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USER'S MANUAL. AMP IMPLEMENTATION AND TRACKING SYSTEM. (U)

OCT 79 J BAILEY , S COTTON , N STEELE

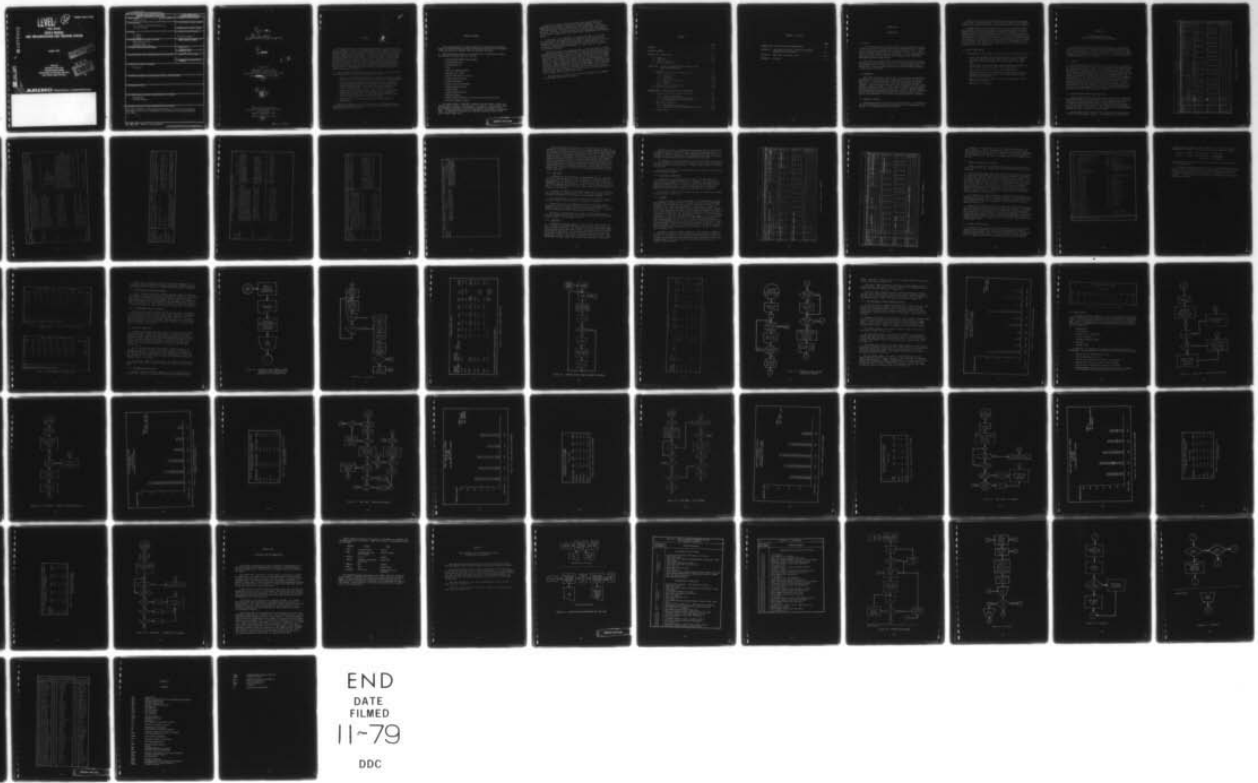
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**FINAL REPORT
USER'S MANUAL
AMP IMPLEMENTATION AND TRACKING SYSTEM**

October 1979

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Prepared for
Department of the Air Force
Aeronautical Systems Division
Wright-Patterson Air Force Base, Ohio 45433
under Contract F33657-79-C-0567

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FOREWORD

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This report presents a user-oriented description of a data base architecture designed to assist in the implementation and tracking of the Avionics Master Plan (AMP). This architecture is based on a preliminary design reported in ARINC Research Publication 1743-01-1-1963, *Avionics Master Plan: Data Base Mechanization Architecture*. Pertinent sections of that document have been reproduced in this report so that the data base description may be consolidated into a single consistent text. Refined features of the data base architecture that were developed subsequent to the preliminary design are also described. This report contains sufficient detail to permit the development of input, output, and data base management routines. Instructions for completing the input forms and suggested codes for the data field are also described.

This presentation is the final report under Contract F33657-79-C-0567, which sponsored the following ARINC Research activities:

- Coding of revised input to the Avionics Planning Baseline data base, as well as a hard copy publication of the Avionics Planning Baseline.
- The development of a mechanization architecture for an enhanced version of the APB data base -- referred to as the Avionics Historical Data base (AHD) -- including additional categories of avionics equipment data such as size, cost, and reliability.
- Production of configuration data summaries for the F-15A, F-16A, A-10A, F-4E, F-4G, RF-4C, F-111A, F-111E, F-111F, and EF-11A, which describe space, power, cooling, and other parameters relevant to integrating avionics on those airframes.
- Development of a user-oriented guide for the AMP data base architecture.

This report addresses only the last activity. Descriptions of our investigations relating to the other activities have been made in separate submittals under this contract.

EXECUTIVE SUMMARY

This report presents an overall framework for developing the Avionics Master Plan Implementation and Tracking System data base by the ASD computer center and serves as a general guide for preparing the input.

The architecture, based on a four-card input, is described in detail. The content of the data base is as follows:

- Program Element/Modification Number
- Project/Budget Code
- Task/Modification
- Title
- Source of Need/Requirement
- Road Map, Path, Node
- Mission Area Point of Contact
- Program Project Officer
- Project Precedence
- ASD/AX Level of Involvement
- Program Element Funding
- Program Status
- Program Element Monitor
- Technical Monitor
- Funding Allocation Factor by Mission Area and Aircraft Type
- Free Text Comment Category

The input process is described, together with the format in which the master record is stored. The four cards, in addition to any optional cards, are combined and repetitive information is deleted to decrease storage space. Having considered sizing and computational requirements, we conclude that it is feasible to establish this data base system on the PDP 11T60 with a single floppy disk.

A variety of output presentation formats have been developed and documented in this report. Presentations include standard listings, summarizations, and selected retrievals of data combinations. For each presentation format, flow charts and logic instructions have been specially developed. With these instructions the data base and output presentations can be coded to produce the Avionics Master Plan Implementation and Tracking System.

On the basis of our experience in preparing the AMP, it is evident that considerable data manipulation and updating will be required on a frequent basis. The system, when established, should fulfill this function much more efficiently than the manual method currently employed. The system will require full-time maintenance to ensure that the information is continuously updated.

The Avionics Master Plan Implementation and Tracking System is a data management system and query language for a specific data base and a specific data presentation format. While we did not undertake a detailed review of existing Data Base Management Systems (DBMS), we are aware that most DBMSs, commercial or Government, offer a cost-effective alternative to the application of specific software development for the use and maintenance of a data base. DBMSs provide data and program independence, flexibility, data protection, growth capabilities, and ease of maintenance. Query Languages and Report Generators that are available for most DBMSs provide "friendly and forgiving" user interfaces, designed with the non-DP user in mind. However, these Report Generators may not provide all of the output presentation formats that are required by the DAC.

Before detailed coding for this system is undertaken, we recommend that the DBMS alternative be explored.

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CHAPTER ONE

INTRODUCTION

1.1 SCOPE

This report documents an effort sponsored by the Deputy for Avionics Control, Directorate of Plans and Management Information (Code: ASD/AXP), U.S. Air Force Systems Command, under Contract F33657-79-C-0567. This effort, performed by ARINC Research Corporation, consisted of the development of top-level software architectural charts (or logic diagrams) and data coding forms for mechanization of the Avionics Master Plan (AMP) Implementation and Tracking System.

This effort is an extension of the architectural design developed by ARINC Research under Contract F33657-79-C-0475 and described in our Publication 1743-01-1-1963, *Avionics Master Plan: Data Base Mechanization Architecture*. The architecture has been refined and extended subsequent to publication of the AMP.

1.2 BACKGROUND

The Deputy for Avionics Control (DAC) is assigned the responsibility for monitoring and controlling Air Force avionics programs, as stated in AFR 800-28. In order for the DAC to perform the avionics controlling function, it was recognized that a single and centralized data base is required -- one that is maintained by the DAC and contains current information on avionics programs. It was further determined that the data base should be mechanized so that the data could be used and updated promptly by the DAC without undue burden on manpower resources. The AMP Implementation and Tracking System Mechanization architecture presented in this report, when implemented, will provide the required data base capability.

1.3 TECHNICAL APPROACH

ARINC Research used the results of a previous effort -- the design of the AMP Implementation and Tracking System data base mechanization architecture -- as a starting point for this work.

The Air Force reviewed and evaluated our previous work and requested a few changes in the data content. We assessed the impact of the requested changes on the overall design and then incorporated the necessary changes.

Subsequent to our previous design effort, we also published the AMP. This document contains a wide variety of presentation formats designed to summarize avionics program information in different categories. To the extent possible, these formats were provided for in the AMP Implementation and Tracking System Data Base Architecture. This entailed adding more flow diagrams and logic instructions, together with developing a printing format for each table. The mechanization architecture was then refined to present, in one document, more comprehensive instructions for implementation of the data base by the ASD computer center, and to serve as a general guide for preparing input to the data base.

1.4 REPORT ORGANIZATION

The remainder of this report is organized into the following sections:

- Chapter Two describes the data base architecture, including input processing, data base record format and instructions, a sample data input sheet, and examples for filling out the data input sheet.
- Chapter Three describes the data output processing; included are flow charts, logic instructions, and printing formats.
- Chapter Four presents conclusions and recommendations.
- Appendix A contains logic diagrams and related program sequence statements describing the details of the data input processing methodology and algorithms.
- Appendix B contains the codes to be used for recording aircraft types in the data base.
- Appendix C is a glossary.

CHAPTER TWO

THE AMP IMPLEMENTATION AND TRACKING SYSTEM DATA BASE ARCHITECTURE

This chapter describes the basic architecture for a computerized Avionics Master Plan (AMP) program tracking system data base. The data base has been designed to provide the Deputy for Avionics Control (DAC) with a flexible management tool that will assist in developing an avionics investment strategy for the AMP and in tracking the progress of avionics programs represented by this strategy.

2.1 PURPOSE

The architecture proposed in this report will be used by ASD/ADP as the basis for developing the program code required to implement the data-base storage and retrieval system. This architecture will also be used by ASD/AXP in creating and updating the mechanized AMP data base itself. The development, implementation, and tracking of the Avionics Master Plan requires the analysis of large quantities of programmatic data. The impact of an avionics investment decision must be viewed from a number of considerations -- the total dollar difference within a given technology area, the relationship of the program to other key programs, and the program's priority from a mission-deficiency point of view. As many of the investment decisions are made on a very quick response basis, the accessibility of the data becomes a key factor in permitting the DAC to carry out its assigned charter. This data base architecture has been developed to provide greater data accessibility.

2.2 DATA BASE INPUT FORMAT AND INSTRUCTION

Data will be entered by cards into the master data base, edited for proper card format, and sorted onto the master data base. The data base is entered by cards keypunched from the format shown in Figure 2-1. Although the data base will be sorted on various fields for analyses, it is currently sequenced for storage in the computer by program element, project, and task. The data base is then accessed by various application programs to present the data by printed output.

The data input process involves both the data base initialization (creation) and maintenance (update). The update function consists of

AMP DATA CODING FORMS		CARD COLUMNS		FUNCTIONING															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ELEMENT		PROJECT		TITLE		SOURCE OF NEED/EQUIPMENT		ROAD MAP		PATH		MISSION AREA		TECH. OFFICER		PROJ. PREC.		FUNDING	
1		1		1		1		1		1		1		1		1		1	
2		2		2		2		2		2		2		2		2		2	
3		3		3		3		3		3		3		3		3		3	
4		4		4		4		4		4		4		4		4		4	
5		5		5		5		5		5		5		5		5		5	
6		6		6		6		6		6		6		6		6		6	
7		7		7		7		7		7		7		7		7		7	
8		8		8		8		8		8		8		8		8		8	
9		9		9		9		9		9		9		9		9		9	
10		10		10		10		10		10		10		10		10		10	
11		11		11		11		11		11		11		11		11		11	
12		12		12		12		12		12		12		12		12		12	
13		13		13		13		13		13		13		13		13		13	
14		14		14		14		14		14		14		14		14		14	
15		15		15		15		15		15		15		15		15		15	
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37		37		37		37		37		37		37		37		37		37	
38		38		38		38		38		38		38		38		38		38	
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98		98		98		98		98		98		98		98		98		98	
99		99		99		99		99		99		99		99		99		99	
100		100		100		100		100		100		100		100		100		100	

Figure 2-1. DATA INPUT CODING FORM

changing current data, deleting data, or merging new data into the current master file. Column 79 on the input cards is used to denote whether the data are to be added (A), changed (C), or deleted (D) from the data base. In all cases, the edit capability will validate the input data for proper format, list any cards in error, and print the entire new master data base, including those data accepted for and entered into the master file. Detailed descriptions of the input process, including logic diagrams and program sequence statements, are contained in Appendix A.

The card input process uses four card types. Each card has the card type printed in column 1 and the identifying program element, project, and task in columns 2 through 13. Column 80 is used to number each card type in sequence. This last numbering is necessary when multiple cards are required for a given sequential file data record. Tables 2-1 through 2-5 present the descriptions and notational conventions for the identifying data elements. We suggest that alphanumeric data entered into the coding form be left-justified and numeric data be right-justified. The notations cited may be modified or enhanced as the development of the data base evolves and are not intended to be all-inclusive at this time.

The four card types are described in the following subsections.

2.2.1 Card Type 1

In addition to the identifiers, card type 1 contains the text for the title in columns 14 through 32, and the source of need or requirement in columns 33 through 51. There is no sorting on these fields. The road map, identified in columns 52 through 56, is the avionics functional area planning road map to which the program can be related and is a field that can be sorted. The associated path and node are contained in columns 57 through 61. The codes to be used for identifying road maps are presented in Table 2-2. Additional codes generated for other road maps developed should not exceed five characters.

Key project personnel are identified in two fields. Mission Area Point of Contact occupies columns 62 through 66, followed by the Program Project Officer in columns 67 through 71. Data in these fields will consist of alphabetic abbreviations of names. Project Precedence, columns 72 through 75, gives the overall project priority as a four-digit number. Column 76 is a one-digit number signifying ASD/AX Level of Involvement. The "1st Year of Funding" input, columns 77 and 78, is used to enable the computer program to align the funding years on card type 2. In other words, if the first year of funding input is 1981, the funds for year 1 will be stored on the data base table under 1981; funds for year 2 will be stored under 1982, etc.

There may be one or two additional type 1 cards to allow for multiple road map effects on a given program. For the additional type 1 cards, the card type, program element, project, and task must be entered, as well as the road map, path, and node information. The remainder of the card can be left blank. Table 2-2 presents the data element descriptions and notations for card type 1.

Table 2-1. DATA ELEMENT DESCRIPTIONS AND NOTATIONAL CONVENTIONS
FOR DATA INPUT COMMON TO ALL FOUR CARD TYPES

Element	Description	Notational Convention
Program Element/ Mod number	The alphanumeric identification of a specific program element or modification number, either existing or proposed, pertaining to the road map.	Up to 6 character alphanumeric (e.g., 64201, 62702, 6XXX, F2906, 123456).
Project/Budget Code	Breakdown of P&D program into specific efforts or technical areas or modification program into appropriate budget code.	Four-digit numeric (i.e., Project 5531, Budget Code 1100).
Task/Mod Class	Task/modification class (e.g., 09, IV or VI).	Up to two-digit P&D task number or Roman numeral of modification class (e.g., IV, V).

Table 2-2. DATA ELEMENT DESCRIPTIONS AND NOTATIONAL CONVENTIONS FOR DATA INPUT FOR CARD TYPE 1		
Element	Description	Notational Convention
Title	Phrase, title, or acronym describing the program element/project or mod program/task. Either as it is widely known in the avionics community (e.g., AWES, EW Master Plan, WILD WEASEL/APR-38) or as it best portrays the purpose of the program effort.	Title for the program, project, mod entry.
Source of Need/Requirement	The primary basis upon which the program was initiated or is proposed. For example, this might be a validated or draft user requirement (SON, ROC, GOR), a mission-oriented need (MAA result, MENS), or an economic consideration (LCC payback from development, acquisition, or support savings).	ROC, GOR, SON in user notation (e.g., TAP 30-79) MAA - MAA Scenario: CC - Central Conflict TC - Theater Conflict IM - Implementation MO - Mobility OR - Orientation ECON - Economic
Road Map	The specific functional planning road map to which the remaining data across the sheet apply (e.g., Target Detection and Validation (TD/V), Software Modeling (SWM), Test and Evaluation (TE). These road maps were initially developed at the second annual Avionics Planning Conference (November 1978).	Target Detection and Validation (TD/V), Navigation Launch and Release (NLR), Avionics Communications and Information Processing (ACIP), Survivability Electronic Warfare (EW), Survivability Cooperative Effects (CCE), Survivability Hardening (HARD), Availability (AV), Standardization Core Avionics Architecture (SCA), Standardization Common/Commercial (SCC), Test and Evaluation (TE), Software Policy (SWP), Software Model (SWM), Software Testing (SWT), Software Support (SWS), Standardization Mission Avionics (STMA).
Path	The road map path (Roman numeral) representing a planning alternative on which the program element is addressed.	Roman numeral corresponding to road map path.
Mode	The road map path decision or activity node (letter or Arabic number) to which the program element applies.	Letter or Arabic number related to road map mode.
Mission Area Point of Contact	ACC/AM Mission Area Point of Contact.	Five-letter abbreviation of name.

Table 2-2. (continued)		
Element	Description	Notational Convention
Program Project Officer	ASD/AX Program Project Officer.	Five-letter abbreviation of name.
Project Precedence	Precedence rating taken from U.S. Air Force Project P.M.D.	Four-digit number formed by removing hyphen from project precedence rating in P.M.D. (10-05 becomes 1005) -- 0000 is the highest precedence.
ASD/AX Level of Involvement	Self-explanatory.	One-digit number except 0; highest level is 1.
First Year of Funding	First fiscal year in which item is to be funded. In the case of an on-going program, the current budget year should be entered. This year corresponds with Year 1 under "Funds".	Last two digits of the first fiscal year in which funding is approved or recommended. For on-going programs, it is the current fiscal year.

Table 2-3. DATA ELEMENT DESCRIPTIONS AND NOTATIONAL CONVENTIONS
FOR DATA INPUT FOR CARD TYPE 2

Element	Description	Notational Convention
Funding Information	Proposed or approved funding level by fiscal year in millions of dollars and fractions thereof as appropriate. Recommended or estimated funding which is not specifically approved for that program/project will be distinguishable: The approved funding baseline is the current President's Budget. Year 1 should correspond to the "First Year of Funding" entry previously described.	Entries to the nearest \$0.1M. Negative values will be input to represent estimated or recommended funding, not yet approved. These recommended funding values will be printed in parentheses () in the output format.
Program Status	The current status of the program in the acquisition or modification cycle (e.g., engineering development, advanced development, production, installation or on-going mod, delayed funding or cancelled).	Exploratory Development (XD), Advanced Development (AD), Engineering Development (ED), Acquisition (AC), Proposed Follow-on to Current Program (FO), On-Going Modification (OG), Planned (PL), Cancelled (CC).
PEM	The Program Element Monitor for the program cited.	Program Element Monitor Code (e.g., RDEDV, LEVY).
Technical Monitor	The Government activity performing the work or monitoring the technical aspects if the work is being performed by contractors, as appropriate. If a proposed program is involved, then the suggested activity is listed and distinguished by parentheses ().	Appropriate organization performing program effort or technical monitor of contractor effort (e.g., AFAL, NAVAIR, ASD/XFE).

Table 2-4. DATA ELEMENT DESCRIPTIONS AND NOTATIONAL CONVENTIONS FOR DATA INPUT FOR CARD TYPE 3		
Element	Description	Notational Convention
Allocation (Alloc)	The fractional value used to allocate the program to either aircraft type or mission area, as appropriate. Allocations to several mission areas or aircraft types should be derived using the method developed previously and presented in AFINC Research Publication 1968-01-2-1944.	Fraction up to four decimal places.
Mission Area	List of the applicable mission areas to which the program can be related (e.g., reconnaissance, strategic defense).	Air-to-Surface (A/S), Reconnaissance (RECCE), Counter Air/Air (CA/A), Counter Air/Ground (CA/G), Strategic Defense (STDEF), Strategic Defense (STDEF), Tactical Mobility (TMOB), Strategic Mobility (SMOB), Training (TR), All Tactical (A/T), All Strategic (A/ST), All Mobility (A/M).
Aircraft Type (A/C)	The aircraft types to which the program applies (e.g., F-106, A-10, B-52G/H). If the program relates generally to the Air Force fleet or if the specific aircraft type(s) are not known, then special codes should be used.	Three-digit code (see table in Appendix B).

Table 2-5. DATA ELEMENT DESCRIPTIONS AND NOTATIONAL CONVENTIONS FOR DATA INPUT FOR CARD TYPE 4		
Element	Description	Notational Convention
Comments	Section used to enhance, clarify, or emphasize program data (e.g., "funding recently increased", "parallel effort on-going in the Navy").	Free-form narrative; use for amplifying remarks or to reference a previous program from which this program evolved (e.g., 64YYY transitioned from 63XXX or 64YYY now includes previous 64ZZZ).

The data required for card type 1 is generated through a number of processes. A listing of avionics-related program elements and modifications was developed by manually researching the Program Objective Memorandum (POM) for R&D and the Class V and IV modification priority lists (AFLC document). Source of need or requirement is documented in the POM. Program road map, path, and node are determined either through the Avionics and Armament Planning Conference Process or by manually comparing the project description to the road maps contained in the Avionics Planning Guidance (APG). Mission area point of contact, program project officer, and ASD/AX level-of-involvement data are available in ASD/AXP. The project precedence is obtained from the project Program Management Directive (PMD) or from the project PEM. First year of funding is obtained from the POM or Five-Year Defense Plan (FYDP).

2.2.2 Card Type 2

In addition to the identifiers, program element, project, and task, card type 2 contains data in columns 14 through 63 related to funding for up to 10 years. If additional years of funding are to be entered, one additional card type 2 may be used. In this case, the "year 1" field will actually be interpreted as "year 11", "year 2" will be interpreted as "year 12", etc. When two cards are needed, columns 64 through 78 can remain blank on the second card.

In general, estimated or recommended funding that is not yet approved must be entered as a negative value. When outputted, the value will be printed in parentheses to distinguish it from approved funding.

The program status is entered in columns 64 and 65, PEM in columns 66 through 70, and the technical monitor in columns 71 through 78.

A blank entered for any funding year will be printed as a blank. Therefore, if a zero level of funding (approved or recommended) is the desired response, "0" should be entered as appropriate. Table 2-3 presents the data element descriptions and notations for card type 2.

The sources of funding data are the RD-5 for R&D programs and the P3-X for aircraft modifications. The narrative of the RD-5 contains PEM, Technical Monitor, and the program status.

2.2.3 Card Type 3

In addition to program element, project, and task identifiers, card type 3 contains the weighted allocation, mission area, and aircraft type for up to five allocations. The allocation is a four-place decimal amount, with the decimal point understood (.XXXX). An allocation of 1.0 can also be inserted in this field. For each allocation there is a mission area (up to five characters) or a coded aircraft type (three-digit code, see Appendix B), or both. There may be a maximum of two type-3 cards. Table 2-4 presents the data element descriptions and notations for card type 3.

Data for card type 3 are gathered by discussions with the project PEM to determine specific aircraft for which the potential product is being planned. If there is only one aircraft, then the allocation factor is 1.0. For multiple aircraft, allocations are determined by the ratio of aircraft inventories obtained from the force structure data in the APB.

For example, if a program applied to the F-15A and F-4E, the allocation for the F-15 would be the ratio of the number of F-15s in the inventory to the total number of F-15As and F-4Es. A similar number would be calculated for the F-4E.

Mission area applies to aircraft mission, as reflected in the Air Force Planning Guidance documents.

2.2.4 Card Type 4 (Optional)

In addition to the program element, project, and task identifiers, card type 4 uses columns 14 through 77 for comments. The reference to a previous program element for follow-on or consolidated programs should be noted in the comments field. At present, only two type-4 cards will be maintained in the data base. The use of abbreviations is encouraged. Table 2-5 presents a brief description of the data for card type 4.

The sources of data for this card are varied, as the data are included at the discretion of the user.

2.2.5 Examples

Figures 2-2 and 2-3 contain two examples of program elements from the Target Detection/Validation (TD/V) road map, both of which are PAVE PENNY programs. Both programs are located at the same node (1), path (1), and road map (TD/V). These data are filled in on card type 1, columns 52 through 61. The first 13 columns identified the program element. Example 1 is a modification program; P1100 is the modification number, left-justified since it is alphanumeric. This modification number is placed in columns 2 through 6 of each card used. The budget code, 2951, is placed in columns 8 through 11 of each card, and the modification class, V, is left-justified and placed in column 12. The title, "A-7 PAVE PENNY", and the source of need or requirement, "TAC 23-72", are recorded in columns 14 through 51. Five-letter abbreviations of the names of the mission area point of contact and the program project officer are placed in columns 62 through 71. The project precedence, "04-25", is recorded as "0425" in columns 72 through 75. This card ends with the ASD/AX level of involvement, "5", and first fiscal year of funding, "80".

Card type 2 contains funding information. This program is funded in FY 1980 and FY 1981. Year 1 is now specified as 80, and year 2 will therefore be 81. The funding is for \$7,000,000 in FY 1980, and \$1,700,000 in FY 1981. The program is in the acquisition phase, status "AC", the program element monitor is LEY (left-justified), and the technical monitor is "ASD/AE" (left-justified).

Figure 2-2. DATA INPUT -- EXAMPLE 1

AMP DATA CODING FORMS									
CARD COLUMNS									
1	2	3	4	5	6	7	8	9	10
PROGRAM ELEMENT	PROJECT	TITLE	SOURCE OF NEED/REQUIREMENT	ROAD MAP	PATH	MISSION AREA FOR OFFICER	PROG. REC.	TECH. MONITOR	FUNDING
1	271131	A-10 SQUADRONS	TAC 23-72	TD/V	I	SMITH BENJ TO 430	80		
2	271131								
3	271131								
4	271131								
5	271131								
6	271131								
7	271131								
8	271131								
9	271131								
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94	271131								
95	271131								
96	271131								
97	271131								
98	271131								
99	271131								
100	271131								

Figure 2-3. DATA INPUT -- EXAMPLE 2

Example 2 is program element "27131", right-justified because the entry is numeric. There is no subdivision of project and task in this particular program, and the second two categories are therefore left blank. The information in this example is recorded as in the previous example. The only difference is that there is a comment card in this example (card type 4).

2.3 MASTER DATA BASE RECORD FORMAT

Table 2-6 presents the recommended data base record format for the master data storage; this format will be used during both input and output processing.

It is envisioned that floppy disks will be used for data base storage. The data base record format is designed in block increments of 128 bytes. If a particular program element data set requires no type-4 cards and only one type-1 and one type-3 card, a basic 256-byte block is required. One additional 128-byte block is required in either of two cases: (1) one or two type-4 "Comments" cards are used, or (2) additional or optional type-1 and -3 cards are used. Therefore, the record size for any particular program element/project/task sequence may be 256, 384, or 512 bytes, depending on the quantity of input data. Bytes 255 and 256 in the basic block are used to indicate the record size and the nature of additional blocks "chained" to the basic block.

This approach was taken to maximize utilization of disk storage. However, if varying the record sizes makes searching or sorting too complex, consideration should be given to forcing consistency of record size to 512 bytes regardless of the type and quantity of data involved for a given program or project set.

Normalizing the funding data to the same fiscal year baseline facilitates the design and execution of the sort and print routines. For example, questions concerning the statistics for funding for a particular year are easily extracted. The flow chart for converting input data cards to the logical data base records is shown in Figure A-2 of Appendix A. Each record contains funding information for the years 1980 through 1998, so that the format will be stable for several years of use and historical data will be saved automatically.

2.4 SIZING OF THE DATA BASE

Our review of the current five-year defense plan reveals that approximately 140 data records will be required to accommodate the avionics-related program elements (PEs) and their associated projects. Each project requires a separate data record. In addition to the currently approved PEs, it is expected that the data base will contain up to 100 proposed

Table 2-6. LOGICAL DATA BASE RECORD FORMAT

Bytes	Primary Data Block Data Element	Bytes	Primary Data Block Data Element
1-6	Program Element/Modification Number	229-233	MSN Area (4)
7-10	Project/Budget Code	234-236	ACFT Type (Coded) (4)
11-12	Task/Modification Class	237-240	Allocation (5)
13-31	Title	241-245	MSN Area (5)
32-50	Source of Need or Requirement	246-248	ACFT Type (Coded) (5)
51-55	Road Map	249-254	Future Growth
56-58	Path	255	Additional Block Indicator *
59-60	Node		(For optional Type 4 Card data)
61-65	Mission Area P.O.C.	256	Additional Block Indicator *
66-70	Program Project Officer		(For optional Type 1 and/or Type 3 Card data)
71-74	Project Precedence		
75	ASD/AX Level of Involvement		
76-77	First FY of Funding		
78	Blank		
79-83	1980 Funding		Additional Data Block
84-88	1981 Funding		for Optional Type 1 and Type 3 Cards
89-93	1982 Funding	1-4	Allocation (6)
94-98	1983 Funding	5-9	MSN Area (6)
99-103	1984 Funding	10-12	ACFT Type (Coded) (6)
104-108	1985 Funding	13-16	Allocation (7)
109-113	1986 Funding	17-21	MSN Area (7)
114-118	1987 Funding	22-24	ACFT Type (Coded) (7)
119-123	1988 Funding	25-28	Allocation (8)
124-128	1989 Funding	29-33	MSN Area (8)
129-133	1990 Funding	34-36	ACFT Type (Coded) (8)
134-138	1991 Funding	37-40	Allocation (9)
139-143	1992 Funding	41-45	MSN Area (9)
144-148	1993 Funding	46-48	ACFT Type (Coded) (9)
149-153	1994 Funding	49-52	Allocation (10)
154-158	1995 Funding	53-57	MSN Area (10)
159-163	1996 Funding	58-60	ACFT Type (Coded) (10)
164-168	1997 Funding	61-65	Second Road Map
169-173	1998 Funding	66-68	Second Path
174-175	Program Status	69-70	Second Node
176-180	PEM	71-75	Third Road Map
181-188	Technical Monitor	76-78	Third Path
189-192	Allocation (1)	79-80	Third Node
193-197	MSN Area (1)	81-128	Future Growth
198-200	ACFT Type (Coded) (1)		
201-204	Allocation (2)		
205-209	MSN Area (2)		
210-212	ACFT Type (Coded) (2)		Additional Data Block
213-216	Allocation (3)		for Optional Type 4 Cards
217-221	MSN Area (3)		
222-224	ACFT Type (Coded) (3)	1-64	Comments (First Type 4 Card)
225-228	Allocation (4)	65-128	Comments (Second Type 4 Card)

*When both additional data block types exist in a record, the block consisting of Type 1 and Type 3 Card data will always appear first.

programs under the notation "62XXX", "64YYY", etc. Under the worst-case assumption, we estimate that the data base should be sized as follows:

$$140 \text{ PEs} \times 4 \text{ blocks} \times 128 \text{ bytes/block} = 71,680 \text{ bytes}$$

$$100 \text{ PEs} \times 3 \text{ blocks} \times 128 \text{ bytes/block} = \underline{38,400 \text{ bytes}}$$

$$\text{Total bytes} = 110,080 \text{ bytes}$$

Thus the data base can reside on one 128K-byte floppy disk and allow for some future expansion.

We further estimate that when the data for aircraft modification programs are added to the data base, an estimated additional 70,000 bytes will be required. Therefore, it is not possible to include them on the same 128K-byte disk with the RDT&E program data; a separate disk would be required. If the disk will hold 256K bytes, a combination of the program data may be desirable.

CHAPTER THREE

DATA BASE OUTPUT AND PRESENTATION

This chapter contains detailed logic diagrams and program sequence step descriptions for output presentations. The data output formats should be flexible and yet responsive to the specific user needs. In addition to the complete listing of the data base records, the user must be able to request listings of the data that have been sorted by various categories, as well as listings of only selected portions of the data base. For the latter listing, it is necessary both to screen and to sort the data.

Section 3.1 provides instructions for several sorting options for summary presentations, while Section 3.2 provides instructions for presentations that are both screened and sorted. These latter outputs contain the information necessary to construct many of the graphs from the AMP. Other sorting and screening options are discussed in Section 3.3, and a complete listing of the master data base is presented in Appendix A.

3.1 SORTING OPTIONS FOR OUTPUT PRESENTATIONS

The DAC will require standard data summary presentations and formats that can be requested repeatedly without requiring any special coding. Examples of data summary outputs that will provide general program visibility that the DAC often requires are presented in the following sections. Accompanying these outputs are detailed logic diagrams and algorithms that describe each output process.

3.1.1 Funding Presentations

One of the most often required presentations is the financial summary. Three options have been selected for summarizing and presenting the overall funding allocations: funding sorted by mission area, aircraft type, and status. Section 3.1.2 presents a listing that contains descriptive information in addition to a five-year funding summary.

The first option is presented in Figure 3-1. Funds are sorted and summarized by mission area, e.g., Air-to-Surface (A/S), Reconnaissance (RECCE). The second option, presented in Figure 3-2, lists funds by aircraft type, e.g., A-10, B-52G/H, F-106. The third option is to list funds by current status, e.g., Advanced Development (AD), Engineering Development (ED). This summary is presented in Figure 3-3.

FINANCIAL SUMMARY - FUNDS ACCUMULATED BY MISSION AREA									
MISSION	1980	1981	1982	1983	1984	1985	1986	BEYOND	TOTAL*
A/S	25.0	25.0	25.0	25.0	25.0	(25.0)	(25.0)	(40.0)	(215.0)
PECCE	12.0	12.0	12.0	12.0	12.0	(12.0)	(12.0)	(20.0)	(104.0)
CA/A	5.0	5.0	5.0	5.0	5.0	(5.0)	(5.0)	(7.0)	(42.0)
STOFF	5.0	5.0	5.0	5.0	5.0	(5.0)	(5.0)	(7.0)	(42.0)
STDEP	5.0	5.0	5.0	5.0	5.0	(5.0)	(5.0)	(7.0)	(42.0)
TMCE	5.0	5.0	5.0	5.0	5.0	(5.0)	(5.0)	(7.0)	(42.0)
SMOB	5.0	5.0	5.0	5.0	5.0	(5.0)	(5.0)	(7.0)	(42.0)
TR	5.0	5.0	5.0	5.0	5.0	(5.0)	(5.0)	(7.0)	(42.0)
CA/G	5.0	5.0	5.0	5.0	5.0	(5.0)	(5.0)	(7.0)	(42.0)
.
.
.
TOTALS	72.0	72.0	72.0	72.0	72.0	(72.0)	(72.0)	(109.0)	

*INCLUDES BOTH FUNDED AND NON-FUNDED REQUIREMENTS.

Figure 3-1. FINANCIAL SUMMARY -- FUNDS ACCUMULATED FOR MISSION AREA
(EXAMPLE ONLY)

FINANCIAL SUMMARY - FUNDS ACCUMULATED FOR AIRCRAFT TYPE									
A/C TYPE	1980	1981	1982	1983	1984	1985	1986	BEYOND	TOTAL*
A-10	12.1	15.0	10.0	7.1	6.8	5.0			56.0
B-52G/H	5.0	12.0	19.0	20.0	19.0	12.0	(5.0)		(92.0)
F-106		2.3	14.0	14.0	14.0	7.0	7.0		58.3
EF-111A			101.9	101.9	101.9	101.9	55.0		462.6
.									
.									
.									
TOTALS*	17.1	29.3	144.9	143.0	141.9	125.9	(67.0)		

*INCLUDES BOTH FUNDED AND NON-FUNDED REQUIREMENTS.

Figure 3-2. FINANCIAL SUMMARY -- FUNDS ACCUMULATED FOR AIRCRAFT TYPE (EXAMPLE ONLY)

FINANCIAL SUMMARY - FUNDS ACCUMULATED BY STATUS									
STATUS	1980	1981	1982	1983	1984	1985	1986	BEYOND	TOTAL*
AC	300.0	355.0	345.0	311.0	(311.0)	(305.0)	(300.0)		(2227.0)
AD	100.0	102.0	102.0	100.0	(100.0)	(100.0)	(100.0)		(704.0)
SD	125.0	100.0	100.0	120.0	(131.0)	(136.0)	(125.0)		(837.0)
OG	700.0	700.0	700.0	650.0	(700.0)	(700.0)	(700.0)		(4850.0)
XD	150.0	105.0	105.0	165.0	(165.0)	(170.0)	(150.0)		(1010.0)
.									
.									
.									
TOTALS*	1375.0	1362.0	1352.0	1340.0	(1407.0)	(1411.0)	(1375.0)		

*INCLUDES BOTH FUNDED AND NON-FUNDED REQUIREMENTS.

Figure 3-3. FINANCIAL SUMMARY BY STATUS (EXAMPLE ONLY)

Each of these presentations involves sorting and summarization. No screening of data is involved; no funding information is deleted. Figure 3-4 presents the flow chart for processing each of these three summaries.

3.1.2 FYDP and Brief Program Description

In this listing, the data are sorted by program element (or modification number, if appropriate). Funding information is limited to the current five years of the FYDP, and additional descriptive information is given. This information includes program element, project number, task number (or modification number, modification budget code, modification class), mission type, and aircraft type. This output presentation is depicted in Figure 3-5; the flow chart, presented in Figure 3-6, provides logic instructions.

3.1.3 Program/Modification Presentation

This data base listing presents most of the descriptive information, sorted by program element or modification number, as before. In addition to the descriptors of the previous listing, this listing also includes the title, road map, path, node, program project officer, project precedence, and ASD/AX level of involvement. Not included in this listing are any funding data. This listing is presented in Figure 3-7, and the flow chart is presented in Figure 3-8.

3.2 AMP GRAPH COMPILATION

During our development and publication of the first Avionics Master Plan, we developed several graphical formats to highlight significant funding divisions. ASD/AXP has indicated that it would be desirable to have these graphs produced by the AMP Implementation and Tracking System. Of the 12 graphs contained in the AMP, 5 could not be included here because they incorporated information not recorded in the data input sheets. The feasible output formats are discussed in the following subsections.

Each of the graphs discussed below depict funding levels for the current five years of the FYDP. Each graph is shown as it appears in the AMP, followed by a presentation of the information in a tabular format, and by flow charts and additional logic instructions for processing the information. The option exists to print the information either in a tabular format or in a graph.

The first two graphs list total funds. The third graph lists only modification funds, and the last four graphs list funds in selected road maps.

3.2.1 FYDP Funding Presentations

The first output presentation summarizes the FYDP funding levels by mission area. Funds are also divided into modification funds and R&D

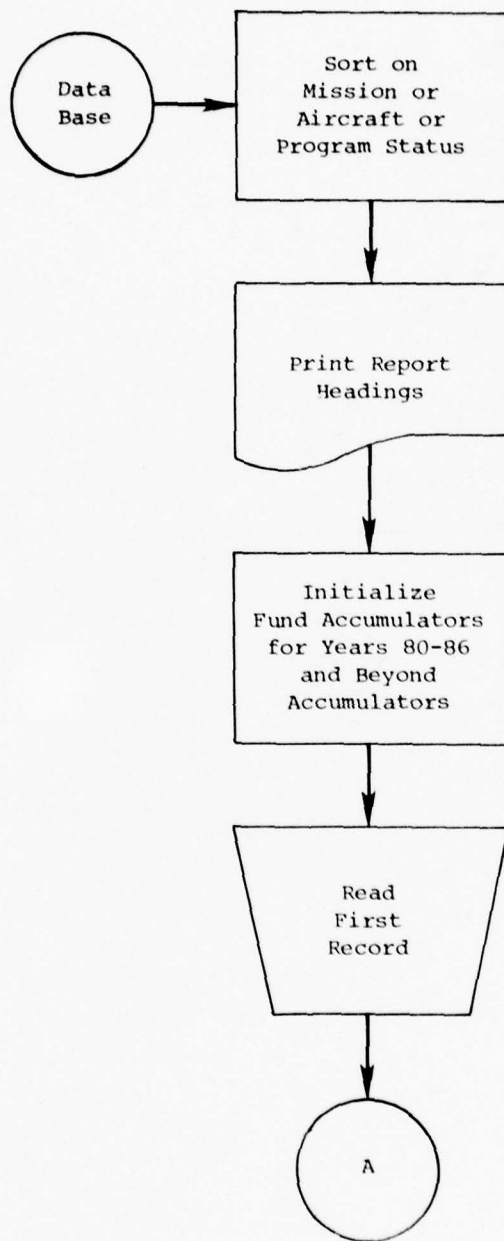


Figure 3-4. ROUTINE TO PRINT SUMMARY OF FUNDS ACCUMULATED FOR MISSION AREA OR AIRCRAFT TYPE OR PROGRAM STATUS

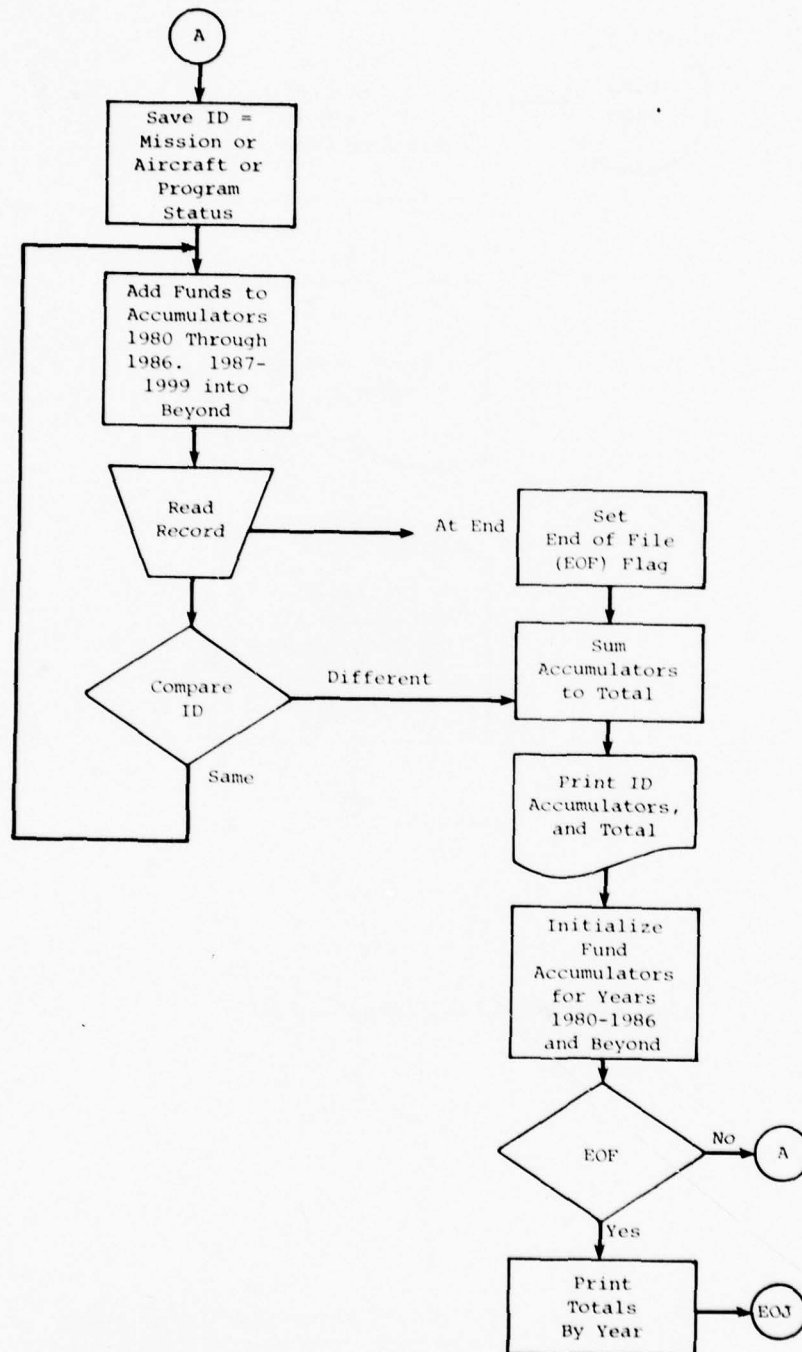


Figure 3-4. (continued)

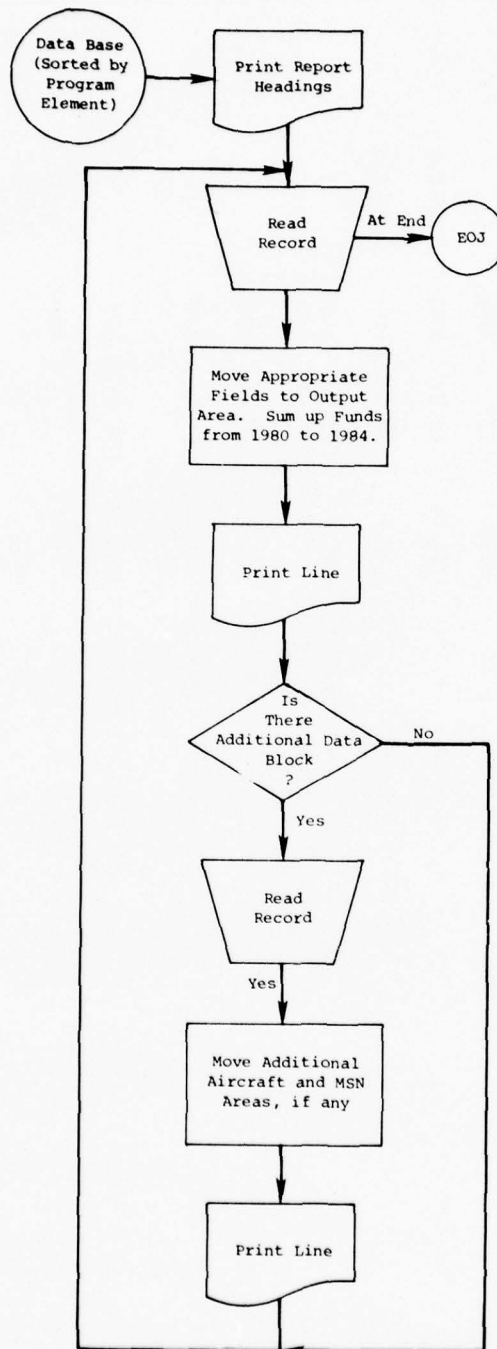


Figure 3-6. ROUTINE TO PRINT FUNDING SUMMARY BY PROGRAM

PROGRAM ELEMENT LISTING											
PROGRAM ELEMENT/ MOD NUMBER	PROJECT MOD BUDGET CODE	TASK MOD-CLASS	TITLE	PROG. OFFICER	PROJ. PREC.	ASD/AX L.O.I.	PMAP	PATH	MODE	MSN	A/C TYPE
11113	2406		B-52 AVIONICS UPDATE	SNITS	0601	7	NLR AV	1 1	1 4	STOFF	B-52G/H
11142	2301		KC-135 AVIONICS	TIMS	0306	2	NLR AV	1 1	1 3	SMOB	KC-135
27129			F-111 SQUADRONS	BAKER	0205	2	HARD NLR	IV I	B A	A/S	F-111D/F
64709	2306		ADVERSE WX STRIKE	LANDS	0404	3	TD/V	III	3	A/S	ETF
3013	1100	V	PAVE TACK	LAVE	0203	2	TD/V	I	A	PECCE CA/G	RF-4C F-111F F-4E

Figure 3-7. PROGRAM ELEMENT SORT (EXAMPLE ONLY)

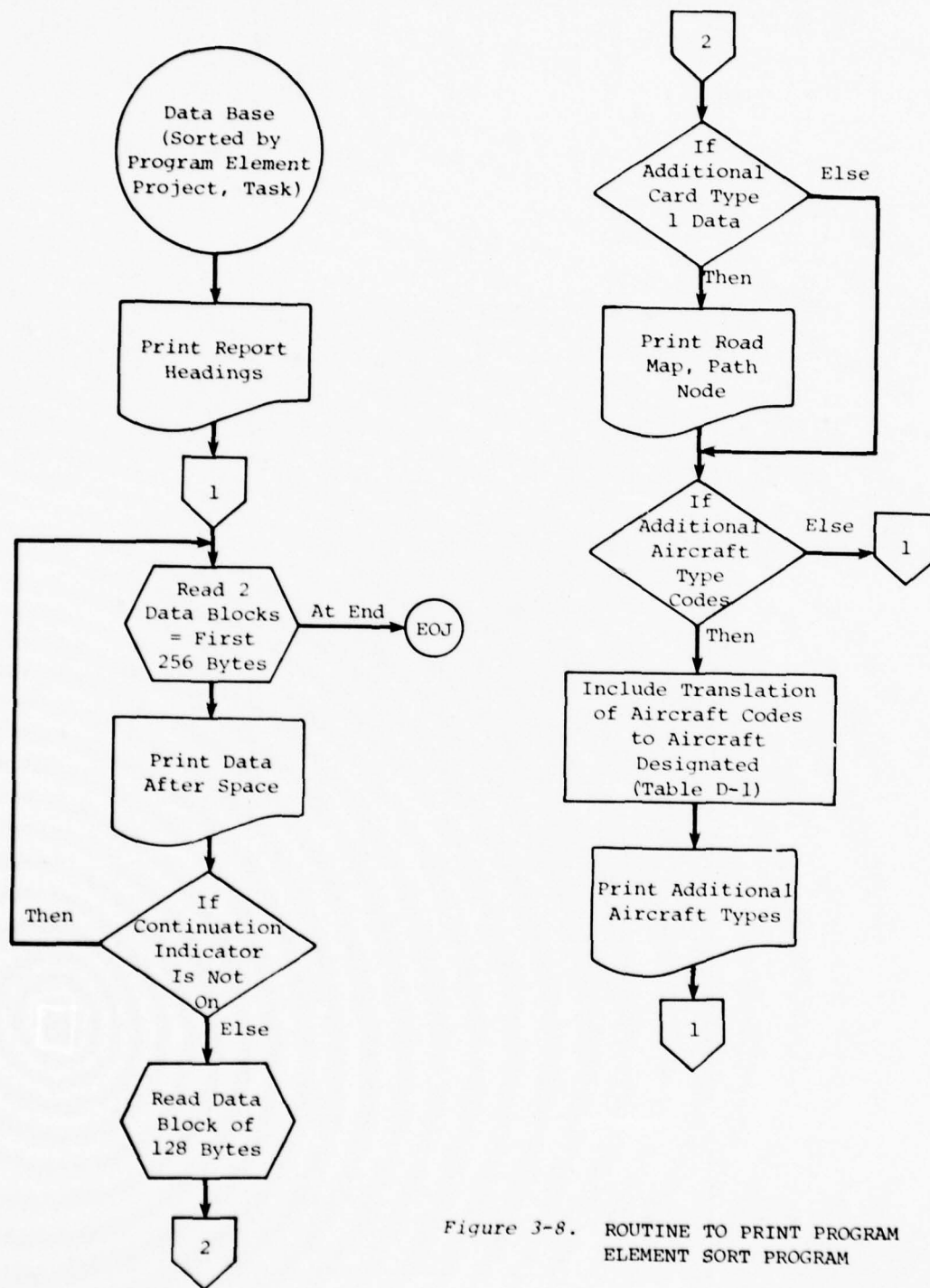


Figure 3-8. ROUTINE TO PRINT PROGRAM ELEMENT SORT PROGRAM

funds. The graph is shown in Figure 3-9, the tabular format in Figure 3-10, and the flow chart in Figure 3-11.

The second output presentation summarizes the FYDP funding levels by functional area. The graph is shown in Figure 3-12, the tabular format in Figure 3-13, and the flow chart in Figure 3-14.

The third output summarizes avionics modification funds by selected aircraft type. The user could select the particular aircraft desired or ask that all aircraft funds be printed. The graph is shown in Figure 3-15, the tabular format in Figure 3-16, and the flow chart in Figure 3-17.

3.2.2 FYDP Funding by Selected Road Map Function

In this section, the graphs present more details about a specific road map function or group of related road map functions. The first graph, Figure 3-18, lists RDT&E funds by year for Avionics Communication and Information Processing (ACIP) programs. Annual funds are also divided by mission area. The mission areas listed are "Strategic", "Tactical", and "General".

Strategic mission areas are defined here to be Strategic Offense (STOFF), Strategic Defense (STDEF), Strategic Mobility (SMOB), and All Strategic (A/ST). Tactical mission areas are defined as Tactical Mobility (TMOB), Counter Air/Air (CA/A), Counter Air/Ground (CA/G), Air-to-Surface (A/S), and All Tactical (A/T). General is defined as all other mission areas.

The tabular format for this graph is shown in Figure 3-19, and the flow chart is shown in Figure 3-20.

The next graph, Figure 3-21, depicts total funds for all programs falling under the Availability (AV) Road Map function. Annual funds are divided into RDT&E and Class IV Modification funds. Class V funds are not included. The tabular format is shown in Figure 3-22 and the flow chart in Figure 3-23.

In the next graph, Figure 3-24, Annual RDT&E funds are listed for all survivability-related road map functions. These functions are Survivability Electronic Warfare (EW), Survivability Cooperative Effects (COE), and Survivability Hardening (HARD). The tabular format follows in Figure 3-25 and the flow chart in Figure 3-26.

The last graph, Figure 3-27, depicts annual RDT&E funds for all standardization-related road map functions. These functions are Standardization Mission Avionics (STMA), Standardization Core Avionics Architecture (STCA), and Standardization Common/Commercial (STCC). Annual funds are divided into 6.4, 6.3, and 6.2 funds. The tabular format for this graph is shown in Figure 3-28 and the flow chart in Figure 3-29.

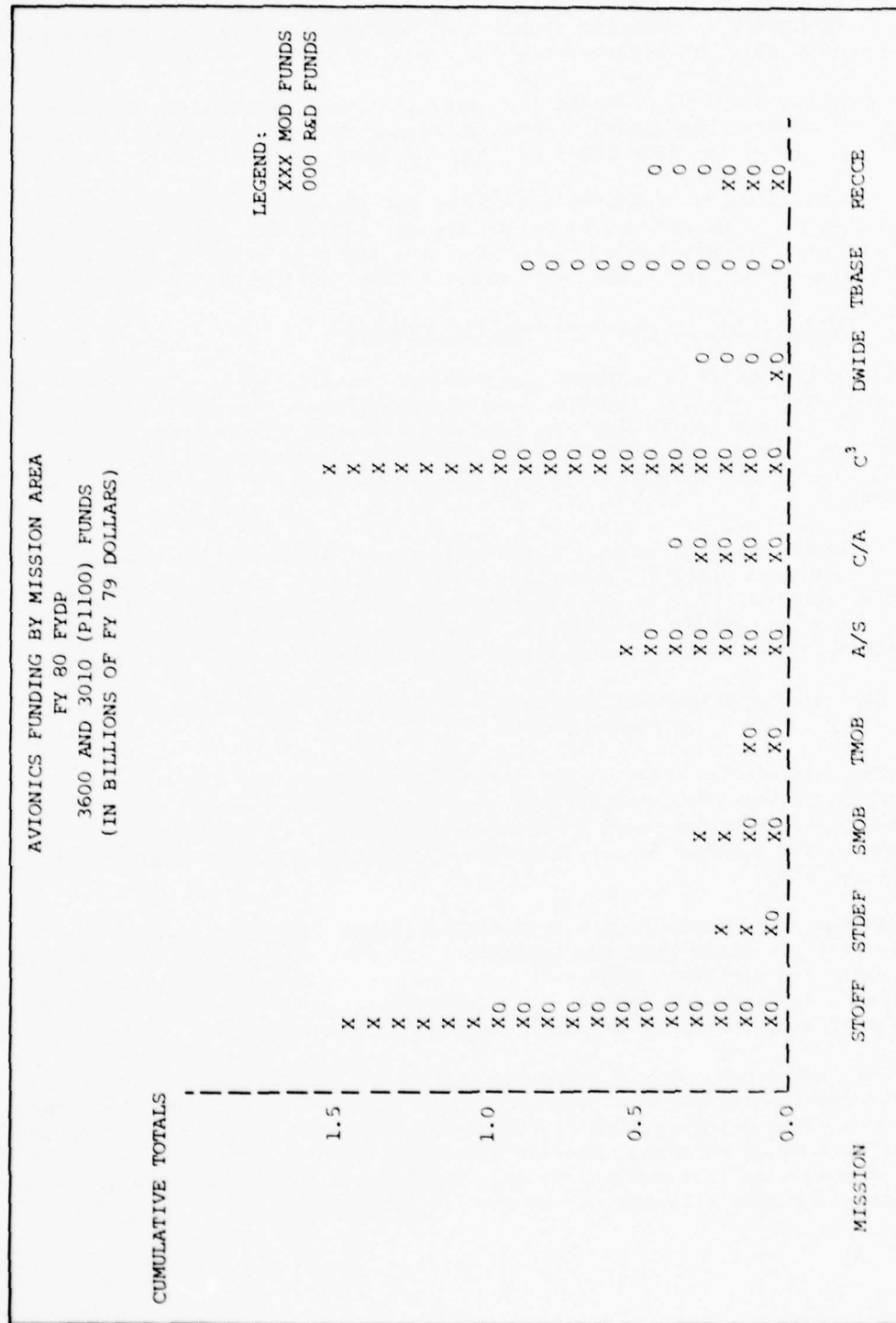


Figure 3-9. AVIONICS FUNDING BY MISSION AREA

AVIONICS FUNDING BY MISSION AREA (IN MILLIONS OF FY 79 DOLLARS)											
FUND TYPE	MISSION AREA										
	STOFF	STDEF	SMOB	TMOB	A/S	CA/A	CA/G	C ³	DWIDE	TBASE	RECCE
MOD	1600	125	200	75	650	100	125	1550	50	0	100
R&D	960	25	50	50	525	150	150	950	300	625	350
TOTAL	2560	150	250	125	1175	250	275	2500	350	625	450

Figure 3-10. AVIONICS FUNDING BY MISSION AREA

3.3 OTHER OPTIONS

To maximize data base flexibility, specific sorting and listing of the data in any format should be permitted within the constraints of the output printer. This sorting and listing would best be handled in an interactive mode. Specific requirements for the output structure must still be determined, but it is recommended that the following data fields be included in any sort capability:

- Mission Area
- Aircraft Type
- ASD/AX Level of Involvement
- Project Precedence
- Program Element/Mod Number
- Road Map
- Program Status

In addition, the capability to retrieve from certain data fields is recommended. The following are suggested data fields and screening options:

- ASD/AX Level of Involvement (>X or <X)
- Project Precedence (>Y or <Y)
- Aircraft Type (specify only those to be included)
- Mission Area (specify only those to be included)
- Program Status (specify only those to be included)
- Program Element (specify first two digits of class of programs to be included) or Modification Class (specify IV or V)

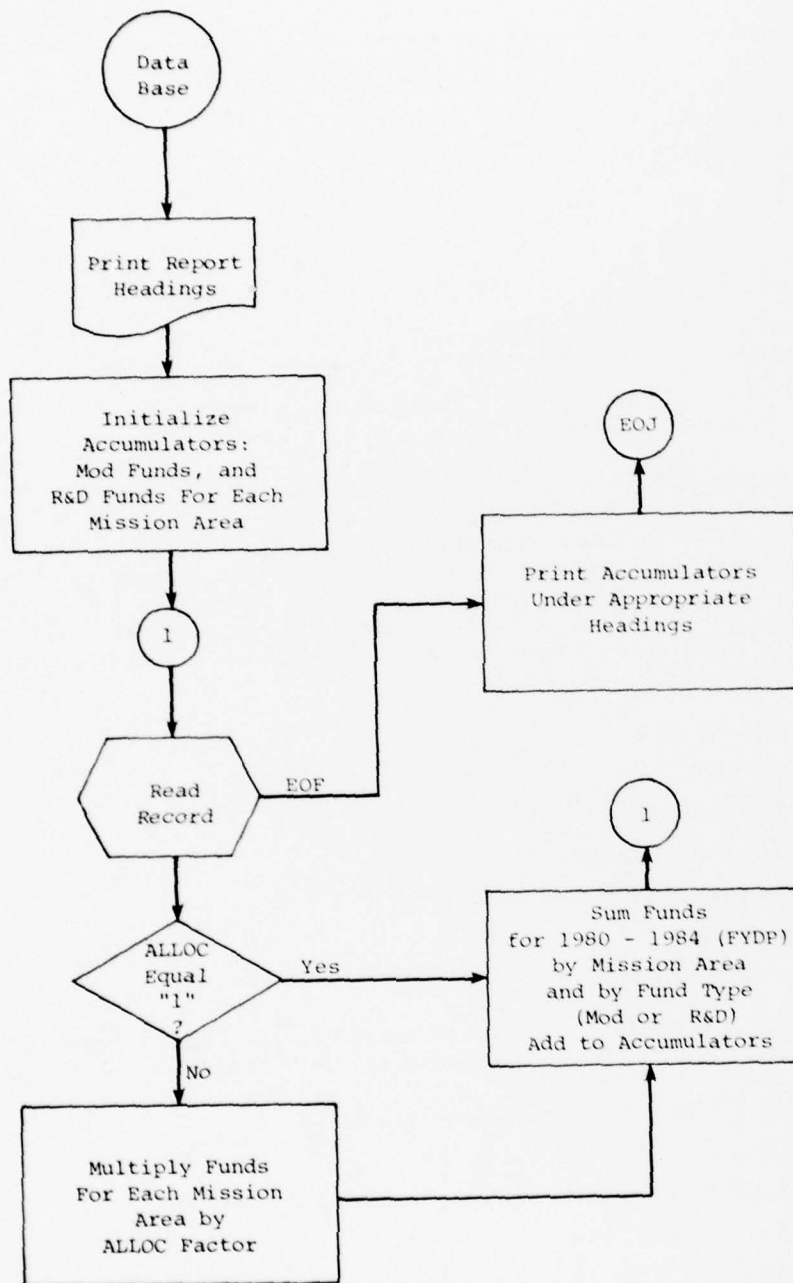


Figure 3-11. FLOW CHART -- FUNDING BY MISSION AREA

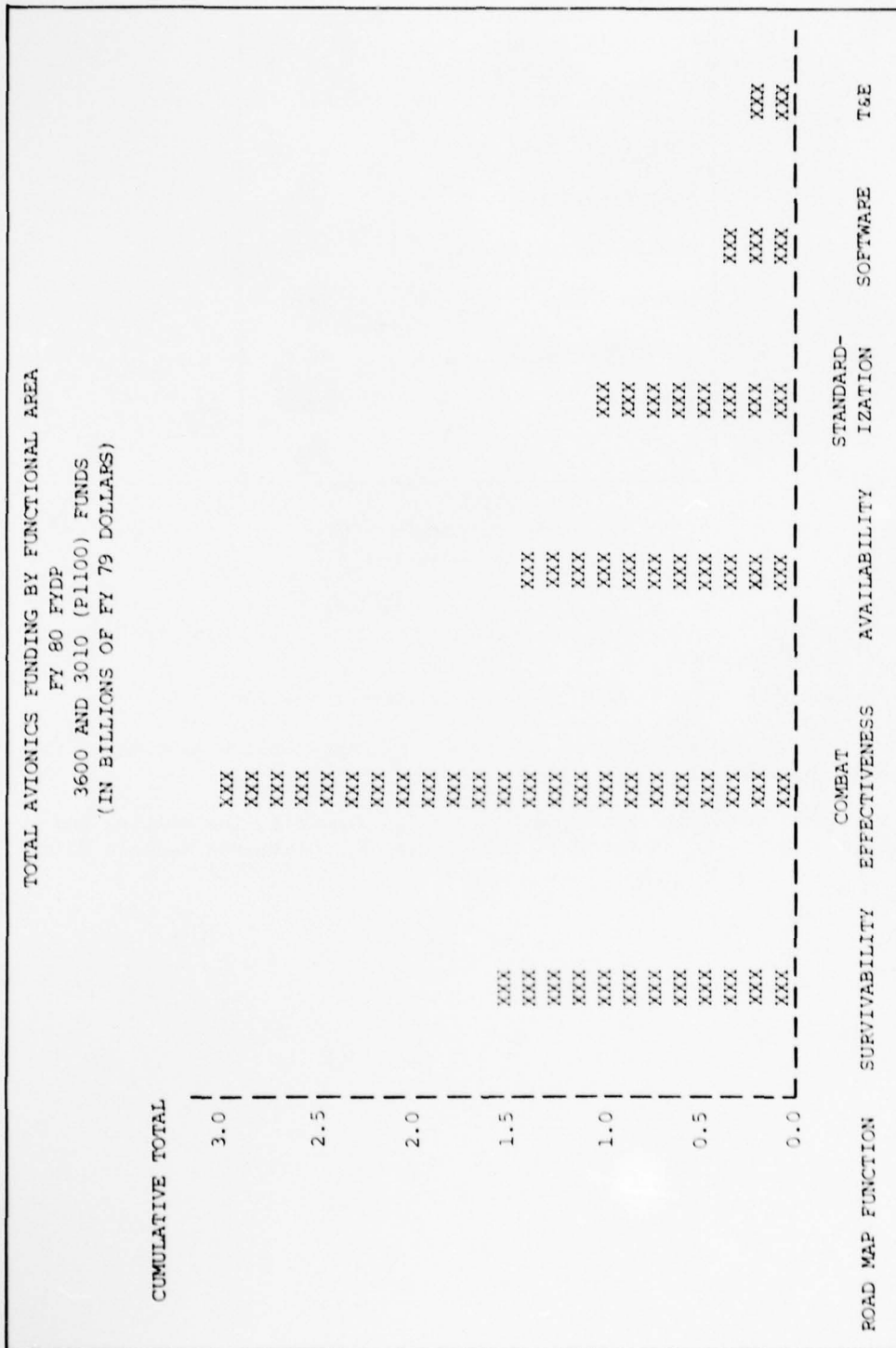


Figure 3-12. TOTAL AVIONICS FUNDING BY FUNCTIONAL AREA

TOTAL AVIONICS FUNDING BY FUNCTIONAL AREA (IN MILLIONS OF FY 79 DOLLARS)	
<u>FUNCTIONAL AREA</u>	<u>FUNDS</u>
SURVIVABILITY	1600
COMBAT EFFECTIVENESS	2850
AVAILABILITY	1500
STANDARDIZATION	1300
SOFTWARE	350
T&E	300

Figure 3-13. FUNDING BY FUNCTIONAL AREA

- Year of Funding (specify years or interval over which funding is to be included)
- Road Map (specify only functional areas to be included)

With no screening criteria specified, a comprehensive listing of the data base will result.

Details related to the mechanisms for implementing the sorting and screening options are to be developed by the DAC subsequent to this effort.

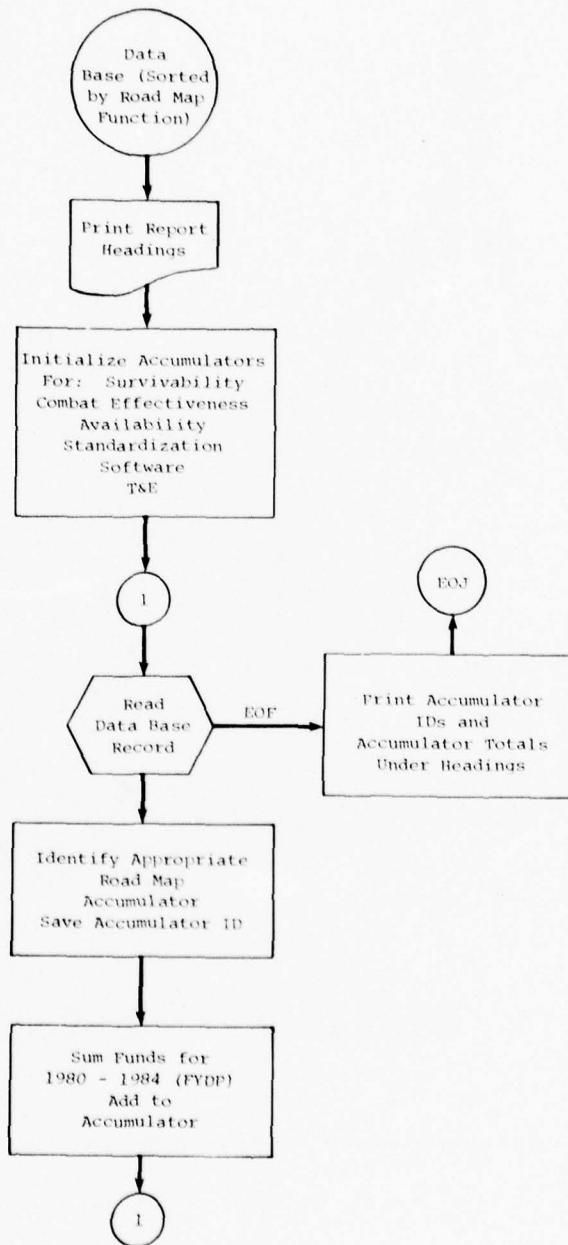


Figure 3-14. FLOW CHART -- FUNDING BY ROAD MAP FUNCTION

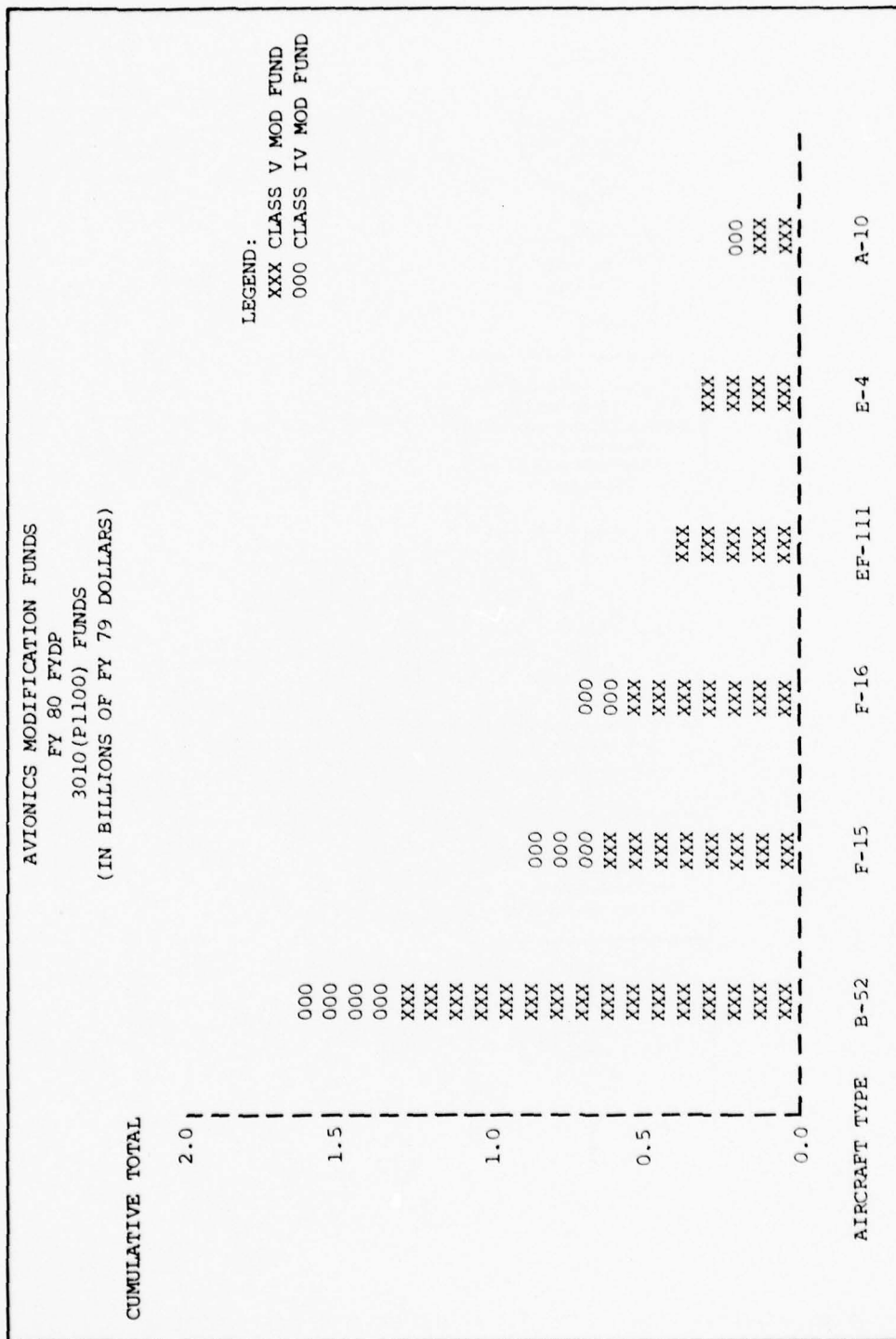


Figure 3-15. AVIONICS MODIFICATION FUNDS (P1100) FOR SELECTED AIRCRAFT, FY 1980 THROUGH 1987

AVIONICS MODIFICATION FUNDS FOR SELECTED AIRCRAFT (IN BILLIONS OF FY 79 DOLLARS)			
<u>AIRCRAFT TYPE</u>	<u>CLASS IV FUNDS</u>	<u>CLASS V FUNDS</u>	<u>TOTAL</u>
B-52	0.15	1.65	1.80
F-15	0.04	0.73	0.77
F-16	0.03	0.67	0.70
EF-111	0.00	0.50	0.50
E-4	0.00	0.45	0.45
A-10	0.01	0.17	0.18

Figure 3-16. AVIONICS MODIFICATION FUNDS FOR
SELECTED AIRCRAFT

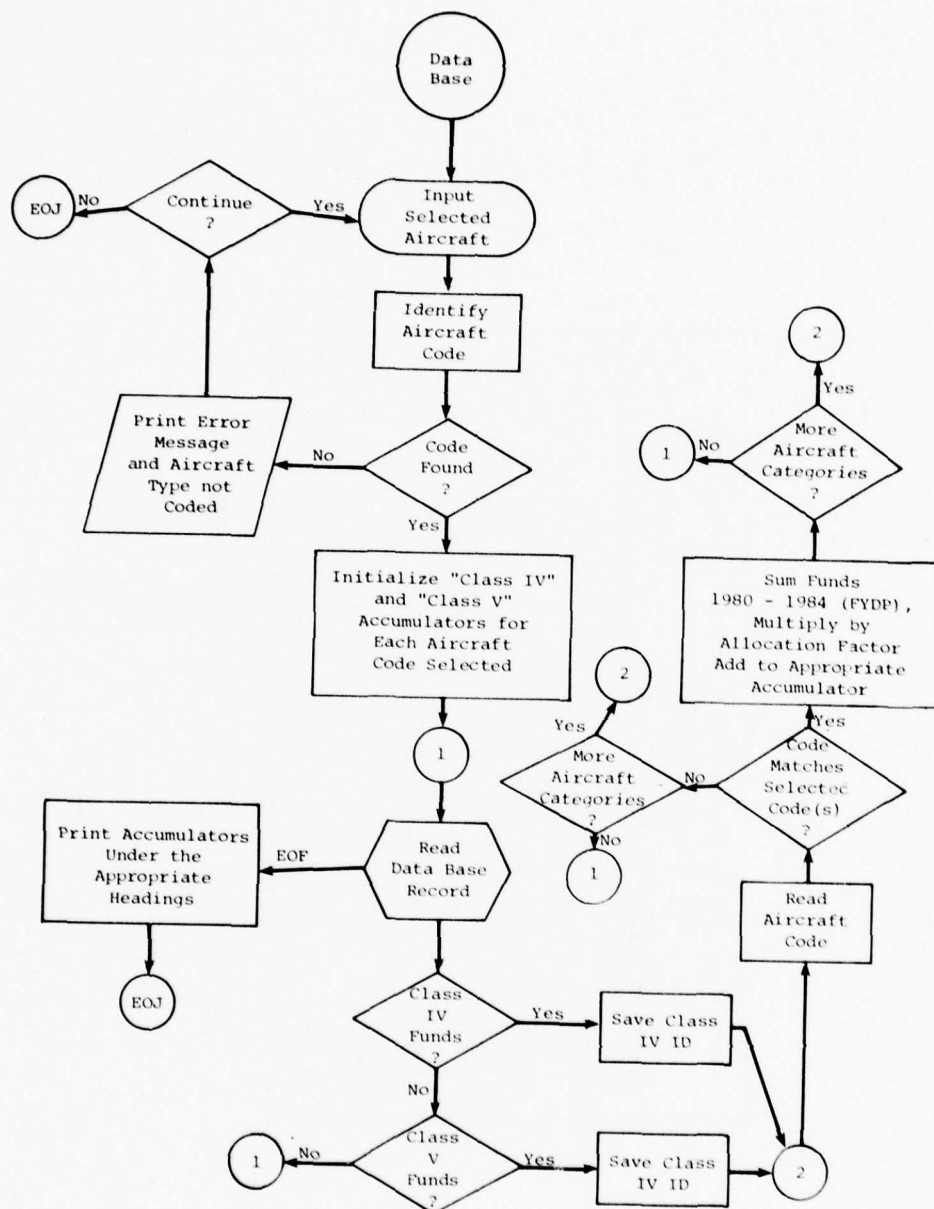


Figure 3-17. FLOW CHART -- MODIFICATION FUNDING

RDT&E FUNDS FOR ACIP PROGRAMS (IN MILLIONS OF FY 79 DOLLARS)		FISCAL YEAR			
MISSION TYPE	1980	1981	1982	1983	1984
GENERAL	20.0	20.0	20.0	20.0	20.0
TACTICAL	130.0	125.0	145.0	65.0	110.0
STRATEGIC	40.0	25.0	20.0	15.0	10.0
TOTAL	190.0	170.0	185.0	100.0	140.0

Figure 3-19. RDT&E FUNDS FOR ACIP PROGRAMS

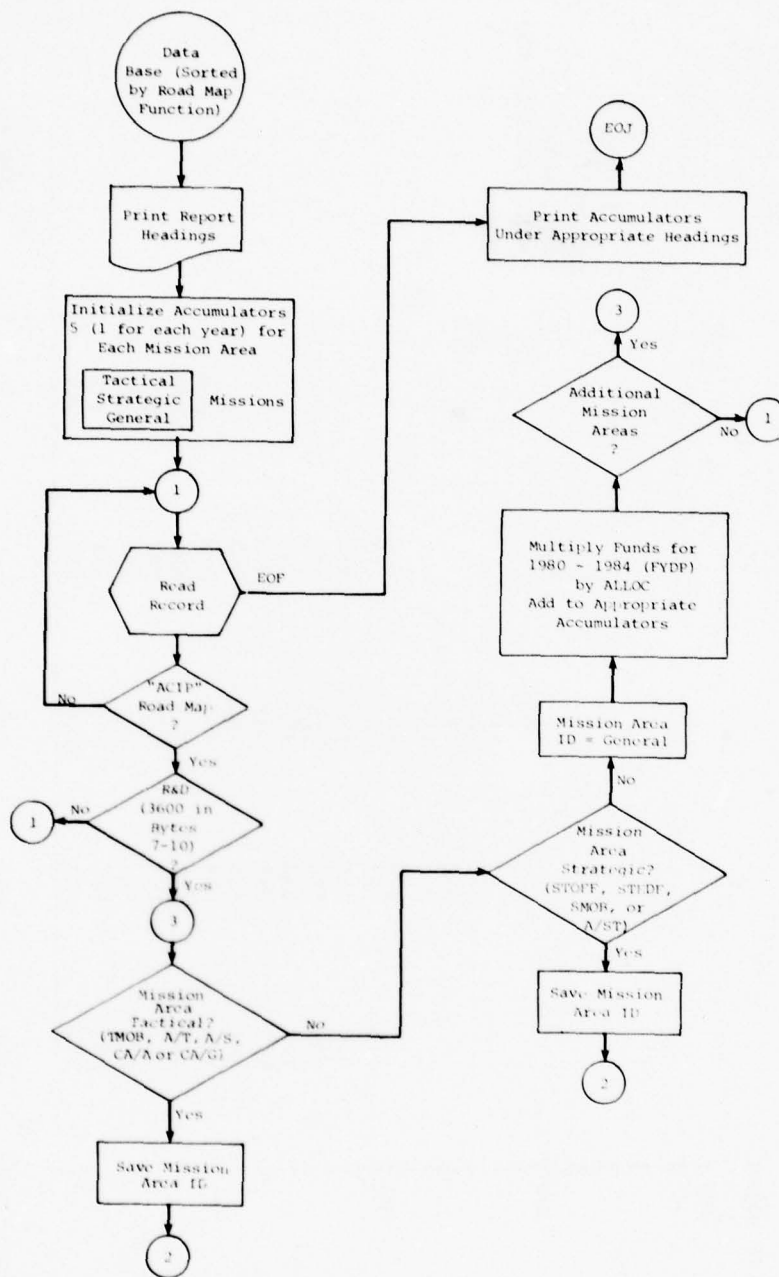


Figure 3-20. FLOW CHART -- ACIP PROGRAMS

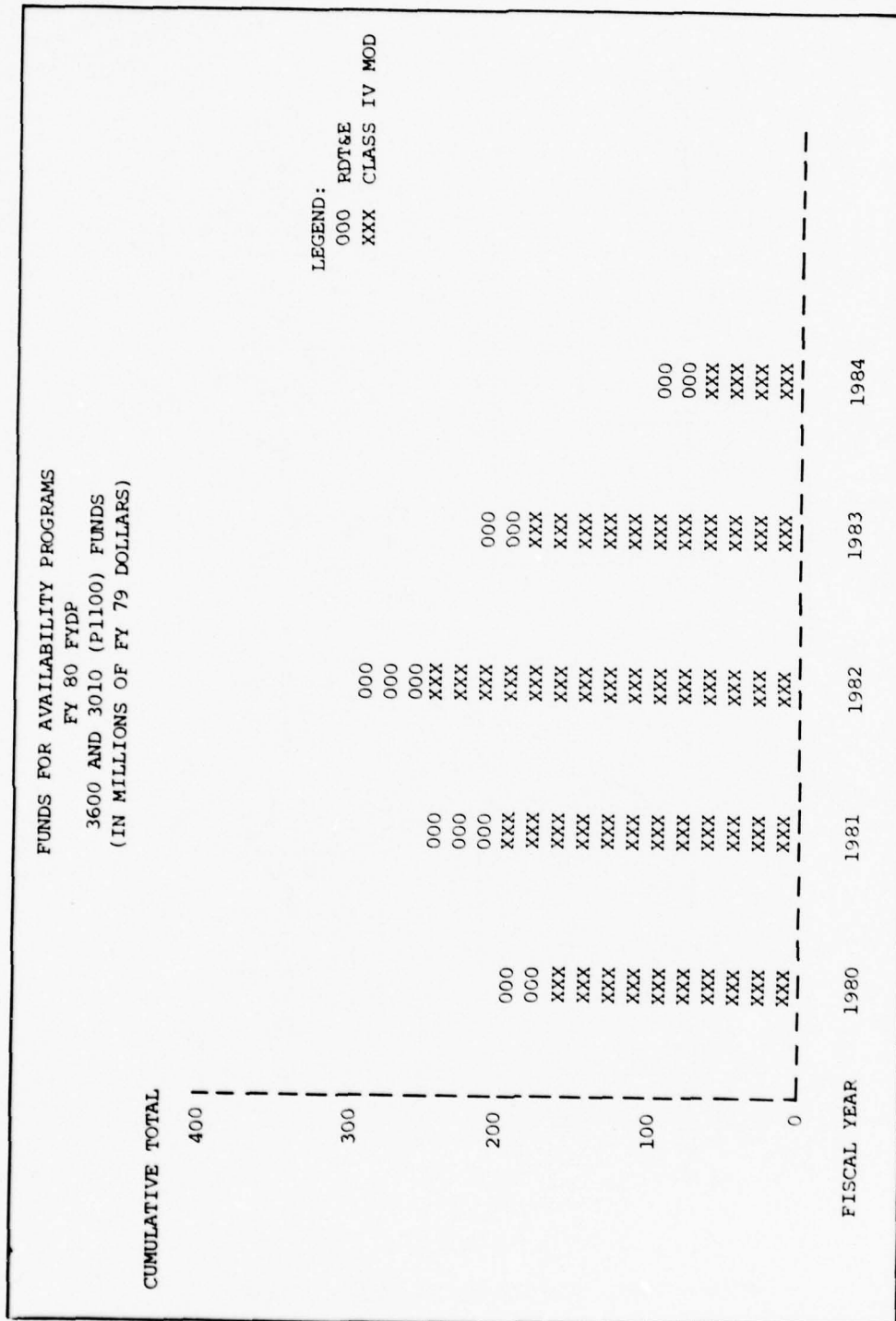


Figure 3-21. FUNDS FOR AVAILABILITY PROGRAMS

FUND TYPE	FISCAL YEAR				
	1980	1981	1982	1983	1984
RDT&E	20	20	15	15	15
CLASS IV MODS	140	160	270	160	80
TOTAL	160	180	285	175	95

Figure 3-22. FUNDS FOR AVAILABILITY PROGRAMS

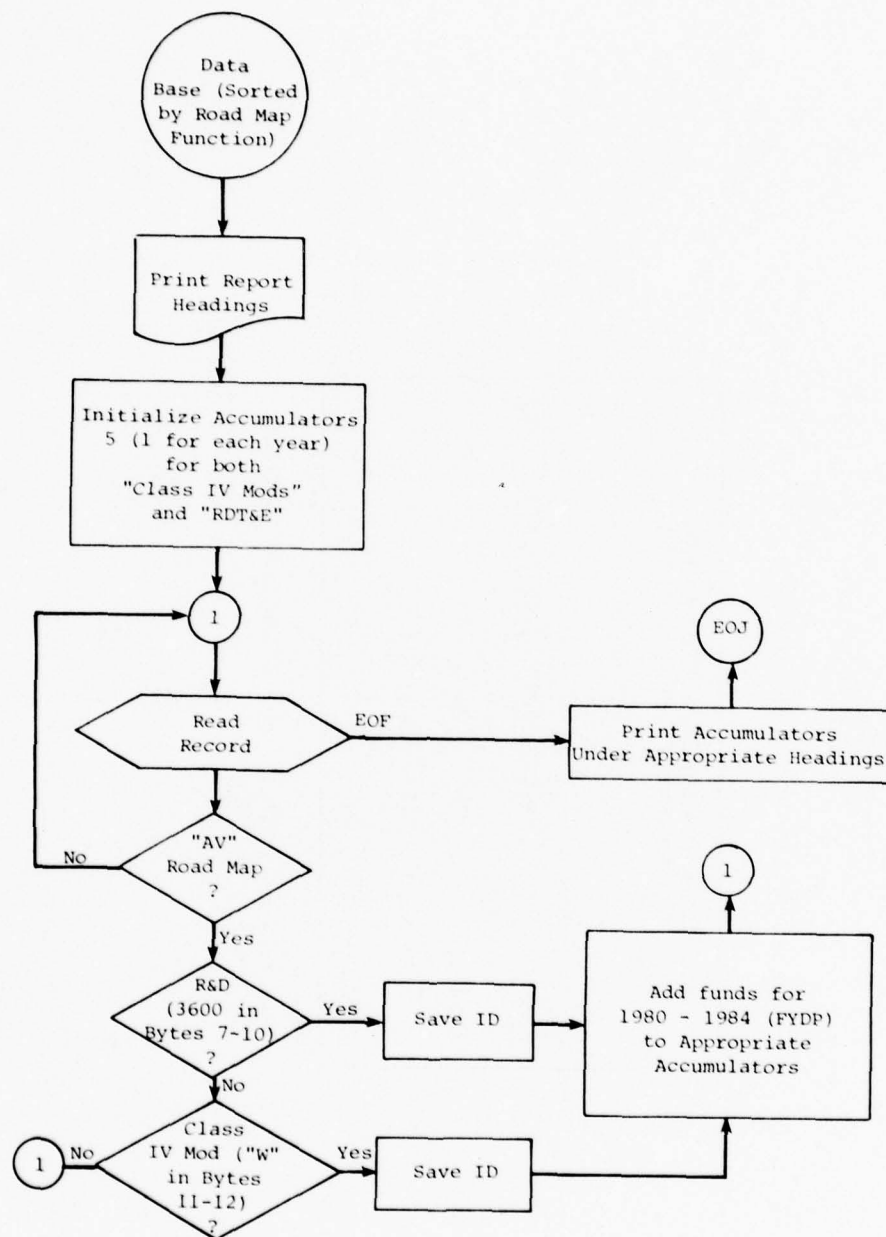


Figure 3-23. FLOW CHART -- AV PROGRAMS

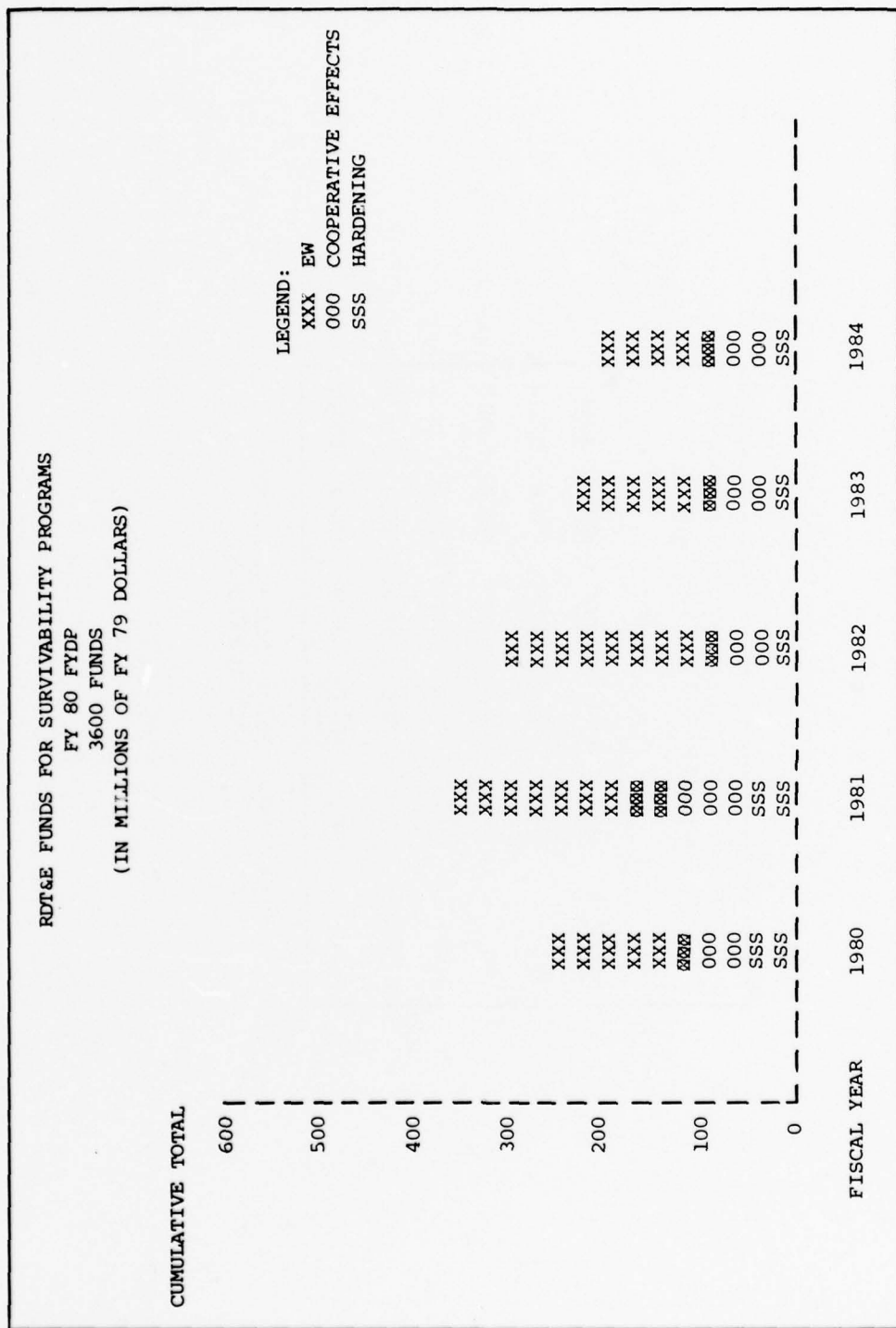


Figure 3-24. RDT&E FUNDS FOR SURVIVABILITY PROGRAMS

RDT&E FUNDS FOR SURVIVABILITY PROGRAMS (IN MILLIONS OF FY 79 DOLLARS)					
FUNCTION	FISCAL YEAR				
	1980	1981	1982	1983	1984
EW	125.0	180.0	215.0	195.0	175.0
COE	50.0	60.0	50.0	40.0	40.0
HARD	60.0	70.0	40.0	20.0	20.0
EW/COE	15.0	30.0	15.0	15.0	15.0
ALL	250.0	340.0	320.0	270.0	250.0

Figure 3-25. RDT&E FUNDS FOR SURVIVABILITY PROGRAMS

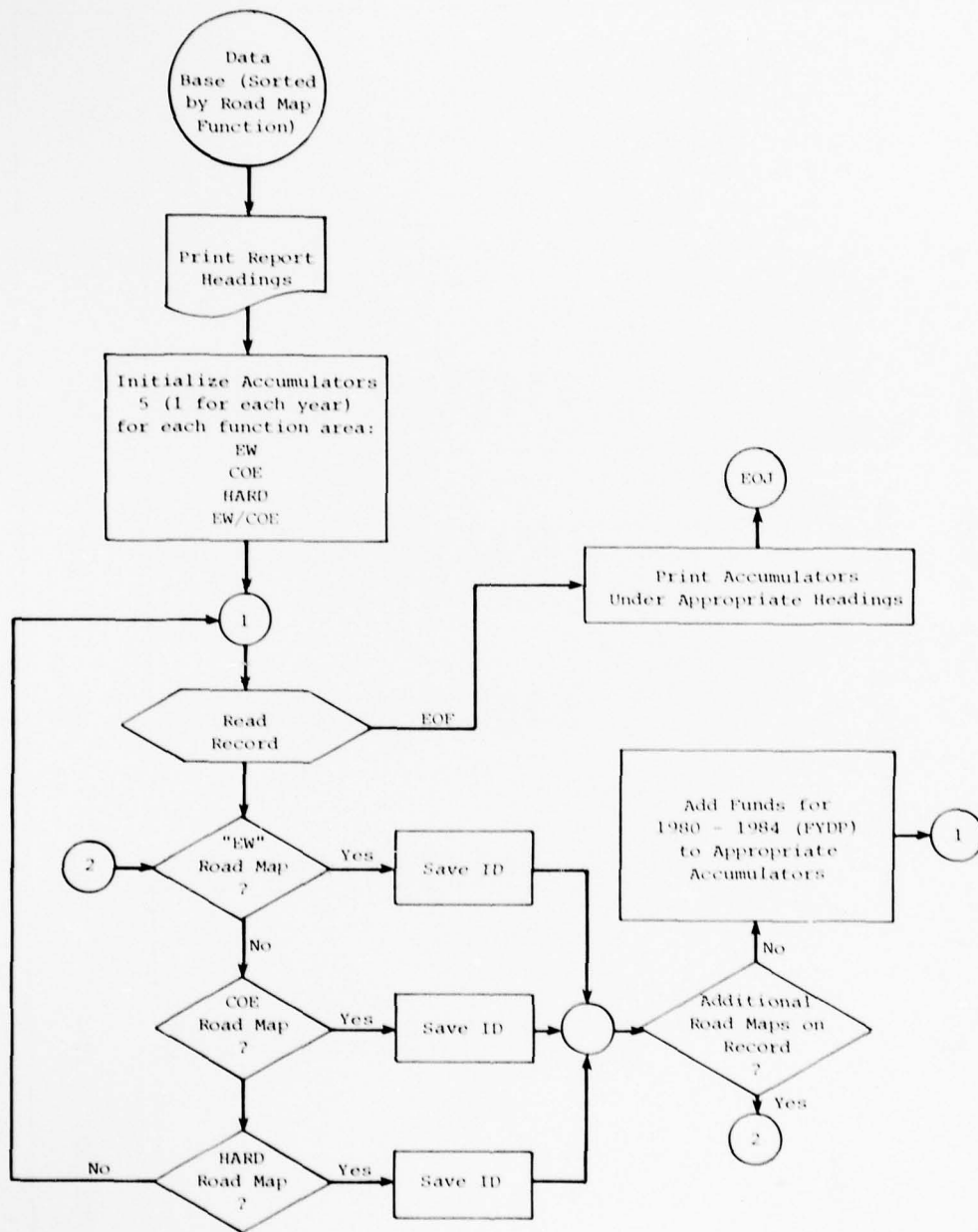


Figure 3-26. FLOW CHART -- SURVIVABILITY PROGRAMS

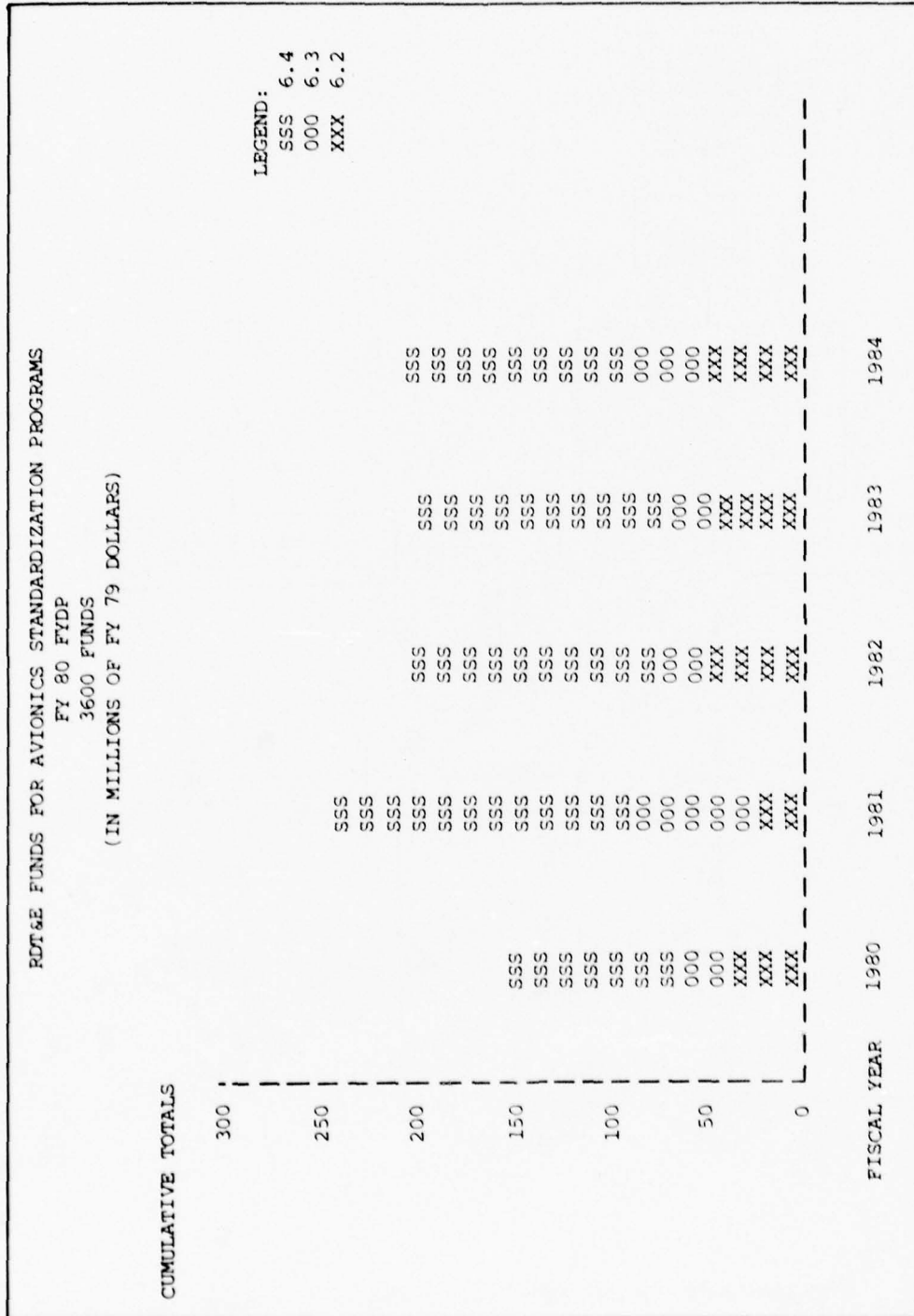


Figure 3-27. RDT&E FUNDS FOR AVIONICS STANDARDIZATION PROGRAMS

RDT&E FUNDS FOR AVIONICS STANDARDIZATION PROGRAMS (IN MILLIONS OF FY 79 DOLLARS)					
PROGRAM TYPE	1980	1981	1982	1983	1984
-----	----	----	----	----	----
6.4	125.0	170.0	180.0	180.0	155.0
6.3	15.0	65.0	10.0	15.0	35.0
6.2	25.0	20.0	30.0	30.0	35.0
ALL	165.0	255.0	220.0	225.0	225.0

Figure 3-2a. RDT&E FUNDS FOR AVIONICS
STANDARDIZATION PROGRAMS

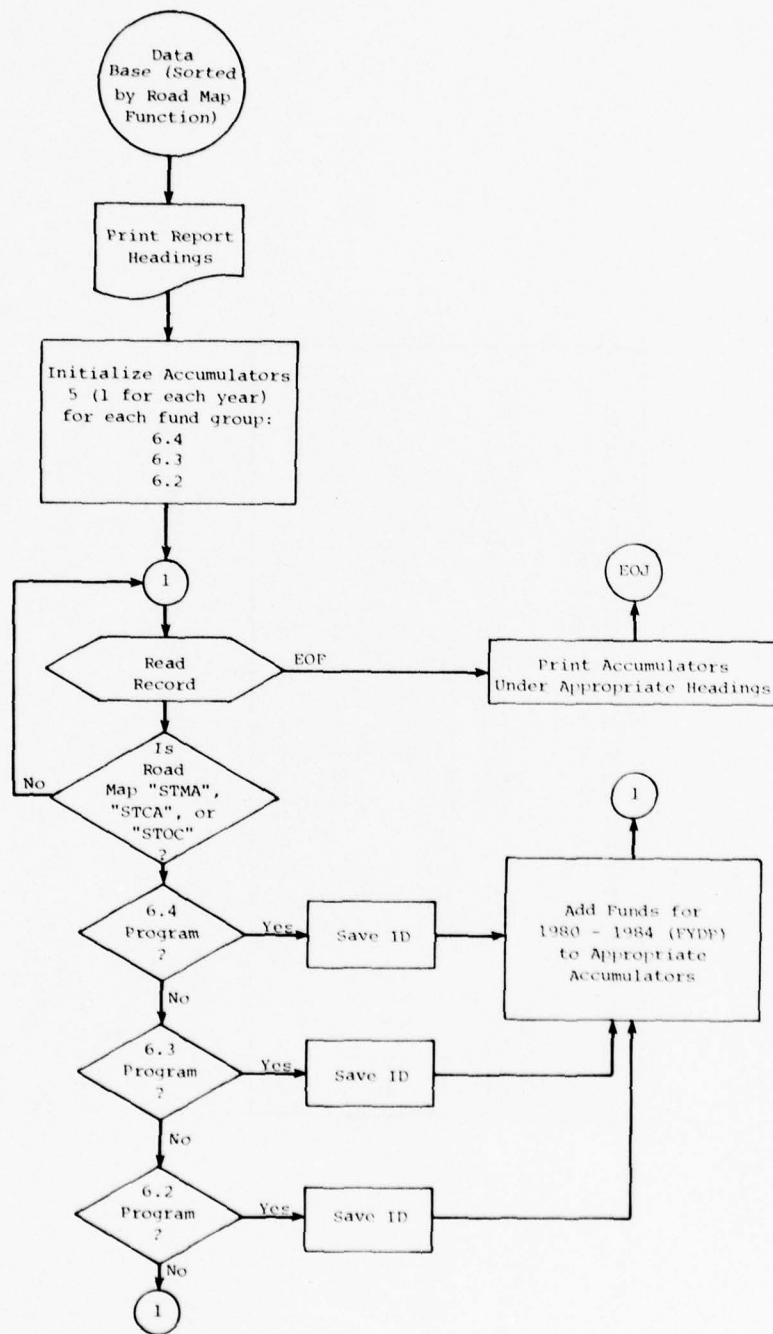


Figure 3-29. FLOW CHART -- STANDARDIZATION PROGRAMS

CHAPTER FOUR

CONCLUSIONS AND RECOMMENDATIONS

This report has developed an overall framework for implementation of the Avionics Master Plan Implementation and Tracking System data base by the ASD computer center; it also serves as a general guide for preparing the input.

The architecture, based on a four-card input, is described in detail in Chapter Two. The input process is described together with the format in which the master record is stored. The four cards, in addition to any optional cards, are combined and repetitive information is deleted to decrease storage space. Having considered sizing and computational requirements, we conclude that it is feasible to establish this data base system on the PDP 11T60 with a single floppy disc.

A wide variety of output presentation formats have been developed and documented in this report. For each format, flow charts and logic instructions have been specially developed. With these instructions the data base and output presentations can be coded to produce the Avionics Master Plan Implementation and Tracking System.

On the basis of our experience in preparing the AMP, it is evident that considerable data manipulation and updating will be required on a frequent basis. The system, when established, should fulfill this function much more efficiently than the manual method currently employed. The system will require full-time maintenance to ensure that the information is continuously updated.

The Avionics Master Plan Implementation and Tracking System is a data management system and query language for a specific data base and a specific data presentation format. While we did not undertake a detailed review of existing Data Base Management Systems (DBMS), we are aware that most DBMSs, commercial or Government, offer a cost-effective alternative to the application of specific software development for the use and maintenance of a data base. DBMSs provide data and program independence, flexibility, data protection, growth capabilities, and ease of maintenance. Query Languages and Report Generators that are available for most DBMSs provide "friendly and forgiving" user interfaces that have been designed with the non-DP user in mind. However, these Report Generators may not provide all of the output presentation formats that are required by the DAC.

Before detailed coding for this system is undertaken, we recommend that the DBMS alternative be explored. DBMSs that should be investigated include the following:

<u>System</u>	<u>Vendor</u>	<u>Type</u>
• TOTAL	Cincom Systems	Network
• SEED	International Data Base Systems	Partial CODASYL
• DRS/XBS	A.R.A.P.	Network
• ORACLE	Software Development Laboratory	Relational
• DBMS-II	DEC	CODASYL
• GIM-II	TRW	Hierarchical
• ADABAS-M	Software AG	Network with full inversion

The system description provided in this report should be sufficient for the vendor to determine how closely his product will meet the DAC's needs. The system description should also be sufficient for the ASD computer center to estimate the Government cost of implementing a specialized system. The DAC may make a decision on the basis of the relative costs of this determination.

APPENDIX A

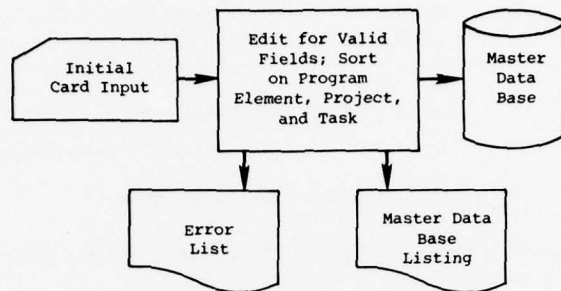
INPUT PROCESSING LOGIC DIAGRAMS AND PROGRAM SEQUENCE STEP DESCRIPTIONS

This appendix contains detailed logic diagrams and program sequence step descriptions for the Avionics Master Plan data base input processing.

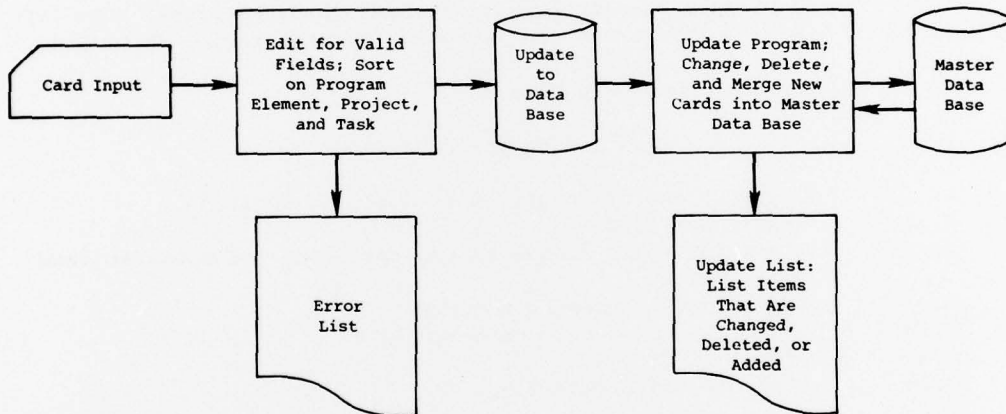
The intent of Figure A-1 is to show a macro-level view of the input process for the data base initialization and maintenance. It shows assembly of the various card types, 1, 2, 3, and 4, for one program element, project, and task, and shows the master data base. This diagram also depicts the overall card input verification and editing routine used in a batch mode of operation.

The flow in Figure A-2 is a further breakdown and is more specific than the flow of Figure A-1.

Tables A-1 and A-2 present a listing of sequential program statements that follow the logic flow.



Initialization of the Data Base



Maintaining the Data Base

Figure A-1. INITIALIZING AND MAINTAINING THE DATA BASE

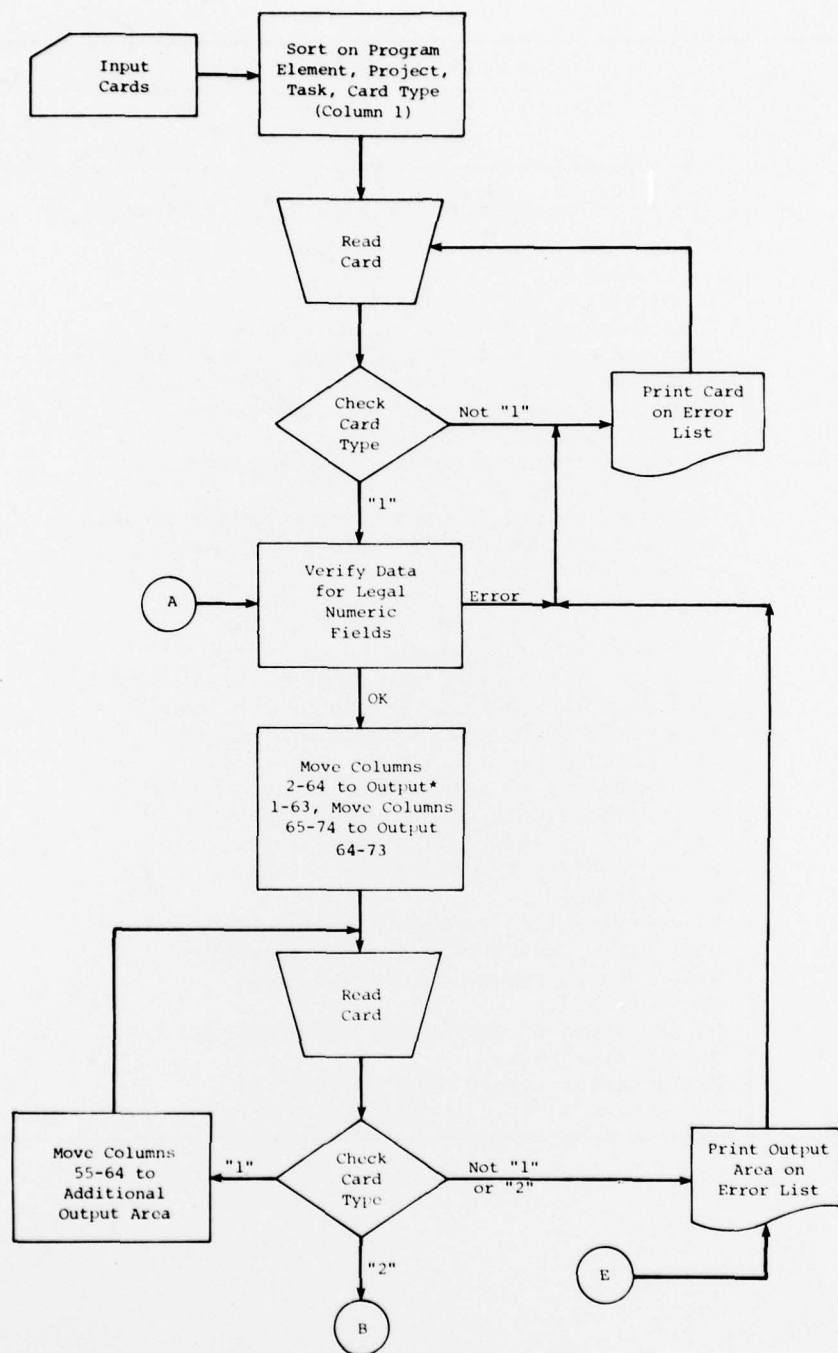
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Table A-1. TABLE OF PROGRAM STATEMENTS FOR THE
LOGIC DIAGRAM IN FIGURE A-1.

Sequential Step Number	Program Statement
Initializing the Data Base	
1.	Do until end of input. When done, go to Step 5.
2.	Read input card.
3.	Check for valid fields as designated by the specific card type format.
4.0	If validity checks do not pass,
4.10	Then print card data on error list.
4.15	Go to Step 2.
4.20	Else copy card onto file.
4.25	Go to Step 2.
5.	Sort data base by program element, project, task, card type.
6.	Read sorted cards and store appropriate fields in output file for master data base.
7.	Print master data base.
Maintaining the Data Base	
1.	Do until end of input. When done, go to Step 5.
2.	Read input card.
3.	Check for valid fields as designated by the specific card type format.
4.0	If validity checks do not pass,
4.10	Then print card data on error list
4.15	and go to Step 2.
4.20	Else copy card onto file.
4.25	Go to Step 2.
5.	Sort update data by program element, project, task, card type.
6.	Do until end of update file. When done, go to Step 11.
7.	Read update record (equivalent to one input card).
8.0	If column 79 = C (Change),
8.10	Then read record of master data base.
	Match on program element, project, task, card type.
8.20	If master record is less than update record,
8.25	Then write master record onto new master.
8.30	Go to Step 8.10
8.35	If master record is equal to update record,
8.40	Then write update record onto new master..
8.45	Go to Step 7.
8.50	If master record is greater than update record,
8.55	Then write update record onto Error List.

Table A-1. (continued)

Sequential Step Number	Program Statement
Maintaining the Data Base (continued)	
8.60	Go to Step 7.
9.0	If Column 79 = D (Delete),
9.10	Then read record of master data base.
9.15	Match on program element, project, task, card type.
9.20	If master record is less than update record,
9.25	Then write master record onto new master.
9.30	Go to Step 9.10
9.35	If master record is equal to update record,
9.40	Then go to Step 7.
9.45	If master record is greater than update record,
9.50	Then write update record onto error list
9.55	Write master onto new master.
9.60	Go to Step 7.
10.0	If Column 79 = A (Add or Merge),
10.10	Then read record of master data base.
10.15	Match on program element, project, task, card type.
10.20	If master record is less than update record,
10.25	Then write master record onto new master.
10.30	Go to Step 10.10
10.35	If master record is equal to update record,
10.40	Then write update record onto error list.
10.45	Write master record onto error list.
10.50	Write update record onto new master.
10.55	Go to Step 7.
10.60	If master record is greater than update record,
10.65	Then write update record onto new master.
10.70	Write master record onto new master.
10.75	Go to Step 7.
11.0	Do until end of master file. When done, exit.
11.10	Read master record.
11.15	Write master record onto new master.
11.20	Go to Step 11.10.



*Output refers to computer Master Data Base Record. See Table 2-6 for byte allocations.

Figure A-2. DETAILED FLOW DIAGRAM

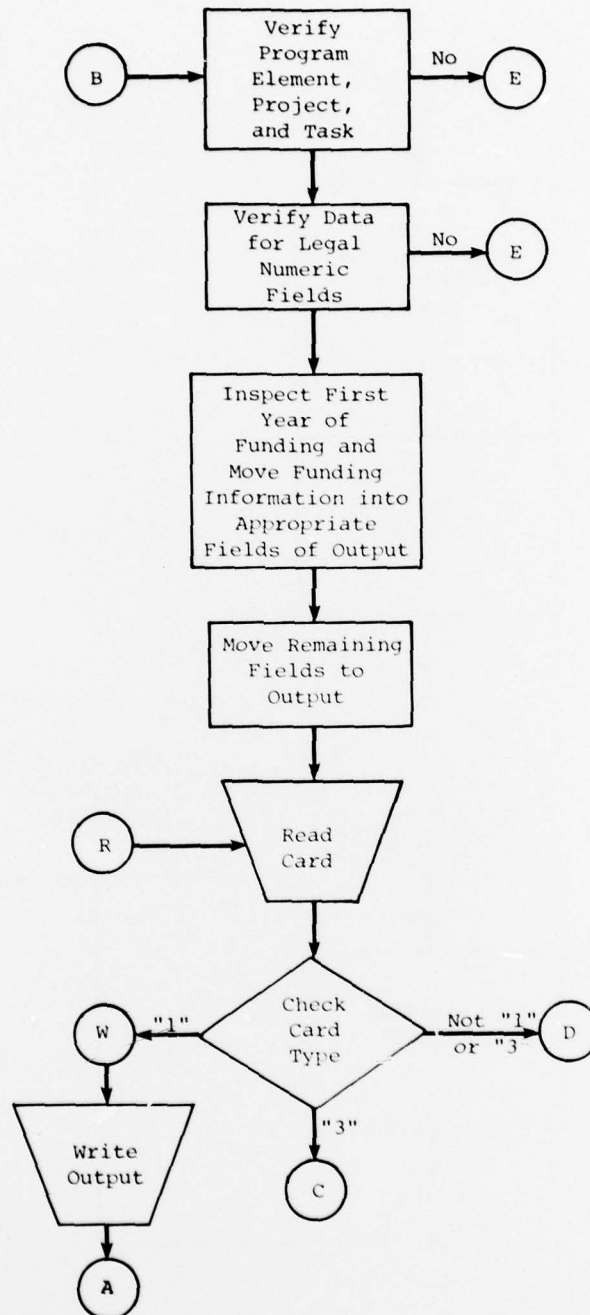


Figure A-2. (continued)

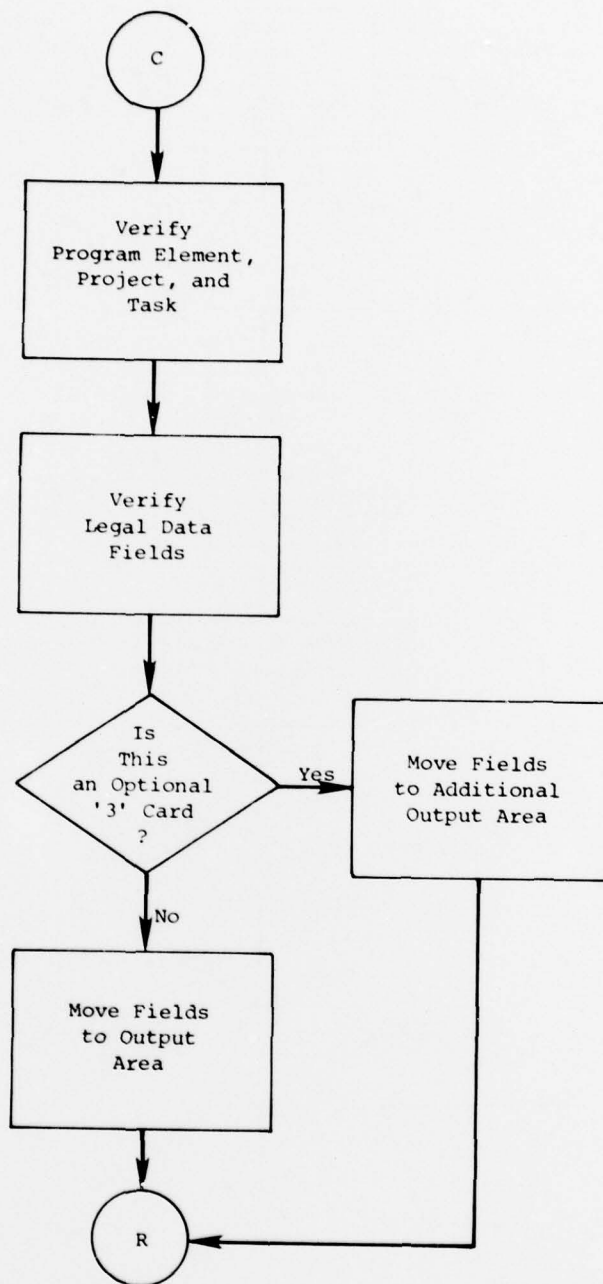
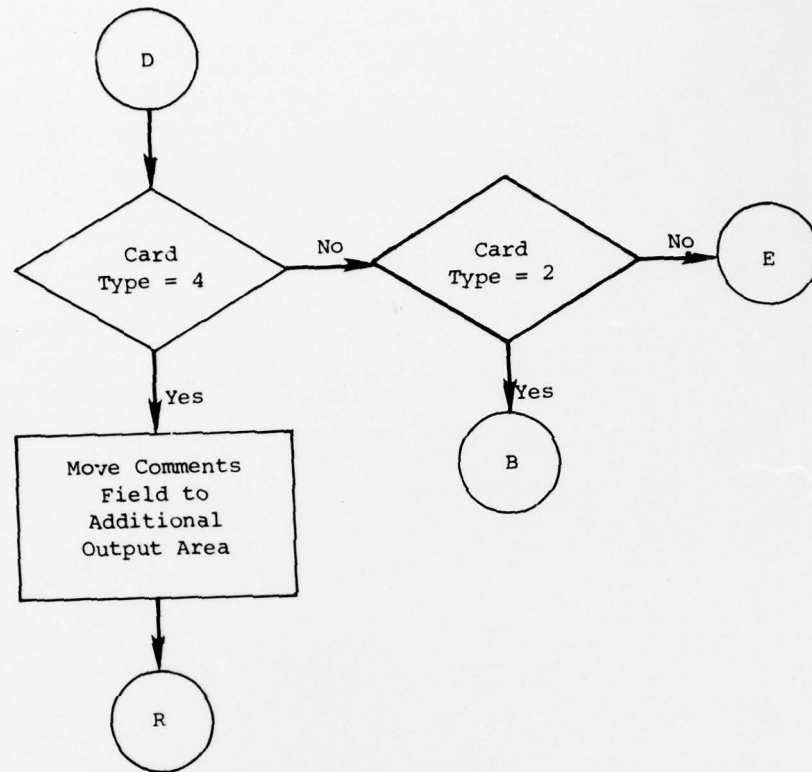


Figure A-2. (continued)



At End of File

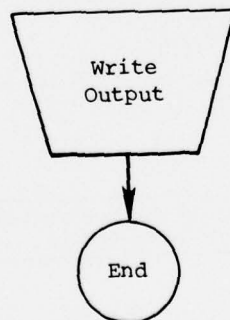


Figure A-2. (continued)

Table A-2. STEPS TO CREATE/UPDATE SEQUENTIAL FILE

Sequential Step Number	Program Statement
1.	Do until end of input. When done, go to Step 24.
2.	Sort input by program element, project, task, card type.
3.	Read record.
4.0	If card type is not equal to 1,
4.1	Then write record onto Error List.
4.2	Go to Step 3.
5.0	If first year of funding input is not numeric,
5.1	Then write record onto Error List.
5.2	Go to Step 3.
6.	Move fields into 256-byte data base block (see Table 2-6 in Chapter Two).
7.	Read record.
8.0	If card type is equal to 1,
8.10	Move additional road map, path, node into 128-byte data base block and set indicator byte 256 (see Table 2-6 in Chapter Two).
8.20	Go to Step 7.
9.0	If card type is not equal to 1 or 2,
9.10	Error: Print error record on Error List.
9.20	Go to Step 3.
10.0	If program element, project, task is not equal to previous record,
10.1	Then go to Step 9.10.
11.0	If funding information is not numeric,
11.1	Then go to Step 9.10.
12.	Move appropriate funding information by indexing on "1st year Funding Input" into data base block.
13.	Read record.
14.	If card type is equal to 2,
15.0	Then go to Step 10.
15.1	If card type is equal to 1,
15.2	Then write data base blocks.
16.0	Go to Step 5.0.
16.1	If card type is equal to 3,
17.0	Then go to Step 17. Else go to Step 20.
17.1	If program element, project, task is not equal to previous record,
17.2	Or if allocation fields are not numeric,
18.	Then go to Step 9.10.
19.	There must be a test to see if a type 3 card has already been processed (i.e., is this an optional type 3 card?).
20.0	Move fields to proper data base block and set indicator byte 256 if this is an optional card (see Table 2-6 in Chapter Two).
20.1	Go to Step 13.
21.	If card type is not equal to 4,
22.	Then go to step 9.10.
23.	Move comments field to additional data base block and set indicator byte 255 (see Table 2-6 in Chapter Two).
24.0	Write data base blocks.
24.1	Go to Step 3.
25.0	At end, write data base blocks.
25.1	Exit.

Note: Tests must be made to determine that the maximum allowable number of cards of any type has not been exceeded for a given program element record.

APPENDIX B

DATA CODES FOR AIRCRAFT TYPES

Table B-1 provides a numerical coding scheme for identifying aircraft by type to be used with the program tracking system for the Avionics Master Plan.

Table B-1. CODES FOR AIRCRAFT TYPES

Code	Aircraft	Code	Aircraft	Code	Aircraft
001	A-7D	055	EC-135N	108	UV-18B
002	A-10A	056	EF-111A	109	AC-X
003	A/OA-37B	057	EC-135C	110	Not Used
004	AC-130A	058	EC-135G	111	Not Used
005	O-2A	059	F-105G	112	K-10A
006	OV-10A	060	F-105F	113	Not Used
007	O-2B	061	F-105D	114	AV-X
008	AC-130H	062	F-4C	115	FAC-X
009	A-7K	063	F-4D	116	Not Used
010	B-1	064	F-4E	117	RF-X
011	B-52D	065	F-4G	118	BGM-34C
012	B-52G	066	F-5B	119	Not Used
013	B-52H	067	Not Used	120	CMC
014	B-57C	068	F-16A	121	Not Used
015	FB-111A	069	Not Used	122	Not Used
016	Not Used	070	F-101B	123	Not Used
017	NMB	071	Not Used	124	Not Used
018	C-140B	072	F-105B	125	Not Used
019	VC-9C	073	F-106A	126	Not Used
020	C-5A/B	074	F-111A	127	Not Used
021	VC-6A	075	F-111D	128	ATRS
022	C-7A	076	F-111E	129	CX-TAMA
023	C-9A	077	F-111F	130	F-5E
024	C-12A	078	F-15 Intercept	131	F-5F
025	Not Used	079	EC-135P	132	F-15A
026	Not Used	080	Not Used	133	F-15B
027	MC-130E	081	Not Used	134	F-15C
028	C-123K	082	HH-1H	135	F-15D
029	C-130A	083	TH/UH-1F	136	HC-130N
030	C-130B	084	CH-3E	137	HC-130P
031	C-130D	085	HH-53B	138	VC/C-131D
032	C-130E	086	HARV	139	VC/C-131E
033	C-130H	087	Not Used	140	F-106B
034	HC-130H	088	Not Used	141	AQM-34L
035	VC/C-131B	089	DC-130H	142	AQM-34M
036	NC/C-131H	090	Not Used	143	AQM-34V
037	C/NC-135A	091	RC/135A/D/M/S/T/U/V	144	HH-3E
038	C-135B/C	092	RF-4C	145	HH-X
039	KC-135A	093	Not Used	146	RC-X
040	VC-137B/C	094	SR-71A/B	147	ARPV
041	C-140A	095	WC-130E	148	TR-1
042	YC-141B	096	WC-135B	149	T-38B
043	EC-135H	097	Not Used	150	F-101F
044	EC-135J	098	CT-39A/F	151	UH-1N
045	EC-135K	099	T-33A	152	UH-1P
046	EC-135L	100	T-37B	153	F-16B
047	E-3A	101	T-38A	154	HH-53C
048	E-4A/B	102	T-39A/B/F	155	CH-53C
049	EB-57B	103	T-41C	156	C/NC-141A
050	EC-135B	104	T-43A	157	KC-135Q
051	Not Used	105	Not Used	158	WC-130H
052	Not Used	106	U-2	159	UH-X
053	EC-130E	107	Not Used	160	HH-53H
054	EC-135A				

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APPENDIX C

GLOSSARY

AC	Acquisition
ACIP	Avionics Communications and Information Processing
AD	Advanced Development
AMP	Avionics Master Plan
APB	Avionics Planning Baseline
AV	Availability
A/M	All Mobility
A/S	Air-to-Surface
A/ST	All Strategic
A/T	All Tactical
CA/A	Counter Air/Air
CA/G	Counter Air/Ground
CC	Cancelled
COE	Survivability Cooperative Effects
DAC	Deputy for Avionics Control
ED	Engineering Development
EW	Survivability Electronic Warfare
FO	Proposed Follow-on to Current Program
FYDP	Five Year Defense Plan
HARD	Survivability Hardening
NLR	Navigation Launch and Release
OG	On-going Modification
PEM	Program Element Monitor
PL	Planned
PMP	Program Management Directive
POM	Program Objective Memorandum
RDT&E	Research, Development, Test and Evaluation
R&D	Research and Development
RECCE	Reconnaissance
SMOB	Strategic Mobility
STCA	Standardization Core Avionics Architecture
STCC	Standardization Common/Commercial
STDEF	Strategic Defense

STMA	Standardization Mission Avionics
STOFF	Strategic Offense
TD/V	Target Detection and Validation
TE	Test and Evaluation
TMOB	Tactical Mobility
TR	Training
XD	Exploratory Development