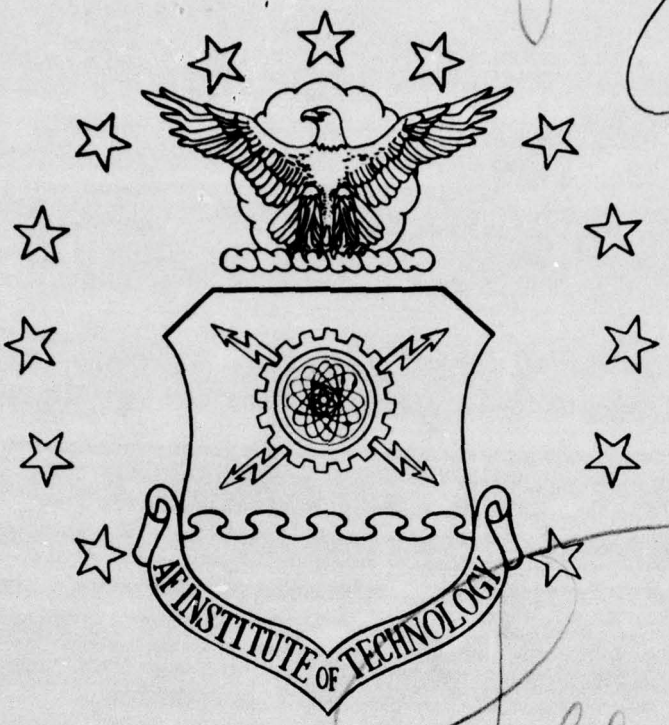
AD-A038 911 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCH--ETC F/G 5/2
ADVANCED DEGREE REQUIREMENTS INFORMATION SYSTEM.(U)
MAR 77 M B WALDRON

UNCLASSIFIED AFIT/GCS/MA/77M-3 NL

1 OF 2
AD A038911



AD A038911



AD No.
DDC FILE COPY

UNITED STATES AIR FORCE

AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

DDC
RECEIVED
MAY 3 1977
A

GCS/MA/77M-3

(1)

ADVANCED DEGREE REQUIREMENTS

INFORMATION SYSTEM

THESIS

GCS/MA/77M-3 Matthew B. Waldron
Capt USAF

DDC
RECEIVED
MAY 3 1977
A

Approved for public release; distribution unlimited.

GCS/MA/77M-3

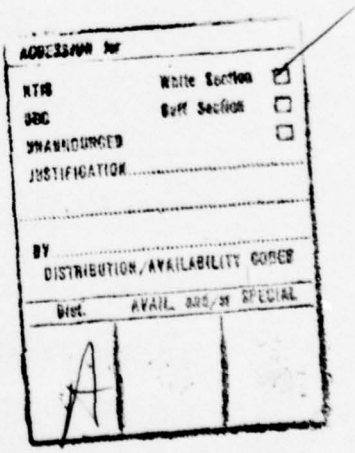
ADVANCED DEGREE REQUIREMENTS INFORMATION SYSTEM

THESIS

Presented to the Faculty of the School of Engineering
of the Air Force Institute of Technology
Air University
in Partial Fulfillment of the
Requirements for the Degree of
Master of Science

by

Matthew B. Waldron, B.S.
Capt USAF
Graduate Computer Systems



March 1977

Approved for public release; distribution unlimited.

Preface

The Advanced Degree Requirements Information System (ADRIS) is an information and management tool that will see wide use at the Air Force Institute of Technology (AFIT) on behalf of faculty and students. The Advanced Academic Degree (AAD) Inventory and Requirements information available from ADRIS can lead to AFIT curricula development to better meet Air Force needs. A secondary, but important use of ADRIS is the help it can provide to AFIT students looking for graduation assignments.

This thesis provided the satisfaction of finally applying classroom academic learning to a practical problem. Making ADRIS suitable for AFIT's needs made me aware of the importance of good communication between system developers and implementors and expectant users. Finally, there is the reward of seeing one's thesis work provide a useful service to the AFIT community.

I would like to thank Capt Thomas E. Reeves, thesis advisor, for his patience, understanding, and outstanding support during this endeavor. Capt Reeves knew instinctively when to guide and when to listen to my frustrations. My other committee members, Dr. Charles J. Bridgman and Mr. Richard H. Lee, provided helpful counsel and many useful comments in their roles as ADRIS "users". Professor Charles W. Richard gave freely of his time in assisting me through the program optimization effort.

Capt John E. Carmack, the original ADRIS developer, answered countless questions over the telephone. Mr. John E. Gates provided invaluable assistance during this project: supplying test data bases for the validation effort, obtaining test results, and supplying current AAD policy and data. Mr. Gates was extremely patient in answering my endless questions over the telephone.

My wife, Belinda, gave me the support, encouragement, and understanding necessary to sustain this effort from beginning to end.

Matthew B. Waldron

Contents

	Page
Preface	ii
List of Figures	vii
List of Tables	viii
Glossary of Acronyms	ix
Abstract	x
I. Introduction	1
Problem Statement	2
Results	3
Organization	4
II. Advanced Academic Degree Management System	6
Validating AAD Requirements	6
Supervisors	8
Major Command Functional Manager	8
HQ USAF	10
Classification of Advanced Academic Degrees	12
Academic Education Level	12
Academic Specialty Code	14
III. The ADRIS Computer Program	17
Need for ADRIS	17
Concept of Operations	19
Descriptor Values	20
Inventory and Requirements Tally	21
List of Records	22
Data Summaries	22
Program Structure	23
SPLY and SMND	25
Program ADRIS	27
DRIVER	27
Subroutine DOBASIC	28
Subroutine GTPARAM	28
Subroutine SRCH	28
Subroutine PRINTIT	29
Subroutine DOSUM	29

		Page
IV.	Program and Data Conversion	31
	Character and Record Conversion	31
	Source Code	32
	Data Tapes	33
	Source Code Alteration	33
	Data Management	35
	Data Files	35
	Random File Creation and Access	36
V.	ADRIS Enhancements	39
	Management of the ASC	40
	ASC Generalization	42
	Aggregate ASCs	44
	Converting Obsolete ASCs	44
	AFDSC Compatibility	47
	Improvements for AFIT Use	48
	Example ADRIS Modifications	49
	Build Test Features	49
VI.	Validation	51
	Build Data Bases	52
	Gather User Parameters	53
	Test Data Bases	53
	Validate with AFDSC Programs	55
VII.	Improving Resource Usage	58
	Data Base Storage	59
	Number of Parameters	59
	Record Packing	60
	Build Programs	60
	Record Sorting	60
	Number of Parameters	62
	Final	63
	Interactive ADRIS Program	63
	Timing Test	64
	Record Unpacking	64
	Input/Output	65
	Overlay	65
	Results	66
VIII.	Conclusion	68
	Summary	68
	Software Transportability	70
	Recommendations	71

	Page
Bibliography	73
Vita	74
Appendix A: User's Guide	A-1
Addendum A-1: Academic Specialty Codes (ASCs) . .	A-11
Addendum A-2: Aggregate Academic Specialty Codes (ASCs)	A-16
Addendum A-3: Requirements Academic Specialty Codes Specific to Four Characters .	A-17
Addendum A-4: Obsolete and Replacement Academic Specialty Codes	A-18
Addendum A-5: Career Area Air Force Specialty Codes (AFSCs)	A-19
Addendum A-6: Consolidated Base Personnel Office (CBPO) Codes	A-21
Addendum A-7: Major Commands Codes	A-58
Appendix B: Maintainer's Guide	B-1

List of Figures

Figure		Page
1	AADMS Cycle	7
2	Sample Page 1 of Air Force Form 1779 . .	9
3	Academic Specialty Code Description . . .	13
4	Inventory and Requirements Tally (Jan 1977)	23
5	List of Records (Jan 1977)	24
6	Major Command Summary (Jan 1977)	24
7	AFSC Summary: Level of Specificity 4 (Jan 1977)	25
8	AFSC Summary: Level of Specificity 1 (Jan 1977)	25
9	DMND Program Structure	26
10	SPLY Program Structure	26
11	ADRIS Program Structure	30
12	Repetitive ASCII Character Pattern . . .	32
13	Generalization Table Format	43
14	Search and Match Logic	45
15	Obsolete ASC Tree (Replacement ASCs Not Shown)	46
16	Packed Data Structure	63
17	Magnetic Tape Transaction Request	B-2
18	General Data File	B-12
19	Area Data File Structure	B-13
20	AGGREG Data File Structure	B-13

List of Tables

Table		Page
I	ASC General Areas of Study	15
II	Pointer File Entries	36
III	Results of Q Educational Level Included in Master's Tallies	54
IV	Effect of General Officers Not Being Considered	55
V	Validation Test Cases	57
VI	Build Program Improvements	61
VII	Response and Resource Results	66
VIII	DMND Build Program Test Output	B-5
IX	Tape Fields and Format	B-10
X	File Directory	B-16

Glossary of Acronyms

AAD	Advanced Academic Degree
AADMS	Advanced Academic Degree Management System
ADRIS	Advanced Degree Requirements Information System
AFDSC	Air Force Data Services Center
AFERB	Air Force Education Requirements Board
AFIT	Air Force Institute of Technology
AFMPC	Air Force Military Personnel Center
AFSC	Air Force Specialty Code
ASC	Academic Specialty Code
CBPO	Consolidated Base Personnel Office
CDC	Control Data Corporation
CYBER 74	CDC Computer Model
DAR	Data Automation Requirement
DMND	Program that builds Requirements data base
MDS	Manpower Data System
INTERCOM	Interactive Terminal System
PDS	Personnel Data System
HQ USAF/DPPE	Education Division, Director of Personnel Programs, Deputy Chief of Staff for Personnel
SPLY	Program that builds Inventory data base

Abstract

The Advanced Degree Requirements Information System (ADRIS), an interactive computer-based data retrieval system, was updated, validated, optimized, and documented. The developmental ADRIS software designed for the Honeywell 6060 at Gunter AFS, Alabama, was converted for use on the Control Data CYBER 74 at Wright-Patterson AFB, Ohio. ADRIS was implemented for use by noncomputer oriented Air Force Institute of Technology faculty and staff at time-sharing terminals. The ADRIS Inventory and Requirements data bases can be queried for information about Air Force graduate degree officers and Advanced Academic Degree job positions. The ADRIS system was analyzed, tested, and altered to insure correct operation and reliable output reports. A successful validation effort was conducted with the Air Force Data Services Center using two separately developed computer programs to compare results. A new feature was added to ADRIS to process user queries involving Aggregate Academic Specialty Codes--groupings of related ASCs attached to validated job positions. ADRIS was improved through optimization techniques that reduced data base processing time by over 70% and the resultant user response time by 50%. System User's and Maintainer's Guides are provided.

ADVANCED DEGREE REQUIREMENTS INFORMATION SYSTEM

I. Introduction

The Air Force is a large, diverse, and complex organization in terms of the mix of people and jobs required to accomplish the aerospace defense mission. Successful and cost-effective mission accomplishment is dependent on matching the knowledge and skills required by jobs to the qualifications of Air Force people. The Air Force Advanced Academic Degree Management System (AADMS) was implemented to:

(1) Identify jobs requiring graduate level academic backgrounds.

(2) Make the best use of the available Advanced Academic Degree (AAD) inventory of Air Force officers.

(3) Control the future size, composition, and quality of the AAD force to meet the Air Force's needs.

Information about the inventory of Air Force AAD officers and the AAD job requirements is stored in data bases on file at the Air Force Military Personnel Center (AFMPC), Randolph AFB, Texas. In the past, this information could only be accessed through noninteractive computer programs that were rather inflexible and unresponsive in a typical batch-processing environment. The results were often voluminous and required some effort at interpretation.

In 1974, at Gunter AFS, Alabama, Capt John Carmack developed an experimental interactive computer program called the Advanced Degree Requirements Information System (ADRIS) for use by Air University education planners. The program prompted the user to make responses at a computer terminal; therefore, it could be used by anyone taught the simple procedures to operate a terminal. (These instructions were available in a user's manual (Ref 1).) Inventory and Requirements data bases could then be searched to provide specific AAD personnel and position information in an easily understood format.

The Air Force Institute of Technology's (AFIT) School of Engineering was a primary user of ADRIS (via AUTOVON connection) until the ADRIS interactive program was deactivated in 1975, upon Capt Carmack's transfer to the AFMPC. The School of Engineering obtained magnetic tape copies of the program and latest data bases and submitted a Data Acquisition Requirement (DAR) on 28 May 1976, to activate ADRIS at Wright-Patterson AFB. Conversion of ADRIS to the Control Data Corporation (CDC) CYBER 74 computer was then begun as a thesis project. The DAR was approved in September 1976.

Problem Statement

The initial thesis objective was to bring the ADRIS programs and data bases on-line for interactive use by AFIT faculty and staff. A continuing objective was to gain a

systems-oriented grasp of the ADRIS programs' structure and logic to facilitate changes necessary to:

(1) Conform to current Air Force AAD policy.

(2) Meet AFIT's specific requirements for ADRIS.

An important goal of this thesis was to verify proper program operation and to validate the results obtained from data base searches. No previous validation was known to have been done. A final thesis objective was to insure the efficient and economic use of AFIT computer resources.

Results

The first successful execution of the ADRIS interactive program with the on-line data bases occurred in early November 1976. The ADRIS programs and data files were updated to reflect current AADMS policy in the use of the Academic Specialty Code (ASC). Also, the traditional single ASC was joined by the new Aggregate ASC and this feature was incorporated into the ADRIS program.

Output of the ADRIS interactive program was verified to be the same as results obtained when ADRIS was operational at Gunter AFS. An additional ADRIS validation effort was successfully accomplished by joint tests conducted with the Air Force Data Services Center (AFDSC) at the Pentagon. ADRIS and AFDSC programs were independently developed; however, test case results were identical.

The final ADRIS system turned over to the AFIT School of Engineering Office of Academic Support for administrative

control in March 1977, showed extensive savings in computer resource use. Program execution times were reduced by more than 70%, terminal response times were halved, and memory utilization for programs and data bases was improved. The use and maintainability of ADRIS has been enhanced and documented in program listings and User's and Maintainer's Guides (Appendices A and B).

Organization

The nontechnical reader primarily interested in an overview of ADRIS and its proper use is directed to the following chapters and sections:

(1) Chapter II explains the elements of the AADMS, from section supervisors to the Air Force Education Requirements Board (AFERB). Job positions can be validated as authorized AAD requirements only after a review and approval cycle at unit, major command, and Air Force levels. Chapter II also defines the Education Level and 4-character ASC used to classify every AAD.

(2) The importance of ADRIS to AFIT is discussed in the first section of Chapter III. The second section describes the basic concept of ADRIS operation and explains the types of information products available.

(3) The first part of Chapter V explains AADMS policy changes that resulted in modifications to the data bases and programs. The generalization of most authorized AAD position ASCs, and the new Aggregate ASCs are discussed.

(4) Chapter VI should be skimmed to understand the type of testing conducted to validate ADRIS. The correction of several logical problems with the original ADRIS programs is explained.

(5) The Conclusion, Chapter VIII, presents a short summary, recommendations, and comments on software transportability.

(6) Appendix A, User's Guide, is a complete guide to program operation for the inexperienced ADRIS user.

Technical readers may be more interested in the program and data structures, conversion procedures, and the programming and optimization techniques contained in the last sections of Chapter III and Chapters IV, V, and VII.

The first section of Appendix B, Maintainer's Guide, is a nontechnical guide to bringing new data bases on-line, while the rest of the Appendix is written for the Computer Operations staff monitor for ADRIS.

II. Advanced Academic Degree Management System

The AADMS specifies policies and procedures for the identification, validation, and filling of Air Force AAD requirements. Operation of the system is explained in Air Force Manual (AFM) 36-19, Advanced Academic Degree Management System. This manual is applicable to all Air Force active duty line officer positions for full colonels and below, with the exception of the Judge Advocate General. Advanced Academic Degree requirements are identified by rank, education level, Air Force Specialty Code (AFSC), and the ASC desired for the position.

Validating AAD Requirements

The primary objective of the AADMS is to insure that academically qualified officers are available, at all times, to solve Air Force managerial and technical problems. Cost-effective management of the Air Force's AAD officers and the funding needed to add officers to the AAD inventory necessitates the validation of AAD requirements. Maintenance of an AAD Inventory and Requirements data base enables Air Force functional managers and assignment personnel to make the best use of graduate degree officers. The cyclic nature of the AADMS is represented in Fig. 1. The AADMS is operated through the efforts of Air Force supervisors at every organizational level, area functional managers at major command and HQ USAF levels, the AFERB, and the Education Division,

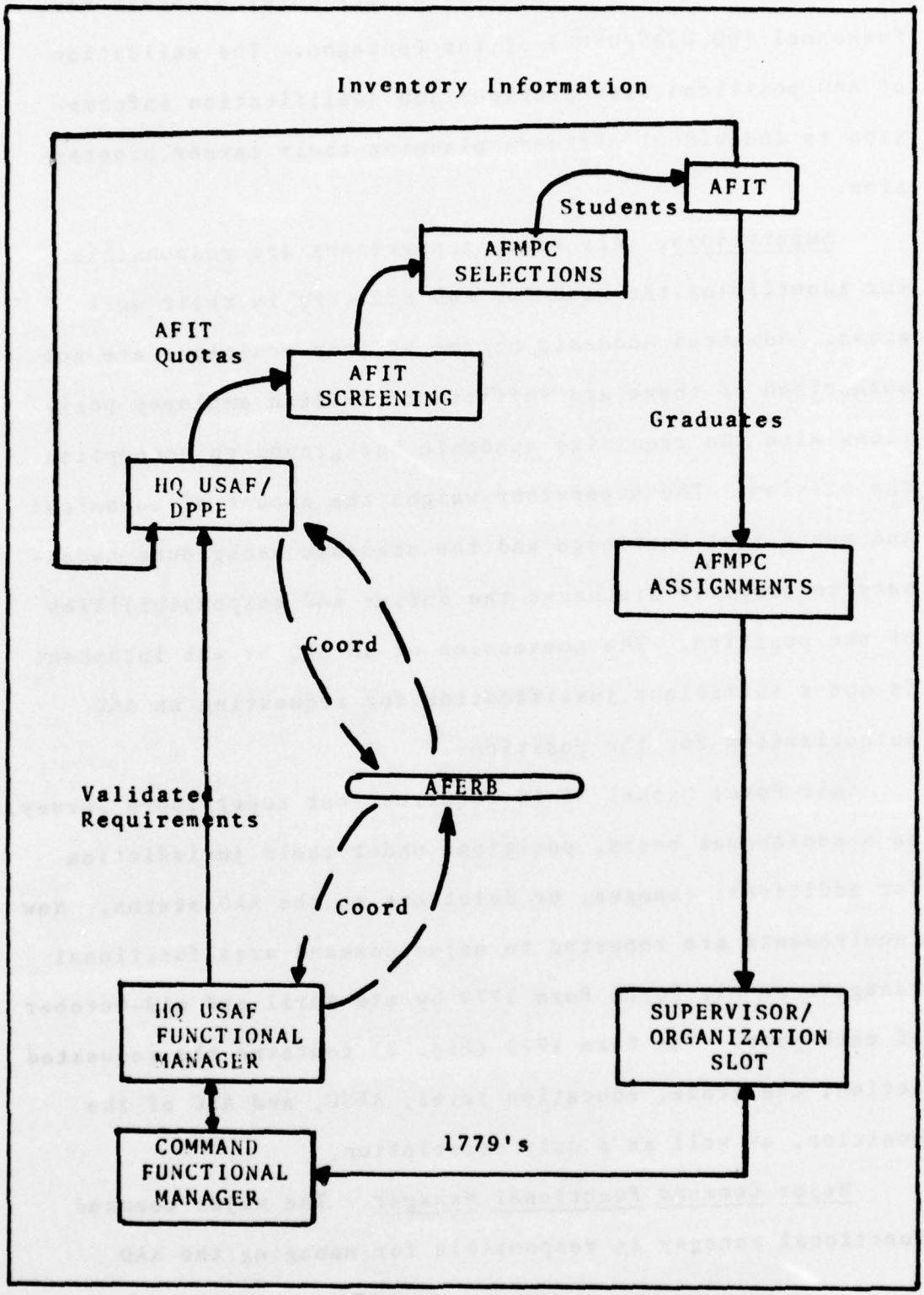


Fig. 1. AADMS Cycle

Director of Personnel Programs, Deputy Chief of Staff for Personnel (HQ USAF/DPPE) at the Pentagon. The validation of AAD positions also provides job qualification information to individual officers planning their career progression.

Supervisors. Air Force supervisors are responsible for identifying the need for AAD officers in their work areas. Advanced Academic Degree officer positions are not authorized if there are sufficient civilian employee positions with the requisite academic background to accomplish the mission. The supervisor weighs the amount of technical and managerial knowledge and the academic background necessary to properly discharge the duties and responsibilities of the position. The possession of an AAD by the incumbent is not a sufficient justification for requesting an AAD authorization for the position.

Air Force Manual 36-19 requires that supervisors survey, on a semiannual basis, positions under their jurisdiction for additions, changes, or deletions to the AAD status. New requirements are reported to major command area functional managers on Air Force Form 1779 by mid-April and mid-October of each year. The Form 1779 (Fig. 2) contains the requested action, the grade, education level, AFSC, and ASC of the position, as well as a duty description.

Major Command Functional Manager. The major command functional manager is responsible for managing the AAD

REQUEST TO ESTABLISH/CHANGE ADVANCED ACADEMIC DEGREE POSITION

REPORT CONTROL SYMBOL: HAF-DPP(SA) 7127

1. MAJOR COMMAND	2. UNIT	3. CONTROL NUMBER
ATC	3510th Flying Training Wing, Randolph AFB TX	DP-1

4. ORGANIZATIONAL STRUCTURE IDENT	5. FUNCTIONAL ACCOUNT CODE	6. AFSC	7. GRADE	8. RATED POSITION ID	9. ORGANIZATIONAL LEVEL
DPXG	160000	C7316	Major	NA	Wing

10. DUTY TITLE	11. CHANGE REQUESTED
Chief, Consolidated Base Personnel Office	X ADDITION DELETION

12. ACADEMIC LEVEL	13. ACADEMIC SPECIALTY REQUIRED	14. EFFECTIVE DATE	FROM / TO	15. NUMBER OF POSITIONS
X MASTER PHD	Personnel Management 1ACY	1 Oct 73		1

16. DUTIES AND RESPONSIBILITIES

Describe what the individual does in sufficient detail to permit evaluation by personnel not intimately familiar with the exact duties and responsibilities of the position or organization. This section must be completed for all requests for additions, changes, and deletions to existing requirements.

17. SPECIFIC JUSTIFICATION FOR AN ADVANCED ACADEMIC DEGREE

This section must explain why the incumbent is required to have an advanced academic degree. The approval/disapproval of your request is normally contingent upon the information provided in this section. Be as specific as possible. Provide information regarding impact of civilians where appropriate.

The appropriate figure in Part Two should be used as a guideline for completing this section. Insure specific justification is provided as required.

Requests to delete an existing advanced academic degree requirement for a position which is otherwise unchanged must be thoroughly justified.

AF FORM AUG 73 1779 PREVIOUS EDITION IS OBSOLETE. PAGE 1 OF 2 PAGES

Fig. 2. Sample Page 1 of Air Force Form 1779.

18. ORIGINATING OFFICIAL		19. REVIEWING OFFICIAL	
TYPED NAME, GRADE, TITLE, AND OFFICE SYMBOL		TYPED NAME, GRADE, TITLE, AND OFFICE SYMBOL	
DATE	SIGNATURE	DATE	SIGNATURE

FOR MAJCOM/HQ USAF USE

FROM:	TO:
FROM:	TO:

COMMENTS/REASON FOR DISAPPROVAL

MAJCOM FUNCTIONAL MANAGER		USAF FUNCTIONAL MANAGER REPRESENTATIVE	
TYPED NAME, GRADE, TITLE, AND OFFICE SYMBOL		TYPED NAME, GRADE, TITLE, AND OFFICE SYMBOL	
SIGNATURE		SIGNATURE	

RECOMMENDATION					HQ USAF FUNCTIONAL MANAGER				
DATE		APPROVED		DISAPPROVED	DATE		APPROVED FOR ENTRY ON MANPOWER DOCUMENT		DISAPPROVED

program for the command in his area. Air Force Manual 36-19 contains a description of the different areas and their constituent Air Force Specialty Codes (AFSCs). The area functional manager is responsible for insuring uniformity throughout the command in determining the types of positions requiring AAD officers. The functional manager is also responsible for the early identification of new requirements brought about by mission changes.

The command functional manager may disapprove and return the Air Force Form 1779 to the originating unit. Other command-approved 1779s are consolidated and forwarded to HQ USAF functional managers for consideration.

When AAD-approved requirements are returned to major commands, the functional manager is responsible for the accurate entry of the data into the Manpower Data System (MDS). Manpower and Organization offices are required to enter the data into the MDS within one month of receipt from the major command functional manager. The data consists of the grade, education level, AFSC, ASC, base, and major command for each authorized position.

HQ USAF. Air Staff functional managers at HQ USAF review, and approve or disapprove, Air Force Forms 1779s on a semiannual basis to validate AAD requirements necessary to meet the Air Force mission in their area. Overall quantitative and qualitative control over the Air Force's AAD program is set by the 10-member Air Force Education Requirements

Board (AFERB). HQ USAF/DPPL acts as the AFERB's executive agent and the overall Air Staff focal point for AAD matters.

Air Force Forms 1779s approved by HQ USAF functional managers become validated Air Force requirements. Functional managers must be able to defend their area AAD authorizations to the AFERB and can call a meeting of the AFERB to raise the ceiling of authorized AAD positions in their area.

The AFERB determines current and future line officer AAD position ceilings Air Force wide and determines the Air Force posture on AAD needs and programs. The board is chaired by the Director of Personnel Programs, DCS/Personnel. Board members are taken from various Air Staff agencies. The Board meets at least every two years and must approve any functional manager request to increase the maximum AAD operating ceiling for a particular area.

The Air Force conducted a position-by-position review of AAD requirements in fiscal years 1971 and 1972 to standardize and validate AAD position needs. The results were approved by the AFERB and returned to Major Commands for entry into the MDS effective 1 July 1972. AFERB approval of the review established the authorized ceilings for each career area. Subsequent changes to the ceilings have been made only as approved or directed by the AFERB.

Within the guidelines provided by the AFERB, HQ USAF/DPPE establishes policies and procedures to assist area functional managers in identifying and validating AAD

requirements. Based on the ASCs of validated positions, HQ USAF/DPPE personnel plan graduate programs for AFIT. In order to maintain a sufficient inventory of Air Force officers with AADs, HQ USAF/DPPE issues quotas to AFIT for AAD education. Quotas are chosen to maintain the proper ratio of AAD officers to the number of authorized AAD positions--this ratio is set by HQ USAF/DPPE for each ASC. The current graduate degree ratios are 1.3 for masters and 1.2 for doctors.

Air Force personnel staff agencies support the AADMS by programming the academic quotas, budgeting the required resources, selecting the most qualified personnel to fill the requirements, and allocating qualified graduates to major commands.

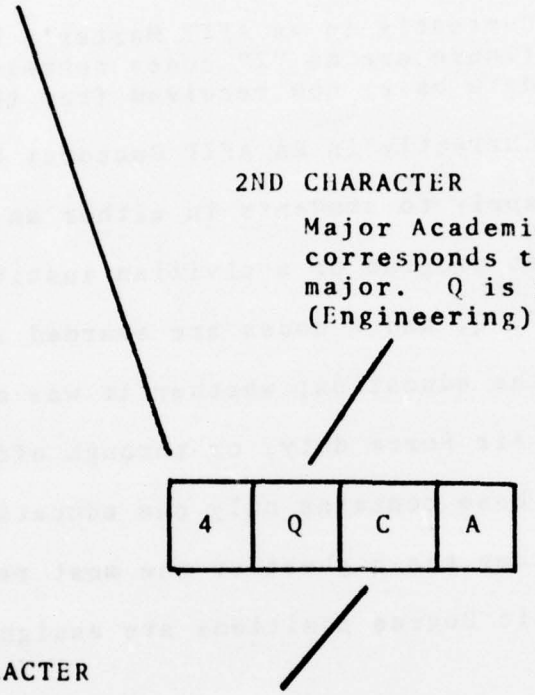
Classification of Advanced Academic Degrees

The classification of AADs is described in AFM 35-25, Educational Assistance and Coding Practices. Advanced Academic Degree information on Air Force personnel is maintained and updated in the Personnel Data System (PDS) only by the AFIT Admissions Directorate (AFIT/RR). Advanced Academic Degree holders are classified by education level and ASC.

Academic Education Level. The education level is a measure of how far an individual has progressed in his academic education. It is coded in the PDS as follows:

1ST CHARACTER - DIGIT

General Area of study or professional area. 4 is Engineering.



2ND CHARACTER

Major Academic Field; often corresponds to a degree major. Q is Nuclear (Engineering).

3RD CHARACTER

Specialization; usually equivalent to academic concentration of at least three courses (12 semester hours) in major field. C is Nuclear and Radiation Effects

4TH CHARACTER

Sub-specialization; graduate study in a definite type of research, course, or courses associated with a given specialization. This level is usually not specified. A is Blast and Thermal Effects.

Fig. 3. Academic Specialty Code Description

P - Master's Degree, less than 30 post-graduate hours

Q - Master's Degree, plus 30 or more semester hours, no doctorate

R - Doctoral Degree

2 - Currently in an AFIT Master's Degree Program (There are no "2" codes contained in the data bases now received from the AFMPC.)

3 - Currently in an AFIT Doctoral Program

Codes 2 and 3 apply to students in either an AFIT resident Institute degree program or a civilian institution degree program. The P, Q, and R codes are awarded regardless of the source of the education; whether it was obtained through AFIT, prior to Air Force duty, or through off-duty education. The ADRIS data base contains only one education level code per person--either the highest or the most recent one. Advanced Academic Degree positions are assigned only the P or R code.

Academic Specialty Code. AFIT quotas are assigned by education level and ASC. The ASC determines the area and level of specialization of study. See Fig. 3.

The ASC is a 4-character identifier. The first (left-most) character is a digit identifying the General Area of Study, a grouping of closely related branches of learning. See Table I for a listing of all the general areas of study. The remaining three characters are alphabetic and identify increasing levels of specialization.

Table I

ASC General Areas of Study

First Character ASC	Description
0	Inter-Area (Interdisciplinary)
1	Administration, Management, and Military Science
2	Arts, Humanities, and Education
3	Biological and Agricultural Science
4	Engineering
5	Civil Law
6	Mathematics
7	Medical Sciences (not included in the ADRIS data bases)
8	Physical Sciences
9	Social Sciences

As an example, consider the ASC 4AGB. The first character, the digit 4 identifies the general area of study, Engineering. The second character represents the major academic field, one of the major subdivisions of the general area of study. This category usually corresponds to a degree major. The A in 4AGB represents the subdivision Aeronautical Engineering.

The third character designates a specialization, equivalent to an academic concentration of at least three courses (12 semester hours) within a major field. This is usually

the lowest category with which a person's academic background can be associated, except in graduate studies with specific areas of emphasis. The G in 4AGB represents the specialization of Structures.

The fourth and last character designates the subspecialization, a group of courses or on-the-job professional experience associated with a given specialization. This level is usually not reported, except in cases of graduate study or research in specific areas. The B in 4AGB represents Aircraft Structures.

A "Y" is used in any position to indicate no specialization or not applicable. Interdisciplinary or inter-area specialization are indicated by a first digit of zero. These represent specializations common to two or more major academic fields. For example, OYBY represents the inter-area specialization of Biochemistry.

III. The ADRIS Computer Program

The interactive ADRIS computer program is an information and management tool. The speed of the computer enables a user to extract, within a few seconds, detailed information from two data bases containing identifiers describing approximately 10,000 AAD authorized positions and 28,000 officers (as of January 1977). The basic ADRIS product is a tally, by grade, of AAD officers (Inventory) and AAD positions (Requirements). The tally is based on six parameters: education level, ASC, AFSC(s), grade(s), base(s), and major command(s).

Capt Carmack's original interactive program contained a main control program and three subroutines--RETRIEVE, FORECAST, and CHANGE. The AFIT DAR granted approval for use of the RETRIEVE module only. The other modules, used to forecast future training requirements, duplicated other computer products available from HQ USAF/DPPE.

The RETRIEVE module was broken into several functional subroutines for easier understanding. The new structure allowed the ADRIS program to be executed with an overlay composition which reduced central memory storage requirements.

Need for ADRIS

According to the original ADRIS User's Handbook, "The major objective of ADRIS is to place in the hands of the

information user, the power of the computer to manipulate and massage the data base and to display only the information actually needed in a useful form (Ref 1)." Air Force Institute of Technology administrators, faculty, and students will use the ADRIS interactive program for a variety of purposes. New AFIT quotas can be queried against the data base to find the location of authorized positions. Bases and units can then be contacted to determine precise detail about the programs and courses needed for new students. AFIT will also be able to communicate with units and agencies that receive graduates to evaluate the effectiveness of AFIT educational programs.

Long term trends in different academic areas can be tracked with the ADRIS program. As the Air Force's needs for particular ASCs increases or decreases, AFIT can be ready to adjust its programs and faculty accordingly. As AFIT's contacts with users of graduates expands, the emphasis in AFIT courses can more accurately reflect the special research, development, and logistical subjects and problem areas that are currently important to the Air Force. Seminar or short courses can be offered to satisfy the special needs of field units.

The interactive nature of ADRIS becomes paramount when the data base must be searched for a large number of cases. For example, an AFIT yearly quota of 400 students may involve as many as 100 different AFSC-ASC combinations.

Interpretation of ADRIS outputs usually leads to more refined inquiries to track down a trend or figure. The interactive nature of ADRIS is essential for this type of program-user interplay. It would not be practical to frame such questions for another organization to answer.

The ADRIS program will also become a valuable tool for AFIT students looking for duty assignments. Students can determine where requirements exist for their individual AFSCs and ASCs in order to make informal contacts and request realistic assignments. The interactive nature of the program will permit several hundred graduates a year to conveniently use the program.

Concept of Operations

The ADRIS program extracts information from two data bases--one containing AAD Inventory data and the other containing AAD Requirements data. Each AAD officer in the Inventory data base and each AAD position in the Requirements data base is identified by six descriptors. These six descriptors are: education level, ASC, AFSC, grade, base, and major command.

The program user at a time-sharing terminal is "prompted" to enter values for the six descriptors. The program searches both the Inventory and Requirements data bases to find officers and positions that have matching descriptors. These matching "records", the data base values for the six descriptors, are used to provide the user with three types of

information products:

(1) An Inventory and Requirements tally of the matching records.

(2) A listing of all matching records.

(3) Five varieties of summaries of the matched records.

Descriptor Values. The user enters values for the descriptors as prompted by the terminal. An asterisk (*) may be entered to indicate either all of a descriptor category or no preference for the element(s) of a category. Codes for ASCs, AFSC career areas, bases, and major commands have been extracted from AFM 300-4 and listed in the User's Guide, Appendix A.

A single or Aggregate ASC may be entered. An Aggregate ASC identifies a position that can be filled by one of several different ASCs. For example, Aggregate code AAAY is composed of ASCs 4AYY, 4BYY, 4EYY, and 4KYY. Aggregate ASCs are further explained in Chapter V. An "*" indicates all data base ASCs except Aggregate ASCs from the Requirements data base.

A "Y" character in a single ASC means no specialty. Thus, the ASC 4ACY has no subspecialization. If an ASC contains one or more "Ys" an option exists to examine only that ASC (e.g., 4ACY) or both that ASC and all of its specialties (e.g., 4ACA, 4ACB, etc.).

P, Q, R, 2, or 3 (defined in Chapter II) may be entered for the education level. An asterisk will result in matching any record having a P, Q, or R educational level (any graduate degree).

Either one or a list of AFSCs may be designated. A range of AFSCs may be indicated by an "X" in the last position or last two positions of the AFSC. For example, 51XX indicates AFSCs 5100 through 5199. Alphabetical area codes may also be entered, as defined in AFM 36-19. For example, INTE, for intelligence, matches the AFSCs 0910, 57XX, and 80XX. An asterisk indicates that all AFSCs are to be considered.

Single or multiple grades may be entered. An asterisk indicates grades second lieutenant through colonel. General officers are not included in the tallies, since only second lieutenants through lieutenant colonels are eligible for AFIT programs. Colonels are tallied as a matter of information.

A 2-character Consolidated Base Personnel Office (CBPO) code is entered for each base desired. An asterisk indicates no restriction on bases.

Major commands are indicated by a 1-character code; single or multiple entries are permitted. An asterisk indicates no preference or restriction.

Inventory and Requirements Tally. Given the above descriptors as input, the program prints as output a tally,

by grade, of the number of AAD positions and number of AAD officers that match the user's criteria. The quotient of this Inventory to Requirements is also shown. Figure 4 is an example of both input and output for ASC OCDY, numerical methods in data processing.

List of Records. If requested by the user, a listing of all records found during the Inventory and Requirements search will be printed. Figure 5 shows such a list for the example of Fig. 4.

Data Summaries. The records found during the Inventory and Requirements search can be used to print summaries by ASC, AFSC, base, or major command.

The base and major command summaries print the Inventory and Requirements totals, by grade, and by base or major command. Figure 6 shows a major command summary for the example of Fig. 4.

The ASC summary prints Inventory and Requirements, by grade, and by ASC. The "level of specificity" of the ASC is chosen by the user. For example, if the original ASC was OCYY, and the user entered 3 for level of specificity, the ASC summary would show tallies for OCAY, OCBY, OCCY, etc. For a level of specificity of 4, subspecialty divisions would be shown--OCAA, OCAB, ...; OCBA, OCBB, ...; etc. The AFSC summary also permits level of specificity designations. See Figs. 7 and 8 for two AFSC summaries with different levels of specificity (based on Fig. 4 criteria).

```
EDLEV=R

ABC=OCDY

ENTER 1 TO DESIGNATE ONLY THIS SPECIFIC ASC
      2 TO SUMMARIZE THIS ASC + ALL ITS SUB-SPECIALTIES

 = 2

AFSC=51XX

GRADE=4,5

CBPO=*

MAJCOM=*

CLOCK TIME START:  18.56.12.
TIME FOR DATA BASE SEARCH: .357
CLOCK TIME FINISH:  18.56.28.
```

GRADE	PHD REQ	INV
04	1	4
05	2	3
TOTALS	3	7
INV/REQ	2.3	

Fig. 4. Inventory and Requirements Tally (Jan 1977).

The Major Command Special Summary requests level of specificity ASC information from the user. The summary then prints Inventory and Requirements tallies by major command, by ASC and by grade (only for nonzero Requirements ASCs).

Program Structure

The ADRIS computer software at AFIT consists of three programs: the interactive ADRIS program and the two data

LEVEL	ASC	AFSC	GRADE	CBPO	MAJCOM
		*** REQUIREMENTS ***			
R	OCDY	5116	5	EP	OH
R	OCDY	5135B	4	KV	03
R	OCDY	5116	5	KH	3V
		*** INVENTORY ***			
R	OCDB	5116	5	HH	3V
R	OCDY	5116	5	KV	OH
R	OCDY	5116	4	WE	OF
R	OCDY	5116	5	KV	OH
R	OCDY	5116	4	HH	ON
R	OCDY	T5125C	4	US	OB
R	OCDY	V5135A	4	US	OB

Fig. 5. List of Records (Jan 1977).

		01	02	03	04	05	TOTAL	06
H	INV	0	0	0	0	2	2	0
	REQ	0	0	0	0	1	1	0
3	INV	0	0	0	0	0	0	0
	REQ	0	0	0	1	0	1	0
V	INV	0	0	0	0	1	1	0
	REQ	0	0	0	0	1	1	0
F	INV	0	0	0	1	0	1	0
	REQ	0	0	0	0	0	0	0
N	INV	0	0	0	1	0	1	0
	REQ	0	0	0	0	0	0	0
B	INV	0	0	0	2	0	2	0
	REQ	0	0	0	0	0	0	0

Fig. 6. Major Command Summary (Jan 1977).

		01	02	03	04	05	TOTAL	06
5116	INV	0	0	0	2	3	5	0
	REQ	0	0	0	0	2	2	0
5135	INV	0	0	0	1	0	1	0
	REQ	0	0	0	1	0	1	0
5125	INV	0	0	0	1	0	1	0
	REQ	0	0	0	0	0	0	0

Fig. 7. AFSC Summary: Level of Specificity 4 (Jan 1977).

		01	02	03	04	05	TOTAL	06
5XXX	INV	0	0	0	4	3	7	0
	REQ	0	0	0	1	2	3	0

Fig. 8. AFSC Summary: Level of Specificity 1 (Jan 1977).

base builder programs, SPLY (Inventory) and DMND (Requirements).

SPLY and DMND. SPLY and DMND build the data bases from the magnetic tapes supplied by the AFMPC. See Figs. 9 and 10 for module structure charts.

Records are read, one-by-one, from the magnetic tapes. Corrections are made to out-of-date ASCs by the modules shown below the main programs in Figs. 9 and 10. These modules, new to the build programs, are explained in Chapter V. Each record is temporarily sorted into a file, based on the ASC digit (first character) which specifies the general area of study. After all records are processed from the

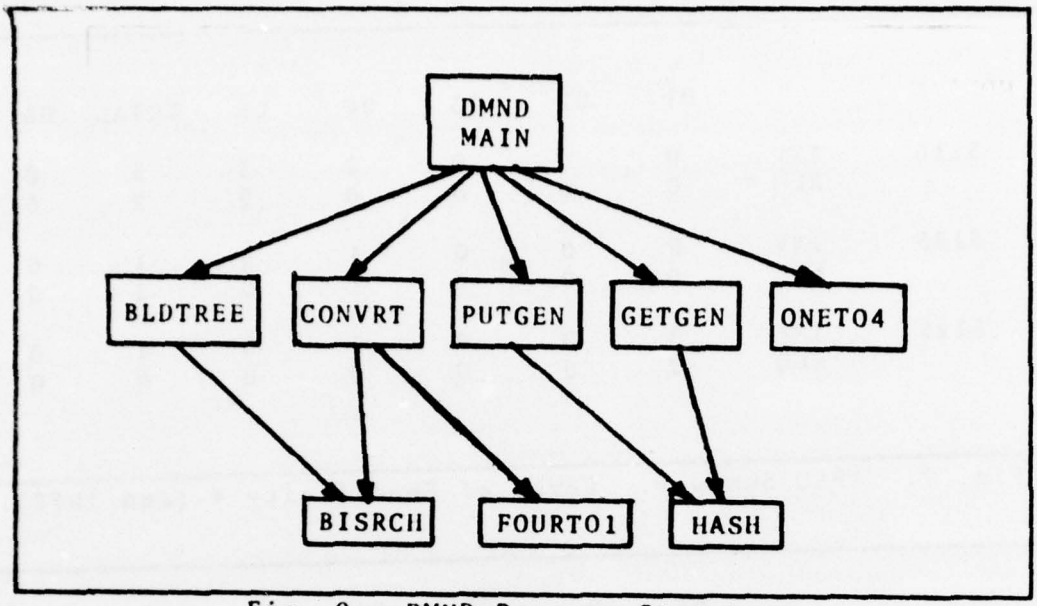


Fig. 9. DMND Program Structure

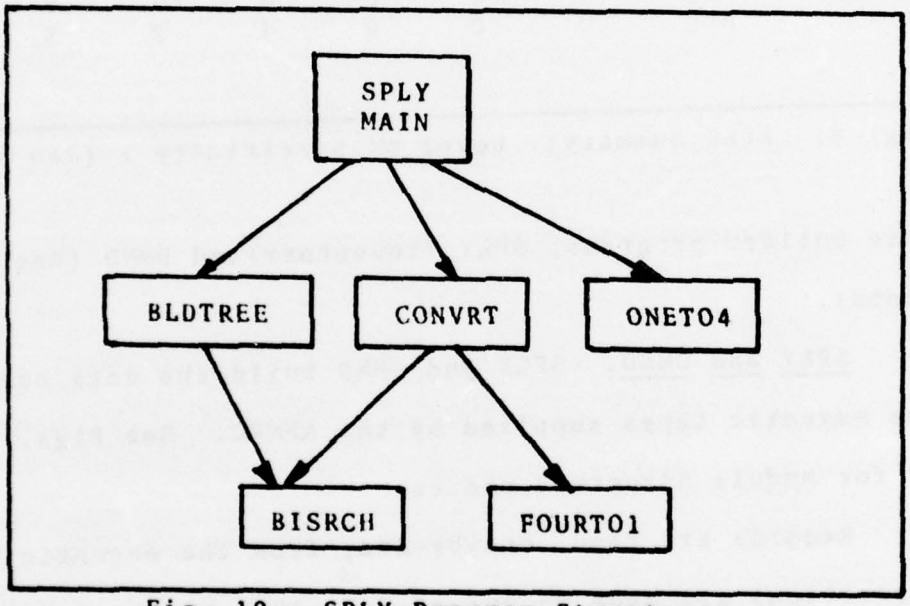


Fig. 10. SPLY Program Structure.

magnetic tape, the separate files, each containing all the records for a particular ASC general area of study, are sequentially merged together. The starting and ending points of each area are saved, to simplify searches conducted by the interactive ADRIS program.

For example, records 1 through 1,124 could constitute area "0" (interdisciplinary); records 1,125 through 4,999 could constitute area "1" (administrative and management); etc.

When the merged records are stored on mass storage (disc) they are packed together, 100 records to a group, to save space. Both data bases are created in this manner; they are then accessible to the ADRIS interactive program.

Program ADRIS. Program organization is shown by the module structure chart in Fig. 11. The original ADRIS program grouped GTPARAM, SRCH, and DOSUM into a single large subroutine. The new structure provides a more functional division and permits an overlay structure to reduce program memory requirements.

Brief module descriptions follow:

DRIVER. The DRIVER module controls program flow. The DRIVER activates the data bases and briefly explains the program's purpose and the format of the responses expected from the user. The DRIVER passes control to the DOBASIC and DOSUM modules and terminates the program when the user is done.

Subroutine DOBASIC. The DOBASIC module is a short control subroutine which sequentially passes control to three modules which perform the basic Inventory and Requirements tally.

Subroutine GTPARAM. The GTPARAM module queries the user for AAD descriptors and stores the values for use in the data base search. The GETAFSC, GTGRD, GETCMD, GETCBPO, AGGREG, and DCIPHR subroutines gather and store user-entered AFSC(s), grade(s), education level, base(s), command(s), and Aggregate or single ASCs. GTFCT processes area AFSCs and SAVE stores AFSCs. ILLEGAL prints out a pointer to an illegal character if an incorrectly-formatted entry is made. CONCAT concatenates characters from separate computer words into a single word. This is required to place descriptor values into the proper format for matching. User descriptor values are stored left-justified and blank-filled, except for AFSCs and grades, which are stored in integer format, right-justified and zero-filled.

Subroutine SRCH. The SRCH module extracts records from the applicable data base for comparison against the user's descriptor values. When a match occurs, grade-tally totals are incremented and the record is temporarily stored for later use. The search is confined to that part of the data base containing the same general area ASCs as the user-entered ASC. This prevents a time-consuming search of the entire data bases, unless the user enters an asterisk

for ASC. For example, if the user's ASC is 4AGY, only the "4's" in the data bases must be searched. When Aggregate ASCs are entered it may be necessary to search several areas of the data bases. Descriptors are provided to the SRCH subroutine by the NXTREC module. The NXTREC subroutine reads groups of 100 records into memory and unpacks the records one-at-a-time for matching against the user's criteria.

Subroutine PRINTIT. The PRINTIT module calculates the Inventory to Requirements ratio, prints appropriate header information, and prints the Inventory and Requirements tally and ratio. A tally for full colonels is printed but not included in the totals used to calculate the Inventory to Requirements ratio.

Subroutine DOSUM. The DOSUM module calculates and prints results for the five types of summaries and list of records products optionally available after completion of the Inventory and Requirements tally.

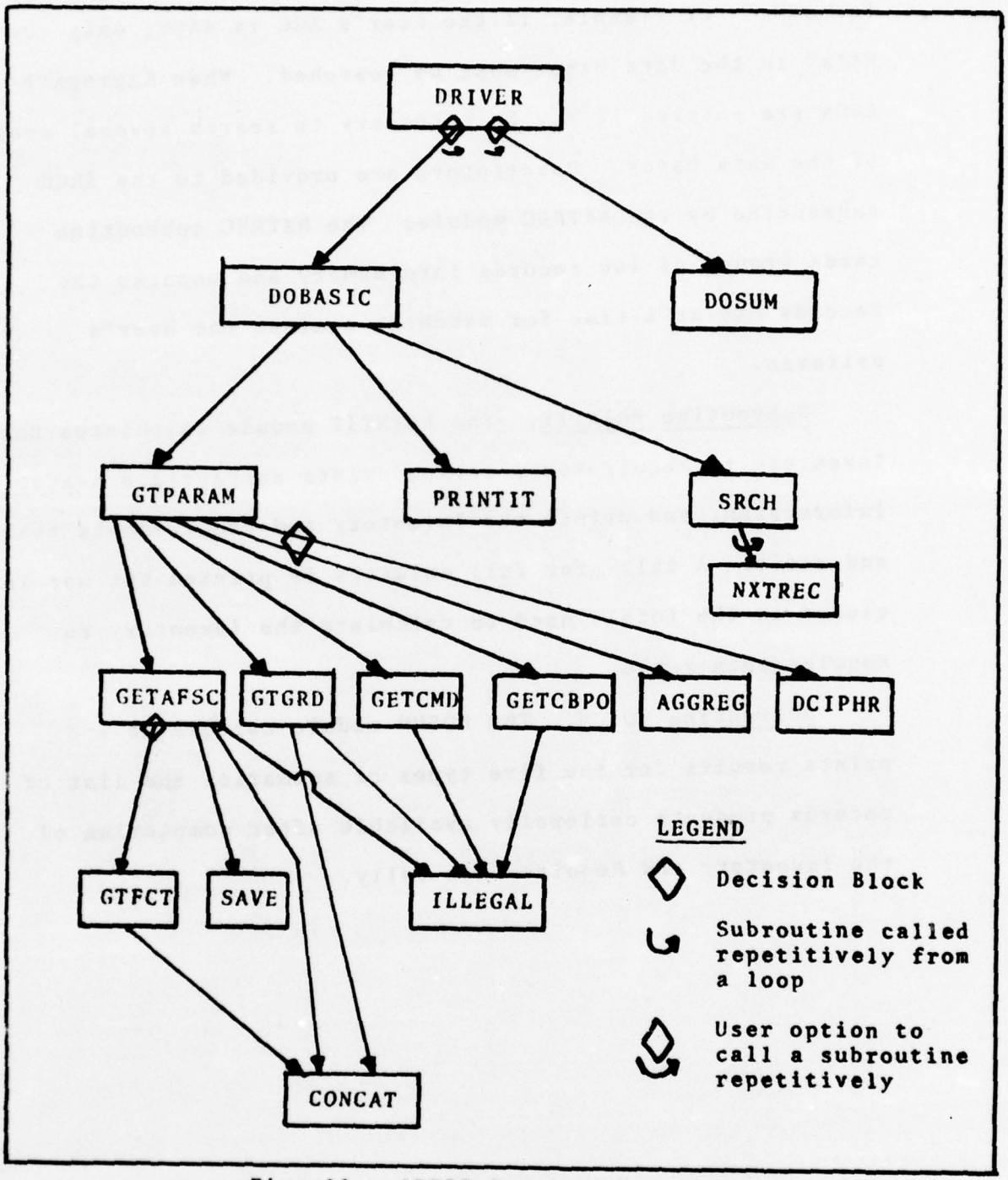


Fig. 11. ADRIS Program Structure.

IV. Program and Data Conversion

ADRIS was developed and initially operated on Honeywell 6060 computer equipment at Gunter AFS, Alabama. The ADRIS programs and the April 1975 data bases were made available to the AFIT School of Engineering on magnetic tapes produced by the Honeywell 6060 at Gunter. Moving ADRIS to the CDC CYBER 74 computer required a character set and character code conversion. The ADRIS source code was written with nonstandard American National Standards Institute (ANSI) FORTRAN, which included FORTRAN features unavailable to the CYBER users. Different Honeywell and CYBER procedures for creating and using random files required changes in ADRIS data base construction and use.

Character and Record Conversion

Program editing and compilation and data base use could not be attempted until the magnetic tapes were converted to CYBER format. The Honeywell 6060, with a word size of 36 bits, gives users a choice of two character sets: 7-bit ASCII (USA Standard Code for Information Interchange) or 6-bit BCD (Binary Coded Decimal). The CDC CYBER 74, on the other hand, uses 60-bit words, with each character represented by a 6-bit "display code". The Honeywell program tape was coded in ASCII while the two data tapes were coded in BCD.

The source programs and data tapes were both created in block format: blocks consisted of multiple lines (records) of source code or multiple data entries (records) run together on a single tape record of information. The block was the smallest piece of information that could be read from the tape since no system routines were available to translate either ASCII or BCD.

Source Code. Program TAPE1 was written to translate the source code magnetic tape into card image records (lines of code) composed of display-coded characters. Translation required character isolation, character conversion, and card isolation.

When the magnetic tape was read into memory, characters streamed in side-by-side, filling up consecutive words. Twenty 9-bit Honeywell characters filled up three CDC words in the repetitive pattern shown in Fig. 12. Each of the

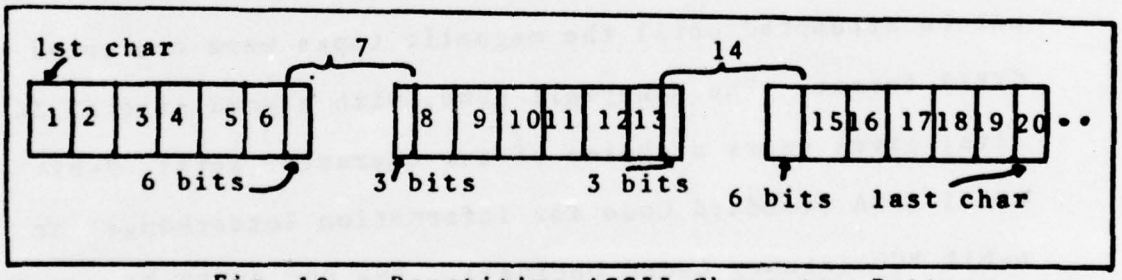


Fig. 12. Repetitive ASCII Character Pattern

20 characters was isolated into a single word by the use of bit shifts and masks. The isolation FORTRAN code was placed in a loop that advanced three memory words at a time until the entire block brought in from tape was processed.

Each isolated character was stored right-justified and zero-filled in a word. The integer value of this word was used as a subscript into a dimensioned array that contained the equivalent CDC display code bit pattern. The Honeywell character was then replaced with its equivalent CDC character pattern.

After character isolation and conversion, card images were isolated from the block by the detection of the Honeywell end-of-line character.

Data Tapes. A "look-up" table was also used to convert the 6-bit BCD data characters into CDC display code in program TAPE2. The converted data bases were stored on local magnetic tapes so that data base entries could be read directly from the tapes as individual records with FORTRAN formatted input statements. The two original data tapes containing Inventory and Requirements information for April 1975 were used to verify the ADRIS program's operation. Data bases for June 1976 were furnished by the AFDSC at the Pentagon in late 1976 to continue program validation on more current data bases.

Source Code Alteration

The CYBER INTERCOM interactive terminal system was used to alter the ADRIS programs. The INTERCOM text editor considerably simplified the task of adding, changing, and deleting hundreds of lines of code. These alterations were

necessary to make the program's syntax and FORTRAN statement repertoire consistent with the conventions and language statements acceptable to the CYBER FORTRAN compiler.

For example, the Honeywell source code contained sequence numbers in the first four columns of every card image and source statements began in column 10. The sequence numbers were moved to begin in column 73 and the source statements moved to begin in column seven or later. The Honeywell convention for a continuation line was the placement of an ampersand (&) in column five, immediately after the sequence numbers. This was corrected by removing the ampersands and placing any character other than a blank or zero (usually a "+") in column six. All list-directed prints and reads required changing: for example--READ, ANS to READ*, ANS. A Honeywell FORTRAN manual was used as a reference guide for all language differences (Ref 2).

A number of FORTRAN statement features not available to the CYBER user required code alterations. Several examples follow:

(1) The use of real variables and constants, as well as expressions in DO loops.

(2) The inclusion of a statement label number in an input or output statement for transfer when an end-of-file occurs.

(3) The existence of CHARACTER type declation statements for the automatic assignment of the proper number

of computer words to hold alphanumeric strings.

(4) The use of a Honeywell system routine to set the reflexive read character sent to a terminal to request input.

Capt Carmack described the ADRIS code as developmental and the programs as "experimental". Thus, there were sections of "dead code" that were never executed, as well as unused variables and arrays throughout the program. Approximately 2,000 words of code and data were deleted. Also, the subroutines FORECAST and CHANGE were eliminated, since their use by AFIT was not authorized.

The original ADRIS program contained sparse explanatory comments. Comments were found, if at all, at the beginning of main programs and subroutines. This lack of documentation made it necessary to study the source code line-for-line to understand and verify program operation. The new ADRIS source code programs have been more fully documented.

Data Management

The original interactive ADRIS program used data from four files to accomplish the data base searches. The two large files containing the data bases were structured as random files for quick access to individual records. A significant change in data base structure was required to use the CDC random file routines.

Data Files. Three data files are used in the data base searches; the Inventory data base file, the Requirements

data base file, and a data base pointer file. The pointer file contains the starting record number for each group of area ASCs. The pointer file records for the April 1975 data bases are shown in Table II below. These starting record numbers are used by the interactive ADRIS program to restrict data base searches to the applicable ASC general area of study.

Table II

Pointer File Entries

INVENTORY		REQUISITIONS		
	P(1)=1		P(1)=1	Inter-area
	P(2)=1794		P(2)=1094	Admin, Mgt, Mil Sci
	P(3)=10065		P(3)=5288	Arts, Hum, Ed
	P(4)=12678		P(4)=5876	Biol, Agri Sci
	P(5)=12878		P(5)=5848	Engin
	P(6)=18204		P(6)=8961	Math
	P(7)=18718		P(7)=9109	Phys Sci
	P(8)=20146		P(8)=10275	Soc Sci
	P(9)=23398		P(9)=10929	No Area Spec.(YYYY)
	P(10)=23407		P(10)=11693	Last Record + 1

A fourth data file, referred to as the AFSC Area data file, is used by the GTFCT ADRIS module to obtain the specific AFSCs that make up the AFSC areas. A table of the areas, their computer codes and constituent AFSCs is contained in the User's Guide in Appendix A.

Random File Creation and Access. Use of CYBER random file routines require the user to declare a dimensioned index array in his program to hold the addresses of all records stored in the random file. The Honeywell 6060 automatically

kept track of these addresses without requiring the user to allow space in his program for their storage. Since the Inventory and Requirements data bases hold a total of nearly 40,000 records, a 40,000-word array would have to be carried in the program. This large array would exceed the maximum program size allowed for execution at INTERCOM. Therefore, the program could not be run interactively at a terminal.

The index array was reduced to an acceptable size by changing the data base build programs to store 100 of the "old" records (information on 100 AAD positions or officers) as a single CYBER random record. This reduced the size of the index arrays from 40,000 to 400.

The pointer file still contains the number of the beginning "old" record in each general area of study. In order to access the correct CYBER random record from mass storage and locate the correct "old" record within, two conversion formulas were developed for the interactive ADRIS program. The correct CYBER random record is calculated by Eq (1).

$$\text{CYBER RECORD} = \frac{\text{"OLD" RECORD} - 1}{100} + 1 \qquad (1)$$

The "+1" part of the expression is due to the truncation effect of integer division (e.g., 256/100 = 2). Thus, all "old" records from 1 through 100 convert to CYBER random record 1 while all "old" records 101 through 200 convert to CYBER random record 2.

Once the correct CYBER record is read into memory, the relative location of the "old" record is as shown by Eq (2).

$$\text{LOC} = \text{Remainder of}\left(\frac{\text{"OLD" RECORD} - 1}{100}\right) + 1 \qquad (2)$$

For example, if the "old" record number is 8,768 then the relative location within the 100 records is: Remainder of (8767/100) + 1 = 68.

V. ADRIS Enhancements

The ADRIS interactive program and the two data base build programs were changed to reflect current Air Force AAD policy. Also, additional changes were made to the programs to meet AFIT needs.

Program changes were necessary to process the new Aggregate ASCs and to relax the specialization required for most AAD positions. Two new data files were added to the ADRIS software: one containing data necessary to relax the specificity of ASC Requirements and the other containing Aggregate ASC information. Two existing data files were brought up-to-date: area AFSCs and obsolete or old ASCs and their replacements. A new procedure was implemented to convert obsolete ASCs to their replacement values.

Mr. John Gates, AFDSC, provided the policy guidance and tables of data necessary for these changes (Ref 3). Mr. Gates currently develops and manages computer programs used to provide AADMS Inventory and Requirements information to HQ USAF/DPPE.

The primary AFIT ADRIS user during implementation of the programs on the CYBER 74 was the School of Engineering Director of Academic Support, Mr. Dick Lee. Mr. Lee was consulted throughout the enhancement period to insure that ADRIS would satisfy AFIT's needs. He authorized changes suggested by the author and Mr. Gates, suggested additional improvements to the program and evaluated

the program's ease of use and correct operation over a long test period.

Management of the ASC

The importance of the ASC is central to the AADMS. AAD positions are requested and authorized for a specific ASC; AFIT quotas and programs are aimed at insuring that there are enough AAD officers to fill these authorized positions.

In 1975, Air University and HQ USAF/DPPE officials became aware of the problem of overspecification in the ASCs aligned with many AAD positions. It was often difficult to find available personnel in the inventory with an ASC matching a position requiring a specific subspecialty in the fourth character position. Also, many AAD officers possessed ASCs specific only to the specialty level (third character of the ASC).

HQ USAF/DPPE made the determination that Air Force requirements were such that only a small number of ASCs warranted identification of the subspecialty in the fourth character position of the ASC. Only 157 ASCs were identified as requiring the fourth character specificity. All other ASCs attached to AAD positions would have their fourth character generalized to "Y".

HQ USAF/DPPE also decided that requirements specifying an "X" for Other in character positions three and four of

the ASC would be treated as requirements for general or no subspecialty, with the exception of 12 Physics ASCs: 8HXA to 8HXL. For example, 4ICX became 4ICY and 4IXY became 4IYY.

Often, officers with different ASCs could satisfactorily fill an AAD position. However, it was impossible for supervisors to indicate this variability on Air Force Form 1779 since the form only permitted entry of a single ASC. The Aggregate ASC was introduced in 1975 to identify a position that could be filled by more than one ASC. An example is the Aggregate code AABY (Basic Sciences); the ASCs that will satisfy an AABY position are: 6YYY (Mathematics), 8CYY (Chemistry), and 8HYY (Physics). A list of the Aggregate codes, their descriptions and constituent ASCs is contained in the User's Guide in Appendix A.

Over time, a number of ASCs became obsolete as the Air Force modified its ASC classification scheme. A current table of obsolete ASCs and their replacements was provided by AFDSC. The table was incorporated into the two data base build programs to convert all obsolete ASCs to their current values. Nineteen of the 23 obsolete ASCs are converted to the "0" or interdisciplinary general area of study. The old and replacement ASCs are shown in the User's Guide in Appendix A.

As a result of the preceding policy and data changes the following program changes were made.

ASC Generalization. Generalization of the third or fourth ASC characters to "Y" was accomplished in the DMND build program. A look-up table was built to hold the 157 ASCs which were specific to the fourth character and 57 ASCs whose last two characters were "XY". Each of these 212 ASCs was tagged with an integer code, "0" for ASCs not requiring generalization and "2" for "XY" ASCs. When the Requirements data base is built, each ASC read from the magnetic tape is checked against the generalization table. If a match is found, the integer code is extracted to determine whether the ASC is to be passed on unchanged or generalized in the third character position. If there is no table match, the last character of the ASC is generalized to "Y".

Subroutine PUTGEN (see Fig. 9) creates the generalization table by using the ASCs to be stored in the table to hash to a word in an array dimensioned 4,096. The algorithm shown in Eq (3) produced a unique hash function for all but four of the 212 ASCs entered into the table.

$$\text{DIMENSION INDEX} = \text{RT-MOST 12 BITS OF } \sqrt{\text{ASC REPRESENTED AS A REAL NUMBER}} \quad (3)$$

Two of these four ASCs hashed to one index while the other two hashed to another index. The array size was chosen to hold the maximum 12-bit number, 4095. No other hashing function could be found which could hash to 12 or fewer bits without resulting in one or more instances of three or more ASCs hashing to the same index. Larger arrays (2^{13}, 2^{14},

etc.) were considered too costly in terms of increased program core requirements. Moreover, two ASCs and their codes could be packed into a single computer word.

General ASCs are read into memory and stored in an array as shown in Fig. 13.

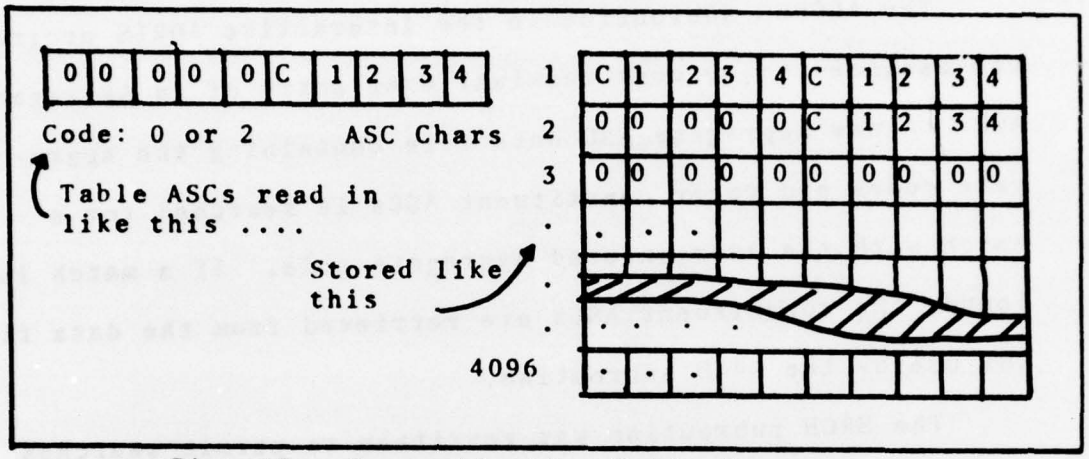


Fig. 13. Generalization Table Format.

After the table is prepared, ASCs are read off the magnetic tape for processing. The ASC is hashed to a table index and then compared to the ASC stored in the right half of the word first and the left half second. If a match occurs the integer code is extracted from the word to see whether the ASC must be generalized in the third character. If there is no match the last character of the ASC is generalized.

New ASCs may be added to the table in the future, if they hash to unfilled or half-filled words. If there are triple hashes a new hashing function or checking algorithm must be found.

Aggregate ASCs. Aggregate ASCs are only found in the Requirements data base. At the present time there are very few positions identified as such; however, as new AAD positions are classified and old positions reclassified, the Aggregate code is expected to see wider use.

The AGGREG subroutine in the interactive ADRIS program was designed to process terminal user entry of an Aggregate ASC. A new Aggregate ASC data file containing the aggregate codes and their constituent ASCs is searched for a match with the user-entered aggregate code. If a match is found, the constituent ASCs are retrieved from the data file for use by the SRCH subroutine.

The SRCH subroutine was rewritten to permit searches for multiple ASCs. Figure 14 shows a flowchart of the new program structure which permits searches for multiple ASCs.

The outer loop can be traversed from one to five times during the Inventory search, depending on the number of different ASC areas included in the Aggregate ASC chosen. The outer loop is traversed only once to search the Requirements data base--all aggregate codes are segregated together to minimize the search time. If the user enters a single normal ASC the outer loop is traversed once each for the Inventory and Requirements data bases.

Converting Obsolete ASCs. Obsolete ASCs are converted to replacement ASCs when building both the Inventory and Requirements data bases. The procedure used to check and

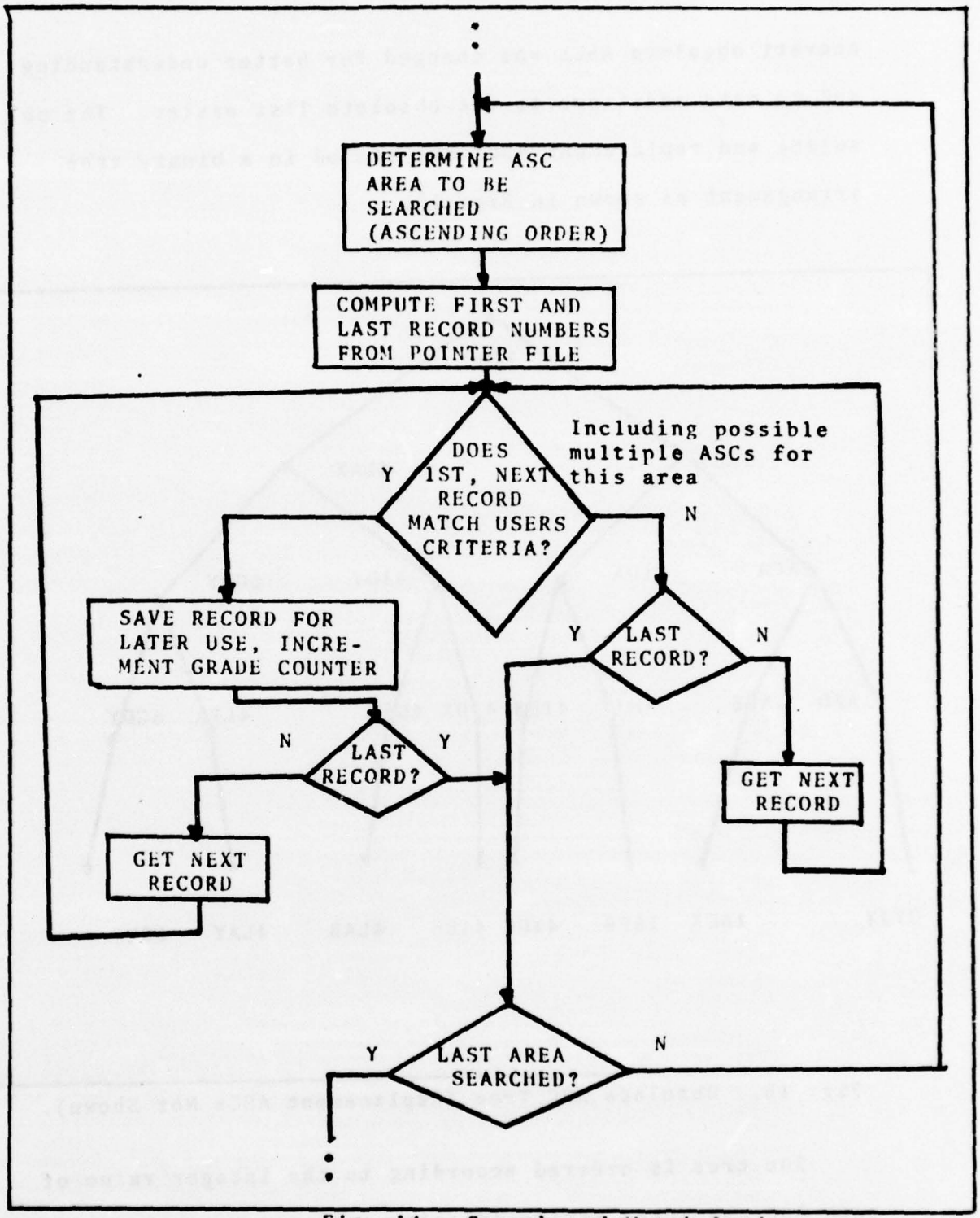


Fig. 14. Search and Match Logic.

convert obsolete ASCs was changed for better understanding and to make additions to the obsolete list easier. The obsolete and replacement ASCs are stored in a binary tree arrangement as shown in Fig. 15.

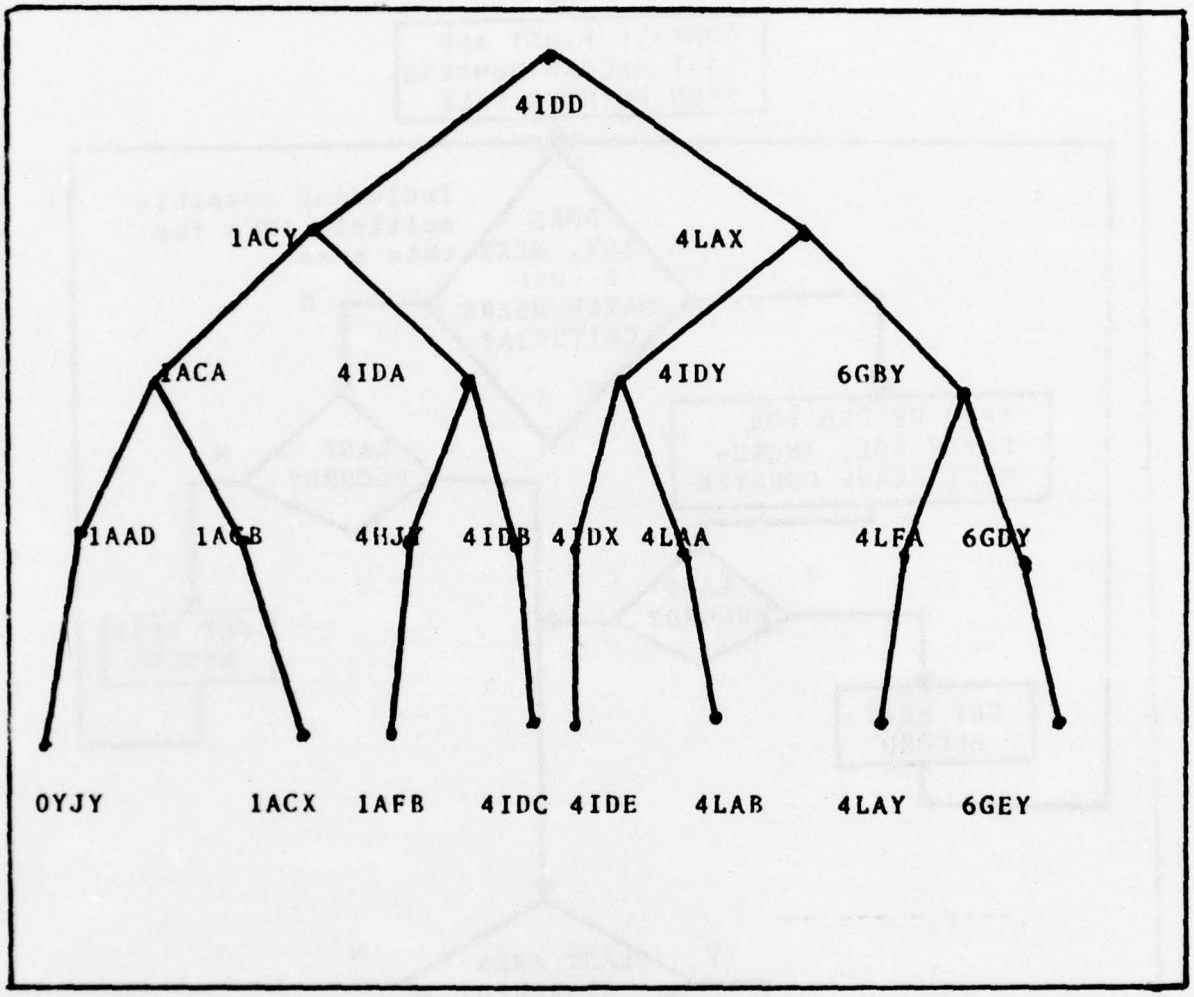


Fig. 15. Obsolete ASC Tree (Replacement ASCs Not Shown).

The tree is ordered according to the integer value of each ASC character string (display code numeric values right justified in a computer word). The left branch below each

node leads to a smaller ASC integer value while the right branch leads to a larger ASC integer value. Each ASC read from the magnetic tape is compared to the "root" ASC (4IDD) in the tree. If the ASC is less than 4IDD the left branch is taken; if the ASC is larger than 4IDD the right branch is taken. Comparison continues until a match is found or the tree is exhausted. If a match is found, the obsolete ASC is replaced with its current value.

This structure was chosen to balance the tree and minimize the number of comparisons necessary to determine if an ASC is obsolete or not. Five comparisons are required to pass through the tree if there is no match. The tree structure can be modified if additional obsolete ASCs must be added.

The BLDTREE subroutine constructs and loads the tree prior to ASC processing, while the BISRCH and CONVRT subroutines check ASCs against the tree entries and convert obsolete ASCs. See Figs. 9 and 10. Subroutines FOURTO1 and ONETO4 format ASCs read from magnetic tape from four words to one word or one word to four words as required by the build programs.

AFDSC Compatibility. The general area of Law was added to the data bases since some Law ASCs were associated with AADs. Most Law ASCs are associated with professional degrees, as are medical ASCs, and are not considered by the AADMS or contained in data tapes received from the AFMPC.

The build programs were extended to segregate Law ASCs. Also, the DMND build program was altered to segregate Aggregate ASCs. The pointer file was extended to include these additions.

There is no classified information contained on the magnetic tapes provided by the AFMPC. However, some AAD officers and positions are involved with classified work. In this case, the unit involved (not put into the ADRIS data bases), is replaced with asterisks on the magnetic tape. The original build programs processed the unit-asterisked entries from the Inventory magnetic tape but not from the Requirements tape. Both build programs now process all records from the magnetic tapes.

Possible errors in ASC coding on the magnetic tapes are corrected by "digit conversion" code in the build programs. If a letter "O" or a letter "I" is found in the first ASC character position it is converted to a zero or one, respectively. In character positions two through four, zeroes and ones are converted to letters "O" and "I".

Improvements for AFIT Use

The interactive messages printed at a time-sharing terminal by the program to prompt the user were largely rewritten in response to user comments during the ADRIS test phase. For example, users familiar with ADRIS are offered a fast parameter entry option without explanatory messages to speed program use.

Example ADRIS Modifications. One user discovered that the program would not process an "X" used as the last character in the AFSC (i.e., 514X, meaning 5140 through 5149) though the program would process a double "X" (i.e., 51XX, meaning 5100-5199). Code was added to the GETAFSC and SRCH subroutines to handle this case.

Another user found it annoying that no further summaries could be requested after a special Major Command summary. The user had to first reenter all search criteria and wait for the search to be completed. Program code was altered to permit unlimited summaries until the user explicitly terminated the DOSUM module.

An addition was made to the SPLY program to simplify program updating. The current data base date printed by ADRIS could only be changed by altering the interactive program's source code. This would require source code editing and recompiling every time new data bases were received. The SPLY build program was changed to read the current date off a computer card and store it on the pointer file saved on auxiliary storage, when the new data bases are built. This date is read and printed during ADRIS execution.

Build Test Features. Optional test segments were added to each build program to process any number of magnetic tape records into a reduced data base and then print the pointer file and all records. During normal data base building, the pointer file is also printed so that the program maintainer

can keep track of the increase or decrease in the size of the data bases. Any records processed from the magnetic tape with illegal ASC first characters or illegal data in other fields are printed.

VI. Validation

Verification of the correct operation of the ADRIS programs and validation of the results obtained from the data base retrievals were important efforts needed to increase user confidence. Because of the experimental nature of ADRIS' development, thorough testing had not been accomplished. Nor were program results known to be correct.

Testing was conducted during successive stages of the thesis effort. The data base build programs were tested by examining the entries stored in the data bases and insuring that the pointer file values were correct. The subroutines that gather and store user parameters were tested with a variety of legal and illegal parameters. After the ADRIS interactive program was executing, it was tested on a series of user requests which had been run while ADRIS was operational at Gunter AFS, Alabama. Results were identical; therefore, the conversion to the CYBER 74 was deemed successful.

However, continued testing on the original data bases revealed problems. Master's tallies were not including AADs with a Q education level (Master's Degree plus 30 or more semester hours). A second problem, excessive PHD tallies occurring when an asterisk was entered for education level, was traced to the existence of AAD general officers in the Inventory data base.

The ADRIS program was put on-line for test use by several key users for a one-month period. A variety of

minor problems were uncovered and debugged during this period.

A final validation test was conducted on the June 1976 data bases. The results of a number of test cases separately run on ADRIS and the batch computer programs maintained by AFDSC for HQ USAF/DPPE were compared. The results were identical, number for number (Ref 4). The AFIT and AFDSC programs had been separately designed and developed--one designed for interactive use and the other for batch use. Identical results obtained for a variety of test cases and information products typically used by AFIT faculty and staff certainly increases user confidence in ADRIS results.

The testing and validation efforts have uncovered and corrected problems in the programs and shown that a finite number of test cases generated identical results on two different ADRIS programs. However, these results do not prove the correctness of the programs or show the absence of errors. It can be claimed that the probability of correct results has been increased.

Build Data Bases

Data base building was verified by using 500 records from each magnetic tape to build mini data bases. The test sections of the build programs were used to print the records stored in the data bases and the pointer values. The 1,000 records (500 from each magnetic tape) were separately read and printed for comparison. Segregation of the records by

ASC, correct transferral of record fields, and correct pointer file values could then be independently checked. After correct results were obtained on the mini data bases, the full data bases were built.

Gather User Parameters

Correct gathering and storing of user parameters was confirmed by unit testing of the GETAFSC, GTGRD, GETCMD, GETCBPO, GTFCT, and AGGREG modules. The modules were driven with legal and illegal parameters to test proper operation and error handling. Proper internal storage was verified by printing out the contents of the storage variables.

Parameter error handling is not exhaustive. For example, parameters are checked for proper number of characters but not always for proper alphanumeric content. The DCIPHR module will detect an error in the ASC OBCYY and ask the user to reenter; however, the DCIPHR module will accept the ASC 12B4. It should be noted that there is a natural check to the entry of such an illegal parameter. The data base search will report "no Requirements or Inventory" for the user's criteria. Specific details on correct parameter formatting is contained in the User's Guide in Appendix A.

Test Data Bases

The first step in attempting to show correct program operation was the comparison of ADRIS Inventory and Requirements tallies obtained while the program was operational at

Gunter AFS, Alabama, with results obtained from the same user criteria on the CYBER 74 program. A representative sample taken from 28 available cases tested out identically.

A problem was discovered in the SRCH subroutine code which accepted or rejected records based on the education level. Data base searches for Master's Degrees were rejecting Q education levels. The AFDSC included Q records in Master's Degree reports and this change was approved by the AFIT Director of Academic Support. The result for the original data base is shown in Table III (Search criteria: all asterisks except P for Education Level).

Table III

Results of Q Educational Level Included in Master's Tallies

	REQ	INV	INCREASE
01	0	536	+1
02	333	1289	+33
03	3075	8218	+155
04	2685	5578	+174
05	2890	4030	+153
06	1764	2037	+72

A second problem was noticed when retrieving all records with a "2" education level (students enrolled in AFIT Master's programs). The Inventory and Requirements tally showed non-zero results for the PHD Inventory in grades 01-04. The erroneous result was caused by the Master's and PHD grade

arrays being dimensioned only six. General officers possessing AADS were stored in the data base. If the user did not specify a grade parameter, general officers could satisfy the user's criteria and spill over from the Master's grade array into the adjacent PHD grade array. The result is shown in Table IV, for a user's criteria of all asterisked entries. The problem was corrected by dimensioning the grade

Table IV

Effect of General Officers Not Being Considered

	REQ	INV	REQ	INV	
01	0	535	3	117	(109 07s)
02	333	1256	78	148	(80 08s)
03	3075	8063	251	214	(14 09s)
04	2685	5404	295	338	(2 010s)
05	2890	3877	235	281	
06	1764	1965	83	150	

arrays 10. The general officer problem surfaced again in the user's test period, in the DOSUM module, where the same array spillover effect was causing erroneous results. The AFIT Director of Academic Support approved the future elimination of general officers from the Inventory data base. (There are no requirements for AAD general officers.)

Validate with AFDSC Programs

The test cases shown in Table V were run on ADRIS and AFDSC programs. The test cases were chosen as being representative of criteria and products that would be used by

AFIT staff and faculty. The product codes are as follows:

(1) Inventory and Requirements tally.

(2) List of Records.

(3) Special Major Command Summary.

(4) Base Summary.

(5) AFSC Summary.

Test cases ran the gamut from specific ASCs to full data base searches (ASC=*) for Master's and PHD education levels. Aggregate ASCs and area AFSCs were tested. In every test case, the results were identical.

Aggregate ASCs and area AFSCs were independently checked by doing Inventory and Requirements runs on the constituent ASCs or AFSCs and summing the totals. This internal check showed that these portions of the program were working.

It should be noted that the AFDSC data bases included several medical AADs. The ADRIS data bases do not include medical ASCs. When the AFDSC medical ASCs appeared in results they were subtracted to maintain the equality of the data bases for testing.

Table V

Validation Test Cases

CASE	ED LEV	ASC	AFSC	RANK	CBPO	MAJCOM	PRODUCT
1	P	4IJY	*	*	*	*	1,2
2	*	4QYY	*	*	*	*	1,3,4
3	P	4THY	*	*	*	*	1,3,4
4	P	4YYY	*	*	*	*	1,3
5	*	2FCY	*	*	*	*	1,3,4,5
6	*	9HYY	*	*	*	*	1,3,4,5
7	*	9EYY	*	*	*	*	1,3,4,5
8	*	8FYY	*	*	*	*	1,2
9	P	9CYY	*	*	*	*	1,2
10	P	4ECY	*	*	*	*	1,3,4,5
11	P	*	2821C 2825C	*	*	*	1,3,4
12	P	*	2845	*	*	*	1,3,4
13	*	8HMY	*	*	*	*	1,2
14	*	*	OPER	*	*	*	1
15	Q	*	*	*	*	*	1
16	3	*	*	*	*	*	1
17	*	AAAY	*	*	*	*	1
18	*	AAHY	*	*	*	*	1
19	*	*	LOGI	*	*	*	1

VII. Improving Resource Usage

AFIT shares the CYBER 74 with other organizations in the sense that if AFIT uses more than its portion of computer resources, AFIT jobs receive a lower priority than other jobs in the system. Batch and INTERCOM jobs are counted towards determining how many computer resources AFIT is using. The net result for excessive use of resources is a slowdown in AFIT's throughput of jobs.

Use of resources is calculated in terms of Computer Resource Units (CRUs); a job's CRUs are determined by the use of central processor time (CPU), tape channel and disk access time (IO), and the number of central memory words (CM). A suggested job cost is calculated, for informational purposes, by multiplying CRUs by a cost factor (currently about 6¢ a CRU) (Ref 5:10).

Another AFIT limitation is the use of secondary storage on disc for permanent storage of information. AFIT is currently allocated 2,200 record blocks of storage (RBS), with 3,584 words per RBS.

Because of AFIT's competition for scarce computer resources, a goal of this thesis was the minimization of ADRIS interference with other AFIT computer activities. Efforts were directed at reducing the secondary storage required for permanently holding the data bases and reducing the CRUs used by ADRIS programs.

The reduction of CRUs in the interactive program was accomplished by code alterations to that part of the program which searched the data base for records meeting the user's criteria. This part of the program was responsible for large CRU usage.

A major corollary problem was that program response time (user wait time) could take as long as 4-5 minutes for an extensive search. This was established as a problem area by ADRIS users and it detracted from the quick response, interactive nature of the system.

Data Base Storage

The original ADRIS build programs stored each field or subfield extracted from the magnetic tape in a single computer word. Eighteen words were used to store a Requirements record while 13 words were used to store an Inventory record. Using the June 1976 data base with 26,540 Inventory and 11,243 Requirements records, this would require almost 550,000 words of disc storage. Since Honeywell word size is 36 bits while CDC word size is 60 bits, CDC storage would be almost twice that required by Honeywell. Storage for 550,000 words would require approximately 6% of AFIT's disc allocation, a high figure considering other AFIT disc requirements.

Number of Parameters. AFIT's use of the interactive ADRIS program required only six parameters from the Inventory and Requirements data bases: education level, ASC, AFSC

(including prefix and suffix), grade, CBPO and major command. These parameters required only 11 words of storage. Thus, the data base could be reduced to (26,540 + 11,243) x 11 = 416,000 words, a 24% savings.

Record Packing. To further reduce storage requirements the 11 words required for each record were packed into two words. Thus, (26,540 + 11,243) x 2 = 75,566 words of storage were required. This is only about 14% of the original requirement. For coding simplicity, packing in the build programs and unpacking in the interactive programs was initially done with FORTRAN ENCODE and DECODE statements respectively.

Build Programs

The ADRIS build programs, modified to pack and group 100 tape records into a single CYBER random record, were found to be extremely expensive. See Table VI for a comparison of resource usage before and after two modifications.

Record Sorting. Each build program sorts records by the ASC general area of study (a digit between 0 and 9 inclusive) in order to group data base records by ASC.

The original build programs were quite inefficient in sorting records by ASC. The sort scheme began by sequentially reading records off the magnetic tape and sequentially storing processed records on a single scratch file. The scratch file would then be reread, from beginning to end, for each ASC general area of study. For the SPLY program, with 11 different

Table VI

Build Program Improvements

	Version[1]	No. Records[2]	CP[3]	IO[3]	CRUs	Cost	% CRUs[4]
S	Original	23,407	355	371	461	$27.63	100
P	New Sort	23,407	133	185	194	$11.64	42
L	Updates[5]	26,541	157	205	224	$13.42	49
Y	Min Param	26,541	100	215	171	$10.61	38
	Final	27,679	108	141	142	$8.52	26
D	Original	11,693	238	277	328	$19.64	100
M	New Sort	11,693	82	144	142	$8.54	43
N	Updates[4]	11,243	82	147	159	$9.56	48
D	Min Param	11,243	43	94	86	$5.15	26
	Final	10,232	40	52	56	$3.35	20

Notes:

1 Each succeeding version shows change from previous version

2 No. records stored into data base

3 Units are seconds

4 % CRUs = Original CRUs/New Version CRUs (new version CRUs proportionately corrected for differing number of records)

5 Update changes: digit and ASC conversions/generalizations (as applicable)

ASC types, this would be (26,541 records) x 11 = almost 292,000 separate reads and character comparisons.

The new sort eliminated all of these scratch file reads by sorting the records into eleven separate files, by ASC, as the records were read from magnetic tape. Table VI shows a CP savings of more than 60% and an IO savings of almost 50%.

Number of Parameters. Parameter reduction to those actually needed has been mentioned. The effect on resource usage was most noticeable for the DMND program in which the required parameters could be read from magnetic tape into 11 rather than 18 computer words. See "Min Param" versions in Table VI.

The packed data structure created by both build programs is as shown in Fig. 16, with the six parameters stored in two computer words.

This data structure was chosen to simplify and limit the execution time of the unpacking code (replaced DECODE statement) found in the interactive program. All fields are character display code except AFSC and GR which are stored in binary integer representation to preclude time-consuming conversion in the interactive program. Since the largest AFSC integer value is 9,999, 14 bits ($2^{14} - 1$ = 16,383) are sufficient and the AFSC is stored in a three character field (18 bits). The GR integer value easily fits into a single character (6 bits).

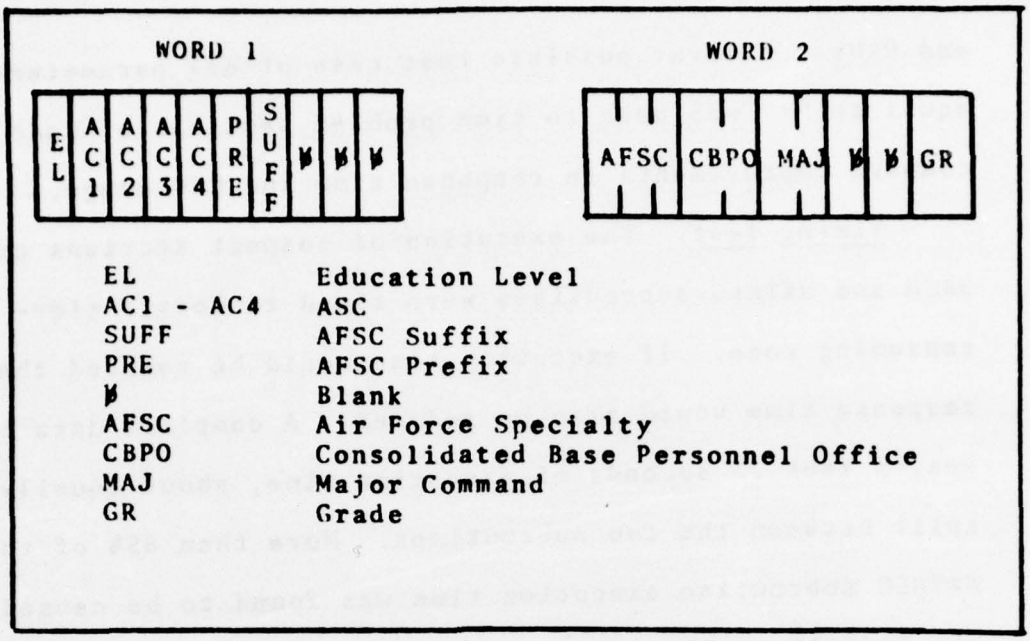


Fig. 16. Packed Data Structure.

Final. The final version represents a considerable savings in input processing time. This is due to buffering blocks of 25 records at a time from the AFMPC magnetic tapes. Earlier versions of the build programs processed unblocked magnetic tapes one record at a time.

Interactive ADRIS Program

After the interactive program was executing, the most noticeable shortcoming was the long user wait time for data base searches. This poor program response time was particularly aggravating for searches of the whole data base (ASC=*). The response time also became worse during periods of heavy INTERCOM use by other system users. An effort was made to reduce the user wait time by improving the efficiency of the search which would also reduce resource usage

and CRUs. A worst possible test case of all parameters equal to "*" was used to time problem sections of code and compare improvements in response time and CRU usage.

Timing Test. The execution of suspect sections of the SRCH and NXTREC subroutines were timed to locate time-consuming code. If execution time could be reduced then response time would also be reduced. A complete data base search took 73 seconds of execution time, about equally split between the two subroutines. More than 85% of the NXTREC subroutine execution time was found to be caused by the FORTRAN DECODE statement originally used to unpack the parameters. More than 90% of the SRCH subroutine execution time was due to the output (saving) of matched records onto scratch files.

These results indicated that execution time would be primarily affected by:

(1) The number of records that needed to be unpacked for a search, i.e., the size of an ASC general area of study or the entire data base if ASC=*.

(2) The number of records found during the search which matched the user's criteria and would be written to a scratch file.

Record Unpacking. The DECODE statement was replaced with in-line code which used shifts and masks to extract the fields and place them in the proper format in separate words. This improvement, along with reducing the number of

variables, reduced the execution time by more than 30 seconds for a full data base search, only 56% of the original execution time of 73 seconds.

Input/Output. The FORTRAN "formatted" write statements that saved the matched records were replaced with "unformatted" writes to eliminate the formatting execution time. The information could then be read back in by other program segments with unformatted reads. This change resulted in a savings of 20 seconds so that record unpacking and output changes together reduced a full data base search to 21 seconds or 29% of the original execution time.

Different scratch file buffer sizes were tried to find a buffer size that could handle movement of records to the scratch files without delaying execution and also minimize IO channel time. A buffer size of 2002 octal resulted in a 20% reduction of IO channel time from a buffer half as big. The response time was found to be just slightly improved by the 2002 buffer. Larger buffers had negligible effect on IO channel time or response time.

Overlay. The program was overlaid to reduce memory requirements, allow for future program growth in the INTERCOM environment (INTERCOM limited to 60K octal), and reduce resource usage and response time. The overlay consisted of two primary sections: the DOBASIC and DOSUM components shown previously in Fig. 11. Central memory use for the overlays is approximately 43K, down from just under 60K octal initially.

Results. Resource usage and response time improvements are shown in Table VII for a data base search with all parameters equal to "*".

Table VII

Response and Resource Results

Version	Exec. Time	Mem	IO	CRUs	Cost	Response
Original[1]	73	54600[2]	77	98	$5.85	3-5 min
Min param, DECODE replaced	41	50600	52	60	$3.59	1.8-3 min
Unformatted I/O	21	50700	68	59	$3.53	1.2-2 min
Overlay 2002 Buffer	21	43000	56	48	$2.90	1-1.7 min

Notes: 1 Each succeeding version shows improvement from previous version

2 Dead code and unused arrays were removed

Response time improvement was quite variable; however, an average reduction of 50% is estimated. This improvement was noted on both the worst case search and smaller, more average searches. Computer Resource Unit savings averaged 50% for large and small searches.

The reduction in parameters reduced the IO time from 77 to 52 seconds since fewer fields had to be written to the scratch files. An increase from 52 to 68 seconds occurred with the change to unformatted Input/Output because

the entire word holding each parameter was transferred to the scratch file as a record rather than the packed record created by a formatted write statement. The effect of the 2002 octal buffer is seen in the final reduction of IO from 68 down to 56 seconds due to less channel activity.

During repeated tests of response time only minor improvements were noticed with the Input/Output changes: response time was affected most by the reduction in execution time.

VIII. Conclusion

ADRIS is operational and its use is under the control of the AFIT School of Engineering's Director of Academic Support. The interactive program has already seen a steady rise in service among School of Engineering faculty, staff, and students. Use should continue to increase as all of the resident AFIT schools are briefed on the availability of ADRIS.

Summary

The accomplishments of this thesis can be briefly summarized:

(1) Honeywell character-coding, formatting, and nonstandard FORTRAN capabilities were obstacles that were overcome to convert ADRIS to CDC CYBER 74 usage.

(2) ADRIS data base processing and interactive program operation were altered to conform to current AADMS policy. Policy and data were provided by the AFDSC which supports the computer information needs of HQ USAF/DPPE. ADRIS was altered or updated in the areas of:

(a) AFSC areas.

(b) Obsolete ASCs.

(c) Less specificity in ASCs attached to authorized AAD positions.

(d) New Aggregate ASCs for authorized AAD positions.

(3) The code of the ADRIS programs was checked to verify correct and consistent data base construction and correct retrieval and storage of information from the data bases. This was done to provide user understanding and confidence in ADRIS products. To provide further assurances of ADRIS' correct operation, a validation effort was conducted with the AFDSC at the Pentagon. Nineteen test cases were run on the ADRIS interactive program and on AFDSC batch programs developed and written without knowledge of ADRIS' development. Results were identical.

(4) During the course of this thesis a continuing effort was made to adapt ADRIS to the needs of the AFIT community. Comments from two primary users resulted in numerous changes to improve program-user communication and program operation. A Maintainer's Manual (Appendix B) was written to explain all the necessary procedures to maintain ADRIS and place new data bases on-line as they are received from the AFMPC.

(5) ADRIS was implemented to make its use as economical and efficient as possible. Techniques used included storing the minimum amount of information needed by the interactive ADRIS program into a packed (condensed) data base structure and building the data base with a much-improved sorting procedure. Optimization changes made to the interactive program reduced the user wait time for a data base search by more than half on the average and also reduced search resource use by some 50%.

Software Transportability

This thesis project was instructive to the author in several areas concerned with the transportability and conversion of computer programs from one installation to another.

(1) The importance of determining the magnetic tape processing capabilities of an installation before preparing program and data tapes is critical. Neither of the original magnetic tapes could be directly processed because their character codes could not be translated by CYBER System routines. A second example was the receipt of the first data tapes from the AFMPC blocked in excess of the number of characters processable by CYBER Record Manager. This type of problem was not even suspect, but it nevertheless caused an unforeseen delay.

(2) Different computer manufacturers and models have dissimilar source language compilers. Some of the FORTRAN syntax and statements found in ADRIS were at odds with the syntax and language expectations of the CYBER. Time-consuming conversions were necessary. The lesson is that a standardized subset of a language (ANSI, for example) should be used if program transportabiility is ever expected.

(3) Different systems have different basic purposes and organizations: Honeywell is more oriented to character manipulation and record transactions while CDC is designed for scientific calculations. This different orientation resulted in more cumbersome and inefficient

random record processing (a central program component) for the CYBER.

(4) Good documentation can be extremely helpful in understanding an alien program. The scarcity of ADRIS documentation and its developmental nature required a time-consuming study of code for proper understanding. It is hoped that the Maintainer's Guide and new source code comments will be helpful to future users or modifiers.

Recommendations

The following recommendations are made to keep ADRIS a reliable tool and improve its versatility and ease of use.

(1) Contact should be maintained with HQ USAF/DPPE and the AFDSC to insure that ADRIS reflects current AADMS policy and data. Consistency of results between AFDSC programs and ADRIS should be periodically checked.

(2) ADRIS should be modified to present base and command mnemonics that can be read directly instead of the one and two character codes now used.

(3) A module should be added to accept multiple ASCs from the user. The School of Engineering Office of Academic Support recommended this improvement but time was not available to implement the change. This capability would permit the data base to be combed for a related group of ASCs (in Operation Research, for example) in a single search. This would relieve the user from entering parameters and

waiting through several searches before manually adding the results.

(4) Additional information could be stored in the data bases for retrieval and presentation. An example is the unit or organization of an AAD position or officer. All the information available from the magnetic tapes is shown in the Maintainer's Guide, Appendix B.

Bibliography

1. Carmack, John E. ADRIS User's Handbook. Gunter Air Force Station, Alabama: Computer Center, January 1975.

2. Series 600/6000 FORTRAN Manual. Publication BJ67, Minneapolis, Minnesota: Honeywell Information Systems, Inc., 1972.

3. Gates, John E. Summary Letter to Author, Advanced Academic Degree Management System Policy and Data. Washington DC: Air Force Data Services Center, December 1976.

4. Gates, John E. Validation Effort Computer Output. Washington DC: Air Force Data Services Center, January 1977.

5. Digital Computer Manual for Faculty and Students of the School of Engineering, 3rd Edition. Wright-Patterson AFB, Ohio: Air Force Institute of Technology, School of Engineering.

6. The Multiplexed Information and Computing Service: Programmer's Manual. Cambridge, Mass.: Massachusetts Institute of Technology, Project MAC, September 1973.

7. University of Washington Academic Computer Center. Catalogued Procedures and Other Techniques for Manipulating Control Cards. Wright-Patterson AFB, Ohio: Reprinted by Aeronautical Systems Division, October 1976.

Vita

Matthew Barron Waldron was born in Boston, Massachusetts, on June 3, 1946. He received his Bachelor of Science Degree in Mathematics at the United States Air Force Academy in June 1969. Upon graduation, Second Lieutenant Waldron served his initial tour of duty as an Information Officer at the Air Force Flight Test Center, Edwards AFB, California. In September 1972, Capt Waldron was transferred to the 21st Composite Wing at Elmendorf AFB, Alaska. There he served briefly as Wing Ground Safety Officer before becoming the Wing Information Officer. Capt Waldron entered the Air Force Institute of Technology at Wright-Patterson AFB, Ohio, in September 1975 to begin study toward a Master's Degree in Computer Systems.

Permanent address: Box 108-B-1, Rt. #3
Eatonton, Georgia 31024

Appendix A

Advanced Degree Requirements Information System (ADRIS)

User's Guide

1 March 1977

1. Purpose of ADRIS

The purpose of ADRIS is to use the speed and flexibility of an interactive computer program to provide detailed and summary information about the inventory of Air Force officers possessing Advanced Academic Degrees (AADs) and the job positions that require these AAD officers. AAD information is contained in two data bases built from magnetic tapes updated quarterly by the Air Force Military Personnel Center (AFMPC). The two tapes are extracts from the Manpower Authorization and the Uniform Officer Record files maintained at Randolph AFB, Texas. The Requirements data base contains the Education Level, Academic Specialty Code (ASC), Air Force Specialty Code (AFSC), grade, base, and major command for each AAD position while the Inventory data base contains the same information for each AAD officer.

The primary product of ADRIS is an Inventory and Requirements count of officers and positions satisfying the criteria selected by the ADRIS user. The criteria consist of values chosen by the ADRIS user for the six parameters: Education Level, ASC, AFSC, grade, base and major command. The ADRIS user may optionally obtain more detailed summaries of the data base entries matching his or her criteria. Summaries by ASC, AFSC, base, and command may be printed as well as the data base entries themselves.

2. Using ADRIS

The ADRIS program and data bases reside on the Control Data Corporation (CDC) 74 computer at Wright-Patterson AFB, Ohio. ADRIS is accessible anytime the INTERCOM (interactive terminal) system is in operation. Normal operation hours are 8:30 a.m. to midnight, Monday through Saturday. Terminals are most readily available and program response time the quickest early in the morning or after 4 p.m.

No special computer knowledge is required to run the ADRIS program. The program prints instructions to the user as it proceeds and will notify the user of syntactically illegal responses. Terminal operation instructions are contained in Section 3.

Login and Starting the Program. The ADRIS user must first login to the INTERCOM system. Users unfamiliar with the use of the terminal should now read Section 3. The ADRIS problem number is T770008 and ADRIS passwords are ENR3 and ENR4. The login line should be entered as:

LOGIN,T770008,ENR3,(or ENR4),(terminal ID)

The terminal ID is usually printed on a tag on the terminal. After the terminal prints a few lines of login information (system name, messages, date, time and user ID), it will print:

COMMAND-

To activate the ADRIS program, the user must then enter:

BEGIN,AFIT,(codeword)

and depress the RETURN or CR (carriage return) key. The codeword may be obtained from the AFIT School of Engineering Director of Academic Support.

Interacting with the Program. Program-user interaction is largely self-explanatory with the terminal printing instructions as necessary and then printing an equals sign (=) followed by a pause when a response from the user is needed. The "=" is a cue to the user to type in the requested information. Blanks are never entered between user entries or after the "=".

Once the user has typed a response he must depress the RETURN or CR key to transmit the response. If a syntactical error is detected ADRIS will direct the user to reenter. Logical or miskeyed errors cannot be retracted after the RETURN key has been struck. The user must wait until the data base search is complete and the program has recycled back to the point where the error was made.

If the user detects an error before the line has been transmitted, the error may be corrected by depressing the CTRL key on the terminal and hitting the H key to backspace to a point where the entry may be corrected by typing over the faulty letter(s).

The initial program request is for the user to identify himself as an old or new user. Old users receive abbreviated instructions so that they may quickly enter their data base search criteria.

Stopping ADRIS. The program may be terminated during printing by pressing the ESC key, followed by the % key, and then the A key. To stop the program during a pause, use %A. If the user desires to restart the program he must enter AADMS after the terminal aborts the program and prints COMMAND-. Normal program termination is directed by entering "D" when the terminal prints OPTION. After the terminal asks for the next COMMAND-, type LOGOUT and disconnect the telephone.

Search Criteria. The user is asked to enter values for the six search parameters. The data base is then searched to find Inventory and Requirements entries which match the user's search criteria. A tally of the results is then printed at the terminal as well as the ratio of Inventory to Requirements.

The parameters and rules governing the entry of their values follow. An asterisk (*) should be entered to indicate all possible parameter values.

(a) Education Level = The user enters "P" for Master's Degree or "R" for PHD. An "*" will result in a separate tally for each. ("Q" - Master's Degree plus 30 or more semester hours; "2" - AFIT Master's Students (not included in AFMPC data bases); and "3" - AFIT PHD Students are

other allowable entries.) Only one value may be entered.

(b) ASC = The user must enter a single ASC as identified in Addendum A-1 or a single Aggregate ASC as explained and identified in Addendum A-2. A "Y" in a character position of the ASC denotes no academic specialization for that component of the ASC. If an entry contains a "Y" the user will be asked to specify whether he means that specific ASC or all ASCs with any allowable character in the "Y" position(s). Most Requirement ASCs are specific only to the first three characters. See Addendum A-3 for exceptions. Addendum A-4 contains a list of obsolete ASCs and their replacements. Data base searches with ASC=* take the longest (could take 1-2 minutes if INTERCOM is slow).

(c) AFSC = A single or multiple value(s) separated by a comma(s) are permitted. Ranges of values are permitted, such as 26XX-29XX or 513X-514X. The "X" character must be used to show the digit(s) over which the range extends. Career area descriptors for common AFSC groups may be entered as defined in Addendum A-5. Any combination of the above entries

is allowable so long as the total entry fits on a single line.

(d) GRADE = The user must enter a number between one and six inclusive. Multiple entries are permitted. General officers are not included in the data base. Full colonels are included for information only since there are not any 0-6 quotas for AFIT education.

(e) CBPO = The user must enter a single or multiple 2-character code(s) as defined in Addendum A-6.

(f) MAJCOM = The user must enter a single or multiple 1-character code(s) as defined in Addendum A-7.

EXAMPLES:

```
EDUCATION LEVEL = P
ACADEMIC SPECIALTY CODE = OCYY
ENTER 1 TO DESIGNATE ONLY THIS ASC
      2 TO SUMMARIZE THIS ASC + ALL ITS SUB-SPECIALTIES
= 2
AFSC = 51XX
GRADE = 3,4
CBPO = *
MAJCOM = K
```

This would result in the Inventory vs. Requirements status of all CAPTs and MAJORs assigned to Air University with a 51XX AFSC and a Master's Degree in Computer Technology

```
EDUCATION LEVEL = P
ACADEMIC SPECIALTY CODE = YYYY
ENTER 1 TO DESIGNATE ONLY THIS ASC
      2 TO SUMMARIZE THIS ASC + ALL ITS SUB-SPECIALTIES
= 2
AFSC = *
GRADE = *
CBPO = *
MAJCOM = *
```

This would result in the Inventory vs. Requirements status for all PHDs in the USAF.

Summaries. The user may request additional summary reports, based on the criteria already entered. The program will offer the user his choice of five summaries: ASC, AFSC, CBPO, Major Command, or Special Major Command. The AFSC Summary will print each different AFSC and the tally by grade for Inventory and Requirements. The other summaries are similar. The Special Major Command Summary prints ASCs, for each command, by grade, for Inventory and Requirement.

The AFSC, ASC, and Special Major Command Summaries require the user to indicate the degree of character specificity. For example, assume that the original ASC parameter value was OCYY, with all subspecialties requested. Then an ASC summary with degree of specificity of 3 would result in a report with tallies for OCAY, OCBY etc. An ASC summary with degree of specificity 4 would result in a report with tallies for OCAA, OCAB, ...; OCBA, OCBB, ...; etc.

3. Terminal Operation Instructions

Most terminals are designed with flexibility to allow use with different types of systems. This flexibility is

expressed in the form of switches whose settings must be correct for proper operation. AFIT's terminals should be set properly, but here's a quick guide: the terminal power should be on; mode should be on-line rather than local speed or baud rate set at 300; duplex at half; and parity at mach or 1. If there seems to be a switch-setting problem, get help.

The connection of the terminal to the computer is done by telephone lines, and by dialing the telephone number of the computer. The correct number to dial is the one for Computer System B (CSB), 300 baud--the number should be on a tag attached to the terminal. This number will connect you to the first free line into the CYBER 74.

Communication of keyboard characters to the computer is done by conversion of these characters into sequences of tones which can be sent over the telephone line. The piece of hardware which does this conversion is called a dataset or modem (for modulator-demodulator); there must be one modem at the terminal and another at the computer. Two types of modems are in common use: those directly attached to the telephone line and those which are acoustically coupled by placing the telephone handpiece physically into the modem. The directly-attached devices normally come with a special telephone set which has a row of buttons; one of these buttons must be depressed in order to get a dial tone to start the call. In contrast, the acoustic coupler is designed to work with an ordinary telephone.

AD-A038 911 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCH--ETC F/G 5/2
ADVANCED DEGREE REQUIREMENTS INFORMATION SYSTEM.(U)
MAR 77 M B WALDRON

UNCLASSIFIED AFIT/GCS/MA/77M-3 NL

2 OF 2
AD A038911



END

DATE FILMED
5-77

After dialing the correct telephone number, you should hear one or two rings (if you hear a busy signal, redial), and then the computer will answer. The next step is to complete an electronic handshake sequence. The computer starts the sequence after it answers by placing a tone which you can hear on the telephone line. You should then press the data button on the modem telephone, if the modem is directly attached, or else insert the telephone handpiece into the acoustic coupler.

The computer should then print some identification information and request you to LOGIN. Refer back to Section 2 to obtain the login command and how to start ADRIS.

The preceding discussion was synthesized from the MULTICS Programmer's Manual, Chapter 3 (Ref 6:3-1 to 3-3). A terminal trouble shooting guide is also found in Chapter 3.

Addendum A-1

Academic Specialty Codes (ASCs)

The listing of ASCs beginning on the next page is reproduced from AFM 300-4, Vol II.

1 Title Academic Specialty, ADE AC-030, Effective 1 Jun 1975 *(Continued)*

Data Code Sequence
Section A

5 Data Codes	Data Items and Explanations:
YYYY	NO ACADEMIC SPECIALTY APPLICABLE
	INTER-AREA SPECIALIZATIONS
0CYY	1. *Major Academic Field:* COMPUTER TECHNOLOGY
0CAY	Spec.--Data Processing (Business Administration and/or Management concentration)
	Sub-Spec.
0CAA	Electronic Data Processing (Accounting)
0CAB	Automated Data Processing Systems (Electronic Data Processing Systems)
0CAC	*Mechanical Data Processing* systems (PCAN)
0CAD	Business Statistics and Quantitative Methods
0CAX	Business Administration and/or Management ADP/EDP, other
0CBY	Spec.--Electronic Computation (Electrical Engineering concentration)
	Sub-Spec.
0CBA	Analogue Computation
0CBB	*Digital Computer Design*
0CBC	Digital Data Systems
0CBD	Information Storage and Retrieval
0CBE	Man-Machine Translation
0CBX	Electronic Computation, other
0CCY	Spec.--Applied Electronic Data Processing (Industrial Engineering concentration)
	Sub-Spec.
0CCA	Applications of Data Processing
0CCB	Computer Theory
0CCC	Data Processing in Operations Research
0CCX	Applied Data Processing, other
0CDY	Spec.--Numerical Methods and Computation in Data Processing (Mathematics concentration)
	Sub-Spec.
0CDA	Analogue System, Coding and Programming
0CDB	Digital Computers, Coding and Programming
0CDC	Digital Computers, Logic and Design
0CDX	*Numerical Methods & Computation* in Data Processing other
0YAY	Spec.--Agriculture and Food Chemistry
	Sub-Spec.--
0YAA	Alcoholic Beverages
0YAB	Animal and Vegetable Fats and Oils
0YAC	Animal Feeds
0YAD	Bakery and Confectionery Products
0YAE	Cereals and Carbohydrates
0YAF	Fertilizers, Plant Growth Regulators
0YAG	Food and Feed Additives
0YAH	Fruits, Vegetables, Juices
0YAI	Meat, Fish, Dairy and Poultry Products
0YAJ	Nonalcoholic Beverages
0YAK	Nonfood Crop Products
0YAL	Pesticides
0YAX	Other
0YBY	Spec.--Biochemistry
	Sub-Spec.--
0YBA	*Amino Acids, Peptides, Proteins*
0YBB	Antimetabolites
0YBC	Biochemical Mechanisms
0YBD	Biochemorphology
0YBE	Carbohydrates
0YBF	Clinical Biochemistry
0YBG	Cyto-Histo-Chemistry
0YBH	Endocrine Biochemistry
0YBI	Enzyme, Co-enzyme
0YBJ	Immunochemistry
0YBK	Intermediary Metabolism, Biosynthesis
0YBL	Lipids
0YBM	Microbiological Chemistry
0YBN	Natural Pigments
0YBO	Neurochemistry
0YBP	Nucleic Acids
0YBQ	Oncology, Carcinogenesis
0YBR	Physical Biochemistry
0YBS	Radiation Biochemistry
0YBT	Steroids
0YBU	Technology, Methodology
0YBX	Other
0YCY	Spec--Biogeography
	Sub-Spec.--
0YCA	Medical Geography
0YCB	Phytogeography
0YCC	Zoogeography
0YCX	Other
0YDY	Spec.--Biophysical Specialties
	Sub-Spec.--
0YDA	Bioacoustics and Transmission
0YDB	Biochemical Physics
0YDC	Bioelectricity and Transmission
0YDD	Bioelectronics
0YDE	Bionics
0YDF	Bio-optics, Physical and Geometric
0YDG	*Bio-systems, Control, Communications*
0YDH	Biothermics and Bioenergetics
0YDI	Biotransport and Membrane Physics
0YDJ	Cellular Biophysics
0YDK	Electron Microscopy
0YDL	Fluid Biomechanics

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section A (Continued)

5. Data Codes	Data Items and Explanations:
0YDR	Health Physics
0YDN	Mathematical Biophysics
0YDO	Methodology, Instrumentation and Measurement
0YDP	Molecular Biophysics
0YDQ	Radiation Biology
0YDR	Solid Biomechanics
0YDX	Other
0YEY	Spec.--Operations Research
	Sub-Spec.--None
0YFY	Spec.--Paleontology
	Sub-Spec.--
0YFA	Micropaleontology
0YFB	Paleobotany
0YFC	Paleozoology
0YFD	Palynology
0YFX	Other
0YGY	Spec.--Psychometrics
	Sub-Spec.--None
0YHY	Spec.--Social Psychology
	Sub-Spec.--None
0YIY	Spec.--Soil Science
	Sub-Spec.--
0YIA	Soil and Water Management
0YIB	Soil Chemistry
0YIC	Soil Fertility, Fertilizers, Plant Nutrition
0YID	Soil Genesis, Morphology and Classification
0YIE	Soil Microbiology
0YIF	Soil Mineralogy
0YIG	Soil Physics
0YIX	Other
0YJY	Spec.--Systems Analysis
	Sub-Spec.--None
0YKY	Spec.--Systems Management
	Sub-Spec.--None
0YLY	Spec.--Area Specialist
	Sub-Spec.
0YLA	Western Europe
0YLB	Eastern Europe
0YLC	Soviet Union
0YLD	North Africa
0YLE	Sub-Sahara Africa
0YLF	Middle East
0YLG	South Asia
0YLH	Mediterranean
0YLJ	Southeast Asia
0YLK	Caribbean
0YLL	Latin America
0YLM	Far East
0YTY	Spec.--Telecommunications
0YYY	Spec.--Inter-Area Specializations, Other
	Sub-Spec.--None

Data Codes	Data Items and Explanations:
1YYY	General Area of Study: ADMINISTRATION, MANAGEMENT AND MILITARY SCIENCE
1AYY	1. Major Academic Field--BUSINESS ADMINISTRATION AND/OR MANAGEMENT
1AAY	Spec.--Accounting
	Sub-Spec.--
1AAA	Auditing
1AAB	Budgeting
1AAC	Cost Accounting
1AAE	Fiscal Procedures
1AAF	Government Accounting
1AAG	Tax Accounting
1AAX	Other
1ABY	Spec.--Applied Comptrollership
	Sub-Spec.--None
1ADY	Spec.--Business Economics
	Sub-Spec.--
1ADA	Business Cycles
1ADB	Comparative Economic Systems
1ADC	Economic Geography
1ADD	Economics of Natural Resources
1ADE	International Trade
1ADF	Labor Economics
1ADX	Other
1AEY	Spec.--Business Law
	Sub-Spec.--
1AEA	Agency Law
1AEB	Business Organization and Regulation Law
1AEC	Contracts Law
1AED	Labor Law
1AEE	Negotiable Instruments Law
1AEF	Sales Law
1AEX	Other
1AFY	Spec.--Business Statistics & Quantitative Methods
	Sub-Spec.--
1AFA	Advanced Statistics
1AFC	Indexes of Business Conditions
1AFD	Management Research Techniques
1AFE	Probability
1AFF	Statistical Design and Analysis
1AFG	Time Series and Index Numbers
1AFX	Other
1AGY	Spec.--Engineering Management
1AGA	Sub-Spec.--Facilities Management
1AHY	Spec.--Finance
	Sub-Spec.--
1AHA	Corporation Finance
1AHB	Investments
1AHX	Other

1 Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section A (Continued)

5. Data Codes	Data Items and Explanations:
1AIY	Spec.--Food Service & Institutional Management
	Sub-Spec.--
1AIA	Hospital and Institutional Management
1AIB	Motel or Club Management
1AIC	Restaurant Management
1AIX	Other
1AJY	Spec.--General Management
	Sub-Spec.--
1AJA	Business History
1AJB	Business Policies
1AJC	Economic Analysis
1AJD	Government Policy
1AJE	International Economic Relations
1AJF	Management Research Techniques
1AJX	Other
1AKY	Spec.--Industrial or Production Management
	Sub-Spec.--
1AKA	Cost Administration
1AKB	Factory Management
1AKC	Industrial Procurement
1AKD	Inventory Control
1AKE	Line Supervision
1AKF	Marketing
1AKG	Operations Research
1AKH	Plant Layout
1AKI	Production Planning and Control
1AKJ	Purchasing
1AKK	Time and Motion Study
1AKX	Other
1ALY	Spec.--Insurance
	Sub-Spec.--
1ALA	Casualty Insurance
1ALB	Life Insurance
1ALC	Maritime Insurance
1ALD	Property Insurance
1ALX	Other
1AMY	Spec.--Logistics Management
	Sub-Spec.--
1AMA	Advanced or Executive Management
1AMB	Government Accounting and Budgeting
1AMC	Logistics Function Management
1AMD	Logistics Statistics
1AME	Management Information Systems
1AMF	Negotiations Management
1AMH	Procurement Management
1AMG	Systems Analysis
1AMX	Other
1ANY	Spec.--Marketing
	Sub-Spec.--
1ANA	Advertising
1ANB	Cooperative Marketing
1ANC	Purchasing
1AND	Retailing
1ANE	Sales
1ANF	Wholesaling
1ANG	Buying
1ANX	Other
1AOY	Spec.--Personnel Administration
	Sub-Spec.--
1AOA	Education and Training
1AOB	Employee Services
1AOC	Industrial Relations
1AOD	Job Classification
1AOE	Job Evaluation
1AOF	Labor Relations
1AOG	Organization Planning and Development
1AOH	Performance Rating
1AOI	Personnel Tests and Evaluation
1AOJ	Recruiting, Selection and Employment
1AOK	Union Organization
1AOL	Wage and Salary Administration
1AOX	Other
1APY	Spec.--R and D Management
	Sub-Spec.--None
1AQY	Spec.--Real Estate
	Sub-Spec.--
1AQA	Commercial Real Estate
1AQB	Industrial Real Estate
1AQC	Residential Real Estate
1AQX	Other
1ARY	Spec.--Safety Management
	Sub-Spec.--None
1ASY	Spec.--Systems Management
	Sub-Spec.--None
1ATY	Spec.--Transportation Management
	Sub-Spec.--
1ATA	Air Transportation
1ATB	Highway Transportation Management
1ATC	Industrial Traffic Management
1ATD	Principles of Transportation
1ATE	Rail Transportation
1ATF	Rate Structures
1ATG	Traffic Control
1ATH	Transportation Geography
1ATI	Transportation Law
1ATJ	Water Transportation
1ATX	Other
1AVY	Spec.--Aviation Management
	Sub-Spec.--None
1AXY	Spec.--Business Administration and Management, Other
	Sub-Spec.--None
1BYY	2. Major Adademic Field--MILITARY SCIENCE

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section A (Continued)

5. Data Codes	Data Items and Explanations:
1CYY	General Area of Study: ADMINISTRATIVE/MANAGEMENT TECHNOLOGY
1CAY	Spec.--Administrative/Management Occupational Technologies
	Sub-Spec.--
1CAA	Administrative Assistant
1CAB	Advertising Management
1CAC	Bookkeeping
1CAD	Resource Management Technology
1CAE	Religious Institutions Administration
1CAF	Civil and Public Administration
1CAG	Data Processing
1CAH	Dental and Medical Secretary
1CAI	Executive Secretarial Science
1CAJ	General Business
1CAK	Technical Management
1CAL	Work Center Management
1CAX	Other
1CBY	Spec.--Distributive Services Occupational Technologies
	Sub-Spec.--
1CBA	Commercial Education Technology
1CBB	Distribution Technology
1CBC	Materiel Management
1CBD	Transportation and Traffic Management
1CBE	Travel Agent
1CBF	Fuels Distribution Technology
1CBX	Other

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section B

5. Data Codes	Data Items and Explanations:
2YYY	General Area of Study: ARTS, HUMANITIES, AND EDUCATION
2AYY	Major Academic Field--CHAPLAINCY AND PASTORAL CARE
2AAY	Spec.--Counseling and Guidance
	Sub-Spec.--
2AAA	Marriage Counseling
2AAB	Personal Counseling
2AAX	Other
2ABY	Spec.--Hospital Ministry
2ACY	Spec.--Management and Administration
	Sub-Spec.--None
2ADY	Spec.--Prison Chaplaincy
	Sub-Spec.--None
2AEY	Spec.--Religious Education
	Sub-Spec.--
2AEA	Audio-Visual Aids
2AEB	Youth Activities
2AEX	Other
2AXY	Spec.--Chaplaincy and Pastoral Care, Other
	Sub-Spec.--None
2BYY	2. Major Academic Field--EDUCATION
2BAY	Spec.--Administrative Functions
	Sub-Spec.--
2BAA	Adult Education
2BAB	Community Relations
2BAC	Educational Administration and Management
2BAD	Facility Planning
2BAE	Philosophy of Education
2BAF	School Business Administration and Management
2BAG	School Law
2BAH	Supervisory Practices
2BAX	Other
2BBY	Spec.--College Teaching
	Sub-Spec.--
2BBA	Administration and Management
2BBB	Arts, Humanities and Education
2BBC	Biology and Agriculture
2BBD	Engineering
2BBE	Mathematics
2BBF	Physical Sciences
2BBG	Social Sciences
2BBX	Other
2BCY	Spec.--Counseling and Guidance
	Sub-Spec.--
2BCA	Educational Guidance
2BCB	Remedial Education
2BCC	Student Personnel
2BCD	Tests and Measurements
2BCE	Vocational Guidance
2BCX	Other
2BDY	Spec.--Curriculum Development
	Sub-Spec.--
2BDA	Audio-Visual Aids
2BDB	Curriculum Research
2BDC	Instructional Materials
2BDD	Programmed Learning
2BDE	Vocational Education
2BDX	Other
2BEY	Spec.--Educational Psychology
	Sub-Spec.--
2BEA	Adolescent Development and Behavior
2BEB	Child Development and Behavior
2BEC	Educational Measurement
2BED	Exceptional Child
2BEE	Individual Differences
2BEF	School Adjustment
2BEG	School Learning
2BEH	Special Education
2BEX	Other
2BFY	Spec.--Elementary Teaching
	Sub-Spec.--None
2BGY	Spec.--Industrial and Vocational Education
	Sub-Spec.--None
2BHY	Spec.--Physical Education
	Sub-Spec.--None
2BIY	Spec.--Secondary Teaching
	Sub-Spec.--
2BIA	Art
2BIB	Business Administration
2BIC	English
2BID	Foreign Language
2BIE	Industrial Arts
2BIF	Mathematics
2BIG	Music
2BIH	Natural Sciences
2BII	Social Sciences
2BIJ	Vocational Education
2BIX	Other
2BJY	Spec.--Special Teacher Training
	Sub-Spec.--
2BJA	Library Training
2BJB	Methodology
2BJC	Special Education
2BJX	Other
2BKY	Spec.--Educational Technology
	Sub-Spec.--None
2BXY	Spec.--Education, Other
	Sub-Spec.--None
2CYY	3. Major Academic Field--FINE AND APPLIED ARTS
2CAY	Spec.--Architecture

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section B

5. Data Codes	Data Items and Explanations:
	Sub-Spec.--
2CAA	Architectural History
2CAB	City, Regional and Industrial Planning
2CAC	Drawing and Creative Design
2CAD	Landscape
2CAE	Private Residence Design
2CAX	Other
2CBY	Spec.--Commercial Art
	Sub-Spec.--
2CBA	Advertising
2CBB	Cartooning
2CBC	Illustration
2CBD	Industrial Patterns
2CBE	Interior Decoration
2CBF	Layout
2CBG	Lettering
2CBX	Other
2CCY	Spec.--Decorative Arts and Crafts
	Sub-Spec.--
2CCA	Calligraphy
2CCB	Ceramics
2CCC	Fashion Illustration
2CCD	Inlay and Enameling
2CCE	Jewelry
2CCF	Mosaic
2CCG	Mural
2CCH	Photo Ceramics
2CCI	Stage Decoration
2CCJ	Stained Glass and Fiberglas
2CCK	Weaving
2CCL	Wood Carving
2CCX	Other
2CDY	Spec.--Graphic Arts
	Sub-Spec.--
2CDA	Drawing
2CDB	Printing
2CDC	Graphic/Advertising Design
2CDD	Printing Technology
2CDE	Printing Management
2CDX	Other
2CEY	Spec.--Home Economics
	Sub-Spec.--
2CEA	Child Development
2CEB	Clothing and Textiles and Textile Chemistry
2CEC	Dietetics-Industrial Management
2CED	Family Relations
2CEE	Home Economics Journalism
2CEF	Nutrition Technology
2CEG	Related Arts
2CEX	Other
2CFY	Spec.--Industrial Art-Design
	Sub-Spec.--
2CFA	Ceramics
2CFB	Concrete
2CFC	Furniture
2CFD	Glass and Fiberglas
2CFE	Jewelry
2CFF	Landscape
2CFG	Leathercraft
2CFH	Metals--other than Jewelry
2CFI	Packaging
2CFJ	Pottery
2CFX	Other
2CGY	Spec.--Library Science
	Sub-Spec.--
2CGA	Archives, Historic Libraries
2CGB	Cataloguing and Classification
2CGC	Law Library
2CGD	Medical Library
2CGE	Research Library-Research Studies
2CGF	Technical Acquisitions
2CGX	Other
2CHY	Spec.--Music
	Sub-Spec.--
2CHA	Composition
2CHB	Instrumental Music
2CHC	Sacred Music
2CHD	Secular Music
2CHE	Vocal Music
2CHX	Other
2CIY	Spec.--Painting
	Sub-Spec.--
2CIA	History of Painting
2CIB	Oil Painting
2CIC	Oil Portrait Painting
2CID	Serigraphy
2CIE	Tempera Painting
2CIF	Watercolor Painting
2CIX	Other
2CJY	Spec.--Performance Arts
	Sub-Spec.--
2CJA	Ballet
2CJB	Drama and Theater
2CJC	Modern Dance
2CJX	Other
2CKY	Spec.--Sculpture
	Sub-Spec.--
2CKA	Architectural Sculpture
2CKB	Casting and Metallurgical Techniques
2CKC	Ceramic Sculpture
2CKD	Creative Sculpture
2CKE	History of Sculpture
2CKF	Steel Sculpture
2CKG	Stone Sculpture
2CKX	Other
2CXY	Spec.--Fine and Applied Arts, Other
	Sub-Spec.--None

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section B (Continued)

5. Data Codes	Data Items and Explanations:
2DYY	4. Major Academic Field--FOREIGN LANGUAGE AND AREA (L&A) STUDIES
	NOTE: Of the thousands of languages spoken in the world, relatively few have or are likely to have military or diplomatic significance for the United States, and these have been categorized in a way that will be meaningful and useful to the Air Force in determining language policy, training, area assignments, and career planning. Such a classification has the disadvantage of not providing information as to the historical relationships and similarity between languages. Compensating for this disadvantage, however, is the fact that area specialization is necessarily closely tied to geography and only incidentally connected with language families. Although European languages such as English, French, and Spanish are widely spoken in many areas of the world, either as primary or secondary languages (by reason of colonial relationships in the past), only languages native to an area or officially adopted languages are listed. See ADE LA-510, Language Identity.
2EYY	5. Major Academic Field--HUMANITIES, GENERAL
2EYY	Spec.--None
	Sub-Spec.--None
	6. Major Academic Field--LANGUAGE AND COMMUNICATIVE ARTS
2FAY	Spec.--English Language
	Sub-Spec.--
2FAA	English Composition
2FAB	English Grammar
2FAX	Other
2FBY	Spec.--Journalism
	Sub-Spec.--None
2FCY	Spec.--Literature
	Sub-Spec.--
2FCA	American Literature
2FCB	Biblical Literature
2FCC	Classical Literature
2FCD	Comparative Literature
2FCE	English Literature
2FCX	Other
2FDY	Spec.--Public Relations and Related Communications
	Sub-Spec.--
2FDA	Advertising Writing
2FDB	Communications Research
2FDC	Motion Pictures
2FDD	Radio-Television
2FDX	Other
2FEY	Spec.--Speech
	Sub-Spec.--
2FEA	Oral Interpretation
2FEB	Phonetics
2FEC	Techniques of Delivery
2FEX	Other
2FFY	Spec.--Writing
	Sub-Spec.--
2FFA	Compiling and Editing
2FFB	Drama
2FFC	Fiction
2FFD	Nonfiction
2FFE	Poetry
2FFX	Other
2FXY	Spec.--Language and Communicative Arts, Other
	Sub-Spec.--None
2GYY	7. Major Academic Field--PHILOSOPHY
2GAY	Spec.--Aesthetics
	Sub-Spec.--
2GAA	Essence of Beauty
2GAB	Philosophy of Art
2GAX	Other
2GBY	Spec.--Contemporary Philosophy
	Sub-Spec.--
2GBA	Analytic Philosophy
2GBB	Bergsonism
2GBC	Contemporary Metaphysics
2GBD	Cultural Idealism (Italian)
2GBE	Dialectical Materialism
2GBF	Existentialism (French)
2GBG	Existentialism (German)
2GBH	Historicism (German)
2GBI	Neo-Kantianism
2GBJ	Neopositivism
2GBK	Neorealism (English)
2GBL	Phenomenology (School of Husserl)
2GBM	Pragmatism (American)
2GBN	Scientific Idealism (French and British)
2GBO	Thomism
2GBX	Other
2GCY	Spec.--Cultural Philosophies
	Sub-Spec.--
2GCA	Anthropology
2GCB	Philosophy of Education
2GCC	Philosophy of History
2GCD	Philosophy of Language
2GCE	Philosophy of Religion
2GCF	Political and Social Philosophy
2GCX	Other
2GDY	Spec.--Empirical Psychology
	Sub-Spec.--
2GDA	Behavioral Psychology
2GDB	Characterology
2GDC	Consciousness
2GDD	Criminal Psychology
2GDE	Developmental Psychology
2GDF	Existential Psychology
2GDG	Learning
2GDH	Psychoanalysis
2GDI	Psychophysics-Psychosomatics
2GDX	Other
2GEY	Spec.--Epistemology
	Sub-Spec.--
2GEA	Critique of Empirical Knowledge

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Section B (Continued)

2GEB	Critique of Essential Knowledge	Data Codes	Data Items and Explanations:
2GEC	Essence of Truth	2GMY	Spec.--Rational Theology
2GED	Space, Time		Sub-Spec.--
2GEE	Subject-Object and Their Relations	2GMA	God and Man
2GEX	Other	2GMB	God and the World
2GFY	Spec.--Ethics	2GMC	God: His Existence and Nature
	Sub-Spec.--	2GMD	Problem of Evil
2GFA	Justice: Individual and Social	2GMX	Other
2GFB	Moral Acts and Habits	2GXY	Spec.--Philosophy, Other
2GFC	Moral Judgment: Value		Sub-Spec.--None
2GFD	Moral Laws	2HYY	8. Major Academic Field--RELIGION
2GFE	Moral Virtues	2HAY	Spec.--Comparative Religions
2FGX	Other		Sub-Spec.--None
2GGY	Spec.--History of Western Philosophy	2HBY	Spec.--Eastern Religions
	Sub-Spec.--		Sub-Spec.--
2GGA	Ancient Philosophy	2HBA	Buddhism
2GGB	Medieval Philosophy	2HBB	Hinduism
2GGC	Modern Philosophy	2HBC	Islam
2GGX	Other	2HBX	Other
2GHY	Spec.--Logic	2HCY	Spec.--Theology
	Sub-Spec.--		Sub-Spec.--
2GHA	Concept, Judgment, Reasoning	2HCA	Apologetics
2GHB	Methodology	2HCB	Dogmatics
2GHC	Symbolic Logic	2HCC	Moral Theology
2GHX	Other	2HCX	Other
2GIY	Spec.--Metaphysics	2HDY	Spec.--Western Religions
	Sub-Spec.--		Sub-Spec.--
2GIA	Causality	2HDA	Early Christianity
2GIB	Essence and Existence	2HDB	Judaism
2GIC	Freedom and Determinism	2HDC	Medieval Christianity
2GID	Hierarchy of Being	2HDD	Post-Reformation Christianity
2GIE	Human Person	2HDE	Reformation
2GIF	Metaphysical Principles	2HDX	Other
2GIG	Relation	2HXY	Spec.--Religion, Other
2GIM	Substance and Accident		Sub-Spec.--None
2GIX	Other	2IYY	9. Major Academic Field: ARTS, HUMANITIES, AND EDUCATION TECHNOLOGIES
2GJY	Spec.--Natural and Scientific Philosophy	2IAY	Spec.--Communications Technology
	Sub-Spec.--		Sub-Spec.--
2GJA	Cosmology	2IAA	Air Traffic Control
2GJB	Methodology of Biological Sciences	2IAB	Photography
2GJC	Methodology of Physical Sciences	2IAC	Communications Processing Management
2GJX	Other	2IAD	Conference and Court Reporting
2GKY	Spec.--Oriental Philosophy	2IAE	Creative Writing
	Sub-Spec.--	2IAF	Electronic Coutnermeasures
2GKA	China	2IAG	Intelligence and Imagery Analysis
2GKB	India	2IAH	Interpreting and Translating
2GKC	Middle East	2IAI	Aerospace, Command, Control, and Warning Systems
2GKX	Other		
2GLY	Spec.--Philosophical Psychology	2IAX	Other
	Sub-Spec.--	2IBY	Spec.--Education (excluding Religion) Technology
2GLA	Emotions		Sub-Spec.--
2GLB	Ideational Process	2IBA	Comparative Education
2GLC	Imagination	2IBB	Instructor in Technology
2GLD	Instincts	2IBC	Occupational Education Technology
2GLE	Life	2IBD	Preschool Child Care
2GLF	Memory	2IBE	Teacher Aide
2GLG	Perception	2IBX	Other
2GLM	Soul	2ICY	Spec.--Humanities Technology
2GLI	Whole Man		Sub-Spec.--
2GLX	Other		

1 Title Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section B (Continued)

5 Data Codes	Data Items and Explanations:
2ICA	African Studies
2ICB	Afro-American Studies
2ICC	Chicano Studies
2ICD	Classics
2ICE	Indian Histories
2ICF	Peace Studies Technology
2ICX	Other
2IDY	Spec.--Psychology Technology
	Sub-Spec.--
2IDA	Child Development Technology
2IDB	Personal Development Technology
2IDX	Other
2IEY	Spec.--Recreation Technology
	Sub-Spec.--
2IEA	Golf Course Operations
2IEB	Parks and Recreation Management Technology
2IEC	Recreation Grounds Management
2IED	Community Organization and Recreation
2IEX	Other
2IFY	Spec.--Religion Technology
	Sub-Spec.--
2IFA	Christian Education Technology
2IFB	Christian Ministries Technology
2IFC	Christian Vocational Studies Technology
2IFD	Church History Technology
2IFE	Deaconess
2IFX	Other
2IGY	Spec.--Vocational Counseling Technology
	Sub-Spec.--None

1 Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section C

5 Data Codes	Data Items and Explanations:
3YYY	General Area of Study: BIOLOGICAL AND AGRICULTURAL SCIENCES
3AYY	1. Major Academic Field--BIOLOGY
	NOTE: As in other sciences that have developed along interdisciplinary lines, it is difficult to classify the specialties of Biology categorically and fit all purposes for which a classification is required. The principles of several major divisions of biological study (such as cytology, physiology, ecology, anatomy, genetics, and nutrition) are common to both animal and plant forms, and a classification that lists these individually under both Botany and Zoology would be considered correct. However, for the purpose of Air Force classification and coding, it is more practicable to identify the aforementioned divisions of study as specializations; Botany and Zoology will be considered in the context of "natural history" concerned primarily, but not exclusively, with taxonomy, morphology, and natural habits. Because of their importance to Air Force research activities, Bacteriology and Entomology will also be considered as specializations, although they are strictly speaking, subdivisions of Botany and Zoology respectively.
3AAY	Spec.--Anatomy
	Sub-Spec.--
3AAA	Comparative Anatomy
3AAB	Gross Anatomy
3AAC	Histology
3AAD	Systemic Anatomy
3AAX	Other
3ABY	Spec.--Bacteriology
	Sub-Spec.--
3ABA	Growth and Reproduction
3ABB	Nutrition and Physiology
3ABC	Taxonomy
3ABX	Other
3ACY	Spec.--Biochemistry
	Sub-Spec.--
3ACA	Amino Acids, Peptides, Proteins
3ACB	Antimetabolites
3ACC	Biochemical Mechanisms
3ACD	Biochemorphology
3ACE	Carbohydrates
3ACF	Clinical Biochemistry
3ACG	Cyto-Histo-Chemistry
3ACH	Endoctrine Biochemistry
3ACI	Enzyme, Co-enzyme
3ACJ	Immunochemistry
3ACK	Intermediary Metabolism, Biosynthesis
3ACL	Lipids
3ACM	Microbiological Chemistry
3ACN	Natural Pigments
3ACO	Neurochemistry
3ACP	Nucleic Acids
3ACQ	Oncology, Carcinogensis
3ACR	Physical Biochemistry
3ACS	Radiation Biochemistry
3ACT	Steroids
3ACU	Technology, Methodology
3ACX	Other
3ADY	Spec.--Biogeography
	Sub-Spec.--
3ADA	Medical Geography
3ADB	Phytogeography
3ADC	Zoogeography
3ADX	Other
3AEY	Spec.--Biological Warfare
	Sub-Spec.--None
3AFY	Spec.--Biology, General
	Sub-Spec.--None
3AGY	Spec.--Biophysical Specialties
	Sub-Spec.--
3AGA	Bioacoustics and Transmission
3AGB	Biochemical Physics
3AGC	Bioelectricity and Transmission
3AGD	Bioelectronics
3AGE	Bionics
3AGF	Bio-optics
3AGG	Biosystems, Control, Communications
3AGH	Biothermics and Bioenergetics
3AGI	Biotransport and Membrane Physics
3AGJ	Cellular Biophysics
3AGK	Electron Microscopy
3AGL	Fluid Biomechanics
3AGM	Health Physics
3AGN	Mathematical Biophysics
3AGO	Methodology, Instrumentation and Measurement
3AGP	Molecular Biophysics
3AGQ	Radiation Biology
3AGR	Solid Biomechanics
3AGX	Other
3AHY	Spec.--Bioradiology (Incl. Radiological Defense)
	Sub-Spec.--None
3AIY	Spec.--Botany
	Sub-Spec.--
3AIA	Nonvascular Plants
3AIB	Vascular Plants
3AIX	Other
3AJY	Spec.--Cytology
	Sub-Spec.--
3AJA	Animal Cytology
3AJB	Plant Cytology
3AJX	Other
3AKY	Spec.--Ecology
	Sub-Spec.--

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section C (Continued)

5. Data Codes	Data Items and Explanations:
3AKA	Animal Ecology
3AKB	Plant Ecology
3AKX	Other
3ALY	Spec.--Entomology
	Sub-Spec.--
3ALA	Agricultural Entomology
3ALB	Forest Entomolgy
3ALC	Insect Control, Chemical
3ALD	Insect Control, Other
3ALE	Insect Morphology
3ALF	Insect Pests
3ALG	Insect Physiology
3ALH	Medical Entomology
3ALX	Other
3ARY	Spec.--Genetics
	Sub-Spec.--
3ARA	Animal Genetics
3ARB	Cytogenetics
3ARC	Genetics of Microorganisms
3ARD	Plant Genetics
3ARX	Other
3ANY	Spec.--Immunology
	Sub-Spec.--
3ANA	Antibody Formation
3ANB	Antigens
3ANC	Antigens--Antibody Reaction
3AND	Complement; Complement-Fixation
3ANE	Hypersensitivity
3ANF	Infection and Resistance
3ANG	Interference; Latency
3ANH	Tissue Antibodies; Autoantibodies
3ANX	Other
3AQY	Spec.--Nutrition
	Sub-Spec.--
3AQA	Animal Nutrition
3AQB	Clinical Nutrition
3AQC	Nutrient Value of Foods
3AQD	Plant Nutrition
3AQE	Requirements and Deficiencies
3AQX	Other
3APY	Spec.--Paleontology
	Sub-Spec.--
3APA	Micropaleontology
3APB	Paleobotany
3APC	Paleozoology
3APD	Palynology
3APX	Other
3AQY	Spec.--Parasitology
	Sub-Spec.--None
3ARY	Spec.--Pathology
	Sub-Spec.--
3ARA	Comparative Pathology
3ARB	Cytopathology
3ARC	Experimental Pathlogy
3ARD	Histopathology
3ARE	Phytopathology
3ARX	Other
3ASY	Spec.--Pharmacology
	Sub-Spec.--
3ASA	Chemical Pharmacology
3ASB	Chemotherapy
3ASC	Drug Enzymology
3ASD	Experimental Therapeutics, Clinical
3ASE	Industrial Chemicals
3ASF	Pharmacodynamics
3ASG	Psychopharmacology
3ASH	Toxicology
3ASX	Other
3ATY	Spec.--Physiology
	Sub-Spec.--
3ATA	Animal Physiology
3ATB	General Physiology (Cell)
3ATC	Human Physiology
3ATD	Plant Physiology
3ATX	Other
3AUY	Spec.--Virology
	Sub-Spec.--None
3AVY	Spec.--Zoology
	Sub-Spec.--
3AVA	Invertebrates
3AVB	Veterbrates
3AVX	Other
3AXY	Spec.--Biology, Other
	Sub-Spec.--
3AXA	Biology, Teaching
3AXX	Other
3BYY	2. Major Academic Field--AGRICULTURE
3BAY	Spec.--Agriculture and Food Chemistry
	Sub-Spec.--
3BAA	Alcoholic Beverages
3BAB	Animal and Vegetable Fats and Oils
3BAC	Animal Feeds
3BAD	Bakery and Confectionery Products
3BAE	Cereals and Carbohydrates
3BAF	Fertilizers, Plant Growth Regulators
3BAG	Food and Feed Additives
3BAH	Fruits, Vegetables, Juices
3BAI	Meat, Fish, Dairy and Poultry Products
3BAJ	Nonalcoholic Beverages
3BAK	Nonfood Crop Products
3BAL	Pesticides
3BAX	Other
3BBY	Spec.--Animal Husbandry
	Sub-Spec.--
3BBA	Large Animal Husbandry

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section C (Continued)

5. Data Codes	Data Items and Explanations:
3B8B	Poultry
3B8C	Small Animal Husbandry
3B8X	Other
3BCY	Spec.--Crop Science (Agronomy)
	Sub-Spec.--
3BCA	Crop Breeding, Hybridization
3BCB	Crop Management
3BCC	Field Crops
3BCD	Pasture and Forage Crops
3BCE	Seeds
3BCF	Turf and Ornamental Crops
3BCG	Weed Control
3BCX	Other
3BDY	Spec.--Fish and Wildlife
	Sub-Spec.--
3BDA	Fish and Wildlife Controls
3BDB	Food Habits
3BDC	Habitat Influences
3BDD	Population Dynamics
3BDE	Propagation and Management
3BDX	Other
3BEY	Spec.--Forestry and Range Science
	Sub-Spec.--
3BEA	Erosion Control
3BEB	Forest Products
3BEC	Forest Protection
3BED	Forest Management
3BEE	Irrigation
3BEF	Range Management
3BEG	Silviculture
3BEH	Watershed Management
3BEX	Other
3BFY	Spec.--Horticulture
	Sub-Spec.--
3BFA	Floriculture and Ornamentals
3BFB	Fruits
3BFC	Vegetables
3BFX	Other
3BGY	Spec.--Soil Science
	Sub-Spec.--
3BGA	Forest and Range Soils
3BGB	Soil and Water Management
3BGC	Soil Chemistry
3BGD	Soil Fertility, Fertilizers, and Plant Nutrition
3BGE	Soil Genesis, Morphology and Classification
3BGF	Soil Microbiology
3BGG	Soil Physics
3BGX	Other
3BHY	Spec.--Mechanized Agriculture
3BXY	Spec.--Agriculture, Other
	Sub-Spec.--None
3BIY	3. Major Academic Field--AGRICULTURAL TECHNOLOGIES
3BIY	Spec.--Floral Design and Management
	Sub-Spec.--None
3BIX	Other

Section D

Data Codes	Data Items and Explanations:
4YYY	General Area of Study: ENGINEERING

NOTE: There is a problem of differentiating between Aeronautical Engineering, Astronautical Engineering, and Aerospace Engineering. Historically, the major discipline was Aeronautical Engineering. With the advent of practical applications of ballistic missile technology, a segment of this Aeronautical Engineering field was developed to such an extent that it has become a major academic field in its own right, i.e., Astronautical Engineering. The colleges and universities in this country have reflected the emphasis in this area by the modification of the titles of departments of Aeronautical Engineering to titles such as: Department of Aeronautics and Astronautics; Department of Aeronautical and Astronautical Engineering; and the Department of Aero-Space Engineering. The term "aerospace" has come into use primarily as a shortened equivalent of the phrase "aeronautical and astronautical."
The hybrid term, Aerospace Engineer, would appropr - ately apply to an individual whose background nd interests fall equally in both areas, i.e., aeronautics and astronautics, while the Aeronautical or Astronautical Engineer would be one whose training was primarily (but not necessarily exclusively) in the areas of aeronautics and astronautics, respectively. Although aeronautical and astronautical engineering could be considered specializations of aero-space engineering, the practical application of this term in the Air Force officer classification system is limited, since this system is designed to fit an individual to the job which best utilizes his talents. In order to satisfy the requirement of the officer classification system and still use the term "Aerospace Engineer," this classification will list all three terms. The term "Aerospace Engineer" will imply an engineer whose background and interests fall equally or overlap in the other two areas.

4AYY	1. Major Academic Field--AERONAUTICAL ENGINEERING
4AAY	Spec.--Aerodynamics
	Sub-Spec.--
4AAA	Aerodynamic Loads
4AAB	Ballistics
4AAC	Compressibility
4AAD	Flight Test and Research
4AAE	Gas Dynamics, Subsonic
4AAF	Gas Dynamics, Supersonic and Hypersonic
4AAG	Heat Flow
4AAH	Hydrodynamics
4AAI	Magneto-Gas-Dynamics
4AAJ	Non-Continuum Gas Dynamics
4AAK	Rotary Wing
4AAL	Unsteady Gas Dynamics
4AAM	Viscous Aerodynamics
4AAN	Wind Tunnels

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section D (Continued)

5. Data Codes	Data Items and Explanations:
4AAX	Other
4ABY	Spec.--Air Weapons
	Sub-Spec.--None
4ACY	Spec.--Design
	Sub-Spec.--
4ACA	Applied Aerodynamics and Performance
4ACB	Component Design
4ACC	Configuration Design, Manned Vehicles
4ACD	Configuration Design, Unmanned Vehicles
4ACE	Detail Design
4ACF	Systems Design
4ACX	Other
4ADY	Spec.--Instrumentation
	Sub-Spec.--
4ADA	Aircraft Instrumentation
4ADB	Automatic Control Systems
4ADC	Bombardment, Fire Control and Navigation Systems
4ADX	Other
4AEY	Spec.--Propulsion
	Sub-Spec.--
4AEA	Combustion
4AEB	Compressors, Turbines
4AEC	Hybrid Engines
4AED	Liquid Fuels
4AEE	Power Plant Testing
4AEF	Propulsion Systems
4AEG	Ramjet
4AEH	Reciprocating Engines
4AEI	Rockets
4AEJ	Solid Fuels
4AEK	Turbojet
4AEX	Other
4AFY	Spec.--Stability and Control
	Sub-Spec.--
4AFA	Manned Vehicles Dynamics
4AFB	Unmanned Vehicle Dynamics
4AFX	Other
4AGY	Spec.--Structures
	Sub-Spec.--
4AGA	Aeroelasticity
4AGB	Aircraft Structures
4AGC	Flutter, Vibration
4AGD	Loads
4AGE	Materials
4AGF	Missile Structures
4AGG	Stress Analysis
4AGH	Structural Test and Analysis
4AGI	Thermal Effects
4AGX	Other
4AXY	Spec.--Aeronautical Engineering, Other
	Sub-Spec.--None
4BYY	2. Major Academic Field--AEROSPACE ENGINEERING
4BAY	Spec.--Aerospace-Mechanical Engineering
	Sub-Spec.--None
4BBY	Spec.--Configuration Design
	Sub-Spec.--None
4BCY	Spec.--Guided Missiles
	Sub-Spec.--None
4BDY	Spec.--Systems Integration
	Sub-Spec.--None
4BXY	Spec.--Aerospace Engineering, Other
	Sub-Spec.--None
4CYY	3. Major Academic Field--AGRICULTURAL ENGINEERING
4CAY	Spec.--Agricultural Structures and Equipment
	Sub-Spec.--None
4CBY	Spec.--Electric Power and Processing
	Sub-Spec.--None
4CCY	Spec.--Power and Machinery
	Sub-Spec.--None
4CDY	Spec.--Soil and Water Engineering
	Sub-Spec.--None
4CXY	Spec.--Agricultural Engineering, Other
	Sub-Spec.--None
4DYY	4. Major Academic Field--ARCHITECTURAL ENGINEERING
4DAY	Spec.--City and Regional Planning
	Sub-Spec.--
4DAA	City Planning
4DAB	Regional Planning
4DAC	Urban Design
4DAX	Other
4DBY	Spec.--Electrical Systems
	Sub-Spec.--
4DBA	Communications
4DBB	Illumination
4DBC	Wiring
4DBX	Other
4DCY	Spec.--Mechanical Systems
	Sub-Spec.--
4DCA	Air Conditioning
4DCB	Refrigeration
4DCC	Thermodynamics
4DCX	Other
4DDY	Spec.--Sanitary Systems
	Sub-Spec.--
4DDA	Plumbing
4DDB	Sewerage
4DDC	Water Supply
4DDX	Other
4DXY	Spec.--Architectural Engineering, Other
	Sub-Spec.--None

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section D (Continued)

5. Data Codes	Data Items and Explanations:
4EYY	5. Major Academic Field--ASTRONAUTICAL ENGINEERING
4EAY	Spec.--Design
	Sub-Spec.--
4EAA	Component Design
4EAB	Configuration Design, Manned Ballistic Vehicles
4EAC	Configuration Design, Unmanned Ballistic Vehicles
4EAD	Spacecraft Design
4EAE	Vehicle Performance
4EAX	Other
4EBY	Spec.--Gas Dynamics
	Sub-Spec.--
4EBA	Heat Flow
4EBB	Rarified Gas Dynamics
4EBC	Re-entry Mechanics
4EBD	Supersonic and Hypersonic Dynamics
4EBX	Other
4ECY	Spec.--Guidance and Control
	Sub-Spec.--None
4EDY	Spec.--Instrumentation
	Sub-Spec.--
4EDA	Automatic Control Systems
4EDB	Data Transmission
4EDC	Environment Simulation
4EDD	Flight Test and Research
4EDE	Guidance and Control
4EDF	Inertial Guidance Systems
4EDG	Trajectories and Orbits
4EDH	Vehicle Stabilization
4EDX	Other
4EEY	Spec.--Propulsion
	Sub-Spec.--
4EEA	Combustion
4EEB	Design of Power Plants
4EEC	Liquid Fuels
4EED	Non-Chemical Propulsion
4EEE	Nuclear Propulsion
4EEF	Power Plant Testing
4EEG	Rockets
4EEH	Solid Fuels
4EEX	Other
4EFY	Spec.--Space Facilities
	Sub-Spec.--None
4EGY	Spec.--Structures
	Sub-Spec.--
4EGA	Aeroelasticity
4EGB	Ballistic Missile Structures
4EGC	Materials
4EGD	Pressure Vessel
4EGE	Spacecraft Structures
4EGF	Stress Analysis
4EGG	Structural Optimization
4EGH	Structural Test and Analysis
4EGI	Vehicle Structural Dynamics
4EGX	Other
4EXY	Spec.--Astronautical Engineering, Other
	Sub-Spec.--None
4FYY	6. Major Academic Field--CERAMIC ENGINEERING
4FAY	Spec.--Ceramic Engineering Design
	Sub-Spec.--None
4FBY	Spec.--Ceramic Materials
	Sub-Spec.--
4FBA	Abrasives
4FBB	Cements, Limes, Plasters
4FBC	Ceramic Metal Materials Systems
4FBD	Clay Products
4FBE	Electrical Ceramics
4FBF	Glass
4FBG	Refractory Materials Systems
4FBH	Whitewares
4FBX	Other
4FCY	Spec.--Ceramic Prosesses
	Sub-Spec.--
4FCA	Ceramic Fabrication Processes
4FCB	Ceramic Thermal Processes
4FCC	Kilns, Furnaces, and Pyrometry
4FCX	Other
4FXY	Spec.--Ceramic Engineering, Other
	Sub-Spec.--None
4GYY	7. Major Academic Field--CHEMICAL ENGINEERING
4GAY	Spec.--Corrosion and Preservation
	Sub-Spec.--None
4GBY	Spec.--Equipment Design
	Sub-Spec.--
4GBA	Automatic Process Controls
4GBB	Cracking Equipment
4GBC	Filters
4GBD	Materials Handling Equipment
4GBE	Measurement and Controls
4GBF	Mixers
4GBG	Separators, Mechanical
4GBX	Other
4GCY	Spec.--Unit Operations
	Sub-Spec.--
4GCA	Adsorption and Absorption
4GCB	Chemical Separation
4GCC	Crystallization
4GCD	Electrochemical Operations
4GCE	Evaporation
4GCF	Fluid Flow
4GCG	Heat Transfer
4GCH	Mass Transfer
4GCI	Mechanical Separation

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section D (Continued)

5. Data Codes	Data Items and Explanations:
4GCJ	Mixing
4GCK	Nuclear Processes
4GCL	Size Reduction
4GCX	Other
4GXY	Spec.--Chemical Engineering, Other
	Sub-Spec.--None
4HYY	8. Major Academic Field--CIVIL ENGINEERING
4HAY	Spec.--City and Regional Planning
	Sub-Spec.--
4HAA	City Planning
4HAB	Regional Planning
4HAC	Urban Design
4HAX	Other
4HBY	Spec.--Construction Engineering
	Sub-Spec.--
4HBA	Building Construction
4HBB	Construction Management
4HBX	Other
4HCY	Spec.--Environic Engineering
	Sub-Spec.--None
4HDY	Spec.--Hydraulic Engineering
	Sub-Spec.--
4HDA	Fluid Mechanics
4HDB	Hydraulic Machinery
4HDC	Hydraulic Structures
4HDD	Hydrology
4HDE	Hydromechanics
4HDF	Waterways and Harbors
4HDX	Other
4HEY	Spec.--Sanitary Engineering
	Sub-Spec.--
4HEA	Air Pollution
4HEB	Sewage and Industrial Wastes
4HEC	Water Pollution Control
4HED	Water Supply
4HEX	Other
4HFY	Spec.--Soil and Foundation Engineering
	Sub-Spec.--
4HFA	Foundation Design and Construction
4HFB	Soil Mechanics
4HFX	Other
4HGY	Spec.--Structural Engineering
	Sub-Spec.--
4HGA	Structural Analysis
4HGB	Structural Design
4HGC	Structural Dynamics
4HGX	Other
4HHY	Spec.--Surveying and Mapping
	Sub-Spec.--
4HHA	Cartographic Surveying
4HHB	Mapping
4HHC	Photogrammetry
4HHX	Other
4HIY	Spec.--Transportation and Traffic Engineering
	Sub-Spec.--
4HIA	Air Systems
4HIB	Highway and Road Systems
4HIC	Rail Systems
4HID	Water Systems
4HIX	Other
4HXY	Spec.--Civil Engineering, Other
	Sub-Spec.--None
4HJY	Spec.--Civil Engineering/ Facilities
	Sub-Spec.--None
4IYY	9. Major Academic Field--ELECTRICAL ENGINEERING
4IAY	Spec.--Armament
	Sub-Spec.--None
4IBY	Spec.--Electromagnetic Waves and Distributed Parameter Systems
	Sub-Spec.--
4IBA	Acoustics
4IBB	Antennas
4IBC	Electromagnetic Field Theory
4IBD	Electronic Countermeasures
4IBE	Radio Astronomy
4IBF	Radio Wave Propagation
4IBG	Travelling Wave Circuits
4IBX	Other
4ICY	Spec.--Electron Devices
	Sub-Spec.--
4ICA	Magneto-Electric Devices
4ICB	Microwave Tubes
4ICC	Molecular Electronics
4ICD	Quantum Electron Devices
4ICE	Solid State Electron Devices
4ICF	Solid State Materials Science
4ICG	Thermionic Tubes (Non Microwave)
4ICX	Other
4IEY	Spec.--Energy Conversion and Distribution
	Sub-Spec.--
4IEA	Electrochemical Devices
4IEB	Electromechanical Devices
4IEC	Electrothermal Devices
4IED	Illumination
4IEE	Power Systems
4IEX	Other
4IFY	Spec.--Environic Engineering
	Sub-Spec.--None
4IGY	Spec.--Information Systems
	Sub-Spec.--
4IGA	Communications Systems, General
4IGB	Information Theory
4IGC	Instrumentation
4IGD	Radar Systems
4IGE	Radio Communications Systems

1 Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section D (Continued)

5 Data Codes	Data Items and Explanations:
4IGF	Satellite Communication Systems
4IGG	Statistical Communication Theory
4IGH	Telemeentry
4IGI	Television Systems
4IGJ	Wire Communication Systems
4IGX	Other
4IHY	Spec.--Lumped Parameter Systems
	Sub-Spec.--
4IHA	Electronic Circuits
4IHB	Feedback Control Systems
4IHC	Guidance Systems
4IHD	Linear Circuit and System Analysis and Synthesis
4IHE	Non Linear Analysis
4IHX	Other
4IJY	Spec.--Electro-Optics
	Sub-Spec.--None
4IXY	Spec.--Electrical Engineering, Other
	Sub-Spec.--None
4JYY	10. Major Academic Field--ENGINEERING GENERAL
	Sub-Spec.--None
4KYY	11. Major Academic Field--ENGINEERING SCIENCES
4KAY	Spec.--Dynamics
	Sub-Spec.--
4KAA	Dynamics of Structures
4KAB	Engineering Mechanics
4KAC	Particle Dynamics
4KAD	Thermodynamics
4KAX	Other
4KBY	Spec.--Fluid Mechanics
	Sub-Spec.--
4KBA	Fluid Dynamics
4KBB	Gas Dynamics
4KBC	Hydrodynamics
4KBD	Hydrostatics
4KBE	Viscous Flow
4KBX	Other
4KCY	Spec.--Materials, Elasticity and Plasticity
	Sub-Spec.--
4KCA	Elastic Stability
4KCB	Mechanical Properties of Materials
4KCC	Plastic Stability
4KCD	Theory of Elasticity
4KCE	Theory of Plasticity
4KCX	Other
4XXY	Spec.--Engineering Sciences, Other
	Sub-Spec.--None
4LYY	12. Major Academic Field--INDUSTRIAL ENGINEERING
4LBY	Spec.--Engineering Economics
4LBA	Sub-Spec.--
4LBA	Applied Problems
4LBB	Depreciation Techniques
4LBC	Economic Lot Size Determination
4LBD	Industrial Organization
4LBE	Labor Relations
4LBF	Replacement Analysis
4LBX	Other
4LCY	Spec.--Human Factors in Engineering
	Sub-Spec.--
4LCA	Controls and Placement
4LCB	Environmental Effects
4LCC	Error Analysis
4LCD	Machine Design
4LCE	Time and Motion Study
4LCF	Waiting Line Theory
4LCX	Other
4LDY	Spec.--Job Design
	Sub-Spec.--
4LDA	Ergonometrics
4LDB	Predetermined Standard Data
4LDC	Systems and Procedures Design
4LDD	Time and Motion Study
4LDX	Other
4LEY	Spec.--Maintenance Engineering
	Sub-Spec.--None
4LFY	Spec.--Operational Analysis
	Sub-Spec.--
4LFB	Management Science
4LFC	Operations Research
4LFX	Other
4LGY	Spec.--Production Planning and Control
	Sub-Spec.--
4LGA	Inventory Control
4LGB	Materials Handling
4LGC	Packaging
4LGD	Plant Layout
4LGE	Production Engineering
4LGF	Production Planning
4LGX	Other
4LHY	Spec.--Quality Control
	Sub-Spec.--
4LHA	Standards and Testing of Materials
4LHB	Statistical Quality Control
4LHX	Other
4LXY	Spec.--Industrial Engineering, Other
	Sub-Spec.--None
4MYY	13. Major Academic Field--MECHANICAL ENGINEERING
4MAY	Spec.--Automotive Engineering
	Sub-Spec.--None
4MBY	Spec.--Dynamics
	Sub-Spec.--
4MBA	Dynamics of Machinery

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section D (Continued)

5. Data Codes	Data Items and Explanations:
4RBB	Fluid Dynamics
4RBC	Gas Dynamics
4RBD	Mechanics of Compressible Fluids
4RBE	Vibrations
4RBX	Other
4RCY	Spec.--Environic Engineering
	Sub-Spec.--None
4RDY	Spec.--Lubrication Engineering
	Sub-Spec.--None
4REY	Spec.--Marine Engineering
	Sub-Spec.--None
4RFY	Spec.--Materials Engineering
	Sub-Spec.--None
4RGY	Spec.--Power Plants
	Sub-Spec.--
4RGA	Boilers and Steam Engineering
4RGB	Gas Turbines
4RGC	Internal Combustion Engines
4RGD	Nuclear Power Plants
4RGE	Steam Engines
4RGX	Other
4RHY	Spec.--Product Design
	Sub-Spec.--
4RHA	Advanced Product Design
4RHB	Control Systems Design
4RHC	Engine Design
4RHD	Experimental Methods in Design
4RHE	Machine Design
4RHF	Structural Design
4RHX	Other
4RIY	Spec.--Thermodynamics and Heat Transfer
	Sub-Spec.--
4RIA	Air Conditioning and Refrigeration
4RIB	Boundary Layer Flow
4RIC	Engineering Thermodynamics
4RID	Heat Transmission
4RIE	Thermodynamics of Propulsion Systems
4RIX	Other
4RJY	Spec.--Welding Engineering
	Sub-Spec.--None
4RXY	Spec.--Mechanical Engineering, Other
	Sub-Spec.--None
4RYY	14. Major Academic Field--METALLURGICAL ENGINEERING
4RAY	Spec.--Extraction
	Sub-Spec.--
4RAA	Electrometallurgical Extraction
4RAB	Hydrometallurgical Extraction
4RAC	Mill Design
4RAD	Nonferrous Extraction
4RAE	Pyrometallurgical Extraction
4RAX	Other

Data Codes	Data Items and Explanations:
4NBY	Spec.--Foundry Engineering
	Sub-Spec.--
4NBA	Foundry Techniques and Design
4NBB	Foundry Theory
4NBX	Other
4NCY	Spec.--Physical Metallurgy
	Sub-Spec.--
4NCA	Engineering Physical Metallurgy
4NCB	Theoretical Physical Metallurgy
4NCX	Other
4NDY	Spec.--Powder Metallurgy
	Sub-Spec.--
4NDA	Metal Powder Part Fabrication
4NDB	Metal Powder Production
4NDX	Other
4NXY	Spec.--Metallurgical Engineering, Other
	Sub-Spec.--None
4OYY	15. Major Academic Field-MINING AND PETROLEUM ENGINEERING
4OAY	Spec.--Mining Engineering
	Sub-Spec.--
4OAA	Benefication
4OAB	Mine Development
4OAC	Mine Exploration
4OAD	Mine Production
4OAE	Open Cut Mining
4OAF	Place Mining
4OAG	Underground Mining
4OAX	Other
4OBY	Spec.--Petroleum Engineering
	Sub-Spec.--
4OBA	Petroleum Exploration Development
4OBB	Petroleum Production
4OBC	Pipeline Transmission
4OBD	Underground Storage
4OBX	Other
4OXY	Spec.--Mining and Petroleum Engineering, Other
	Sub-Spec.--None
4PYY	16. Major Academic Field--NAVAL ARCHITECTURE
4PAY	Spec.--Design of Structures
	Sub-Spec.--None
4PBY	Spec.--Shipbuilding
	Sub-Spec.--None
4PCY	Spec.--Hydrodynamics
	Sub-Spec.--None
4PDY	Spec.--Model Basin Studies
	Sub-Spec.--None
4PXY	Spec.--Naval Architecture, Other
	Sub-Spec.--None
4QYY	17. Major Academic Field--NUCLEAR ENGINEERING
4QAY	Spec.--Instrumentation
	Sub-Spec.--

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section D (Continued)

5. Data Codes	Data Items and Explanations:
4QAA	Accelerators
4QAB	Radiation Detection and Measurement
4QAC	Reactor Instrumentation and Control
4QAX	Other
4QBY	Spec.--Nuclear Processes
	Sub-Spec.--
4QBA	Activation Analysis
4QBB	Materials Handling
4QBC	Nuclear Spectroscopy
4QBD	Radiochemistry
4QBE	Reactions and Scattering
4QBX	Other
4QCY	Spec.--Nuclear and Radiation Effects
	Sub-Spec.--
4QCA	Blast and Thermal Effects
4QCB	Health Physics
4QCC	Radiation Defense
4QCD	Radiation Hazards
4QCE	Radiation Shielding.
4QCF	Waste Disposal
4QCX	Other
4QDY	Spec.--Nuclear Reactor Engineering
	Sub-Spec.--
4QDA	Reactor Analysis
4QDB	Reactor Design
4QDX	Other
4QXY	Spec.--Nuclear Engineering, Other
	Sub-Spec.--None
4RYY	18. Major Academic Field--SAFETY ENGINEERING
4RAY	Spec.--Accident Prevention
	Sub-Spec.--
4RAA	Design of Structures
4RAB	Investigative Techniques
4RAC	Principles of Prevention
4RAX	Other
4RBY	Spec.--Industrial Safety
	Sub-Spec.--
4RBA	Occupational Hazards
4RBB	Pollution and Contamination
4RBC	Protective Equipment
4RBX	Other
4RCY	Spec.--Safety Management
	Sub-Spec.--
4RCA	Educational Techniques
4RCB	Management Functions
4RCC	Program Planning and Supervision
4RCX	Other
4RDY	Spec.--Systems Safety
	Sub-Spec.--
4RDA	Control Systems
4RDB	Missiles Systems
4RDC	Orbital Vehicle Systems
4RDD	Propulsion Systems
4RDE	Weapon Systems
4RDX	Other
4REY	Spec.--Transportation Safety
	Sub-Spec.--
4REA	Air Transportation Safety
4REB	Highway Transportation Safety
4REC	Rail Transportation Safety
4RED	Underground Transportation Safety
4REX	Other
4RFY	Spec.--Fire Protection Engineering
	Sub-Spec.--None
4RXY	Spec.--Safety Engineering, Other
	Sub-Spec.--None
4SYY	19. Major Academic Field--SPACE PHYSICS ENGINEERING
4SYY	Spec.--None
	Sub-Spec.--None
4TYY	20. Major Academic Field--SYSTEMS ENGINEERING
4TAY	Spec.--Control Systems
	Sub-Spec.--None
4TBY	Spec.--Cybernetics
	Sub-Spec.--None
4TCY	Spec.--Decision Theory, Sequential Analysis
	Sub-Spec.--None
4TDY	Spec.--Econometrics
	Sub-Spec.--None
4TEY	Spec.--Game Theory
	Sub-Spec.--None
4TFY	Spec.--Human Factors in Engineering
	Sub-Spec.--None
4TGY	Spec.--Modeling
	Sub-Spec.--None
4THY	Spec.--Operations Research
	Sub-Spec.--None
4TIY	Spec.--Optimization
	Sub-Spec.--None
4TJY	Spec.--Reliability
	Sub-Spec.--None
4TKY	Spec.--Simulation
	Sub-Spec.--None
4TLY	Spec.--Statistical Communication Theory
	Sub-Spec.--None
4TMY	Spec.--Systems Theory
	Sub-Spec.--None
4TNY	Spec.--Value Theory
	Sub-Spec.--None
4TXY	Spec.--Systems Engineering, Other
	Sub-Spec.--None
4UYY	21. Major Academic Field--TEXTILE ENGINEERING
	Spec.--None

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section D (Continued)

5. Data Codes	Data Items and Explanations:
4VYY	22. Major Academic Field-- ENGINEERING, OTHER
4VFY	Spec.--Computer Engineering Technology
	Sub-Spec.--
4VFA	Digital Equipment Technology
4VFB	Electronic Computer Technology
4VFX	Other
4VGY	Spec.--Electrical Technology
	Sub-Spec.--
4VGA	Electric Power Technology
4VGX	Other
4VHY	Spec.--Electronics Engineering Technology
	Sub-Spec.--
4VHA	Avionics Communication-Navigation Systems
4VHB	Avionics Instrument Systems Technology
4VHC	Avionics Radar Technology
4VHD	Communications Equipment Technology
4VHE	Communications Wire Technology
4VHF	General Electronic Technology
4VHG	Ground Radar Technology
4VHH	Instrumentation Technology
4VHI	Meteorological Equipment Technology
4VHJ	Nuclear Technology
4VHK	Photographic Systems Technology
4VHL	Radio Communications Technology
4VHR	Sensor Systems Technology
4VHN	Telecommunications Systems Control Technology
4VHO	Training Devices Technology
4VHX	Other
4VIY	Spec.--Engineering Technology (General)
	Sub-Spec.--
4VIA	Microprecision Technology
4VIX	Other
4VJY	Spec.--Industrial Engineering Technology
	Sub-Spec.--
4VJA	Industrial Instruments Technology
4VJB	Manufacturing Engineering Technology
4VJC	Packaging Technology
4VJD	Production Planning Technology
4VJE	Paper Technology
4VJF	Quality Control Technology
4VJX	Other
4VKY	Spec.--Mechanical Engineering Technology
	Sub-Spec.--
4VKA	Air Conditioning Engineering Technology
4VKB	Automotive Engineering Technology
4VKC	Automotive Mechanics
4VKD	Fluid Power Engineering Technology
4VKE	Gunsmithing
4VKF	Heavy Equipment Technology
4VKG	Horology
4VKH	Internal Combustion Engine Engineering Technology
4VKI	Mechanical Design Technology
4VKJ	Mechanical Power Technology
4VKX	Other
4VLY	Spec.--Metalurgical Engineering Technology
	Sub-Spec.--
4VLA	Automative Body Repair
4VLB	Metal Working Technology
4VLX	Other
4VMY	Spec.--Nuclear Science Technology
	Sub-Spec.--
4VMA	Radiation and Nuclear Technology
4VMX	Other
4VNY	Spec.--Petroleum Engineering Technology
	Sub-Spec.--
4VNA	Fuels Technology
4VNX	Other
4VOY	Spec.--Safety Engineering Technology
	Sub-Spec.--
4VOA	Fire Protection and Safety Technology
4VOX	Other
4VPY	Spec.--Textile Technology
	Sub-Spec.--
4VPA	Apparel Design Technology
4VPB	Bindery Technology
4VPC	Fabric and Rubber Products
4VPO	Power Sewing Technology
4VPE	Upholstery
4VPX	Other

1 Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section E

5 Data Codes	Data Items and Explanations:
5YYY	General Area of Study: LAW
5AYY	1. Major Academic Field--CIVIL LAW
5AAY	Spec.--International Law
	Sub-Spec.--
5AAA	Private International Law
5AAB	Public International Law
5AAX	Other
5ABY	Spec.--Private Law
	Sub-Spec.--
5ABA	Associations Law (Non-Corporate)
5ABB	Banking and Commercial Law
5ABC	Bankruptcy Law
5ABD	Communications Law
5ABE	Copyright Law
5ABF	Corpoations Law
5ABG	Domestic Relations Law
5ABH	General Practice
5ABI	Insurance Law
5ABJ	Investments Law
5ABK	Labor Law
5ABL	Natural Resources Law
5ABM	Negligence Law
5ABN	Patent Law
5ABO	Real Estate Law
5ABP	Taxation Law
5ABQ	Trademark Law
5ABR	Trial Law
5ABS	Trust Law
5ABT	Utilities Law
5ABU	Wills, Estate Planning, Probate Law
5ABX	Other
5ACY	Spec.--Public Law
	Sub-Spec.--
5ACA	Administrative Law
5ACB	Admiralty Law
5ACC	Aeronautics-Space Law
5ACD	Antitrust Law
5ACE	Antomic Energy Law
5ACF	Comparative Jurisprudence
5ACG	Constitutional Law
5ACH	Criminal Law and Procedure
5ACI	Government Contracts Law
5ACJ	Martial Law
5ACK	Medical Jurisprudence
5ACL	Military Law
5ACM	Motor Carriers Law
5ACN	Workmen's Compensation Law
5ACX	Other
5AXY	Spec.--Civil Law, Other
	Sub-Spec.--None
5BYY	2. Major Academic Field--MILITARY JUSTICE
5BAY	Spec.--Military Criminal Law
	Sub-Spec.--None
5BXY	Spec.--Military Justice, Other
	Sub-Spec.--None

Section F

6YYY	General Area of Study: MATHEMATICS
NOTE:	It is difficult to define mathematical terms of nontechnical language. These terms are technical by their nature and are not susceptible to description in a few words. Most mathematical terms can be defined only by using technical terminology, and this sometimes defeats the purpose of the definition since new technical terms are introduced which may require further definition. The definitions for mathematical terms in this manual therefore, are not to be considered as absolute or precise definitions, but rather as further extensions or descriptions of the terms.
6AYY	1. Major Academic Field-ALGEBRA
6AAY	Spec.--Boolean Algebra
	Sub-Spec.--None
6ABY	Spec --Combinatorial Analysis
	Sub-Spec.--None
6ACY	Spec.--Differential Algebra
	Sub-Spec.--None
6ADY	Spec.--Fields, Rings, Algebras
	Sub-Spec.--None
6AEY	Spec.--Groups, Generalizations
	Sub-Spec.--None
6AFY	Spec.--Homological Algebra
	Sub-Spec.--None
6AGY	Spec.--Linear Algebra and Matrix Theory
	Sub-Spec.--None
6AHY	Spec.--Polynomials
	Sub-Spec.--None
6AIY	Spec.--Presentation Theory
	Sub-Spec.--None
6AXY	Spec.--Algebra, Other
	Sub-Spec.--None
6BYY	2. Major Academic Field--ANALYSIS AND FUNCTIONAL ANALYSIS
6BAY	Spec.--Banach Spaces and Algebras
	Sub-Spec.--None
6BBY	Spec.--Calculus of Variations
	Sub-Spec.--None
6BCY	Spec. Convexity, Inequalities
	Sub-Spec.--None
6BDY	Spec.--Difference and Functional Equations
	Sub-Spec.--None
6BEY	Spec.--Functions of Complex Variables
	Sub-Spec.--None
6BFY	Spec--Functions of Real Variables
	Sub-Spec.--None
6BGY	Spec.--Functions of Several Complex Variables

1 Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section F (Continued)

5 Data Codes	Data Items and Explanations
	Sub-Spec.--None
6BMY	Spec.--Hilbert Spaces
	Sub-Spec.--None
6BIY	Spec.--Integral and Integro-Differential Equations
	Sub-Spec.--None
6BJY	Spec.--Integral Transforms
	Sub-Spec.--None
6BKY	Spec.--Lie Groups and Algebras
	Sub-Spec.--None
6BLY	Spec.--Operational Calculus
	Sub-Spec.--None
6BNY	Spec.--Ordinary Differential Equations
	Sub-Spec.--None
6BNY	Spec.--Partial Differential Equations
	Sub-Spec.--None
6BOY	Spec.--Potential Theory, Subharmonic Functions
	Sub-Spec--None
6BPY	Spec.--Series, Sumnability
	Sub-Spec.--None
6BQY	Spec.--Special Functions
	Sub-Spec.--None
6BRY	Spec.--Trigonometric Series and Integrals
	Sub-Spec.--None
6BXY	Spec.--Analysis and Functional Analysis, Other
	Sub-Spec.--None
6CYY	3. Major Academic Field--GEOMETRY
6CAY	Spec.--Affine Geometry
	Sub-Spec.--None
6CBY	Spec.--Algebraic Geometry
	Sub-Spec.--None
6CCY	Spec.--Complex Manifolds
	Sub-Spec.--None
6CDY	Spec.--Convex Domains, Extremum Problems
	Sub-Spec.--None
6CEY	Spec.--Differential Geometry, Tensor Analysis
	Sub-Spec.--None
6CFY	Spec.--Euclidean Geometry
	Sub-Spec.--None
6CGY	Spec.--Finite Geometries
	Sub-Spec.--None
6CHY	Spec.--Foundations of Geometry
	Sub-Spec.--None
6CIY	Spec.--Integral Geometry
	Sub-Spec.--None
6CJY	Spec.--Projective, Non-Euclidean Geometries
	Sub-Spec.--None
6CKY	Spec.--Reimannian Geometry
	Sub-Spec.--None
6CXY	Spec.--Geometry, Other
	Sub-Spec.--None
6DYY	4. Major Academic Field--LOGIC AND FOUNDATIONS
6DAY	Spec.--Applications of Logic
	Sub-Spec.--None
6DBY	Spec.--Foundations of Mathematics
	Sub-Spec.--None
6DCY	Spec.--Intuitionism
	Sub-Spec.--None
6DDY	Spec.--Lattices
	Sub-Spec.--None
6DEY	Spec.--Normal and Symbolic Logic
	Sub-Spec.--None
6DFY	Spec.--Order, Total and Partial
	Sub-Spec.--None
6DGY	Spec.--Recursive Functions
	Sub-Spec.--None
6DHY	Spec.--Set Theory
	Sub-Spec.--None
6DXY	Spec.--Logic and Foundations, Other
	Sub-Spec.--None
6EYY	5. Major Academic Field--MATHEMATICS OF RESOURCE USE
6EAY	Spec.--Activity Analysis
	Sub-Spec.--None
6EBY	Spec.--Actuarial Mathematics
	Sub-Spec.--None
6ECY	Spec.--Astronomy
	Sub-Spec.--None
6EDY	Spec.--Biometrics, Biostatistics
	Sub-Spec.--None
6EEY	Spec.--Celestial Mechanics
	Sub-Spec.--None
6EFY	Spec.--Control Systems
	Sub-Spec.--None
6EGY	Spec.--Cryptography
	Sub-Spec.--None
6EHY	Spec.--Dynamic Programming
	Sub-Spec.--None
6EIY	Spec.--Econometrics
	Sub-Spec.--None
6EJY	Spec.--Game Theory
	Sub-Spec.--None
6EKY	Spec.--Information and Communication Theory
	Sub-Spec.--None
6ELY	Spec.--Logistics, Inventory
	Sub-Spec.--None
6EMY	Spec.--Operations Research
	Sub-Spec.--None
6ENY	Spec.--Psychometrics
	Sub-Spec.--None
6EOY	Spec.--Weapon Systems Evaluation
	Sub-Spec.--None
6EXY	Spec.--Mathematics of Resource Use, Other

1 Title Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section F (Continued)

5 Data Codes	Data Items and Explanations
	Sub-Spec.--None
6FYY	6. Major Academic Field--NUMBER THEORY
6FAY	Spec.--Algebraic Number Theory
	Sub-Spec.--None
6FBY	Spec.--Analytic Number Theory
	Sub-Spec.--None
6FCY	Spec.--Diophantine Approximations
	Sub-Spec.--None
6FDY	Spec.--Elementary Number Theory
	Sub-Spec.--None
6FEY	Spec.--Geometry of Numbers
	Sub-Spec.--None
6FXY	Spec.--Number Theory, Other
	Sub-Spec.--None
6GYY	7. Major Academic Field--NUMERICAL METHODS AND COMPUTATION
6GAY	Spec.--Algorithm Construction
	Sub-Spec.--None
6GCY	Spec.--Difference and Functional Equations
	Sub-Spec.--None
6GFY	Spec.--Eigenvalues, Rayleigh-Ritz Method
	Sub-Spec.--None
6GGY	Spec.--Error Analysis
	Sub-Spec.--None
6GHY	Spec.--General Methods, Iteration
	Sub-Spec.--None
6GIY	Spec.--Integral and Integro-Differential Equations
	Sub-Spec.--None
6GJY	Spec.--Interpolation, Approximation Curve-Fitting
	Sub-Spec.--None
6GKY	Spec.--Linear Equations, Matrices
6GLY	Spec.--Linear Programming
	Sub-Spec.--None
6GMY	Spec.--Nomography, Tables
	Sub-Spec.--None
6GNY	Spec.--Numerical Differentiation, Quadrature
	Sub-Spec.--None
6GOY	Spec.--Numerical Solutions of Ordinary Differential Equations
	Sub-Spec.--None
6GPY	Spec.--Numerical Solutions of Partial Differential Equations
	Sub-Spec.--None
6GXY	Spec.--Numerical Methods and Computation, Other
	Sub-Spec.--None
6HYY	8. Major Academic Field--PROBABILITY
6HAY	Spec.--Applications of Probability
	Sub-Spec.--None
6HBY	Spec.--Foundations of Probability
	Sub-Spec.--None
6HCY	Spec.--Limit Theorems
	Sub-Spec.--None
6HDY	Spec.--Markov Processes
	Sub-Spec.--None
6HEY	Spec.--Stochastic Processes, General
	Sub-Spec.--None
6HFY	Spec.--Theory of Generating Functions
	Sub-Spec.--None
6HXY	Spec.--Probability, Other
	Sub-Spec.--None
6IYY	9. Major Academic Field--STATISTICS
6IAY	Spec.--Analytical Statistics
6IAY	Sub-Spec.--None
6IBY	Spec.--Decision Theory, Sequential Analysis
	Sub-Spec.--None
6ICY	Spec.--Design and Analysis of Experiments
	Sub-Spec.--None
6IDY	Spec.--Estimation and Testing, Parametric
	Sub-Spec.--None
6IEY	Spec.--Multivariat Analysis
	Sub-Spec.--None
6IFY	Spec.--Nonparametric Methods
	Sub-Spec.--None
6IGY	Spec.--Quality Control
	Sub-Spec.--None
6IHY	Spec.--Sampling Techniques
	Sub-Spec.--None
6IIY	Spec.--Survey Methods
	Sub-Spec.--None
6IJY	Spec.--Theory of Statistical Inference
	Sub-Spec.--None
6IKY	Spec.--Time Series Analysis
	Sub-Spec.--None
6IXY	Spec.--Statistics, Other
	Sub-Spec.--None
6JYY	10. Major Academic Field--TOPOLOGY
6JAY	Spec.--Algebraic Topology
	Sub-Spec.--None
6JBY	Spec.--Fibre Bundles and Spares
	Sub-Spec.--None
6JCY	Spec.--Graphs
	Sub-Spec.--None
6JDY	Spec.--Manifolds
	Sub-Spec.--None
6JEY	Spec.--Point-Set Topology
	Sub-Spec.--None
6JFY	Spec.--Topological Algebra
	Sub-Spec.--None
6JXY	Spec.--Topology, Other
	Sub-Spec.--None

1 Title Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section C

5 Data Codes	Data Items and Explanations:
7YYY	General Area of Study: MEDICAL SCIENCES
7AYY	1. Major Academic Field--ALLIED SCIENCES
7AAY	Spec.--Basic Biomedical Sciences
	Sub-Spec.--
7AAA	Biochemistry
7AAB	Biomedical Engineering
7AAC	Bionics
7AAD	Biophysics
7AAE	Microbiology
7AAF	Physiological Optics
7AAG	Physiology (Human)
7AAX	Other
7ABY	Spec.--Professional Services
	Sub-Spec.--
7ABA	Aerospace Physiology
7ABB	Bacteriology
7ABC	Biometrics
7ABD	Clinical Laboratory Management
7ABE	Clinical Psychology
7ABF	Dietetics
7ABG	Industrial Hygiene
7ABH	Medical Entomology
7ABI	Mycology
7ABJ	Nuclear Health Physics
7ABK	Occupational Therapy
7ABL	Optometry
7ABM	Parasitology
7ABN	Pharmacology
7ABO	Physical Therapy
7ABP	Psychiatric Social Work
7ABQ	Sanitary Engineering
7ABR	Serology
7ABS	Space Pharmacodynamics
7ABT	Toxicology
7ABU	Virology
7ABV	Pharmacy
7ABW	Podiatry
7ABX	Other
7ACY	Spec.--Allied Sciences, Other
	Sub-Spec.--None
7BYY	2. Major Academic Field--DENTAL SCIENCE
7BAY	Spec.--General Dentistry
	Sub-Spec.--
7BAA	Crown and Bridge
7BAB	Oral Diagnosis
7BAX	Other
7BBY	Spec.--Oral Pathology
	Sub-Spec.--None
7BCY	Spec.--Oral Surgery
	Sub-Spec.--None
7BDY	Spec.--Orthodontics
	Sub-Spec.--None
7BEY	Spec.--Periodontics
	Sub-Spec.--None
7BFY	Spec.--Prosthodontics
	Sub-Spec.--None
7BXY	Spec.--Dental Science, Other
	Sub-Spec.--None
7CYY	3. Major Academic Field--HOSPITAL ADMINISTRATION
7CAY	Spec.--Hospital Administration
	Sub-Spec.--
7CAA	Administrative Service
7CAB	Business Office Administration
7CAC	Clinics Administration
7CAE	Hospital Planning
7CAF	Hospital Services Administration
7CAG	Medical Materiel
7CAH	Medical Records
7CAI	Personnel Administration
7CAJ	Public Relations
7CAX	Other
7CXY	Spec.--Hospital Administration, Other
	Sub-Spec.--None
7DYY	4. Major Academic Field--MEDICINE AND SURGERY
7DAY	Spec.--Anesthesiology
	Sub-Spec.--None
7DBY	Spec.--Colon and Rectal Surgery
	Sub-Spec.--None
7DCY	Spec.--Dermatology
	Sub-Spec.--None
7DDY	Spec.--General Practice
	Sub-Spec.--None
7DEY	Spec.--General Surgery
	Sub-Spec.--None
7DFY	Spec.--Geriatrics
	Sub-Spec.--None
7DGY	Spec.--Internal Medicine
	Sub-Spec.--
7DGA	Allergy
7DGB	Cardiovascular Diseases (Cardiology)
7DGC	Endocrinology
7DGD	Gastroenterology
7DGE	Hematology
7DGF	Pulmonary Diseases
7DGG	Rheumatology
7DGX	Other
7DHY	Spec.--Neurology
	Sub-Spec.--None
7DIY	Spec.--Neurosurgery
	Sub-Spec.--None
7DJY	Spec.--Obstetrics and Gynecology
	Sub-Spec.--None

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section G (Continued)

5. Data Codes	Data Items and Explanations:
7DKY	Spec.--Opthalmology
	Sub-Spec.--None
7DLY	Spec.--Orthopedic Surgery
	Sub-Spec.--None
7DMY	Spec.--Otorhinolaryngology
	Sub-Spec.--None
7DNY	Spec.--Pathology
	Sub-Spec.--
7DNA	Clinical Pathology
7DNB	Forensic Pathology
7DNC	Hematology
7DND	Surgical Pathology
7DNX	Other
7DOY	Spec.--Pediatrics
	Sub-Spec.--
7DOA	Pediatric Allergy
7DOB	Pediatric Cardiology
7DOX	Other
7DPY	Spec.--Physical and Rehabilitative Medicine
	Sub-Spec.--None
7DQY	Spec.--Plastic Surgery
	Sub-Spec.--None
7DRY	Spec.--Preventive Medicine
	Sub-Spec.--
7DRA	Aerospace Medicine
7DRB	Immunology
7DRC	Occupational Medicine (Industrial Medicine)
7DRD	Preventive Medicine
7DRE	Public Health Medicine (Incl Epidemiology)
7DRX	Other
7DSY	Spec.--Psychiatry
	Sub-Spec.--
7DSA	Pediatric Psychiatry
7DSX	Other
7DTY	Spec.--Radiobiology
	Sub-Spec.--None
7DUY	Spec.--Radiology
	Sub-Spec.--
7DUA	Diagnostic Radiology
7DUB	Therapeutic Radiology
7DUX	Other
7DVY	Spec.--Thoracic Surgery
	Sub-Spec.--None
7DWY	Spec.--Urology
	Sub-Spec.--None
7DXY	Spec.--Medicine and Surgery, Other
	Sub-Spec.--None
7EYY	5. Major Academic Field--NURSING SCIENCE
7EAY	Spec.--Clinical Nursing
	Sub-Spec.--
7EAA	Anesthesia
7EAB	Cardiovascular Disease Nursing
7EAC	Communicable Disease Nursing
7EAD	Flight Nursing
7EAE	General Duty Nursing
7EAF	Industrial Nursing (Incl Nuclear Nursing)
7EAG	Nursing Research
7EAH	Obstetric Nursing
7EAI	Operation Room Nursing
7EAJ	Pediatric Nursing
7EAK	Premature Infant Nursing
7EAL	Psychiatric Nursing
7EAM	Public Health Nursing
7EAX	Other
7EBY	Spec.--Nursing Administration
	Sub-Spec.--
7EBA	Nursing Education
7EBB	Personnel Management
7EBC	Ward Management
7EBX	Other
7EXY	Spec.--Nursing Science, Other
	Sub-Spec.--None
7FYY	6. Major Academic Field--VETERINARY MEDICINE
7FAY	Spec.--Veterinary Clinical Medicine
	Sub-Spec.--
7FAA	Laboratory Animal Medicine
7FAB	Large Animal Medicine
7FAC	Small Animal Medicine
7FAD	Veterinary Surgery
7FAX	Other
7FBY	Spec.--Veterinary Food Inspection
	Sub-Spec.--
7FBA	Food Microbiology
7FBB	Meat and Dairy Food Hygiene
7FBX	Other
7FCY	Spec.--Veterinary Public Health
	Sub-Spec.--
7FCA	Veterinary Epidemiology and Epizootiology
7FCB	Zoonoses
7FCX	Other
7FDY	Spec.--Veterinary Research Medicine
	Sub-Spec.--
7FDA	Bacteriology
7FDB	Biochemistry
7FDC	Food Science
7FDD	Food Technology
7FDE	Pathology
7FDF	Physiology
7FDG	Radiation Biology
7FDH	Virology
7FDX	Other

1 Title Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

5 Data Codes	Data Items and Explanations Data Code Sequence Section G (Continued)
7FEA	Spec.--Animal Technician
	Sub-Spec.--
7FEA	Farrier
7FEX	Other
7GYY	7. Major Academic Field--Health Care Sciences Occupational Technologies
7GAY	Spec.--Biomedical Sciences Technology
	Sub-Spec.--
7GAA	Biomedical Equipment Technician
7GAB	Community and Mental Health
7GAC	Cytology Technician
7GAD	Food and Nutritional Science
7GAE	Histologic Technician
7GAF	Medical Laboratory Technician
7GAG	Optometric Technician
7GAH	Pharmacy Technician
7GAI	Physical Therapist Assistant
7GAJ	Physiological Training Technology
7GAK	Medical Assistant
7GAX	Other
7GBY	Spec.--Dentistry Technology
	Sub-Spec.--
7GBA	Expanded Duty Dental Assistant
7GBB	Dental Laboratory Technology
7GBC	Dental Assisting
7GBD	Dental Hygiene
7GBX	Other
7GCY	Spec --Health Care Management
	Sub-Spec.--
7GCA	Environmental Health Technology
7GCB	Nursing Home Administration
7GCX	Other
7GDY	Spec.--Medical Technology
	Sub-Spec.--
7GDA	Cardiopulmonary Laboratory Technician
7GDB	Clinical Audiology
7GDC	Clinical Laboratory Science
7GDD	Clinical Microbiology
7GDE	Emergency Medical Technician
7GDF	Orthopedic Assistant
7GDG	Otolaryngology Technician
7GDH	Radiologic Technology
7GDI	Ophthalmic Technology
7GDJ	Clinical Assistant, Health Care
7GDX	Other
7GEY	Spec.--Nursing Science Technology
	Sub-Spec.--
7GEA	Operating Room Technician
7GEB	Psychiatric Nursing Technician
7GEX	Other
7GXY	Spec.--Health Care Sciences Occupational Technologies, Other
7FXY	Spec --Veterinary Medicine, Other
	Sub-Spec.--None

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section H

5. Data Codes	Data Items and Explanations:
8YYY	General Area of Study: PHYSICAL SCIENCES
8AYY	1. Major Academic Field--ASTRONOMY
8AAY	Spec.--Physical Astronomy
	Sub-Spec.--
8AAA	Astronomical Instruments
8AAB	Astronomical Photometry
8AAC	Astronomical Spectroscopy
8AAD	Astrophysics
8AAE	Cosmogony
8AAF	Cosmology
8AAG	Galaxies
8AAH	Gamma Radiation Astronomy
8AAI	Origin of Cosmic Rays
8AAJ	Physics of the Interstellar Medium
8AAK	Physics of the Solar System
8AAL	Physics of the Sun
8AAM	Planetary Atmospheres
8AAN	Planets, Satellites
8AAQ	Radar Astronomy
8AAP	Radiation
8AAQ	Radio Astronomy
8AAR	Satellite Instrumentation
8AAS	Selenology
8AAT	Space Astronomy
8AAU	Stellar Energy Generation, Nucleogenesis
8AAV	Variable Stars
8AAW	Selenodesy
8AAX	Other
8ABY	Spec.--Positional Astronomy
	Sub-Spec.--
8ABA	Astronomy
8ABB	Astronomical Instruments
8ABC	Astronomical Spectroscopy
8ABD	Celestial Mechanics
8ABE	Celestial Navigation
8ABF	Geodetic Astronomy
8ABG	Radio Astronomy
8ABH	Statistical Astronomy
8ABX	Other
8AXY	Spec.--Astronomy, Other
	Sub-Spec.--None
8BYY	2. Major Academic Field--CARTOGRAPHIC SCIENCES
8BAY	Spec.--Cartography
	Sub-Spec.--
8BAA	Compilation Cartography
8BAB	Design Cartography
8BAC	Hypsographic Cartography
8BAD	Radar Cartography
8BAE	Reproduction Cartography
8BAF	Terrain Model Cartography
8BAG	Theoretical Cartography
8BAH	Topography
8BAX	Other
8BBY	Spec.--Photogrammetry
	Sub-Spec.--
8BBA	Aerial and Space Photogrammetry
8BBB	Analytical Photogrammetry
8BBC	Ballistics and Satellite Photogrammetry
8BBD	Mosaic Preparation
8BBE	Nontopographic Photogrammetry
8BBF	Stereo-Plotting
8BBG	Terrestrial Photogrammetry
8BBH	Topographic Photogrammetry
8BBX	Other
8BCY	Spec.--Phot-Interpretation
	Sub-Spec.--
8BCA	Interpretation; Cultural Features
8BCB	Interpretation; Military Features
8BCC	Interpretation; Natural Features and Resources
8BCX	Other
8BXY	Spec.--Cartographic Sciences, Other
	Sub-Spec.--None
8CYY	3. Major Academic Field--CHEMISTRY
8CAY	Spec.--Agriculture and Food Chemistry
	Sub-Spec.--
8CAA	Alcoholic Beverages
8CAB	Animal and Vegetable Fats and Oils
8CAC	Animal Feeds
8CAD	Bakery and Confectionery Products
8CAE	Cereals and Carbohydrates
8CAF	Fertilizers, Plant Growth Regulators
8CAG	Food and Feed Additives
8CAH	Fruits, Vegetables, Juices
8CAI	Meat, Fish, Dairy and Poultry Products
8CAJ	Nonalcoholic Beverages
8CAK	Nonfood Crop Products
8CAL	Pesticides
8CAX	Other
8CBY	Spec.--Analytical Chemistry
	Sub-Spec.--
8CBA	Absorption Spectroscopy
8CBB	Chemical Microscopy
8CBC	Chromatographic Analysis
8CBD	Electrometric Analysis
8CBE	Emission Spectroscopy
8CBF	Gas Analysis
8CBG	Gravimetric Analysis
8CBH	Mass Spectroscopy

1 Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section H (Continued)

5 Data Codes	Data Items and Explanations:
8CBI	Microchemistry
8CBJ	Nucleonics
8CBK	Qualitative Analysis
8CBL	Solvent Extraction
8CBM	Titrimetric Analysis
8CBN	X-ray Analysis
8CBX	Other
8CCY	Spec.--Biochemistry
	Sub-Spec.--
8CCA	Amino Acids, Peptides, Proteins
8CCB	Antimetabolites
8CCC	Biochemical Mechanisms
8CCD	Biochemorphology
8CCE	Carbohydrates
8CCF	Clinical Biochemistry
8CCG	Cyto-Histo-Chemistry
8CCH	Endocrine Biochemistry
8CCI	Enzyme, Co-Enzyme
8CCJ	Immunochemistry
8CCK	Intermediary Metabolism, Biosynthesis
8CCL	Lipids
8CCM	Microbiological Chemistry
8CCN	Natural Pigments
8CCO	Neurochemistry
8CCP	Nucleic Acids
8CCQ	Oncology, Carcinogenesis
8CCR	Physical Biochemistry
8CCS	Radiation Biochemistry
8CCT	Steriods
8CCU	Technology, Methodology
8CCX	Other
8CDY	Spec.--Chemical Warfare
	Sub-Spec.--None
8CEY	Spec.--Inorganic Chemistry
	Sub-Spec.--
8CEA	Alkaline Earths
8CEB	Atomic Nuclei
8CEC	Boron Family
8CED	Building Products: Cement, Lime, etc.
8CEE	Carbon Family
8CEF	Clay and Clay Products
8CEG	Coordination Compounds
8CEH	Electronic Materials: Semi-conductors, Ferroelectrics, Ferromagnetics
8CEI	Explosives and Rocket Fuels
8CEJ	Extranuclear Structure
8CEK	Glass, Fused Silica
8CEL	Halogen Family
8CEM	Hydrogen
8CEN	Industrial Carbon, Graphite, Carbon Black Inner-Transition Elements, Lanthanide Series and Actinide Series
8CEP	Nitrogen Family
8CEQ	Nonmineral Products: Asbestos, Vermiculite
8CER	Oxygen Family
8CES	Pigments and Industrial Minerals
8CET	Radioactive Minerals and Products
8CEU	Solutions and Solvent Theory
8CEV	Theoretical Inorganic Chemistry
8CEW	Transition Elements
8CEX	Other
8CFY	Spec.--Nuclear Chemistry
	Sub-Spec.--None
8CGY	Spec.--Organic Chemistry
	Sub-Spec.--
8CGA	Adhesives
8CGB	Alkaloids
8CGC	Amino Acids
8CGD	Antibiotics
8CGE	Carbohydrates
8CGF	Elastomers and Related Products
8CGG	Explosives and Rocket Fuels
8CGH	Fluorine Compounds
8CGI	Free Radical
8CGJ	Heterocycles
8CGK	Oils, Fats, Waxes
8CGL	Organometallics
8CGM	Petroleum
8CGN	Phosphorus Compounds
8CGO	Plastics and Synthetic Resins
8CGP	Protective Coatings
8CGQ	Reaction Mechanisms
8CGR	Silicon Compounds
8CGS	Soaps, Detergents, Surfactants
8CGT	Steroids
8CGU	Terpenes and Other Alicyclics
8CGV	Textiles and Related Products
8CGW	Use of Isotopes
8CGX	Other
8CHY	Spec.--Physical Chemistry
	Sub-Spec.--
8CHA	Catalysis
8CHB	Chemical Kinetics
8CHC	Colloid Chemistry
8CHD	Electrochemistry
8CHE	Flames and Explosives
8CHF	Fused Salts
8CHG	Gaseous State
8CHH	High Pressure Chemistry
8CHI	High Temperature Chemistry
8CHJ	Homogeneous Chemical Equilibrium
8CHK	Ion Exchange and Applications

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section H (Continued)

5. Data Codes	Data Items and Explanations:
8CHL	Liquid State
8CHM	Molecular Structure
8CHN	Phase Equilibria
8CHO	Photochemistry
8CHP	Polymer Chemistry
8CHQ	Quantum Theory
8CHR	Radiochemistry
8CHS	Solid Methods (Incl. X-rays)
8CHT	Solutions of Electrolytes and Nonelectrolytes
8CHU	Surface Chemistry
8CHV	Thermochemistry
8CHW	Thermodynamics
8CHX	Other
8CXY	Spec.--Chemistry, Other
	Sub-Spec.--
8CXA	Chemistry Teaching
8CXX	Other
8DYY	4. Major Academic Field--EARTH SCIENCES
8DAY	Spec.--Geochemistry
	Sub-Spec.--
8DAA	Cosmochemistry
8DAB	General Inorganic Geochemistry
8DAC	Geochronology
8DAD	Isotope Geochemistry
8DAE	Mineral Synthesis and Stability Relations of Minerals
8DAF	Organic Geochemistry
8DAX	Other
8DBY	Spec.--Geodesy
	Sub-Spec.--
8DBA	Geodetic Astronomy
8DBB	Geodetic Gravimetry
8DBC	Geodetic Leveling
8DBD	Geodetic Surveying
8DBE	Satellite Geodesy
8DBF	Selenology
8DBG	Selenodesy
8DBX	Other
8DCY	Spec.--Geology
	Sub-Spec.--
8DCA	Areal Geology
8DCB	Crystallography
8DCC	Engineering Geology
8DCD	Geology of Mineral Deposits
8DCE	Geology of Petroleum Deposits
8DCF	Geology of Solid Fuels
8DCG	Geomorphology
8DCH	Glacial Geology
8DCI	Mineralogy
8DCJ	Petrography
8DCK	Photogeology
8DCL	Sedimentology
8DCM	Stratigraphy
8DCN	Structural Geology, Igneous and Metamorphic
8DCO	Structural Geology, Sedimentary
8DCX	Other
8DDY	Spec.--Geophysics
	Sub-Spec.--
8DDA	Exploration Seismology
8DDB	Geomagnetism
8DDC	Geophysical Surveying
8DDD	Gravimetry
8DDE	Heat Flow
8DDF	Meteorological Geophysics
8DDG	Physical Properties of Materials
8DDH	Seismology
8DDI	Tectonophysics
8DDJ	Volcanology
8DDX	Other
8DEY	Spec.--Paleontology
	Sub-Spec.--
8DEA	Micropaleontology
8DEB	Paleobotany
8DEC	Paleozoology
8DED	Palynology
8DEX	Other
8DFY	Spec.--Physical Geography
	Sub-Spec.--
8DFA	Biogeography
8DFB	Climatology
8DFC	Geomorphology
8DFD	Military Geography
8DFE	Oceanography
8DFF	Soils Geography
8DFX	Other
8DGY	Spec.--Soil Science
	Sub-Spec.--
8DGA	Soil and Water Management
8DGB	Soil Chemistry
8DGC	Soil Fertility, Fertilizers, and Plant Nutrition
8DGD	Soil Genesis, Morphology and Classification
8DGE	Soil Mechanics and Engineering
8DGF	Soil Microbiology
8DGG	Soil Mineralogy
8DGH	Soil Physics
8DGX	Other
8DXY	Spec.--Earth Sciences, Other
	Sub-Spec.--None
8EYY	5. Major Academic Field--HYDROSPHERIC (WATER) SCIENCES
8EAY	Spec.--Hydrology
	Sub-Spec.--
8EAA	Chemistry of Water
8EAB	Cryology and Cryopedology

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section H (Continued)

5. Data Codes	Data Items and Explanations:
8EAC	Evapo-transpiration
8EAD	Glaciology
8EAE	Ground Waters
8EAF	Precipitation
8EAG	Soil Moisture
8EAH	Surface Waters
8EAI	Transportation
8EAX	Other
8EBY	Spec.-- #Oceanography
	Sub-Spec.--
8EBA	Biological Oceanography
8EBB	Chemical Oceanography
8EBC	Descriptive Oceanography
8EBD	Hydrography
8EBE	Ocean-bottom Processes
8EBF	Physical Oceanography
8EBG	Sea-Air Interactions
8EBH	Shore and Near Shore Processes
8EBI	Underwater Sound
8EBX	Other
8EXY	Spec.--Hydrospheric (Water) Sciences, Other
	Sub-Spec.--None
8FYY	6. *Major Academic Field--METEOROLOGY (ATMOSPHERIC SCIENCES)*
8FAY	Spec.--Atmospheric Dynamics
	Sub-Spec.--
8FAA	Aeronomy
8FAB	Airglow
8FAC	Atmospheric Electricity
8FAD	Atmospheric Optics and Acoustics
8FAE	Atmospheric Thermodynamics
8FAF	Aurora
8FAG	Cloud and Precipitation Physics
8FAH	Composition
8FAI	Dynamics of Atmospheric Motion
8FAJ	Magnetohydrodynamics
8FAK	Radiation
8FAL	*Solar-Terrestrial* Relationships
8FAM	Turbulence and Diffusion
8FAX	Other
	#NOTE: *Although the definitions of* Oceanography and its subspecializations are oriented toward the oceans and the seas, they are also applicable with slight modification to fresh water studies (Limnology). A separate listing for Limnology is not included in this manual.
8FBY	Spec.--Climatology
	Sub-Spec.--
8FBA	Applied Climatology
8FBB	Bioclimatology
8FBC	Microclimatology
8FBD	Paleoclimatology
8FBE	Physical Climatology
8FBF	Physiological Climatology
8FBG	Synoptic Climatology
8FBX	Other
8FCY	Spec.--Meteorological Instrumentation
	Sub-Spec.--
8FCA	Automatic Data Sensing Systems
8FCB	Balloon Sounding Systems
8FCC	Radar and Rocket Instrumentation
8FCD	Satellite Instrumentation
8FCX	Other
8FDY	Spec.--Special Areas
	Sub-Spec.--
8FDA	*Agricultural Meteorology*
8FDB	Air Pollution
8FDC	Aviation Meteorology
8FDD	Marine Meteorology
8FDE	Polar Meteorology
8FDF	Tropical Meteorology
8FDX	Other
8FEY	Spec.--Synoptic Meteorology
	Sub-Spec.--
8FEA	Hydrometeorology
8FEB	*Mesometeorology*
8FEC	Micrometeorology
8FED	Numerical Analysis and Prediction
8FEE	Observations
8FEF	*Radar* Meteorology
8FEG	Weather Analysis and Forecasting
8FEX	Other
8FXY	Spec.--*Meteorology, Other*
	Sub-Spec.--None
8GYY	7. Major Academic Field-- *PHOTOGRAPHIC SCIENCES*
8GAY	Spec.--Photography
	Sub-Spec.--
8GAA	Aerospace Photography
8GAB	Motion Picture Photography
8GAC	Optical Instrumentation Photography
8GAD	Still Photography
8GAE	Video Photography
8GAX	Other
8GXY	Spec.--Photographic Sciences, Other
	Sub-Spec.--None
8HYY	8. Major Academic Field--PHYSICS
8HAY	Spec.--Acoustics
	Sub-Spec.--
8HAA	Applied Acoustics, Instruments and Apparatus
8HAB	*Architectural* Acoustics
8HAC	Ear and Hearing
8HAD	Electroacoustics
8HAE	Infrasonics
8HAF	Mechanical Vibrations and Shock
8HAG	Musical Instruments and Music
8HAH	Noise

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section H (Continued)

5. Data Codes	Data Items and Explanations:
8HAI	Sound Transmission
8HAJ	Speech Communication
8HAK	Theory of Waves and Vibrations
8HAL	Ultrasonics
8HAR	Underwater Sound
8HAX	Other
8HBY	Spec.--Astrophysics
	Sub-Spec.--None
8HCY	Spec.--Atomic and Molecular Physics
	Sub-Spec.--
8HCA	Atomic, Ionic, and Molecular Beams
8HCB	Atomic Masses and Abundance
8HCC	Atomic and Molecular Structure and Spectra
8HCD	Chemical Bonds and Structure
8HCE	Electron Paramagnetic Resonance
8HCF	Impact and Scattering Phenomena
8HCG	Lasers
8HCM	Mass Spectroscopy
8HCI	Nuclear Magnetic Resonance
8HCX	Other
8HDY	Spec.--Biophysical Specialties
	Sub-Spec.--
8HDA	Bioacoustics and Transmission
8HDB	Biochemical Physics
8HDC	Bioelectricity and Transmission
8HDD	Bioelectronics
8HDE	Bionics
8HDF	Bio-optics
8HDG	Bio-systems; Control and Communications
8HDH	Biothermics and Bioenergetics
8HDI	Biotransport and Membrane Physics
8HDJ	Cellular Biophysics
8HDK	Electron Microscopy
8HDL	Fluid Biomechanics
8HDM	Health Physics
8HDN	Mathematical Biophysics
8HDO	Methodology, Instrumentation and Measurements
8HDP	Molecular Biophysics
8HDQ	Radiation Biology
8HDR	Solid Biomechanics
8HDX	Other
8HEY	Spec.--Electromagnetism
	Sub-Spec.--
8HEA	Antenna Theory
8HEB	Electrical Measurements and Instrument
8HEC	Electromagnetic Waves
8HED	Electromagnetic Wave Propagation
8HEE	Electron Dynamics
8HEF	Electron Microscopy, Ion Optics
8HEG	Masers
8HEH	Microwaves
8HEI	Physical Electronics
8HEJ	Quantum Electronics
8HEK	X-ray Interactions
8HEL	X-ray Phenomena
8HEM	X-ray Technology
8HEX	Other
8HFY	Spec.--Electronics
	Sub-Spec.--
8HFA	Electron Ballistics
8HFB	Electron Tubes
8HFC	Electronic Device Circuitry
8HFD	Electronics Instrumentation
8HFE	Emission
8HFF	Gas Devices
8HFG	Semiconductor Devices
8HFM	Solid State Electronics
8HFX	Other
8HGY	Spec.--Elementary Particle Physics
	Sub-Spec.--
8HGA	Cosmic Rays
8HGB	High Energy Accelerators
8HGC	High Energy Phenomena
8HGD	Particle Detectors
8HGE	Phenomenological Computer Analysis
8HGX	Other
8HHY	Spec.--Engineering Physics
	Sub-Spec.--None
8HIY	Spec.--Mechanics
	Sub-Spec.--
8HIA	Analytical Mechanics
8HIB	Ballistics
8HIC	Elasticity
8HID	Flight Dynamics
8HIE	Friction
8HIF	High Pressure Physics
8HIG	Impact Phenomena
8HIH	Instruments and Measurement
8HIX	Other
8HJY	Spec.--Metallurgy
	Sub-Spec.--None
8HKY	Spec.--Nuclear Effects Physics
	Sub-Spec.--
8HKA	Biological Effects
8HKB	Blast Effects
8HKC	Nuclear Effects
8HKD	Thermal Effects
8HKX	Other
8HLY	Spec.--Nuclear Physics
	Sub-Spec.--
8HLA	Accelerators
8HLB	Detectors
8HLC	Neutrons
8HLD	Nuclear Properties
8HLE	Nuclear Reactions and Scattering
8HLF	Nuclear Spectroscopy
8HLG	Radiation Effects
8HLH	Radioactive Materials, Isotopes
8HLI	Radiation Shielding
8HLX	Other

1. Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section H (Continued)

5. Data Codes	Data Items and Explanations:
8HRY	Spec.--Optics
	Sub-Spec.--
8HRA	Atmospheric and Space Optics
8HRB	Color, Colorimetry
8HRC	Fiber Optics
8HRD	Geometrical Optics
8HRE	Geophysical Optics
8HRF	Illumination
8HRG	Information Theory (Image Evaluation)
8HRH	Infrared Phenomena
8HRI	Interferometry
8HRJ	Lasers
8HRK	Lenses
8HRL	Optical Instruments
8HRM	Optical Materials
8HRN	Photography
8HRO	Physical Optics
8HRP	Physiological Optics
8HRQ	Radiometer, Photometry
8HRR	Spectroscopy
8HRX	Other
8HRY	Spec.--Physics of Fluids
	Sub-Spec.--
8HNA	Aerodynamics
8HNB	Aerosols
8HNC	Boundary Layer Effects
8HND	Cavities and Jets
8HNE	Compressible Fluid Dynamics
8HNF	Explosion Phenomena
8HNG	High Temperature Flow
8HNH	Incompressible Fluid Dynamics
8HNI	Magneto-Fluid Dynamics
8HNJ	Plasma Physics
8HNK	Rarefied Gas Flow
8HNL	Rheology
8HNM	Shock Wave Phenomena
8HNN	Structure and Property of Fluids
8HNO	Superfluidity
8HNP	Transport Phenomena
8HNQ	Turbulence
8HNR	Viscosity
8HNX	Other
8HOY	Spec.--Solid State Physics
	Sub-Spec.--
8HOA	Ceramics
8HOB	Cooperative Phenomena
8HOC	Crystallography
8HOD	Dielectrics (Incl Fluids)
8HOE	Dislocations and Plasticity
8HOF	Dynamics of Crystal Lattices
8HOG	Electron Emission
8HOH	Ferromagnetism
8HOI	High Polymers and Glasses
8HOJ	Internal Friction
8HOK	Lattice Effects and Diffusion
8HOL	Luminescence
8HOM	Para- and Diamagnetism Phenomena
8HON	Photoconductivity
8HOO	Photoelectric Phenomena
8HOP	Piezo and Ferro-Electricity
8HOQ	Radiation Damage
8HOR	Resonance Phenomena
8HOS	Semiconductors
8HOT	Superconductivity
8HOU	Surface Physics
8HOV	Thermal Conduction in Solid State
8HOW	Thin Films
8HOX	Other
8HPY	Spec.--Thermal Physics
	Sub-Spec.--
8HPA	Calorimetry
8HPB	Heat Transmission
8HPC	High Temperature Physics
8HPD	Low Temperature Physics
8HPE	Temperature and its Measurement
8HPF	Thermal Properties
8HPG	Thermodynamics
8HPH	Thermodynamic Relations
8HPI	Thermodynamic Tables
8HPX	Other
8HXY	Spec.--Physics, Other
	Sub-Spec.--
8HXA	Constants, Standards, Metrology
8HXB	Energy Conversion Problems
8HXC	Field Theory
8HXD	High Vacuum Techniques
8HXE	Many Body Theory
8HXF	Mathematical Physics
8HXG	Mossbauer Effect
8HXH	Operations Research
8HXI	Physics Teaching
8HXJ	Quantum Mechanics
8HXK	Relativity and Gravitation
8HXL	Statistical Mechanics and Kinetic Theory
8HXX	Other

1 Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section I (Continued)

5 Data Codes	Data Items and Explanations
9YYY	General Area of Study: SOCIAL SCIENCES
9AYY	1. Major Academic Field--ANTHROPOLOGY
9AAY	Spec.--Applied Anthropology
	Sub-Spec.--None
9ABY	Spec.--Archaeology
	Sub-Spec.--
9ABA	New World Archaeology
9ABB	Old World Archaeology
9ABX	Other
9ACY	Spec.--Cultural Anthropology
	Sub-Spec.--
9ACA	Cultural Dynamics
9ACB	Enthnography
9ACC	Enthnology
9ACD	Social Anthropology
9ACX	Other
9ADY	Spec.--Linguistics
	Sub-Spec.--None
9AEY	Spec.--Physical Anthropology
	Sub-Spec.--
9AEA	Anthropometry
9AEB	Human Paleontology
9AEC	Racial Genetics
9AEX	Other
9AXY	Spec.--Anthropology, Other
	Sub-Spec.--None
9BYY	2. Major Academic Field--ECONOMICS
9BAY	Spec.--Economic History and Development
	Sub-Spec.--
9BAA	Development Economics
9BAB	History of Economic Thought
9BAX	Other
9BBY	Spec.--Economic Theory
	Sub-Spec.--
9BBA	Comparative Economic Systems
9BBB	Income and Employment Theory
9BBC	Price and Allocation Theory
9BBD	Theory of Business Fluctuations
9BBX	Other
9BCY	Spec.--Industrial Economics
	Sub-Spec.--
9BCA	Competition in American Industry
9BCB	Economics of Industry (Specific Industry Specialization)
9BCC	Industrial Organization
9BCD	Public Utilities
9BCX	Other
9BDY	Spec.--International Economics
	Sub-Spec.--
9BDA	Economic Problems (Area Studies)
9BDB	International Economic Relations
9BDC	Theory of International Trade
9BDD	U.S. Tariff Policy
9BDX	Other
9BEY	Spec.--Labor Economics
	Sub-Spec.--
9BEA	History of Labor Movements
9BEB	International Labor Problems
9BEC	Labor-Management Relations
9BED	Manpower and Labor Markets
9BEX	Other
9BFY	Spec.--Land Economics
	Sub-Spec.--
9BFA	Agricultural Economics
9BFB	Economic Geography
9BFC	Natural Resources
9BFD	Regional and Urban Planning
9BFX	Other
9BGY	Spec.--Money, Credit, Banking
	Sub-Spec.--
9BGA	Commercial Banking
9BGB	Consumer Finance and Mortgage Credit
9BGC	International Finance
9BGD	Monetary Theory and Policy
9BGX	Other
9BHY	Spec.--National Defense Economics
	Sub-Spec.--None
9BIY	Spec.--Public Finance
	Sub-Spec.--
9BIA	Central Government Finance
9BIB	Fiscal Theory and Policy
9BIC	State and Local Finance
9BIX	Other
9BJY	Spec.--Quantitative Economics
	Sub-Spec.--
9BJA	Econometrics
9BJB	Input--Output Analysis
9BJC	Social Accounting
9BJD	Statistical Methods
9BJX	Other
9BXY	Spec.--Economics, Other
	Sub-Spec.--None
9CYY	3. Major Academic Field--GEOGRAPHY
9CAY	Spec.--Biogeography
	Sub-Spec.--
9CAA	Medical Geography
9CAB	Phytogeography
9CAC	Zoogeography
9CAX	Other
9CBY	Spec.--Cultural Geography (Incl Human)
	Sub-Spec.--
9CBA	Historical Geography
9CBB	Philosophy of Geography
9CBC	Political Geography
9CBD	Population Geography
9CBE	Regional Geography
9CBF	Settlement Geography
9CBG	Theoretical Geography
9CBH	Toponomy
9CBI	Urban Geography
9CBX	Other

1 Title Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section I (Continued)

5 Data Codes	Data Items and Explanations
9CCY	Spec.--Economic Geography
	Sub-Spec.--
9CCA	Agricultural Geography
9CCB	Manufacturing Geography
9CCC	Marketing Geography
9CCD	Resource Geography
9CCE	Transportation Geography
9CCX	Other
9CDY	Spec.--Military Geography
	Sub-Spec.--None
9CXY	Spec.--Geography, Other
	Sub-Spec.--None
9DYY	4. Major Academic Field--HISTORY
	NOTE: Although the professional historian, when speaking of categorization, thinks first in terms of period and then in terms of country, the categorization more useful to the Air Force is that of classification by country or area. For example, it is not as important for the Air Force to identify an officer who has studied the history of Europe from the time of the Renaissance onward, as it is to identify an officer who has studied a specific country or region of Europe, particularly with respect to the recent political, social, and cultural history. In the following categorization, except for Ancient History and Medieval History which are traditional expressions of academic periodization, and Subject Histories, the specializations are based on geographic regions
9DAY	Spec.--Africa
	Sub-Spec.--
9DAA	East Central Africa
9DAB	North Africa
9DAC	South Africa
9DAD	West Central Africa
9DAX	Other
9DBY	Spec.--Ancient History
	Sub-Spec.--None
9DCY	Spec.--Eastern Europe and the Balkans
	Sub-Spec.--
9DCA	Balkan Countries
9DCB	Slavic Countries
9DCX	Other
9DDY	Spec.--Far East (Incl Oceania)
	Sub Spec.--
9DDA	Australia (Incl New Zealand)
9DDB	Burma
9DDC	Cambodia, Laos, Vietnam
9DDD	China (Incl Mongolia and Tibet)
9DDE	Formosa
9DDF	Indonesia
9DDG	Japan
9DDH	Korea
9DDI	Pacific Islands
9DDJ	Philippine Islands
9DDK	Thailand
9DDX	Other
9DEY	Spec.--Medieval History
	Sub-Spec.--None
9DFY	Spec.--Middle East
	Sub-Spec.--
9DFA	Afghanistan
9DFB	India
9DFC	Pakistan
9DFX	Other
9DGY	Spec.--Near East
	Sub-Spec.--
9DGA	Iran
9DGB	Iraq
9DGC	Israel
9DGD	Jordan
9DGE	Lebanon
9DGF	Saudi Arbia (Incl Associated Areas)
9DGG	Syria
9DGH	Turkey
9DGX	Other
9DHY	Spec.--North America (Incl Central America)
	Sub-Spec.--
9DHA	Canada
9DHB	Central America
9DHC	Mexico
9DHD	United States (to 1789)
9DHE	United States (1789-1900)
9DHF	United States (1900-Present)
9DHG	United States Economic History
9DHH	United States Intellectual History
9DHI	United States Military History
9DHJ	United States Political History
9DHX	Other
9DIY	Spec.--South America
	Sub-Spec.--
9DIA	Argentina
9DIB	Bolivia
9DIC	Brazil
9DID	Chile
9DIE	Colombia
9DIF	Ecuador
9DIG	Paraguay
9DIH	Peru
9DII	Uruguay
9DIJ	Venezuela
9DIX	Other

1 Title Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section I (Continued)

5 Data Codes	Data Items and Explanations:
9DJY	Spec.--Subject Histories (Academic Disciplines)
9DJA	History of Economic Thought
9DJB	History of Education
9DJC	History of Philosophy
9DJD	History of Political Thought
9DJE	History of Religion
9DJF	History of Science
9DJG	Military History
9DJH	Social and Cultural History
9DJX	Other
9DKY	Spec.--Union of Soviet Socialist Republics (USSR)
	Sub-Spec.--
9DKA	Armenian SSR
9DKB	Azerbaijan SSR
9DKC	Byelorussian SSR
9DKD	Estonian SSR
9DKE	Georgian SSR
9DKF	Kazakh SSR
9DKG	Kirghiz SSR
9DKH	Latvian SSR
9DKI	Lithuanian SSR
9DKJ	Moldavian SSR
9DKK	Russian SFSR
9DKL	Tadjik SSR
9DKM	Turkmen SSR
9DKN	Ukrainina SSR
9DKO	Uzbek SSR
9DKX	Other
9DLY	Spec.--Western Europe
	Sub-Spec.--
9DLA	Benelux Countries
9DLB	France
9DLC	Germany and Austria
9DLD	Iberian Peninsula
9DLE	Italy
9DLF	Scandinavian Countries
9DLG	Switzerland
9DLH	United Kingdom and Ireland
9DLX	Other
9DXY	Spec.--History, Other
	Sub-Spec.--None
9EYY	5. Major Academic Field--POLITICAL SCIENCE
9EAY	Spec.--Comparative Government
	Sub-Spec.--
9EAA	Area Specialization
9EAB	Country Specialization
9EAC	Institutional or Functional Specialization
9EAD	Type Specialization
9EAX	Other
9EBY	Spec.--Geopolitics
	Sub-Spec.--None
9ECY	Spec.--International Relations
	Sub-Spec.--
9ECA	Defense Policy
9ECB	Foreign Policy
9ECC	International Law
9ECD	International Organization
9ECE	International Politics
9ECX	Other
9EDY	Spec.--Political Theory and Political Behavior
	Sub-Spec.--
9EDA	History of Political Thought
9EDB	Legislative Process
9EDC	Method and Scope
9EDD	Periodic, Individual, Idiological or National Studies
9EDE	Political Parties and Interest Groups
9EDF	Public Opinion and Electoral Behavior
9EDX	Other
9EEY	Spec.--Public Law
	Sub-Spec.--
9EEA	Constitutional Law
9EEB	Jurisprudence
9EEX	Other
9EXY	Spec.--Political Science, Other
	Sub-Spec.--None
9FYY	6. Major Academic Field--PSYCHOLOGY
9FAY	Spec.--Clinical Psychology
	Sub-Spec.--
9FAA	Behavior Problems
9FAB	Crime and Delinquency
9FAC	Experimental Psychopathology
9FAD	Group Therapy
9FAE	Individual Diagnosis and Therapy
9FAF	Mental Deficiency
9FAG	Objective Tests
9FAH	Projective Techniques
9FAI	Speech Pathology
9FAX	Other
9FBY	Spec.--Counseling and Guidance
	Sub-Spec.--
9FBA	Directive Therapy
9FBB	Educational Counseling
9FBC	Nondirective Therapy
9FBD	Rehabilitation
9FBE	Vocational Counseling
9FBX	Other
9FCY	Spec.--Development Psychology
	Sub-Spec.--
9FCA	Child and Adolescent Psychology
9FCB	Maturity and Old Age
9FCC	Nursery and Pre-school Psychology
9FCD	School Psychology
9FCX	Other
9FDY	Spec.--Educational Psychology
	Sub-Spec.--
9FDA	Educational Measurement
9FDB	Programmed Learning

1 Title: Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)
Data Code Sequence
Section I (Continued)

5 Data Codes	Data Items and Explanations
9FDC	School Adjustment
9FDD	School Learning
9FDE	Special Education
9FDF	Student Personnel
9FDX	Other
9FEY	Spec.--Experimental Psychology
	Sub-Spec.--
9FEA	Animal Learning
9FEB	Audition
9FEC	CNS Functions
	Communications Research and
9FED	Information Theory
9FEE	Comparative Psychology
9FEF	Engineering Psychology (Human
	Performance Eng)
9FEG	Human Learning
9FEH	Motivation
9FEI	Perception
9FEJ	Physiological Psychology
9FEK	Psychophysics
9FEL	Sensory Processes
9FEM	Symbolic Processes, Problem
	Solving
9FEN	Vision
9FEX	Other
9FFY	Spec.--Industrial and Personnel
	Psychology
	Sub-Spec.--
9FFA	Employee Morale and Attitudes
9FFB	Human Relations
9FFC	Job Analysis and Classification
9FFD	Labor-Management Relations
9FFE	Marketing
9FFF	Performance Rating
9FFG	Recruiting, Selection, Employment
9FFH	Training and Development
9FFX	Other
9FGY	Spec.--Personality
	Sub-Spec.--
9FGA	Personality Development
9FGB	Personality Measurement
9FGC	Personality Theory
9FGD	Structure and Dynamics of
	Personality
9FGX	Other
9FHY	Spec.--Psychological Warfare
	Sub-Spec.--None
9FIY	Spec.--Psychometrics
	Sub-Spec.--
9FIA	Experimental Design
9FIB	Factor Analysis
9FIC	Psychological Testing
9FID	Statistical Development
9FIE	Test Construction, Validation
9FIF	Test Theory, Scale Analysis
9FIX	Other
9FJY	Spec.--Social Psychology
	Sub-Spec.--
9FJA	Culture and Personality
9FJB	Group Interaction
9FJC	Language and Communication
9FJD	Leadership
9FJE	Mass Media Communication
9FJF	Social Attitudes
9FJG	Social Perception and
	Cognition
9FJH	Surveys and Polls
9FJX	Other
9FXY	Spec.--Psychology, Other
	Sub-Spec.--None
9GYY	7. Major Academic Field--PUBLIC
	ADMINISTRATION
9GAY	Spec.--Administrative Policy and
	Public Policy
	Sub-Spec.--
9GAA	American Government
9GAB	Communication
9GAC	Leadership
9GAD	Political Parties
9GAE	Pressure Groups
9GAF	Public Opinion
9GAX	Other
9GBY	Spec.--Constitutional and
	Administrative Law
	Sub-Spec.--
9GBA	Administrative Law and
	Regulation
9GBX	Other
9GCY	Spec.--International Administration
	Sub-Spec.--
9GCA	Comparative Government
9GCB	International Law and
	Regulation
9GCC	International Relations and
	Politics
9GCX	Other
9GDY	Spec.--Organizational Theory and
	Management Concepts
	Sub-Spec.--
9GDA	Accountability
9GDB	Anatomy of Organization
9GDC	Decision Making
9GDD	Functions of Management
9GDE	Modification and Control
9GDF	Process of Management
9GDG	Scientific Management
9GDX	Other
9GEY	Spec.--Public Budgeting and Public
	Finance
	Sub-Spec.--
9GEA	Administrative Law and
	Regulation

1 Title Academic Specialty, ADE AC-030, Effective 1 Jun 1975 (Continued)

Data Code Sequence
Section H (Continued)

5 Data Codes	Data Items and Explanations
9GEB	Business Regulation
9GEC	Financial Management
9GED	Fiscal Policy
9GEE	Public Finance
9GEF	Taxation
9GEX	Other
9GFY	Spec.--Public Personnel Management
	Sub-Spec.--
9GFA	Administrative Leadership
9GFB	Personnel Administration
9GFC	Recruiting, Selection, Employment
9GFX	Other
9GXY	Spec.--Public Administration, Other
	Sub-Spec.--None
9HYY	8 Major Academic Field--SOCIOLOGY
9HAY	Spec.--Criminology and Police Administration
	Sub-Spec.--
9HAA	Correctional Administration
9HAB	Criminal Anthropology
9HAC	Criminal Investigation
9HAD	Criminal Psychology
9HAE	Criminology
9HAF	Evidence Identification
9HAG	Industrial Security
9HAH	Penal Code
9HAI	Penology
9HAJ	Police Administration
9HAK	Prevention and Control
9HAL	Traffic Enforcement
9HAM	Forensic Science
9HAX	Other
9HBY	Spec.--Demography
	Sub-Spec.--
9HBA	Labor Force
9HBB	Population Structure
9HBC	Population Trends
9HBD	Vital Statistics
9HBX	Other
9HCY	Spec.--Family
	Sub-Spec.--
9HCA	Adolescence and Courtship
9HCB	Aging and Retirement
9HCC	Consumer Behavior
9HCD	Family and Kinship
9HCE	Marriage and Divorce
9HCF	Sexual Behavior
9HCX	Other
9HDY	Spec.--Rural-Urban Sociology
	Sub-Spec.--
9HDA	Community Studies
9HDB	Human Ecology
9HDC	Rural Sociology
9HDD	Urban Sociology
9HDX	Other
9HEY	Spec.--Social Change and Development
	Sub-Spec.--
9HEA	Cultural Sociology
9HEB	Economic Development
9HEC	Historical Sociology
9HED	Social Conflict
9HEX	Other
9HFY	Spec.--Social Institutions
	Sub-Spec.--
9HFA	Educational Sociology
9HFB	Legal Sociology
9HFC	Leisure and Popular Culture
9HFD	Medical Sociology
9HFE	Military Sociology
9HFF	Occupational Sociology
9HFG	Political Sociology
9HFH	Sociology of Religion
9HFI	Sociology of Science
9HFJ	Sociology of Arts
9HFX	Other
9HGY	Spec.--Social Organization
	Sub-Spec.--
9HGA	Industrial Sociology
9HGB	Large-Scale Organization
9HGC	Small-Scale Organization
9HGD	Voluntary Associations
9HGX	Other
9HHY	Spec.--Social Problems
	Sub-Spec.--
9HHA	Corrections
9HHB	Crime and Delinquency
9HHC	Deviance
9HHD	Mental Health
9HHE	Social Psychiatry
9HHX	Other
9HIY	Spec.--Social Psychology
	Sub-Spec.--
9HIA	Collective Behavior and Social Movement
9HIB	Public Opinion and Communication
9HIC	Role Theory
9HID	Small Groups
9HIE	Socialization and Personality
9HIX	Other
9HJY	Spec.--Social Structure
	Sub-Spec.--
9HJA	Intergroup Relations
9HJB	International Relations
9HJC	Stratification
9HJX	Other
9HKY	Spec.--Social Theory
	Sub-Spec.--
9HKA	History of Sociology
9HKB	Mathematical Sociology
9HKC	Models
9HKD	Sociology of Knowledge
9HKE	Theory Construction
9HKX	Other
9HXY	Spec.--Sociology, Other
	Sub-Spec.--None
ZZZZ	ACADEMIC SPECIALITY UNKNOWN

Addendum A-2

Aggregate Academic Specialty Codes (ASCs)

(Provided by Air Force Data Services Center, Washington DC)

AG CODE	ASCs	DESCRIPTION
AAAY	4AYY, 4BYY, 4EYY, 4KYY, 4MYY	Aeronautical-Astronautical and Mechanical Engineering
AABY	6YYY, 8CYY, 8HYY	Basic Sciences
AACY	OCBY, OCCC, 6GGY, 6GJY, 6IYY	Data Reduction and Analyses
AADY	4BCY, 4EDE, 4IHY, 4MHB, 4TAY, 6EFY	Guidance and Control
AAEY	4ICE, 4ICF, 8HFH, 8HOY	Solid State
AAFY	OYJY, OYKY, 1AMG, 1ASY, 4ACF, 4BDY, 4LDC, 4TYY	Systems Engineering
AAGY	1AGY, 1APY, 1ASY	Program Management
AAHY	OCCC, OYEY, 1AKG, 4LCF, 4LFY, 4TGY, 4THY, 4TIY, 4TKY, 6EHY, 6EMY, 6EOY, 6GLY, 8HXH	Quantitative Analyses

Addendum A-3

Requirements Academic Specialty Codes Specific to Four Characters

(Provided by Air Force Data Services Center, Washington DC)

OYLA	4EAB	4MBE	5ACG
OYLB	4EAC	4MHA	5ACH
OYLC	4EAD	4MHB	5ACI
OYLD	4EAE	4MHC	5ACJ
OYLE	4EDA	4MHD	5ACK
OYLF	4EDB	4MHE	5ACL
OYLG	4EDC	4MHF	5ACM
OYLH	4EDD	4MIA	5ACN
OYLI	4EDE	4MIB	
OYLJ	4EDF	4MIC	8HMA
OYLK	4EDG	4MID	8HMB
OYLL	4EDH	4MIE	8HMC
OYLM	4IBD		8HMD
	4IEE	5ABA	8HME
1AGA	4IGA	5ABB	8HMF
1AMH	4IGB	5ABC	8HMG
	4IGC	5ABD	8HMH
4ACA	4IGD	5ABE	8HMI
4ACB	4IGE	5ABF	8HMJ
4ACC	4IGF	5ABG	8HMK
4ACD	4IGG	5ABH	8HML
4ACE	4IGH	5ABI	8HMM
4ACF	4IGI	5ABJ	8HMN
4ADA	4IGJ	5ABK	8HMO
4ADB	4IHA	5ABL	8HMP
4ADC	4IHB	5ABM	8HMQ
4AEA	4IHC	5ABN	8HMR
4AEB	4IHD	5ABO	8HXA
4AEC	4IHE	5ABP	8HXB
4AED	4KAA	5ABQ	8HXC
4AEE	4KAB	5ABR	8HXD
4AEF	4KAC	5ABS	8HXE
4AEG	4KAD	5ABT	8HXF
4AEH	4LFA	5ABU	8HXG
4AEI	4LFB	5ACA	8HXH
4AEJ	4LFC	5ACB	8HXI
4AEK	4MBA	5ACC	8HXJ
4AFA	4MBB	5ACD	8HXK
4AFB	4MBC	5ACE	8HXL
4EAA	4MBD	5ACF	

Addendum A-4

Obsolete and Replacement Academic Specialty Codes

(Provided by Air Force Data Services Center, Washington DC)

OLD	NEW
OYJY	OYEY
1AAD	1AAB
1ACA	OCBY
1ACB	OCAC
1ACX	OCAD
1ACY	OCAB
1AFB	1AFD
4HJY	4HYY
4IDA	OCBA
4IDB	OCBB
4IDC	OCBC
4IDD	OCBD
4IDE	OCBE
4IDX	OCBX
4IDY	OCBY
4LAA	OCCA
4LAB	OCCB
4LAX	OCCX
4LAY	OCCY
4LFA	OCCC
6GBY	OCDA
6GDY	OCDB
6GEY	OCDC

Addendum A-5

Career Area Air Force Specialty Codes (AFSCs)

(As supplied by the Air Force Data Services Center, Washington DC; different, in some instances, from Fig. 2-1 in AFM 36-19)

CODE	AFSCs	CAREER AREA
ADMI	70XX	Administration
CHAP	89XX	Chaplain
CIVI	55XX, 62XX	Civil Engineer & Services
COMM	30XX	Communications & Electronics
COMT	005X, 67XX, 69XX	Comptroller
EDUC	0900, 0940, 0950, 75XX	Education & Training
HIST	0930	Historian
INFO	79XX	Information
INTE	0910, 57XX, 80XX	Intelligence
LAWI	88XX	Law
LOGI	0005, 004X, 009X, 31XX, 40XX, 46XX, 60XX, 63XX, 64XX, 65XX, 66XX	Logistics
MANP	74XX	Manpower
OPER	002X, 003X, 006X, 007X, 008X, 021X, 051X, 10XX, 11XX, 12XX, 13XX, 14XX, 15XX, 16XX, 17XX, 18XX, 20XX, 21XX, 22XX, 23XX	Operations
PERS	001X, 0920, 73XX	Personnel
SCIE	26XX, 27XX, 28XX, 29XX	Scientific & Development Eng

Addendum A-5 (Continued)

CODE	AFSCs	CAREER AREA
SECU	81XX	Security Police
SPEC	82XX	Special Investigations
WEAT	25XX	Weather
COMP	0960, 51XX	Computer Technology
OPRE	2691A, 2695A	Operations Research
PIPE	0001, 0003, 0004, 0006, 0007, 0008, 0101, 0102, 0103, 0104, 0105, 0110, 0111	Pipeline

Addendum A-6

Consolidated Base Personnel Office (CBPO) Codes

The listing of bases and CBPO codes beginning on the next page is reproduced from AFM 300-4, Vol XII.

1. Title: Complaint, Type Of, ADE CO-485, Effective 1 Jul 1975
2. Data Name: COMPLNT-TYPE
3. Definition/Explanation: The type of complaint being submitted for adjucation.
4. Data Use Identifiers and Explanations:

4a. Data Name	4b. Code Size and Class
COMPLNT-TYPE	1A

Complaint, Type of: See 3 above

5.

Data Codes	Data Items and Explanations:
A	EEO Discrimination, AFR 40-713
B	Appeal-EEO Discrimination, AFR 40-771
C	Appeal-Non Discrimination, AFR 40-771
D	Appeal-Other
E	Unfair Labor Practice
F	Grievance-Negotiated Procedures
G	Grievance-Air Force Procedures
H-W	Reserved for Future Use
X	Other

---

1. Title: Consolidated Base Personn Office Number, ADE CO-500, Chg Eff: 1 Jul 1975
2. Data Name: CBPO-NR
3. Definition/Explanation: A sequential Alphanumeric number assigned to a Consolidated Base Personnel office
4. Data Use Identifiers and Explanations:

	4a. Data Name	4b. Code Size and Class
Central Civilian Personnel Office Number: A sequential alpha-numeric number assigned to a Central Civilian Personnel Office to be used interchangeable with Consolidated Base Personnel Office Number.	CCPO-NR	2AN
Consolidated Base Personnel Office Number: See 3 above	CBPO-NR	2AN
Consolidated Base Personnel Office Number Initiated First Assignment: It identifies the CBPO number which initiated the first projected assignment. Applies to USAFR only.	CBPO-NR-INIT-1ST-ASG	2AN
Consolidated Reserve Personnel Office Number: Used to route data to respective offices.	CRPO-NR	2AN
Gain CBPO Number of a CBPO Directed Reassignment: Identifies the CBPO number which an individual will be assigned as a result of a CBPO directed assignment action.	CBPO-NR-DIR-ASGMT-PAS	2AN
CBPO Number, Gaining: Gaining CBPO number of the CBPO and unit which will gain the individual.	CBPO-NR-GAIN	2AN
CBPO Number, Losing: Number of the CBPO and unit which will lose an individual.	CBPO-NR-LOSING	2AN
New CBPO Number: The CBPO number associated with a new or changed Personnel Accounting Symbol or the establishment of a new CBPO.	NEW-CBPO-NR	2AN
Personnel Accounting Symbol CBPO Number Attachment Training: The number of the CBPO which services the unit to which a member is attached for training when different from unit of assignment.	PAS-CBPO-NR-ATCH-TNG	2AN
Reenlisting Consolidated Base Personnel Office Number: Identifies the CBPO at which a TDY Airman is reenlisting.	REENL-CBPO-NR	2AN
Routing CBPO Number: Number of the CBPO and unit to which a personnel transaction is routed.	ROUTE-CBPO-NR	2AN
Second Gaining Consolidated Base Personnel Office Number: The number of the Gaining Consolidated Base Personnel Office of the second pending assignment.	2ND-GAIN-CBPO-NR	2AN
Second Losing Consolidated Base Personnel Office Number: The number of the losing Consolidated Base Personnel Office of the Second Pending Assignment.	2ND-LOSING-CBPO-NR	2AN
Temporary Duty Personnel Accounting Symbol, Consolidated Base Personnel Office Number of Attachment: The number of the Consolidated Base Personnel Office of attachment for an individual currently on TDY.	TDY-PAS-CBPO-NR-ATCH	2AN
Uniform Officer Record CBPO Number The CBPO Number contained (This is an Interim Code, pending development by the Department of Defense)	UOR-CBPO-NR	2AN

5.

Data Codes	Data Items and Explanations:
AH	Alconbury RAF, Sta, United Kingdom, (USAFE)
AK	Washington/AFTC, DC (HQ COMD, USAF) (1035)
AN	Altus AFB, OXLA, (MAC)
AT	Andersen AFB, Guam (SAC)
AU	Andrews AFB, MLD (HQ COMD, USAF)
AX	Athens, Greece (USAFE)
AY	Aviano AB, Italy (USAFE)
BB	Barksdale AFB, LIA (SAC)
BD	Beale AFB, CAL (SAC)
BF	Bentwaters RAF Sta, United Kingdom (USAFE)
BH	Bergstrom AFB, TEX (TAC)
BL	Bitburg AB, Germany (USAFE)
BN	Blytheville AFB, AR? (SAC)
BP	Bolling AFB, DC, (HQ COMD, USAF) (1100)
BV	Brooks AFB, TEX (AFSC)
CC	Camp New Amsterdam AB, Netherlands (USAFF)
CD	Cannon AFB, NMEX (TAC)
CF	Carswell AFB, TEX (SAC)
CH	Castle AFB, CAL (SAC)
CK	Chanute AFB, Ill (ATC)
7K	Chanute AFB, Ill (ATC-Pipeline)

1. Title: Consolidated Base Personnel Office Number, ADE CO-500, Chg Eff: 1 Jul 1975 (Continued)
PART I (Continued)

9. Data Codes	Data Items and Explanations:
CL	Charleston AFB, SCAR (MAC)
CP	Clark AB, Philippines (PACAF)
CO	Columbus AFB, MISS (ATC)
CZ	Craig AFB, ALA (ATC)
DF	Davis-Monthan AFB, ARZ (SAC)
DG	Dobbins AFB (GEO (Integrated CBPO Test Site Active & USAFR)
DJ	Denver, COL (AFAFC)
DM	Dover AFB, DEL (MAC)
DT	Duluth IAP, MINN (ADC)
DW	DYESS AFB, TEX (SAC)
EB	Edwards AFB, CAL (AFSC)
ED	Eglin AFB, FLA (AFSC)
EE	Eglin Aux Fld 9, FLA (TAC)
EG	Ellington AFB, TEX (Integrated CBPO Test Site Active & USAFR)
EN	Eielson AFB, ALS (AAC)
EJ	Ellsworth AFB, SDAK (SAC)
EL	Elmendorf AFB, ALS (AAC)
EN	England AFB, LIA (TAC)
EP	Peterson Fld, COLO (ADC) (4600th)
FC	Fairchild AFB, WASH (SAC)
FA	Fort Belvoir, AI, VIR (HQ CORD, USAF)
FW	Francis E. Warren AFB, WYO (SAC)
GB	George AFB, CAL (TAC)
GF	Goodfellow AFB, TEX (USAFSS)
GR	Grand Forks AFB, NDAK (SAC)
GW	Griffiss AFB, NY (AFLC)
> BX	Grissom AFB, IND (SAC)
HB	Hahn AB, Germany (USAFE)
HF	Hancock Fld, NY (ADC)
HH	HQ USAF (1143 ABSq), DC
HL	Hickam AFB, HAW (PACAF)
HP	Hill AFB, UTAH (AFLC)
HS	Holloman AFB, NMEX (TAC)
HV	Homestead AFB, FLA (TAC)
AF	Howard AFB, Canal Zone (USAFSOU)
IN	Incirlik, Turkey (USAF)
KB	Kadena AB, Okinawa (PACAF)
KF	Keesler AFB, MISS (ATC)
>	
KJ	Kelly AFB, TEX (USAFSS) (6960th)
KH	Kelly AFB, TEX (AFLC)
KM	Kincheloe AFd, MICH (SAC)
KV	Kirtland AFB, NM (AFSC)
KY	K.I. Sawyer AFB, MI (SAC)
>	
KU	Kusan AB, Korea (PACAF)
LA	Lackland AFB, TEX (ATC)
LB	Lackland AFB, TX (AFSC)
LC	Lajes Fld, Azores (MAC)
LD	Lakenheath RAF Sta, United Kingdom (USAFE)
LE	Langley AFB, VIR (TAC)
LJ	Laughlin AFB, TEX (ATC)
LK	Laurence G. Hanscom Fld, MASS (AFSC)
LP	Little Rock AFB, ARK (TAC)
LQ	Rickenbacker AFB, OHIO (SAC)
LS	Loring AFB, MNE (SAC)

Data Codes	Data Items and Explanations:
LU	Los Angeles AFS, CAL (AFSC)
LW	Lowry AFB, COL (ATC)
ZL	Lowry AFB, COL (ATC-Pipeline)
LY	Luke AFB, ARZ (TAC)
MA	MacDill AFB, FLA (TAC)
MB	Malmstrom AFB, MONT (SAC)
MD	March AFB, CAL (SAC)
ME	Mather AFB, CAL (ATC)
MG	Maxwell AFB, ALA (AU)
MH	McChord AFB, WASH (MAC)
MU	McClellan AFB, CAL (AFLC)
MK	McConnell AFB, KAN (SAC)
ML	Mildenhall RAF Sta, United Kingdom (USAFE)
MN	McGuire AFB, NJ (MAC)
MP	Minot AFB, ND (SAC)
MT	Moody AFB, GEO (ATC)
MW	Mt Home AFB, IDA (TAC)
MY	Myrtle Beach AFB, SCAR (TAC)
NJ	Nellis AFB, NEV (TAC)
NV	Norton AFB, CAL (MAC)
OO	Offutt AFB, NEB (SAC)
OP	Osan AB, Korea (PACAF)
PF	Patrick AFB, FLA (AFSC)
PJ	Pease AFB, NH (SAC)
PS	Plattsburgh AFB, NY (SAC)
PV	Pope AFB, NCAR (TAC)
RF	Ramstein AB, Germany (USAFE)
RJ	Randolph AFB, TEX (ATC)
RR	Reese AFB, TEX (ATC)
RP	Rhein Main AB, Germany (USAFE) (7310)
RT	Richards Gebaur, MO (AFSC)
RX	Robins AFB, GEO (AFLC)
SF	Scott AFB, ILL (MAC)
SJ	Sembach AB, Germany (USAFE)
SR	Seymour Johnson AFB, NCAR (TAC)
SP	Shaw AFB, SCAR (TAC)
SQ	Sheppard AFB, TEX (ATC)
ZS	Sheppard AFB, TEX (ATC-Pipeline)
SA	Springfield VIR (HQ CRD)
ST	Spangdahlem AB, Germany (USAFE)
PE	Stuttgart, Genrmany (HQ CORD, USAFE)
TE	Tinker AFB, OKLA (AFLC)
TJ	Torrejon AB, Spain (USAFE)
TP	Travis AFB, CAL (MAC)
TX	Tyndall AFB, FLA (ADC)
>	
UD	Udorn AFB, Thailand (PACAF)
UC	U-Tapao AFD, Thailand (PACAF)
UP	Upper Heyford RAF Sta, United Kingdom (USAFE)
US	USAF Academy, COL (USAFA)
VN	Vance AFB, OKLA (ATC)
VQ	Vandenberg AFB, CAL (SAC)
WG	Washington/Forrestall Bldg (AFQSI)
WR	Webb AFB, TEX (ATC)
WT	Whiteman AFB, MO (SAC)
WU	Wiesbaden AB, Germany (USAFE)
WV	Williams AFB, ARZ (ATC)
WY	Wright-Patterson AFB, OHIO (AU)
WE	Wright-Patterson AFB, OHIO (AFLC)
WZ	Wurtsmith AFB, MICH (SAC)
YR	Yokota AB, Japan (PACAF)

1. Title: Consolidated Base Personnel Office Number, ADE CO-500, Chg Eff: 1 Jul 1975 (Continued)

5. Data Codes	Data Items and Explanations:
PART I--(Continued)	
ZB	Lackland AFB, TEX (ATC-Pipeline)
ZR	Zweubrucken AB, Germany (USAFE)
PART II--ANG & AFRES	
A2	Dannelly Fld, Montgomery, ALA
A3	Sumpter Smith ANG Base Birmingham, ALA
A4	Kulis ANG Base, Anchorage, ALS
A5	Sky Harbor Muni Aprt (ANG), Phoenix, ARZ
A6	Tucson IAP, Tucson, ARZ
A7	Little Rock/ANG, ARK
A8	Muni Aprt (ANG), Ft Smith, ARK
B2	Fresno Air Terminal (ANG), Fresno, CAL
B3	Muni Aprt (ANG), Hayward, CAL
B4	Ontario IAP, CAL
B5	Van Nuys Aprt (ANG), Van Nuys, CAL
B6	Buckley ANG Base, Aurora, COL
B7	Bradley IAP, Windsor Locks, CONN
B8	Gtr Wilmington Aprt (ANG) New Castle, DEL
B9	Andrews AFB (ANG), Wash DC
C2	Jacksonville IAP, Jacksonville, FLA
C3	Dobbins AFB (ANG), GEO
C4	Savannah Apt, Savannah, GEO
C5	Hickman AFB (ANG), Honolulu, Haw
C6	Boise Air Terminal (ANG), Boise, IDA
C7	O'Hare IAP (ANG), Chicago, ILL
C8	Capital Muni Aprt (ANG), Springfield, ILL
C9	Gtr Peoria Aprt (ANG), Peoria, ILL
D2	Hulman Fld (ANG), Terra Haute, IND
D3	Baer Fld (ANG), Ft Wayne, IND
D4	Des Moines Apt, IOWA
D5	Sioux City Aprt (ANG), Sergeant Bluff, IOWA
D6	McConnell AFB (ANG), KAN
D7	Forbes ANGB, KAN
D8	Standiford Fld, Louisville, KEN
D9	New Orleans ANG/ANX, LIA
E2	Bangor IAP, MNE
E3	Martin Aprt (ANG), (175th Combat Support Sq), Baltimore, MLD
E4	Martin Aprt (ANG), 135th Combat Support Sq), Baltimore, MLD
E5	Otis ANG/ANX, MASS
E7	Barnes Muni Aprt (ANG), Westfield, MASS
E8	W. K. Kellogg AFB, MICH
E9	Selfridge ANGB, MICH
F2	Selfridge ANGB, Mich
F3	Minn-St Paul IAP (ANG), St Paul, MINN
F4	Duluth IAP (ANG), Duluth, MINN
F6	Thompson Fld (ANG), Jackson, MISS
F7	Key Field (ANG), Meridian, MISS
F8	Lambert/St Louis Apt, MO
G2	Rosecrans Memorial Aprt (ANG), St Joseph, MO
G3	Gt Falls IAP, MONT
G4	Lincoln AFB (ANG), NEB
G5	Muni Aprt (ANG), Reno, NEV
G6	Pease AFB (ANG), Portsmouth NH
G7	McGuire AFB (ANG), 108th Combat Support Sq), NJ
G8	Atlantic City APT, NJ
G9	McGuire AFB (ANG), (107th Combat Support Sq), NJ
H2	Kirtland AFB (ANG), NMEX
H3	Westchester County Aprt (ANG), White Plains, NY
H4	Suffolk Country Apt, NY
H6	Niagara Falls Muni Aprt (ANG), Niagara Falls, NY
H7	Hancock Fld (ANG), Syracuse, NY
H8	Schenectady County Aprt (ANG), Schenectady, NY
H9	Douglas Muni Aprt (ANG), Charlotte, NCAR
J2	Hector Fld (ANG), Fargo, NDAK
J3	Rickenbacker AFB/ANG, OHIO
J4	Springfield Muni Aprt (ANG), (178th Combat Support Sq), Springfield, OHIO
J6	Mansfield LAHM Apt, OHIO
J7	Toledo Express Airport (ANG), Swanton, OHIO
J8	Rickenbacker AFB/ANG, OHIO
J9	Will Rogers World Apt, OKLA
K2	Tulsa IAP, OKLA
K3	Portland IAP (ANG), Portland, ORE
K4	Harrisburg/Olmstead IAP, PENN
K5	Gtr Pittsburgh Aprt (ANG), (111th Support Sq) Coraopolis, PENN
K6	Willow Grove NAS (ANG), PENN
K7	Gtr Pittsburgh Aprt (ANG), 111th Support Sq, Coraopolis, PENN
K8	Puerto Rice IAP (ANG), San Juan, Peurto Rico
K9	TF Green Aprt (ANG), Warwick, RH IS
L2	McEntire ANG Base, Eastover, SCAR
L3	Joe Foss Fls (ANG), Sioux Falls, SDAK
L4	Nashville Metro Apr, TENN
L5	Memphis Metro IAP, TENN
L6	McGhee-Tyson Aprt (ANG), Knoxville TENN
L7	Kelly AFB (ANG), TEX
L8	USN Air Sta (ANG), Dallas, TEX
L9	Ellington AFB (ANG), TEX
M2	Salt Lake City IAP, UTAH

1. Title: Consolidated Base Personnel Office Number, ADE CO-500, Chg Eff: 1 Jan 1976 (Continued)

5. Data Codes	Data Items and Explanations:
PART II--ANG & ARES (Continued)	
R3	Burlington IAP, VT
R4	Byrd Fld (ANG), Sandston, VIR
R5	Spokane IAP (ANG), Spokane, WASH
R7	Kanawha Aprt (ANG), Charleston, WVA
R8	Martinsburg Muni Aprt (ANG), Martinsburg, WVA
R9	Truax Field (ANG), Madison, WISC
N2	Gen B. Mitchell ANGB, Milwaukee, WISC
N3	Muni Aprt (ANG), Cheyenne, WYO
R2	Rickenbacker AFB (USAFR), OHIO
R4	Selfridge ANG (USAFR), MICH
R5	Kelly AFB (USAFR), San Antonio, TEX
R7	Gen Billy Mitchell Fld (USAFR), Milwaukee, WISC
R8	Richards-Gebaur AFB (USAFR), Grandview, MO
R9	Dobbins AFB (USAFR), Marietta, GEO
S1	Ellington AFB (USAFR), Houston
S3	Andrews AFB (USAFR), MLD
S4	Carswell AFB (USAFR), Ft Worth, PENN
S5	Willow Grove NAS (USAFR), PENN
S7	ARPC (Residuals) (USAFR)
S8	ARPC (Air Reserve Squadrons, Reinforcement Designees and Specialty Training Squadrons, Mobilization Augmentees and Overseas Mobilization Augmentees attached to HQ ARPC (CAC) for administration and further attached to Element Training Squadrons for Training (USAFR)
T1	Norton AFB (USAFR), CAL
T2	McChord AFB (USAFR), WASH
T3	McGuire AFB (USAFR), NJ
T4	Dover AFB (USAFR), DEL
T5	Charleston AFB (USAFR), SCAR
T6	Scott AFB (USAFR), ILL
T7	Maxwell AFB (USAFR), ALA
T8	Travis AFB (USAFR), CAL
T9	Youngstown MAP (USAFR), OHIO
U2	Grissom AFB (USAFR), IND
U3	Homestead AFB (USAFR), FLA
U4	Hamilton AFB (USAFR), CAL
U5	Niagara Falls IAP, (USAFR), NY
U6	Barksdale AFB (USAFR), LIA
U7	Tinker AFB (USAFR), OKLA
U8	McClellan AFB, (USAFR), CAL
U9	Hill AFB (USAFR), UTAH
W1	Greater Pittsburgh APT (USAFR) PENN
W2	Chicago-O'Hare IAP (USAFR), ILL
W3	Minn-St. Paul IAP (USAFR), MINN
W4	New Orleans NAS (USAFR), LIA
W5	Westover AFB (USAFR), MASS
W7	Keesler AFB, (USAFR), MISS
PART III--Consolidated Reserve Personnel Offices	
81	Dobbins AFB, Marietta, GEO
82	Richards-Gegaur AFB, Grandview, MO
83	Homestead AFB, FLA
85	Charleston AFB, SCAR
94	Bolling AFB, Wash DC (HQ CORD/ USAF/DPR)*
96	ARPC (Category A&B units, other than Reserve Military Airlift, Tactical Airlift, Medical Service Units) (USAFR), Denver, COL
PART IV--CENTRAL CIVILIAN PERSONNEL OFFICES-UNIQUE IDENTIFIERS	
1A	Ankara AB TURKEY
1B	Arnold AFS, TENN
1C	Atlanta, GA
1D	Chicago/O'Hare IAP, Chicago, ILL
1E	Dallas USN AS, Dallas, TX
1F	Dobbins AFB, GA
1G	Ellington AFB, TX
1H	Ft. Detrick, MD
1J	Goose AB, CANADA
1K	Greater Pittsburg APT, PA
1L	Hamilton AFB, CA
1M	Izmir AB, TURKEY
1N	Karamursel AB, TURKEY
1P	Keflavick AB, ICELAND
1Q	Kingsley Field, OR
1R	Kirkland AFB, (AFCRD) N.M.
1S	MPLS/St. Paul IAP, Minneapolis, MINN
1T	Newark AFS, OHIO
1U	Otis AFB, MASS
1V	San Francisco USN AS, CA
1W	Taipei ASN, TAIWAN (CCK)
1X	Westover AFB, MASS
1Y	Willow Grove NAS, PA
1Z	Wright-Patterson (ASD), OHIO
2A	Youngstown, OHIO

*Office symbol is necessary to identify the location of a CBPO in a specific MAJCOM.

Addendum A-7

Major Commands Codes

(Extracted from AFM 300-4, Vol XII, ADE MA-360, 10 March 1976)

CODE	COMMAND
A	Alaskan Air Command
B	US Air Force Academy
C	Aerospace Defense Command
D	US Air Forces in Europe
E	Air Force Accounting and Finance Center
F	Air Force Logistics Command
G	Aeronautical Chart & Information Center (Historical)
H	Air Force Systems Command
I	Air Reserve Personnel Center
J	Air Training Command
K	Air University
L	USAF Southern Command
M	HQ Air Force Reserve
N	Headquarters USAF
O	Air Force Data Automation Agency
P	Headquarters Command, USAF
R	Pacific Air Forces
S	Strategic Air Command
T	Tactical Air Command
U	USAF Security Service
V	HEADQUARTERS USAF
W	HEADQUARTERS USAF

Addendum A-7 (Continued)

CODE	COMMAND
X	Office of Aerospace Research (Historical)
Y	Air Force Communications Service
2	Air Force Inspection and Safety Center
3	Air Force Test and Evaluation Center
5	Air Force Intelligence Service
6	Air Force Audit Agency
7	Air Force Office of Special Investigation
9	USAF Military Personnel Center

Appendix B

Maintainer's Guide

This appendix contains: instructions for building new Inventory and Requirements data bases from the AFMPC tapes, data file structure, a file directory, and some programming notes.

Building New Data Bases

This section is a procedural guide to be followed by an individual without computer programming experience to build new data bases from the AFMPC magnetic tapes. If any problems are encountered or programming changes desired, assistance should be requested from the AFIT School of Engineering Computer Operations Staff ADRIS monitor.

(1) The two data base magnetic tapes must be individually identified before turning them over to the tape library for processing. Each tape can be identified from a tag attached by the AFMPC before shipment to AFIT. For each tape, record the Reel Number--a 6-digit integer, and the File ID--"AUTHAFIT" for the Requirements tape and "ASGDAFIT" for the Inventory tape.

Hand carry the two tapes to the control desk at the Aeronautical Systems Division (ASD) Computer Center, Bldg. 676. Inform the desk clerk that you wish "X" numbers (Visual Serial Numbers) assigned to the two tapes. The clerk will direct you to fill out some forms with your

problem number, office symbol, and phone. Then, the clerk will attach an adhesive label, marked with an X number, to each tape. Be sure to record the X number (X followed by five digits) and note the tape that the X number is linked with. This is necessary to distinguish the tapes from one another during later processing.

(2) The data bases can now be built. All magnetic tape computer jobs must be submitted as a card deck with a Magnetic Tape Transaction Request blue card (ASD Form 59). This card can be obtained at the turn-in window in the AFIT Computer Lab. The form should be filled out as shown in Fig. 17.

MAGNETIC TAPE TRANSACTION REQUEST

REQUESTOR (Print)	SYMBOL	PROBLEM NR.	PHONE	DATE	PRO
LEE, R.	AFIT/ENR	T770008	55533	1 Jun 77	

TYPE OF TRANSACTION		TAPE NUMBER	PROBLEM NR ASSIGNED TO TAPE	RING STATUS IN	RING STATUS OUT	THIS SECTION TO BE F CLASSIFIED TAPI
COMPUTER RUN	X	X01645	T770008		X	CLASSIFICATION OF TAPE/ COMPLETION OF RUN
ASSIGN						
LIBRARY RELEASE						DOWNGRADING INSTRUC AFTER COMPLETION OF
CUSTOMER REMOVAL		APPROPRIATE	MEANS TAPE CAN			
TRANSFER		X Number	BE READ ONLY			EMERGENCY CLASSIFIED D PROCEDURE
CLEAN						DEGAUSS
STRIP						PICK-UP WITHIN TWO H NOTIFICATION
DEGAUSS						SIGNATURE
CERTIFY						R. Lee

ASD FORM SEP 73 59 PREVIOUS EDITION MAY BE USED

Fig. 17. Magnetic Tape Transaction Request.

Tape Test. A test run should first be made on each magnetic tape. The card deck contents are shown below. All cards are punched starting in column 1. To test the SPLY build program with the Inventory tape:

```
(ASD Form 59)
LE1[1],NT1,STCSB.T770008,LEE,TEST SPLY
BEGIN,TSPLY,BUILD,(MPC #)[2],(X No)[3].
7/8/9[4]
(Date)[5]
2,500[6]
6/7/8/9[7]
```

These numbers are for the "ASGDAFIT" Inventory tape. Period must be in first column after X No.

Notes:

1. This parameter is the job identification banner. It will appear at the top of the computer printout from the job. Also, the first letter will be used by the AFIT computer operator to return the printout and card deck to the output bins in the computer lab.
2. Insert here the 6-digit MPC tape number for the "ASGDAFIT" Inventory tape.
3. Insert here the corresponding X number: X followed by five digits.
4. Multipunch a 7, 8, and 9.
5. Punch date on which data base information became current ("as of" date) (limit of 10 characters).
6. The "2" indicates a test run printout will be produced and the "500" that the test run will be made on 500 tape records.
7. The last card in the deck is the orange 6/7/8/9 end-of-job card, available at the turn-in window.

To test the DMND build program with the Requirements tape:

```
(ASD Form 59)
LE2,NT1,STCSB.T770008,LEE,TEST DMND
BEGIN,TDMND,BUILD,(MPC #), (X #).
7/8/9
2,500
6/7/8/9
```



These numbers are for the "AUTHAFIT" Requirements tape. Period is required.

Both card decks may be submitted at the same time. There are four things to look for in the printout to see if the programs are working with the tapes.

(a) The 500 records and a record storage directory should have been printed. Check the records to see if the information printed looks correct. See Table VIII. Note that the records are printed in ascending order of the ASCs (all "0" ASCs first, followed by all "1" ASCs, etc.). The starting number of each new ASC group (counting down the printout page) should correspond to the equivalent storage directory file value. To help you count the records, every 10th one is numbered.

(b) Check to see that the tape creation date was printed correctly (only on SPLY program output listing).

The next two things to check for also apply to the printout received back with the runs that create the whole data base.

(c) If a record is found with a bad ASC (non-digit first character), this fact is noted in the output

Table VIII

DMND Build Program Test Output

```
EL  ASC   PRE   SUFF  AFSC   CBPO   MAJCOM   GR     COUNT

RANDOM RECORD 1 FOLLOWS:

P   OCAY                5116   EL     OA       5
R   OCYY  T       A     5135   US     OB       4
  .
  .
  .
P   OCYY  T       C     5125   US     OB       4      10
P   OCYY  T       A     5135   US     OB       4
P   OCYY  T       B     5145   US     OB       4
P   OCYY  T             5116   US     OB       4
P   OCYY  T       B     5135   US     OB       3
P   1AYY                 36   EL     OA       6
  .
  .
  .
RANDOM RECORD 2 FOLLOWS
  .
RECORD STORAGE DIRECTORY

PD(1)  =   1   Inter-Area
PD(2)  =  15   Admin, Man, Mil Sci
PD(3)  =  76   Arts, Hum, Educ
PD(4)  = 145   Biolog & Agricul Sci
PH(5)  = 159   Engineering
PD(6)  = 315   Civil Law
PD(7)  = 315   Math
PD(8)  = 338   Phys Sci
PD(9)  = 400   Soc Sci
PD(10) = 501   YYYY ASCs
PD(11) = 501   Aggreg ASCs
PD(12) = 501   Last Record + 1
```

listing and the record is also printed for checking. More than a few errors of this type would indicate that the tape format has changed or there were many key punch errors at the AFMPC.

(d) If a record has alphabetic characters where numeric characters are expected the printout will indicate an "illegal data in field" error for each occurrence (up to 50) and point out the offending character. An example would be a nonnumeric character in an AFSC. There should not be more than a few (if any) of these errors for the whole data base. A record with such an error (either in grade or AFSC) will be accepted into the data base; however, the value retained for the AFSC or grade will be that of the corresponding field of the <u>previous</u> record processed. The number of "illegal data in field" errors found is printed in the output listing.

If there is any doubt in the test runs, get help.

<u>Data Base Creation</u>. The Inventory and Requirements data bases must be separately created. First, submit the following deck to create the Inventory data base.

```
(ASD Form 59)
LE3,NT1,T120[1],IO255[2],CM32000,STCSB.T770008,LEE,SPLY
BEGIN,SPLYGO,BUILD,(MPC #),(X #).
7/8/9
1,100000[3]
6/7/8/9
```

For the "ASGDAFIT" Inventory tapes, mandatory period.

Notes: 1,2 These values are the requested amounts of time for program execution and input/output channel time respectively. These values should be kept approximately 25% above the amounts used by the <u>previous</u> data base creation. Refer to the dayfile at the bottom of the execution listing: see the "CPA" value for [1] and the "IO" value for [2] (values are for <u>full</u> data base creations, not test runs)

3 The "1" and "100000" indicate a full data base creation run.

Successful building of the Inventory data base can be verified only by checking the job dayfile, a summary report of what happened to the job, found at the very end of the output listing. The dayfile should contain two successful "initial catalogs". The listing should look something like the following:

```
.
.
INITIAL CATALOG
CT ID=        AFIT PFN=ADRISINV
CT CY= 001          00055808 WORDS.
CATALOG,TAPE40,ADRISPOINTER,CY=1,XR=*---
*,RP=999.
INITIAL CATALOG
CT ID=        AFIT PFN=ADRISPOINTER
CT CY= 001          00000128 WORDS.
```

The size of the pointer file will always be 128 words; however, the ADRISINV file should remain constant or grow slightly from quarter-to-quarter.

The printout of the record storage directory above the dayfile should also be checked. The entries can be compared with the previous data base values to determine changes in the size of each ASC group.

The program will print out the size of the inventory key index. If SIZE x 100 - 500 is less than the last entry in the pointer file, PS(12), notify the ADRIS monitor.

Run the DMND card deck shown below only after the SPLY program output has been checked and is all right.

```
(ASD Form 59)
LE4,NT1,T55,IO110,CM44000,STCSB.T770008,LEE,DMND
BEGIN,DMNDGO,BUILD,(MPC #),(X #).
7/8/9
2,100000
6/7/8/9
```

For the "AUTHAFIT" Requirements tape-period required.

The same notes following the build Inventory deck for the T and IO parameters apply here also. The dayfile should contain a successful "initial catalog" and "extend" as shown below.

```
.
.
INITIAL CATALOG
CT ID=        AFIT PFN=ADRISREQ
CT CY= 001         00022848 WORDS.
EXTEND,TAPE40
EX ID=        AFIT PFN=ADRISPOINTER
EX CY= 001         00000128 WORDS.
```

As with SPLY the pointer file should remain constant at 128 words while the ADRISREQ file should remain constant or change slightly from quarter-to-quarter. From June 1976 to January 1977, overall Master's Degree AAD Requirements declined by approximately 1,000.

The other checks described for SPLY should also be made for DMND. If everything looks in order, the final test should be to run the ADRIS interactive program with all parameters equal to "*". The totals (not including 0-6s) should approximate the following, obtained from the January 1977 data base:

Master's Inventory	- 24,098
Master's Requirements	- 7,877
PHD Inventory	- 959
PHD Requirements	- 848

The rest of the Maintainer's Guide is for the use of the computer staff ADRIS monitor.

Data File Format and Structure

The data files associated with the ADRIS system can be described in terms of two magnetic tapes (received quarterly from AFMPC) containing source information and the three data files constructed from these tapes. In addition, there are four auxiliary data files, separately prepared, that may require updating from time to time.

Magnetic Tapes. One magnetic tape contains the Inventory data base while the other tape contains the Requirements data base. The two tapes are nine-track, 1600 BPI, coded in EBCIDIC, and labeled--with 25 records to the block. Record structure and read formatting are shown in Table IX (only needed fields are read by the build programs).

Constructed Data Files. The SPLY program builds the Inventory data base while the DMND program builds the Requirements data base. Both data bases are built using the FORTRAN WRITMS statement to create a random file structure which is stored on permanent disc space for interactive program use. Each random record consists of 100 of the tape records. The Education Level, ASC, AFSC, grade, CBPO, and major command of each legal tape record is packed into two

Table IX

Tape Fields and Format

Data Element	Character Position	Read Format
INVENTORY: 96 characters/block (Processed by SPLY)		
Academic Specialty Code (ASC)	1-4	4A1
Education Level	5	A1
Duty Air Force Specialty Code Prefix	6	A1
Duty Air Force Specialty Code and Suffix	7-11	I4,A1
Current Grade	12-13	I2
Assignment Availability Date (Year-Month)	14-17	I4
PAS CBPO Code	18-19	A2
PAS MAJCOM - ID	20-21	A2
PAS Number	22-25	
Method to Achieve Educational Level	26	
PAS Organization Number	27-30	
PAS Organization Kind	31-33	
PAS Organization Type	34-35	
PAS Installation Name	36-52	
PAS Country or State Name (Abbrev)	53-57	
Functional Account	58-63	
Organizational Structure ID	64-68	
Program Element	69-74	
Restricted Field (May not be used)	75-80	
Blank Fill	81-96	
REQUIREMENTS: 102 characters/block (Processed by DMND)		
ASC	1-4	4A1
Education Level	5	A1
Authorized Air Force Specialty Code Prefix	6	A1
Authorized Air Force Specialty Code and Suffix	7-11	I4,A1
Authorized Grade	12-13	I2
Authorized Manpower Level, 15th of the Month	14	I1
PAS CBPO Code	15-16	A2
PAS MAJCOM Code	17-18	A2
PAS Number	19-22	
Authorized Functional Account Descriptor	23-40	
Authorized PAS Organization Number	41-44	
Authorized PAS Organization Kind	45-47	
Authorized PAS Organization Type	48-49	
PAS Installation Name	50-66	
PAS Country or State Name (Abbrev)	67-71	
Authorized Functional Account	72-77	
Authorized Program Element	78-83	
Authorized Organization Structure ID	84-88	
Blank Fill	89-102	

words; therefore, each CYBER random record is 200 words long.

SPLY and DMND each write a random record pointer index of 12 words to the pointer file. The two data base files are organized by grouping records according to the ASC general area of study (all "0s" together, all "1s" together, etc.). The pointer index, then, contains the beginning record number of each ASC group (for example, "0" - 1; "1" - 1,124; "2" - 4,999; etc.)

A third pointer file record is used to store the magnetic tape creation date. This date is printed during use of the interactive ADRIS program.

Auxiliary Files. All four auxiliary files are sequentially structured. SPLY and DMND use the CONVRT file to convert obsolete ASCs to their replacement values. The file contains 23 obsolete ASCs and their replacements. The ASCs are organized in 80-column card-image records. The 23 obsolete ASCs occupy the first 92 character positions with the replacement ASCs occupying the corresponding character positions from 93 to 184. The 23 obsolete ASCs are ordered to reflect a minimum search binary tree structure as explained in Chapter V. If new ASCs are added to the file they should be inserted so as to maintain the minimum search structure. The build programs expect the first four characters on the file to be the "root" element of the tree.

The DMND program uses the GENERAL file to determine which ASCs must have their third or fourth characters generalized (converted to "Y"). The GENERAL file is used to construct a hash table as explained in Chapter V. File format is 80-column card-image records with eight ASCs and their associated codes per card, as shown in Fig. 18.

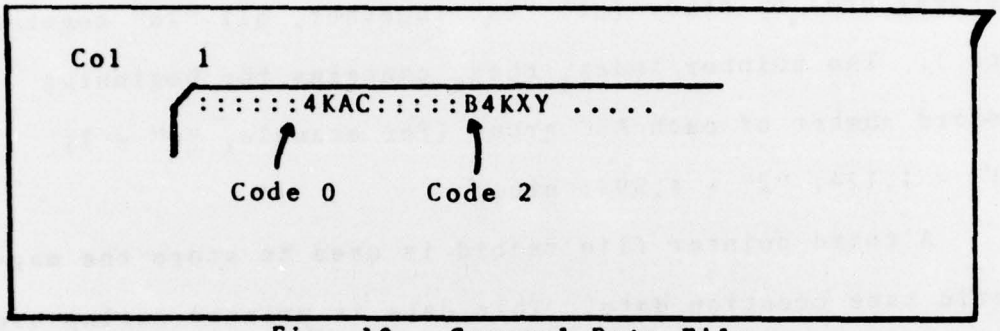


Fig. 18. General Data File.

The file is read with a (5X,R5) format so ":" translates into internal integer 0 and "B" into 2. Code 0 is a cue that the ASC is to be left unchanged while code 2 is a cue to convert the last two characters to "YY". There is no ordering to the file so any additions may be made to the end of the file. Additions should not be made without confirming that no more than two ASCs hash to any particular table position. This can be checked by using the HASHTST program stored in the UPDATE source library described in a later section. Two ASCs on the GENERAL file hash to the number 1,213; two other ASCs hash to 3,607.

The AREA data file is used by the interactive program to convert AFSC area descriptors (see Addendum A-5 of User's

Guide) into the constituent AFSCs. The file is composed of card-image records as shown by two examples in Fig. 19.

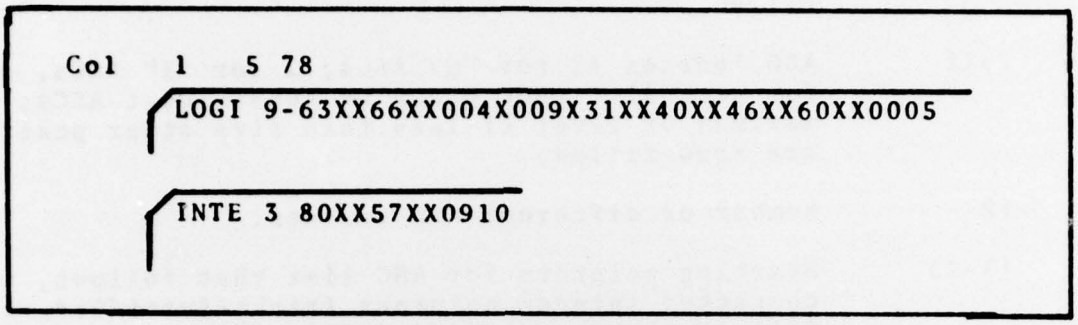


Fig. 19. Area Data File Structure

Characters 1-4 are the area descriptor (four characters must be used)--LOGI for logistics and INTE for Intelligence. Characters 5 and 6 contain the number of constituent AFSCs. Character 7 contains a dash ("-") if the first two AFSCs in the list are to be considered inclusive (i.e., 63XX-66XX above), otherwise character 7 is a blank. The remaining characters are the constituent ASCs. There is no record ordering.

Data file AGGREG is used by the interactive program to convert ASC aggregate codes to constituent ASCs. The file is composed of card-image records as shown by example in Fig. 20.

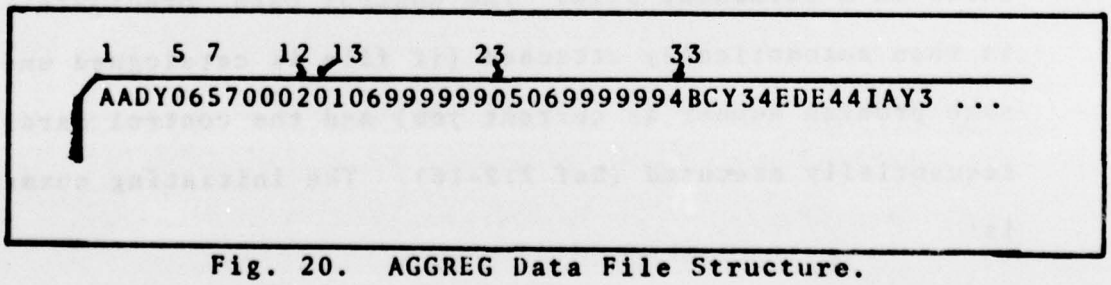


Fig. 20. AGGREG Data File Structure.

Column	Description
1-4	Aggregate ASC
5-6	Number of constituent ASCs, right-justified, zero-filled.
7-11	ASC indexes (1 for "0" ASCs, 2 for "1" ASCs, etc.) for each different group of constituent ASCs; maximum of five; if less than five other positions are zero-filled.
12	Number of different ASC indexes.
13-22	Starting pointers for ASC list that follows, two character integer pointers (right-justified, zero-filled) with a maximum of five. First pointer corresponds to first ASC index, etc. Unused pointers are 9-filled.
23-32	Ending pointers for ASC list that follows, same structure as starting pointer.
33 on	List of constituent ASCs. Each ASC is followed by a digit that indicates the number of specific (non "Y") characters in the ASC.

File Directory

The ADRIS build and interactive programs are stored on permanent file disc space in object form. All ADRIS data files are also stored as permanent files. The programs and data files are attached and used through the use of the University of Washington Control Language facility. The language permits the storing of a string of SCOPE control cards on a permanent file. The control card "procedure" is then automatically attached (if file is catalogued under same problem number as current job) and the control cards sequentially executed (Ref 7:2-16). The initiating command is:

BEGIN, (procedure name), (permanent file name), (optional formal param)...

Use of this job control language simplifies ADRIS use for noncomputer oriented users.

All permanent files are stored under the ADRIS problem number, T770008, with an infinite retention period. The problem number has been protected from file expiration. All files are stored in cycle number one and are catalogued with password XR=MATT protection for multiple attaches and alteration prevention.

All ADRIS source code programs, data, and control card procedures are saved on an UPDATE library, ID=AFIT, file name ADRISLIB, CY=1, PW=MATT. A magnetic tape backup is also kept. Since 80-column data records and control cards are stored in the library, the D and 8 options must be used with the UPDATE command. These options will extract data and control cards with the full 80 columns of information available (and no sequence or ID numbers beyond). The command UPDATE, Q, D, 8, C=ADRIS will place a data file or control card procedure on file ADRIS. The deck name(s) of the desired information should follow *COMPILE in the input file.

Table X specifies the storage location, *DECK name (UPDATE library name), and content of all ADRIS information.

Table X

File Directory

PF NAME	*DECK	DESCRIPTION
ADRISLIB		UPDATE library of all *DECK information
ADRISOBJ		Absolute object of interactive ADRIS program overlay version
	ADRIS1	Source of interactive ADRIS overlay version
	ADRIS2	Source of interactive ADRIS non-overlay version
ADRISREQ		Current Requirements data base
ADRISINV		Current Inventory data base
ADRISPOINTER		Current Pointer file (also data base currency date)
AGGREG	AGGREG	Aggregate ASC data file
AREA	AREA	Area AFSC data file
RLEE	RLEE	Control card procedure to attach data files and execute ADRISOBJ. Procedure name is AFIT.
SPLYOBJ	SPLY	Object and source for building ADRISINV
DMNDOBJ	DMND	Object and source for building ADRISREQ
CONVRT	CONVRT	Data file for obsolete ASC conversion
GENERAL	GENERAL	Data file for ASC generalization
BUILD	BUILD	Contains four procedures: TSPLY, TDMND, SPLYGO, DMNDGO to test build programs with magnetic tapes and then build new data bases.
	HASHTST	Source for hash algorithm testing

Table X (Continued)

PF NAME	*DECK	DESCRIPTION
	TAPE1	Source for converting 7-bit ASCII into display code
	TAPE2	Source for converting BCD into display code
	TEST	Test case data (same as Table V) for batch run

Miscellaneous Notes

(1) The random file key indexes (arrays KEYS and KEYD) in the build and interactive programs must be kept at least one larger than the number of random records. The first section of this Maintainer's Guide directs the data base builder to notify the ADRIS computer staff monitor if the number of random records approaches the KEYS or KEYD dimensions. If the dimensions are changed, they must be changed in the applicable build program and in the interactive program (COMMON and OPENMS statements).

(2) A more comprehensive check of the build programs can be accomplished by separately reading the records from the magnetic tape and comparing these records with those printed by the build test programs.

(3) CYBER Record Manager cannot process magnetic tape blocks larger than 5,120 characters.

(4) The ADRIS interactive program expects the following data file assignments:

TAPE1 - Inventory data base

TAPE2 - Requirements data base

TAPE4 - Pointer file

TAPE6 - Aggregate data file

TAPE9 - Area data file

(5) The object code overlay of the ADRIS interactive program expects the overlays to be stored on file AADMS.

(6) Before ADRIS can be executed by a user logging in to INTERCOM under his own problem number, the RLEE file must be attached:

```
ATTACH,RLEE,ID=T770008
BEGIN,AFIT,RLEE
```

(7) ADRIS may be run as a batch card job if there are a large number of cases or products to be run. The user responses should be prepared on cards in the input file. This method can be a little tricky since all program requests must be anticipated. The input card images used to run the validation effort test cases are stored on the UPDATE library in *DECK TEST.

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: GCS/MA/77M-3
2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle): (6) ADVANCED DEGREE REQUIREMENTS INFORMATION SYSTEM.
5. TYPE OF REPORT & PERIOD COVERED: MS Thesis
6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s): (10) Matthew B. Waldron, Capt USAF
8. CONTRACT OR GRANT NUMBER(s)

9. PERFORMING ORGANIZATION NAME AND ADDRESS: Air Force Institute of Technology (AU), Wright-Patterson AFB OH 45433
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS: (9) Master's thesis,
12. REPORT DATE: (11) March 1977
13. NUMBER OF PAGES: 74

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): (12) 167p.
15. SECURITY CLASS. (of this report): Unclassified
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

(14) AFIT/GCS/MA/77M-3

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Appro[illegible] for public release; IAW AFR 190-17

JERRAL F. GUESS, Capt, USAF
Director of Information

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Advanced Degree Requirements Information System (ADRIS)
Academic Specialty Code (ASC)
Interactive Program
Terminal Response Time

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

The Advanced Degree Requirements Information System (ADRIS), an interactive computer-based data retrieval system, was updated, validated, optimized, and documented. The developmental ADRIS software designed for the Honeywell 6060 at Gunter AFS, Alabama, was converted for use on the Control Data CYBER 74 at Wright-Patterson AFB, Ohio. ADRIS was implemented for use by noncomputer oriented Air Force Institute of Technology faculty and staff at

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

012225

LB

time-sharing terminals. The ADRIS Inventory and Requirements data bases can be queried for information about Air Force graduate degree officers and Advanced Academic Degree job positions. The ADRIS system was analyzed, tested, and altered to insure correct operation and reliable output reports. A successful validation effort was conducted with the Air Force Data Services Center using two separately developed computer programs to compare results. A new feature was added to ADRIS to process user queries involving Aggregate Academic Specialty Codes--groupings of related ASCs attached to validated job positions. ADRIS was improved through optimization techniques that reduced data base processing time by over 70% and the resultant user response time by 50%. System User's and Maintainer's Guides are provided.