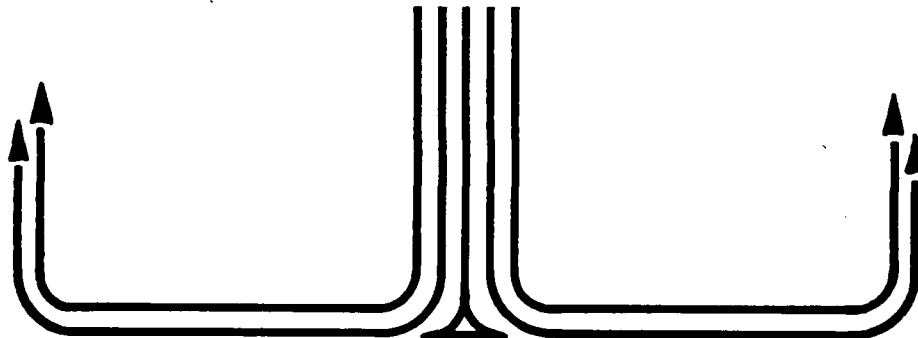
# AIR COMMAND AND STAFF COLLEGE

## STUDENT REPORT

INTERACTIVE VIDEODISC TECHNOLOGY:  
APPLICATIONS TO THE AIR COMMAND AND  
STAFF COLLEGE CURRICULUM

MAJOR MARTIN C. SCHROEDER 88-2345

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**REPORT NUMBER** 88-2345

**TITLE** INTERACTIVE VIDEODISC TECHNOLOGY: APPLICATIONS TO THE  
AIR COMMAND AND STAFF COLLEGE CURRICULUM.

**AUTHOR(S)** MAJOR MARTIN C. SCHROEDER

**FACULTY ADVISOR** LT COL JAMES R. MACEY

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

**AIR COMMAND AND STAFF COLLEGE  
AIR UNIVERSITY  
MAXWELL AFB, AL 36112-5542**

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SECURITY CLASSIFICATION OF THIS PAGE

## REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

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| 1a. REPORT SECURITY CLASSIFICATION<br><b>UNCLASSIFIED</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                          | 1b. RESTRICTIVE MARKINGS                                                                                                |                                                     |                    |
| 2a. SECURITY CLASSIFICATION AUTHORITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                          | 3. DISTRIBUTION / AVAILABILITY OF REPORT<br>STATEMENT "A"<br>Approved for public release;<br>Distribution is unlimited. |                                                     |                    |
| 2b. DECLASSIFICATION / DOWNGRADING SCHEDULE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                          |                                                                                                                         |                                                     |                    |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S)<br><br>88-2345                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                          | 5. MONITORING ORGANIZATION REPORT NUMBER(S)                                                                             |                                                     |                    |
| 6a. NAME OF PERFORMING ORGANIZATION<br><br>ACSC/EDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       | 6b. OFFICE SYMBOL<br>(if applicable)     |                                                                                                                         | 7a. NAME OF MONITORING ORGANIZATION                 |                    |
| 6c. ADDRESS (City, State, and ZIP Code)<br><br>Maxwell AFB AL 36112-5542                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                          | 7b. ADDRESS (City, State, and ZIP Code)                                                                                 |                                                     |                    |
| 8a. NAME OF FUNDING / SPONSORING ORGANIZATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       | 8b. OFFICE SYMBOL<br>(if applicable)     |                                                                                                                         | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER     |                    |
| 8c. ADDRESS (City, State, and ZIP Code)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                          | 10. SOURCE OF FUNDING NUMBERS                                                                                           |                                                     |                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                          | PROGRAM<br>ELEMENT NO.                                                                                                  | PROJECT<br>NO.                                      | TASK<br>NO.        |
| 11. TITLE (Include Security Classification)<br><br>INTERACTIVE VIDEODISC TECHNOLOGY: APPLICATIONS TO THE AIR COMMAND AND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                          |                                                                                                                         |                                                     |                    |
| 12. PERSONAL AUTHOR(S)<br><br>Schroeder, Martin C., Major, USAF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                          |                                                                                                                         |                                                     |                    |
| 13a. TYPE OF REPORT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       | 13b. TIME COVERED<br>FROM _____ TO _____ |                                                                                                                         | 14. DATE OF REPORT (Year, Month, Day)<br>1988 April |                    |
| 15. PAGE COUNT<br>36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                          |                                                                                                                         |                                                     |                    |
| 16. SUPPLEMENTARY NOTATION<br><br>ITEM 11: STAFF COLLEGE CURRICULUM (U)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                          |                                                                                                                         |                                                     |                    |
| 17. COSATI CODES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                          | 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)                                       |                                                     |                    |
| FIELD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | GROUP | SUB-GROUP                                |                                                                                                                         |                                                     |                    |
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| 19. ABSTRACT (Continue on reverse if necessary and identify by block number)<br>The Air Force is becoming more computer-oriented each year and one of the areas of increasing computer use is education and training. Interactive videodisc instruction is a relatively new technology that offers great potential as a training medium. Air Command and Staff College is continually trying to improve the presentation of its curriculum. The objective of this paper is to see if interactive videodisc technology can be constructively applied to the ACSC curriculum. The paper explores the mechanics of videodisc operation, the concepts of interactive education and the benefits of the combination of the two. Next, the paper details the hardware and software necessary to produce and present interactive instruction and what hardware and software is currently available to the Air Force. The paper concludes that interactive videodisc instruction could enhance curriculum presentation at ACSC. |       |                                          |                                                                                                                         |                                                     |                    |
| 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT<br><input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |                                          | 21. ABSTRACT SECURITY CLASSIFICATION<br><b>UNCLASSIFIED</b>                                                             |                                                     |                    |
| 22a. NAME OF RESPONSIBLE INDIVIDUAL<br>ACSC/EDC Maxwell AFB AL 36112-5542                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                          | 22b. TELEPHONE (Include Area Code)<br>(205) 293-2867                                                                    |                                                     | 22c. OFFICE SYMBOL |

## —PREFACE—

The subject of this paper, interactive videodisc instruction, grew out of several of the circumstances of life at Air Command and Staff College (ACSC). First, the computer is here to stay, not just at ACSC, but in the Air Force and in our everyday world. Some of us like and understand computers, many are indifferent, and some even fear the machines. But, like them or not, there are few places today that are without them. And since they are a part of our environment, we should understand and use them as much as possible.

Secondly, there is a lot of material to cover in a limited amount of time, and often we have to stop an interesting discussion just when we have started to scratch the surface of a topic. It would be beneficial to have additional information available that wasn't tied to a set timetable.

Finally, there is value in student-led seminars and briefings for the presenter, but it is apparent that some students are much better than others at getting the message across. Some form of standardized lesson would insure that every student was exposed to the educational objectives of each lesson.

What is needed is a presentation method that uses (and can teach about) ACSC computer assets. It should be capable of delivering a standardized lesson but be able to give additional information at the user's request. Interactive videodisc instruction is capable of all this. The purpose of this paper is to encourage ACSC to pursue this technology for future classes.



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## —ABOUT THE AUTHOR—

Major Schroeder received a Bachelor of Music Degree from Kent State University in 1971. He enlisted in the Air Force in July 1971 and, after attending basic training, was assigned to the 661st Air Force Band, Wright-Patterson AFB, Ohio. In December 1973 then Sgt Schroeder was accepted in the Airman Education and Commissioning Program and was a Distinguished Graduate of Officers Training School in November 1974. He reported to Undergraduate Navigator Training (UNT) at Mather AFB in December 1974. After completing UNT, he reported to the 6 MAS, McGuire AFB in December 1975 and began duties as a navigator in the C-141. He became an instructor navigator in 1978 and, after completing the Air Force Flight Safety School at Norton AFB in December 1979, he served as a flight safety officer and nuclear safety officer for the 438th MAW. Major Schroeder attended Squadron Officer School in residence from January to March, 1979, finishing in the top third of his class. In December 1980, he was assigned to Hahn AB, Germany as an emergency actions officer. While at Hahn he earned a Master of Science Degree in Public Administration from Troy State University. He returned to Wright-Patterson AFB in November 1982 as an acquisition logistics officer assigned to the Air Force Acquisition Logistics Center. In November 1985 he returned to the C-141 cockpit navigating for Air Force Systems Command's 4950th Test Wing. During his time in the 4950th TW he also served as a maintenance supervisor and interim squadron commander of the 4950th Organizational Maintenance Squadron. Major Schroeder is currently an ACSC student at Maxwell AFB.

Major Schroeder is married to the former Elizabeth Burrier of Mentor, Ohio. They have two sons, Matthew, twelve, and Nicholas, nine.

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## 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

### AUTHOR(S)

### TITLE

I. Purpose: To determine if interactive videodisc technology can be applied effectively to the Air Command and Staff College curriculum.

II. Methodology: First interactive instruction is examined. Then videodisc technology and its connection to interactive instruction is explained. Next, the benefits of interactive videodisc instruction are presented. The hardware and software associated with videodisc instruction are compared with the assets available at ACSC and in the Air Force. Finally, the current ACSC curriculum is listed to discover courses compatible with interactive videodisc instruction.

III. Data: Interactive instruction has been widely documented as being a superior educational tool. By itself or in combination with traditional methods of presentation interactive instruction has demonstrated increased levels of comprehension and standardization while reducing overall training time. The nature of videodisc technology makes it an ideal medium to support interactive instruction. The videodisc can hold a large volume of

## CONTINUED

pictures, both stills and movies, and a stereo sound track, and each picture or series of pictures is directly accessible almost instantaneously. The hardware necessary to run the courses is readily available and, except for videodisc players, is already in place at ACSC. Existing courseware, however, has been produced for specific training situations and is not transferable to the ACSC curriculum. The ACSC curriculum has several courses of an historical nature. These lend themselves to videodisc instruction since the information in the lessons needs little or no update from year to year. The Air Force currently has the necessary equipment to produce interactive videodisc courses in-house.

IV. Conclusion: ACSC can effectively apply interactive videodisc instruction as an additional method of curriculum presentation. Portions of the ACSC curriculum lend themselves to the medium and Air University and the Air Force have both the curriculum development methods and technical equipment to produce interactive videodisc courseware.

V. Recommendations: ACSC should pursue a program to incorporate interactive videodisc instruction into the curriculum.

## Chapter One

### INTERACTIVE VIDEODISC TECHNOLOGY

#### INTRODUCTION

Air Command and Staff College, as a military school, is a unique institution in several ways. As an institution of higher learning, its primary curriculum deals with war and warfighting, subjects rarely dealt with in other colleges and universities in the United States. As a military unit, its mission is not force employment, deployment or support, but rather increasing the intellectual skills and abilities of mid-level officers. Another unique aspect is the fact that ACSC is not only preparing these officers to think and act on the basis of their expanded knowledge, but also to become the teachers of their peers and subordinates during subsequent assignments. While much of what is studied here has its roots in history and tradition, the course work is grounded in its application to the present. And present warfare has a pronounced technological flavor.

The best way to learn is by doing. ACSC's emphasis on speaking and writing and the seminar approach to learning is in line with this belief. But while technology is surely in the classroom, more can be done at ACSC with technologically enhanced education methods. This can not only increase the students' knowledge of warfighting, but by using the new technology, they can understand both war and technology better as well. This paper will explore videodisc technology supporting Computer Aided Instruction in an interactive format. In order to understand how videodisc technology relates to education, this chapter will define the technology and its relationship to computer education (education by computers, not about computers) and interactive learning.

#### INTERACTIVE INSTRUCTION

It seems every computer company or trade journal has a different catch phrase for teaching with the help of the computer. Figure 1 illustrates this problem (4:7). The term Computer Based Education (CBE) will be used to include every application of the computer to education and training environment (13:6). A subset of CBE is Computer Aided Instruction (CAI). CAI is defined here

# PICK YOUR OWN TERMINOLOGY

| A                           | B           | C           |
|-----------------------------|-------------|-------------|
| Computer                    | Assisted    | Instruction |
|                             | Aided       | Learning    |
|                             | Managed     | Education   |
|                             | Based       | Training    |
|                             | Enhanced    | Teaching    |
|                             | Mediated    | Development |
|                             | Interactive | Study       |
| Select One From Each Column |             |             |

Figure 1

## THE INTERACTIVITY CYCLE

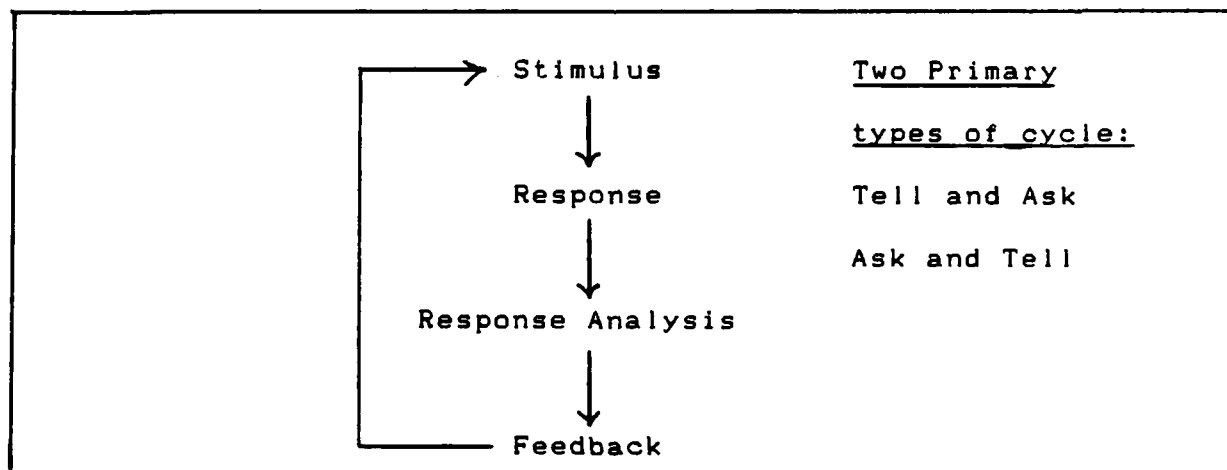


Figure 2

as: "The use of the communication and storage capabilities of a computer to provide the direct presentation of instructional materials and/or provision of practice to the learner (13:6)." As we will see, videodisc technology relates directly to the computer's communications and storage capabilities. Interactivity can be defined by the way it is used in CAI. "A [CAI] interaction is either a course-initiated or learner-initiated stimulus-and-response cycle with the added dimension of having either the learner or course evaluate the response and then take another action that requires some response. In straightforward terms, interactivity is the incorporation of repetitive, frequent and meaningful iterations of a stimulus-response-analysis-feedback cycle into material that is presented in a medium that permits it (see Figure 2) (4:14-15).

Although videodisc technology is not the only way to provide interactivity to CAI, it presents some advantages that make videodisc a promising media for CAI. Videodisc technology, then, is a subset of interactive instruction which, in turn, is a subset of CAI, all under the CBE umbrella (see Figure 3).

#### COMPUTER BASED EDUCATION HIERARCHY

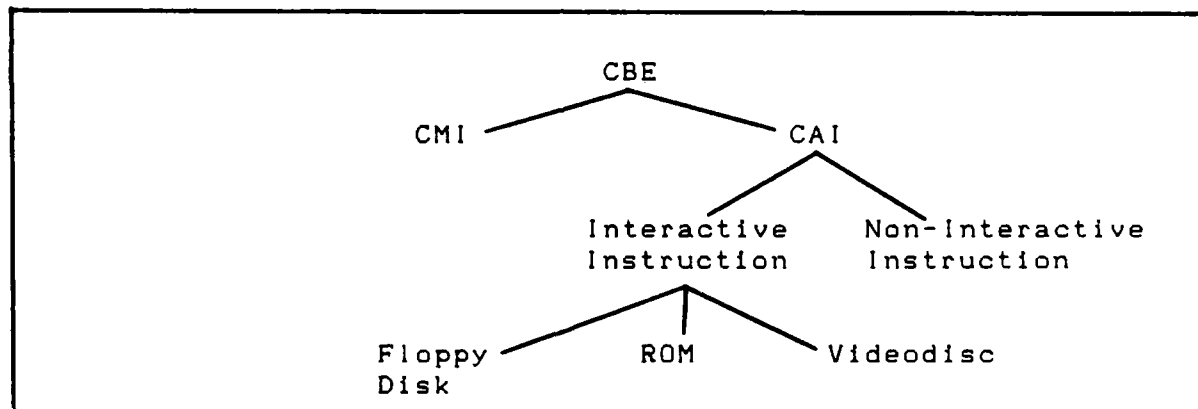


Figure 3

#### VIDEODISC TECHNOLOGY

The actual videodisc is comparable to a long playing phonograph record. However, instead of having information recorded in a groove, videodisc information is stored as a series of small pits in the silicon surface of the disc. These pits can be arranged in one of two different patterns.

CAV (Constant Angular Velocity) discs spin at the rate of one frame per revolution, which is a constant speed of 1800 rpm in NTSC [the North American standard for television signals]... The track length - the space on the disc assigned to each separate frame - is not fixed, but is, obviously, much longer on the outer edge of the disc than on the inner. The neat ratio of one revolution of the disc to one frame of video material means that CAV discs are what is known as 'frame addressable' - that is, any single frame can be easily identified and quickly and accurately retrieved. This is one component of disc's impressive 'random access'. Precision, coupled with speed, put the CAV laser disc ahead as a medium for interactive video (6:76).

CLV (Constant Linear Velocity) discs, on the other hand, assign a fixed track length to every frame in the programme, so there are more frames read in one revolution around the outer edge of the disc than the inner. The disc does not play at a constant speed, as the CAV disc does, but runs more slowly on the rim than near the center. This greatly increases the playing time: Philips CLV disc, for instance, can hold 87,000 frames a side, which gives nearly two hours' playing time on a double sided disc. However, this also reduces access from the frame accurate address of the CAV discs to terms of chronological time, minutes and seconds. Random access is, therefore, much less precise on these 'extended play' discs than on 'active play' ones. The short answer is that CLV discs are an excellent medium for entertainment, but of limited use interactively (6:78).

There are also two ways to embed the pits on the videodisc. In the "slow" method, the pits are pressed into the disc by machine. In the "fast" process, a laser is used to burn the pits into the disc. A laser is also used to read the information from the disc. A low intensity laser beam is focused on the disc surface. Photocells pick up the pattern of reflected or refracted light and convert the light impulses to electrical energy. This electrical signal is then processed like a TV signal for video. The videodisc can also be used to produce an audio signal and both audio and video can be contained on the same disc. Storage capacity for a disc ranges from 10 to 20 billion bits of information. That amount of information equates to 108,000 individual pictures, about an hour's worth of movie (5:79,117; 3:123-124; 1:29,46).

The way in which videodiscs operate leads to the following characteristics:

1. The production of the master disc requires that the

display process be run backwards. That is, film or pictures and recorded sound of the presentation must be taken. Then those images are converted to an electrical signal which is encoded by a digital or analog process into the pattern of pits that are embedded in the disc. Briefly, it is a expensive process to produce the master disc.

2. The disc itself is inexpensive.

3. Copies of the master are inexpensive but can only be made with commercial equipment.

4. Since the information is pressed or burned into the disc, the information is permanent. In its present marketable form the disc cannot be updated or reused.

5. The videodisc is not a linear medium like tape or film. Any picture or group of pictures is instantaneously available (100 ms) for viewing.

6. Because light, rather than mechanical means is used to read the information on the disc, there is no wear on the disc.

7. The precise storage of information possible and the absence of mechanical distortion due to the use of laser technology produce exceptionally clear pictures and sound.

These characteristics are neither positive or negative in themselves but can be advantages or disadvantages when applied to interactive CAI.

Different videodisc players have different abilities and affect the degree of interactivity available to the user. The Nebraska Videodisc Design/Production Group has categorized videodisc players into four levels of capability. Level 0 machines have no interactive capability at all. Level 1 machines offer the following features: "Remote control, random access (search), freeze frame, forward and reverse, scan, slow motion, step frame, and two audio tracks (6:14)." Level 2 machines, besides having the Level 1 features, contain a small microprocessor and a key pad. The microprocessor reads program data stored on the videodisc and is able to jump to different program segments when commanded by the program or the key pad, providing real interactivity. These machines are usually industrial players rather than the home entertainment type (6:15-16). Level 3 machines are connected through an interface to a computer. Here the program is controlled by a floppy disk run on the computer. In addition to the capabilities found at the lower levels, Level 3 devices allow computer generated screens and graphic overlays to be displayed along with the pictures and text

stored on the videodisc (6:17).

### EDUCATIONAL BENEFITS

Training or education with an interactive program using videodisc technology offers several benefits. Some of these benefits are reduced training time, mastery level learning and the ability to practice in a simulated work environment. Reduced time required for training has been well documented. A 1981 review of military training courses by Orlansky and String showed a 30 percent reduction in training time required to master material compared to conventional training (8:33). A 1985 comparison showed a 50 percent time savings over traditional instruction (14:5). Magel reported a 65 to 68 percent time reduction by a Federal Express interactive videodisc training program (14:63). Although it is difficult to make a true one-to-one comparison between traditional instruction and interactive videodisc training, the increased efficiency may be due to putting the course material into the CAI medium.

When [CAI] courseware takes less time, it's typically because of the increased precision and conciseness in expression of material. Writing is more terse to accommodate the visual medium. Scripts are subject to more editing and review, so content is more precise, less unintentionally redundant, and structured more carefully than in the freeform, live-instructor environment. In addition, the irrelevant material, war stories, and personal material that always creep into instructor-led courses is avoided (4:195-196).

The result of this more concise presentation is it takes less time to cover the relevant course material.

While taking less time for training is beneficial, learning and understanding the material more thoroughly may be even more important. This higher level of competence or mastery learning is also a benefit of interactive videodisc instruction. "A 1986 study performed by the Learning Center/George Peabody College, Vanderbilt University ... found that students using the [video] disc made significantly higher post-test gains (97 percent gain) than the gain by a control group using traditional [methods.] (30 percent gain) (9:62)." In an IBM study, "Learning gain scores using videodisc were found to be as much as 50 percent higher than a lecture-based learning environment (9:62)." The key to these gains is the ability of the videodisc to produce sight and sound coupled with the interactive program's ability to make the student think and respond. "Lynne Hayden, manager at Digital Equipment Corporation/Adaptive Learning Solutions, said that, as a rule of thumb, 'We retain about 30 percent of what we hear, 50 percent of

what we hear and see, and about 70 percent of what we hear, see and do (9:62).'"

Another advantage of interactive videodisc instruction is that it can let people practice real life situations and make mistakes that would otherwise be costly in money or lives. One videodisc program presents medical students with examinations of 27 infants suffering from cerebral palsy, a disease difficult to diagnose without sufficient practice. Students completing the course showed marked superiority over a control group when given a diagnostic skills and knowledge test (8:34). In another medical videodisc course, students must question and diagnose a fictitious patient named Sam Hall. Correct questions lead to proper treatment, but faulty or incomplete questioning leads to Sam's "death (8:34)." In the military business of "breaking things and killing people" it would be good for commanders to try out their warfighting skills on an interactive videodisc wargame. They could lose a battalion of troops or a squadron of planes without spilling real blood.

#### PRODUCTION OF INTERACTIVE VIDEO DISC COURSEWARE

Production of interactive videodisc courseware can be divided into six phases; analysis, design, preproduction, production, post production and mastering.

Analysis is the first and most important step in the production of courseware. It should result in a clear understanding of the goals of the project. Communication between the client and producer is essential for the success of the project (2:32-33). The analysis process includes the following parts:

Goals analysis describes the overall program objectives, budgetary requirements and deadlines. The first step towards successful completion of a program is made when these aspects of the project are clearly outlined and agreed upon.

The preliminary specification is a comprehensive listing of all tasks or facts to be presented in the program. The content of this specification reflects decisions made during goals analysis concerning program objectives. Extraneous or obsolete information is easier to spot and eliminate when the purpose of the program is kept firmly in mind.

Task or message definition expands upon the preliminary specification. Each task or message is described in detail to clearly state what the user will encounter in

each section of the program.

Decisions about the final presentation of program content are made during the process of media selection. Each task or message has been explicitly outlined during the previous steps and now the most effective means of presentation must be determined.

The last step in front-end analysis is final specification, a culmination of results from all previous steps. A program flow chart is derived from an established hierarchy of all tasks or messages and describes program content, methods of presentation, and flow. The flow-chart is also used to determine final project costs and time requirements. This information, along with a description of the project, is then used to produce the final project specification (2:27-28).

The second phase of courseware production is design. Design is concerned with two areas, program structure and screen design. Program structure is most important to the courseware user. It includes, "...the arrangement of the content into component parts, the relationship among those parts as presented to and perceived by the user, and the inputs by which the user moves through or around the material (2:39)." The program as a whole must make sense to the user.

Screen design is the use of frame types, type styles and color to give the user visual cues to program structure.

Visually distinctive frame types provide a kind of advance warning of the kind of information being presented. All videodisc programs can benefit from clear visual differences in the treatment of at least the following three distinct types of frames:

1. Title frames, announcing a new section (and usually confirming a menu choice.)
2. Information frames, describing content (but with prompts indicating how to advance.)
3. User-input frames, such as menus, where the whole point is to present and accept user inputs.

Color is by far the most powerful graphic device for underscoring differences in frame types. A single color used consistently for prompts, for example, can be a very effective cue. Different chapters or levels might also have distinctive colors (2:43).

Preproduction is the third phase of courseware production and deals primarily with scripting. A major concern of the script writer is the degree of interactivity planned for the courseware. In an interactive program the user determines the sequence of scenes. Since the actual sequence of scenes can't be known, the script writer must create transitions that can lead to any of the program options. The more options available, of course, the tougher the script writer's job. Other considerations for the script writer include multiple user levels and the kind and amount of feedback given to the user. These also increase the complexity of the script (2:45-49).

Production, the fourth phase, is where the individual parts of the program are recorded on slides, film or video tape. Activities in this phase include rehearsing, directing and filming the motion sequences; shooting the still pictures; and programming the computer graphics overlays. Once the scenes are on tape, special effects can be added. A character generator and a digital video effects generator can produce all the fancy effects seen on network television (2:56-58).

Phase five, postproduction or premastering is, "...the process of assembling onto a single medium all of the intermediate media, such as slides, motion picture film, videotape, etc., that will comprise the finished videodisc program (2:77)." The consolidated package is called a premaster and is usually a videotape.

Premastering is a four step process. Editing is the most time-consuming because of the many technical requirements of each different production facility.

All of the mastering facilities have specified requirements for blank leader, color bars, audio tone, and color black that must precede and follow active program material on the premaster tape. There are also exact specifications for audio levels, chroma levels, and luminance (2:79).

Videotape size is also important, one-inch tape being the preferred format.

Coding, the second step, "...involves the insertion of certain codes into the program material that trigger automatic functions on certain videodisc players (2:81)." These codes identify chapters and stopping points for Level 1 programs and signal data dumps for Level 2 programs (2:81).

The third step is evaluation. A good evaluation consists of two separate parts. The technical evaluation checks the quality of the edit. Does the program flow from part to part correctly?

Are the sound levels right? Are spelling and grammar correct? The course evaluation uses a test group of students and determines if the user can run the program correctly and easily and if the lesson gets the message to the student. Both parts of the evaluation process require a check disc, a single videodisc produced from a master. This allows the program to be checked with an actual production disc but before the copies are made (2:82).

The final step in the postproduction phase is revision. Any flaws in the premaster found during evaluation will be corrected. The corrected premaster will be evaluated again and if no further errors are found the postproduction phase is complete.

Mastering, the last phase of production, is simply the manufacturing of the required number of videodisc copies using the processes previously discussed in this chapter.

## Chapter Two

### INTERACTIVE VIDEODISC HARDWARE AND SOFTWARE

#### HARDWARE

Several key pieces of equipment are necessary to support interactive videodisc instruction. The central piece of hardware is, of course, the videodisc player. Peripheral equipment consists of the following:

1. A color monitor with sound capability.
2. A computer to run Level 3 programs.
3. A videodisc player/computer interface.
4. Disk drive(s) to run the software.

Optional additional peripheral equipment could include a mouse and/or a graphic tablet.

#### SOFTWARE

Many of the current interactive videodisc instruction programs have been developed by companies for training for their specific work situation. The most numerous type of programs deal with technical or machine skills. Tutorials designed to improve salesmanship are also popular. A review of courseware catalogs shows few products that address the generic subject areas of the ACSC curriculum. Without modification, no existing course could be directly applied to the ACSC curriculum (2:217-453; 7:83-85).

#### HARDWARE AND SOFTWARE TO SUPPORT PRODUCTION

The following software/hardware is necessary to produce interactive videodisc courseware:

1. An authoring system. This is a software package used to build the computer program that runs the courseware by controlling the flow of the program from segment to segment. The program built by the authoring system locates the

pictures, text and sound on the videodisc and transfers them to the monitor screen.

2. A computer to run the authoring system and the control program.

3. Still, motion picture and video cameras to shoot the slides, film and tape segments used in the courseware.

4. Video tape recorders to record the motion scenes and the still pictures and, finally, to edit the premaster tape.

5. An audio tape recorder to dub the audio track.

6. Mastering equipment to transfer the video tape premaster to a videodisc format.

A character generator and a video effects generator can be used to create special effects but are not necessary to produce usable courseware.

#### AIR FORCE HARDWARE AND SOFTWARE ASSETS

The following computer equipment is available for use at ACSC (16):

1. Sixty-five each Z-100 computers, modified to be IBM/MS DOS compatible.

2. One each Z-150 computer, rated Tempest, for classified work.

3. Sixty-five each Z-158 computers, IBM/MS DOS compatible, each with a Citizen MSP 10 printer, a ZVM 1360 high resolution color monitor and a 10 MB Bernoulli hard disk drive. Forty-seven of these machines are equipped with a mouse.

4. Seven each portable computers.

The Z-158 machines with their peripherals are most available to the ACSC students since each seminar room contains one system. Currently the Z-158 systems are stand-alone with no networking or modem capability. While these systems could be the basis of an interactive videodisc instruction delivery system, space limitations in the existing security enclosure may present a problem.

The ACSC Associate Program, Instructional Systems and Technology Division, has the following equipment (17):

1. The PCD3 (Plato) authoring system.
2. A Pioneer LD-V4200 videodisc player, capable of playing 8 or 12 inch discs.
3. A Z-158 computer with a ZVM1360 high resolution color monitor and a 10MB Bernoulli hard disk drive.

The Air University Center for Professional Development has the following equipment (15):

1. A Z-248 computer with a 20MB Winchester hard disk drive, a GO 512 interface card containing graphics, graphics overlay and videodisc controller functions, and a digital audio card.
2. A Pioneer LD-V4200 videodisc player, capable of playing 8 or 12 inch discs.
3. A Sony PVM 1271Q monitor.
4. A Carroll infrared touch screen.

Detachment 3, 1361 Audiovisual Squadron (AUTV), at Maxwell AFB, has the studio facilities to videotape a lesson. Although they do not have the preferred one inch format video tape recorders, they can borrow them from other Air Force units (18).

Detachment 8, 1365 Audiovisual Squadron, at Hill AFB, has premastering equipment and capabilities including the ability to produce a check disc (18).

## Chapter Three

### THE AIR COMMAND AND STAFF COLLEGE CURRICULUM

#### MISSION AND GOALS

"Our mission is to enhance the professional knowledge and skills of mid-career officers for increased leadership roles in command and staff positions (12:1)." This is the mission statement of Air Command and Staff College (ACSC). In order to find out where interactive videodisc instruction could be applied to ACSC courses, this chapter will document the program goals and areas of instruction of both the resident and non-resident curriculum.

ACSC has six course goals. They are (12:2):

1. To provide an environment for personal and professional growth.
2. To enhance knowledge and understanding of the Air Force's mission and capabilities.
3. To enhance professional skills required to command, manage and lead aerospace forces.
4. To enhance understanding of the dimensions and roles of the military in a democratic society within the global setting.
5. To provide a forum for significant professional contribution.
6. To prepare officers for the critical task of imparting acquired knowledge, skills, and perspectives to others.

ACSC wants to make mid-level officers smarter about what the Air Force mission is and how to get it done better, and to give those officers the tools to pass on to others their enhanced knowledge.

The resident program uses readings, student-led seminars, and guest and faculty lectures to present course material. The non-resident program relies on readings and student-led seminars. Student progress is measured in both programs by subject examinations and graded writing assignments. Additional assessment is provided in the resident program by faculty instructor critiques of student speeches.

#### RESIDENT CURRICULUM

The resident program is divided into five areas of instruction and a block of electives. The five areas include: Staff Communications and Research; Command, Leadership and Resource Management; National Security Affairs; Warfare Studies; and Space Operations (12:4-5). These areas are further broken into phases and individual lessons. This information is included in Appendix 1. The electives are designed to supplement the areas by exploring in depth a small segment of one of the areas. The list of electives is included in Appendix 2.

#### NON-RESIDENT CURRICULUM

The non-resident program is organized into three separate parts: Prerequisite Courses, Core Curriculum, and Electives (11:4-5). The two prerequisite course areas are Staff Communications and Thinking About War. The 40 core curriculum courses are grouped into three areas of study: Command, Leadership and Resource Management; National Security Affairs; and Warfare Studies. The specific courses are listed in Appendix 3. The electives augment the core curriculum. The currently available electives are listed in Appendix 4.

With the exception of Space Operations the non-resident program addresses the same areas of instruction as the resident program. Although specific course format and content vary between the two programs, interactive videodisc instruction that supports the basic area of instruction should be usable in either program.

## Chapter Four

### CONCLUSIONS

The purpose of this paper was to learn about interactive videodisc technology, and see if it might benefit ACSC. This chapter will draw upon the information found in previous chapters to answer that question.

#### EDUCATIONAL BENEFITS

In terms of educational worth there is no question that interactive videodisc instruction would benefit students at ACSC. Numerous studies conclude that interactive videodisc instruction increases both the rate and level of understanding. The benefits were found to be greatest when interactive instruction was combined with traditional teaching methods. Therefore, introduction of interactive videodisc instruction would be a positive addition to the ACSC curriculum.

#### AVAILABLE COURSEWARE

The search for off-the-shelf courseware was disappointing. While there are numerous producers of interactive instruction, listings and catalogs of their courseware were limited, and those listing available were not current. A review of what is available shows that the existing courseware was developed for specific training situations, not a generic subject area. No existing courseware is directly applicable to the ACSC curriculum.

#### AVAILABLE HARDWARE

The ACSC resident program has all the necessary hardware to run Level 3 interactive videodisc courseware except for the videodisc player and computer interface. The ACSC Associate Program has, at Maxwell AFB, a complete system. The resident program would need 44 players and interfaces to equip all the seminar classrooms. If the computers in the classrooms were networked, fewer players and interfaces would be needed.

### IN-HOUSE PRODUCTION

While in-house production of interactive videodisc instruction would be a big job, the lack of off-the-shelf courseware and the cost of contracting for courseware make it the most attractive option. The Air Force has all the necessary equipment and facilities to produce a videodisc. ACSC already does its own course development using the ISD process. Some student-developed courses are now recorded on video tape. With a faculty advisor for continuity and expertise, a student or student team could develop an interactive course. The Audio Visual Squadron at Maxwell AFB could videotape the lesson and the Audio Visual Squadron at Hill AFB could edit the tape and produce the videodisc.

The amount of time and money needed to produce an interactive videodisc program, together with the fact that an eraseable or updateable videodisc is not yet on the market, would indicate that a target course should be one with very little expected change. The lessons in the curriculum that deal with the history of warfare would be good candidates for interactive videodisc instruction. Also, the foreign language electives could be enhanced with interactive courseware.

### RECOMMENDATION

In conclusion, interactive videodisc technology can be of benefit to the ACSC program. ACSC has access to the equipment and facilities necessary to produce interactive courseware, but must purchase videodisc players to be able to use that courseware. Parts of the ACSC curriculum are ideal candidates for interactive instruction and student teams using the ISD process could develop those courses.

It is recommend that ACSC pursue interactive videodisc instruction as an additional means of curriculum presentation.

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## APPENDICES

## Appendix One

### RESIDENT PROGRAM AREAS OF INSTRUCTION, PHASES AND COURSES

#### AREA

#### PHASE

#### Course

#### STAFF COMMUNICATIONS AND RESEARCH

##### STAFF COMMUNICATIONS

Managing by communicating  
Introduction to staff communications  
The military briefing  
Analyze purpose and audience  
Effective listening  
Nonverbal communications  
Conduct the research  
Support your ideas  
Get organized  
Draft and edit with English that's alive  
Fight for feedback  
"The quill" products  
The nature of creativity  
Creativity  
Videotape replay laboratory  
Library resources and research aids  
Discussion with international officers  
Time-Life Video speed reading program  
Professional reading enhancement program  
Action officer exercises

##### OFFICER EFFECTIVENESS REPORT

The OER: an introduction and the job description  
The OER: performance factors  
The OER: rater, additional rater, and indorser comments  
The OER: the complete report  
Sister service "OER" systems - a comparison  
The APR  
Civilian performance appraisals  
The OER in perspective

This appendix is taken from the ACSC Curruculum Compendium AY 88, pages 6-49, edited by Major Martin C. Schroeder.

## RESEARCH PROGRAM

Introduction to the ACSC research program  
Research project proposal briefings  
Research project debriefs

## COMMAND, LEADERSHIP, AND RESOURCE MANAGEMENT

### LEADERSHIP STUDIES

Introduction to leadership studies  
The concepts of leadership: the challenge to lead  
The concepts of leadership: the challenge to lead seminar  
The concepts of leadership: leadership in history- Arnold and Spaatz  
The concepts of leadership: a corporate view  
The concepts of leadership: leadership and the microchip  
The concepts of leadership: military leadership in the Soviet Union  
The concepts of leadership: leadership concepts seminar  
Interim summary: from concepts to the interpersonal dimension  
Leadership and the individual: values--the past and present  
Leadership and the individual: values-- the future  
Leadership and the individual: you have power  
Leadership and the individual: using your influence  
Leadership and the individual: using your influence seminar  
The leader and groups: group development review  
The leader and groups: group problem solving  
The leader and groups: working with conflict  
The stress of leadership: the dynamics of stress  
The stress of leadership: stress management seminar  
Leadership theory: situation and style  
Leadership case study: 12 O'clock High  
Interim summary: from the interpersonal dimension to the professional dimension  
Military professionalism  
Challenges for the US military professional  
Code of conduct  
Code of conduct seminar  
Ethics and leadership  
Professional ethics  
Air Force professionals: the NCO  
Leadership American style  
Tips for commanders  
Civilian personnel management  
Air Force public affairs

Air Force personnel issues  
Social actions now  
Family support  
The military justice system  
Quality force management  
Administrative discharge board  
Air Force promotion system  
Promotion board exercise  
The challenge to lead

## RESOURCE MANAGEMENT

Introduction to resource management  
Budget formulation: overview of the Department of Defense's PPBS  
Budget formulation: Office of the Secretary of Defense (OSD) role in PPBS  
Budget formulation: Joint Chiefs of Staff role in PPBS  
Budget formulation: Air Staff planning  
Budget formulation: Air Staff programming  
Budget formulation: Air Staff budgeting  
Budget formulation: Air Staff role in formulating plans, programs, and budget submissions  
Budget formulation: MAJCOM role in the PPBS  
Budget formulation: base-level financial management  
Budget enactment: the Congressional enactment process  
Budget enactment: Congressional enactment-- a staffer's view  
Budget enactment: Congressional enactment--an Air Force view  
Budget enactment: Air Force budget issues  
Weapon design and support philosophies  
Designing tomorrow's Air Force  
Systems acquisition process  
Source selection process  
The trade-off process  
The acquisition environment  
Acquisition reform  
Integrated logistics support  
Combat support doctrine  
Logistics, strategy, and tactics  
Wholesale logistics  
Retail logistics  
Combat logistics  
Combat support capability  
Coalition logistics  
Survivability/operability  
Civil engineering and services  
Combat capability summary  
Log plan X

## NATIONAL SECURITY AFFAIRS

### US NATION SECURITY POLICY

- Introduction to national security affairs
- International system
- Interdependence
- Power
- National security process/international environment
- National security policy
- National objectives
- Policy, power, and objectives
- Executive and NSC system
- Congress
- Military
- Intelligence community
- Media
- National environment
- Transcultural communications
- Global challenges
- Cuban missile crisis

### REGIONAL STUDIES: USSR AND EUROPE

- Superpower global objectives
- The Soviet Union: background
- The Soviet political-economic system
- Soviet foreign policy
- Soviet-American relations
- Eastern Europe
- Western Europe: regional survey
- Strategic overview of Western Europe
- The European community
- The European flanks
- The central region
- The US, Europe and NATO
- Europe/USSR: summary

### REGIONAL STUDIES: LATIN AMERICA

- Latin America: regional survey
- Strategic overview of Latin America
- Latin American debts
- Turbulence in Latin America
- Latin America: summary
- Latin America Symposium: Democracy in Latin America:  
an ongoing assessment

### REGIONAL STUDIES: ASIA, AFRICA, AND THE MIDDLE EAST

- East Asia and the Pacific: regional survey

- Strategic overview of East Asia and the Pacific
- Security issues in Southeast Asia
- Security issues in Northeast Asia
- East Asia and the Pacific: summary
- Africa: regional survey
- Strategic overview of Africa
- Southern Africa
- Africa: summary
- Middle East and Southwest Asia: regional survey
- Strategic overview of the Middle East and Southwest Asia
- The Arab-Israeli dispute
- North Africa
- The Gulf and oil security
- Security in South Asia
- Middle East and Southwest Asia: summary
- National security affairs review
- The crisis game

## WARFARE STUDIES

### MILITARY HISTORY AND THEORY

- Overview to thinking about war
- Sun Tzu
- Great thinkers I
- Land strategy in World War I
- Great thinkers II
- Great thinkers III
- Great thinkers IV
- Fog and friction of war
- Evolution of strategic nuclear theory
- Great thinkers V

### MILITARY HISTORY

- Why study military history
- History of land warfare
- French Revolution
- Arming the earth
- Perspective of a participant in Air Force history
- The effect of airpower on warfare--world war II
- Indochina--the roots of conflict
- Vietnam perspective

### MILITARY DOCTRINE

- Doctrine-strategy link
- Principles of war
- The development of airpower between the wars
- History of the basic doctrinal concepts of the Soviet Union

Soviet military doctrine and strategy  
Law of armed conflict  
Air Force basic doctrine  
XOXFP on doctrine

#### MILITARY STRATEGY

The strategy process  
Military strategy and doctrine  
American Revolution  
Great warriors I  
Great warriors II  
Strategy in the American Civil War  
Great warriors III  
Naval strategy in World War I  
Great warriors IV  
Ground operations--western front  
The Battle of Britain  
The eastern front--ground  
The eastern front--air  
Great warriors V  
Stalingrad  
US Pacific naval strategy in World War II  
Great warriors VI  
Airpower in Korea  
Air war Vietnam  
The strategy process and Vietnam  
Vietnam and the media  
Man at arms in today's world  
Thinking about war review

#### LOW-INTENSITY CONFLICT

Keynote address--issues and challenges in low-intensity conflict  
Contemporary international terrorism  
Insurgent theories  
Soviet threat in low-intensity conflict (Spetnaz)  
Military response to low-intensity conflict  
Peacetime contingency operations  
Peacekeeping operations  
Case study in low-intensity conflict  
Low-intensity conflict exercise

#### THEATER WARFARE

Phase introduction  
The operational perspective  
The theater battlefield  
Soviet theater threat  
Airland battle

- Air reserve forces
- Combat stress
- Command and control
- Intelligence at the operational level
- Counter air
- Electronic combat (EC)
- Close air support and air interdiction
- Tactical deception
- NATO, USAFE, and the central region
- Chemical operations
- Strategic mobility
- Airlift
- Army overview
- Army tactical exercise
- Army field trip
- Survey of US Navy missions and strategy
- Survey of US Marine Corps
- Maritime operations
- Joint force development process
- Joint Operations Planning System
- Fast Stick
- German Air Force visit
- CANUSA
- USARAF

#### NUCLEAR WARFARE

- Phase introduction
- A perspective on deterrence
- The nuclear revolution
- Nuclear doctrines
- Soviet nuclear strategy
- US nuclear strategy
- US/Soviet strategy comparison
- Nonstrategic nuclear forces
- Soviet nuclear forces
- The nuclear situation in Europe
- US nuclear offensive forces: the strategic air command (SAC)
- Strategic command and control communications (C3)
- US nuclear offensive forces: the US Navy
- Strategic attack assessment and warning
- Countering the airbreathing threat
- Soviet strategic concepts
- Planning for strategic nuclear employment
- US/Soviet decision making: a comparison
- The balance of forces
- Strategic modernization
- Strategic force mix for the future
- Nuclear warfare and morality
- The strategic defense initiative

Reducing the risk of nuclear war  
Arms control  
Big stick exercise

#### SPACE OPERATIONS

##### SPACE DOCTRINE

Evolution of US military space activities  
Characteristics of the space medium  
Space doctrine

##### SPACE: FORCE SUPPORT

Introduction to space operations  
US space policy and international space law and treaties  
Force enhancement  
Force enhancement and tactical doctrine  
Soviet space threat .  
Space support  
Space systems survivability

##### SPACE: LOOKING TO THE FUTURE

Space control  
Man in space  
Space force structure decisions

## Appendix Two

### RESIDENT PROGRAM ELECTIVES

#### AREA

##### Course

#### STAFF COMMUNICATIONS

- Effective staff briefing
- Effective writing
- Creative thinking
- Instructional system development
- Spanish language
- German language
- Arabic language

#### COMMAND/LEADERSHIP/RESOURCE MANAGEMENT

- Next assignment-air staff
- Introduction to acquisition management
- System acquisition issues
- Personal financial planning and management
- Dealing with death in the military community
- Squadron Commander elective
- Executive fitness
- War and morality: ethics and the military profession
- Introduction to MS-DOS word processing
- Media relations for staff officers
- The planning, programming, and budgeting system

#### NATIONAL SECURITY AFFAIRS

- Development of the Soviet military establishment
- The People's Republic of China
- Arab-Israeli Conflict
- Introduction to Islamic political world-view
- East Asia and US security
- Contemporary Africa
- Latin America-United States relations
- Introduction to Soviet Politics
- Twentieth century Europe

This appendix is taken from the ACSC Curriculum Compendium AY 87, pages 50-51, edited by Major Martin C. Schroeder.

## Intelligence problems and national security

### WARFARE STUDIES

- History of airpower
- The Vietnam War
- The American Civil War
- War through the ages
- USAF roles and missions: then and now
- US air reserve forces
- Nuclear weapons and issues
- Electronic combat
- Lessons of tactical air employment...Vietnam to the present
- Guerrilla warfare in Latin America
- Airlift
- Army overview
- The US Army
- Update on Army issues
- United States Navy elective
- JMEEX player group preparation
- The intelligence community
- Sources of the Soviet mind set
- US and Soviet navies
- Faculty development

### SPACE OPERATIONS

- Space wargames

## Appendix Three

### NON-RESIDENT PROGRAM CORE CURRICULUM

#### AREA

#### Course

#### COMMAND, LEADERSHIP, AND RESOURCE MANAGEMENT

- Orientation
- Leadership perspectives
- Professionalism and integrity
- Society and the military
- Command I
- Command II
- Quality force actions
- Civilian personnel/labor management relations
- Air reserve forces
- Building the Air Force budget
- The Air Force budget-Congress and you
- Resource management issues
- Creating military capability
- Logistics support

#### NATIONAL SECURITY AFFAIRS

- The strategy process
- Introduction to national security affairs
- National security policy
- Challenges to national security
- USSR/Eastern Europe
- Western Europe
- East Asia and the Pacific
- Middle East and Southwest Asia
- Africa
- Latin America
- Air Force doctrine
- Soviet doctrine
- International law-conduct of armed conflict

This appendix is taken from the ACSC Associate Programs, Seminar Member Handbook AY 88, page 6, edited by Major Martin C. Schroeder.

## WARFARE STUDIES

- Low intensity conflict
- Tactical air forces I
- Tactical air forces II
- The Joint Chiefs of Staff and the Joint Operations Planning System
- Joint force development process
- Joint/combined force operations
- Strategic mobility
- Non-strategic nuclear, chemical and biological operations
- Command, control, communications, and intelligence
- Introduction to strategic nuclear warfare
- Strategic nuclear operations
- Space operations
- Warfare issues

## Appendix Four

### NON-RESIDENT PROGRAM ELECTIVES

Soviet foreign policy  
Next assignment: Air Staff  
US military strategy in Vietnam  
Strategic defense issues  
US Army  
Microcomputer literacy  
Military leadership

This appendix is taken from the ACSC Associate Programs, Seminar Member Handbook AY 88, page 5, edited by Major Martin C. Schroeder.

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