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A REVIEW AND ANALYSIS OF SYSTEM PROGRAM OFFICE MANAGER'S EXPERIENCE AND TRAINING, AND ITS RELATION WITH THE MAN-MACHINE CONCEPT

Harold A. Solberg, et al

Air Force Institute of Technology
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Charles J. Steiner, Major USAF

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13. ABSTRACT
The man-machine concept is frequently given insufficient emphasis during the development phase of the weapons acquisition process. This situation may be improved through training the Systems Program Office (SPO) Managers in man-machine concepts (in the USAF, the personnel subsystem). Prior to developing a training program, the background of present SPO directors and managers must be known. The report determines this background information through analysis of the computerized personnel records of SPO Managers assigned to the Aeronautical Systems Division at Wright-Patterson AFB. The report concludes that a training program is warranted, on the condition that the entire personnel subsystem element in the SPOs is re-emphasized by the Air Staff.

KEY WORDS

Personnel Subsystem Training
Man-machine concept
System Program Office (SPO) Manager Training
SPO director/manager career progression
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A Thesis

Presented to the Faculty of the School of Systems and Logistics of the Air Force Institute of Technology Air University

In Partial Fulfillment of the Requirements for the Degree of Master of Science in Logistics Management

By

Harold A. Solberg, B.S.
Major, USAF

Charles J. Steiner, B.S.
Major, USAF

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This thesis, written by

Major Harold A. Solberg

and

Major Charles J. Steiner

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INTRODUCTION

Problem Statement

The Headquarters United States Air Force Personnel Research Office has indicated that the weapon systems acquisition process is primarily engineering and hardware-oriented during the developmental phase. This often means that problems associated with human operators and maintainers of a system (i.e., the man of the man-machine system) are not included as prime considerations in development. In such situations, men are considered sufficiently flexible to be trained to fit a system which has been mechanically optimized. (30:1)* This is particularly true in the maintenance of weapon systems; the needs of the maintenance men are often not considered in design and development. In this respect, weapons are being developed without receiving sufficient logistical emphasis. (42)

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*The number in parentheses refers to a correspondingly numbered reference in the bibliography. A single number refers to an interview or the reference in general. Literature bibliographic entries will be followed by a colon and the page number.

In order to overcome this shortcoming, the USAF Personnel Research Office would like to extend System Program Manager training to include an understanding of human factors in system design and development. The problem is that the USAF Personnel Research Office does not currently know the man-machine experience and training of System Program Managers. It is this problem which we have addressed in our thesis. We investigated the background and training of System Program Managers to determine if expansion of their human factors training is warranted.

Background

The concept of systems and systems management is basic to this thesis, both in understanding the study and in defining the terminology. Systems management is a term liberally used and intuitively defined by many of us. Nevertheless, it may be of value to define and point out some common characteristics of systems. Buffa refers to a system as a "regularly interacting or interdependent group of items forming a unified whole." Thus, a system may have many components and elements (materials, information, machines, people, etc.) but they are united in striving toward some common goal. (1:39) Applying the system concept to design and development is widely accepted by the military

establishment and its contractors. It is the concept of a group of components designed to serve its intended purposes or missions. (3:1) A weapon system might, for example, consist of an aircraft and related men and machines. The aircraft is a subsystem of the larger weapon system which includes the runway, air traffic control, refueling, maintenance and other elements required to complete a stated mission. The aircraft is also a complete system in itself, with avionics, flight controls, engines and other vital components as subsystems.

The system concept applies not only to mechanical equipment but, also, to the human beings who operate and maintain the equipment. (3:2) The Air Force has realized the critical role played by human resources in weapon systems development and has created a functional specialty called the Personnel Subsystem (PS). Personnel Subsystem can be defined generally as the major functional part of a system which provides the human performance necessary to operate, maintain, support, and control the system in its intended operational environment. (21:2-2) It is easy to visualize the pilot as a subsystem who coordinates the flight controls, the engines and communications as he maneuvers his aircraft to complete the mission. A less obvious

personnel subsystem than the pilot is the maintenance man, the individual who insures that the many complex mechanical subsystems are in operating order and working together properly. The concern of the USAF Personnel Research Office, as expressed earlier, is directed toward the maintenance man more than toward the aircrewman.

Historically, the procurement of military equipment was handled largely as a hardware item, with little attention devoted to the problem of developing personnel to support the system until the hardware was developed. (7:518) This hardware-oriented development treated man as a flexible resource capable of being molded to match the machine. As design parameters became more difficult to achieve, machines increased in complexity and man was not able to adapt as readily. Weapon systems have become so complex that man is now the limiting factor in achieving design parameters. It is apparent that no matter how well engineered a system may be, unless men can control, operate, and maintain the system, its usefulness to national defense is negligible. (26:197)

The USAF has long been a leader in recognizing the importance of PS. As early as 1953, the Air Force emphasized human engineering and the proper man-machine design. (3:vii) The Air Force Qualitative and Quantitative

Personnel Requirements Information program was initiated in 1954. This program, which is still in effect, was intended to produce information to insure that qualified maintenance personnel would be available by the time new hardware systems rolled off the production lines. (7:518)

By the early 1960's, the man-machine system concept received a great deal of support in the form of USAF research and development. The Human Resources Laboratory (HRL) was established and manned with psychologists, anthropologists and other scientists. The HRL was concerned with many aspects of pure research, which did not result in immediate recognizable benefits to the development efforts, as well as applied research in support of specific systems. (55)

Air Force Regulation (AFR) 30-8 was first published in 1958 to counter the hardware-oriented development efforts and to consolidate the many man-machine concepts into one area. (27:1) Human Engineering, Human Factors, and Industrial Engineering were identified and classed as the Human Engineering (HE) element. Other elements were classified as Biomedical, Personnel Planning, Training (including training aids and equipment), and Subsystem Test and Evaluation. Combined, these elements comprise the Personnel Subsystem (PS) Management element of the Development System Program

Office (SPO). AFR 30-8 was superseded by AFR 80-46 in September, 1970, and is the present policy regulation for management of PS in research and development. (17:1)

There is evidence that the initial impact of AFR 30-8, and the emphasis of PS and HE, resulted in an "overkill" effort. At least one major SPO was heavily loaded with a PS element that apparently cost the system a disproportionate amount of money, and, from some viewpoints, caused complications in the development as well. (44) As a result, the entire PS area has been under scrutiny and vulnerable to the current budgetary cuts. The HRL has been reduced, reorganized, and given new parameters of study and work. (55) The PS organization in Air Force Systems Command (Systems Command) divisions has been placed under the overall responsibility of the Human Factors or HE staff element, which resulted in a side effect of placing the entire PS effort within the control and guidance of the professional psychologists. (42) Finally, the PS manning in the SPOs and in the contractors' plants has been reduced considerably. For example, a major SPO has been reduced from nine to five authorized PS positions, while at the same time, the contractor PS manning was reduced from twenty-four to seven. (44) In the period 1964-1969, total Systems Command

strength was reduced 18 percent. During the same period, applied human factors positions were cut by 66 percent. (43)

The de-emphasized PS trend has apparently not reached its nadir since a principal position required by AFR 80-46, the Personnel Subsystems Manager, is in danger of complete deletion. (45) This reduced emphasis on PS is undoubtedly a combination of current budget restrictions and DOD policy of "fly before you buy," which seems to emphasize the immediate development of workable hardware. Because of the current fiscal restraints and resultant reduced manning policies SPOs are restricted in their authorized manning, and personnel must be selected who can wear many hats and do many jobs. Therefore, specialized positions are at a premium and often reduced or eliminated. No longer are SPOs allowed the luxury of having specialists in every management environment. To compensate for the lack of specialists, PS in particular, SPO managers need to become better acquainted with the PS discipline to insure adequate PS considerations in future weapon systems.

This trend in personnel manning policy and the competition for the human resource shows no sign of improvement. The trend affects the people available to administer the PS management system and the number and types of personnel

available to interact with newly developed weapon systems. This is becoming especially true with respect to maintenance. This does not mean that other personnel subsystems, such as the crew, are any less important. However, the general feeling is that, with some compromises, the crew members are "well taken care of" in current designs. (43) Whether or not these designs are optimized to the fullest extent possible is difficult to say, but that area of PS is not the question at hand. What is of concern is whether or not the new weapon systems of the future can be adequately maintained with fewer and possibly less skilled maintenance people.

Efforts are being made to improve designs to insure adequate PS, but the majority of these are HRL studies yet to be perfected or completed. (57) New aircraft such as the B-1 will be employing revolutionary systems of "black boxes within black boxes" and automated trouble-shooting equipment. (47) The HRL is also developing automated job performance aids, which may replace technical orders. (55) In the midst of all these changes, Personnel Planning is, at the same time, in an extremely dynamic position. An all-volunteer defense force may appreciably decrease the skill levels and availability of maintenance people, which could

present definite constraints in PS interface with new hardware subsystems like the B-1. (65:5) PS may appear to be waning but it is far from being a dead issue or lacking in current importance. With tighter budget restrictions and lower manning levels on the horizon, the limits of man now, more than ever before, are becoming the critical design parameter for the new weapon systems. Therefore, knowledge of the critical area by those ultimately responsible for the acquisition of new weapon systems is becoming more important.

Scope

The research dealt primarily with the background and training of SPO Managers in specified career positions of the 29XX career field. These positions, as defined by Air Force Manual (AFM) 36-23, are held by officers who possess Air Force Specialty Codes (AFSC) 2916 and 2926. (16:20-2)

We limited our study to military managers, excluding the civilian 29XX positions. The reason for this limitation is that the civilian personnel are controlled independently of their military counterparts, with an entirely different career progression and background. An additional factor is that there are no civilian SPO Directors.

The scope was further reduced by confining the analysis to those SPO Managers presently assigned to current Aeronautical Systems Division (ASD) System Program Offices. This limit was imposed because of the convenience to ASD records and the time constraints of the researchers. We assumed that this restriction in scope would not bias the validity of the thesis results.

Objectives

1. Our first objective was to determine the experience and training of the managers responsible for the development of new weapon systems. In addressing this objective, the specific sub-objectives were to determine:

a) the type of background of present SPO Managers;

b) the conformity of the present SPO Managers' background and training with established career progression guidelines;

c) the course content of present educational and training programs provided for SPO Managers.

2. Our second objective was to determine if the present background of SPO Managers indicated a need to improve their training in personnel subsystems.

Research Questions

To achieve the thesis objectives, we formulated the following questions:

1. What is the background and formal training of SPO Managers currently assigned at ASD Wright-Patterson Air Force Base (WPAFB)?

2. Does the background and training of currently assigned SPO Managers at ASD WPAFB compare favorably with the career progression guideline for their career field?

3. What instruction in personnel subsystems do presently available weapon system management educational and training courses offer?

4. Can we conclude from analysis of the backgrounds and training of SPO Managers that additional personnel subsystem training is warranted?

Research Methodology

The three primary methods used in collecting information for this study were library research, personal interviews, and extraction of computerized personnel data.

Library Research. We completed a library search using the following topics: personnel subsystems, human factors, human engineering, man-machine relationship, and SPO officer training. Research of the literature resulted

in an ample amount of both military and civilian information on the thesis topic. Several theses and unpublished research papers were obtained through contacts with interested parties. We did not, however, discover any prior studies that dealt specifically with the objectives of this thesis.

Personal Interviews. A total of 36 people were interviewed.* The interviews included individuals from the following functions:

	OFFICE	NUMBER
1.	Hq. USAF Personnel Research Office (Submitters of the original proposal)	3
2.	Human Resource Laboratory (WPAFB)	3
3.	ASD Personnel Subsystem Branch (WPAFB)	1
4.	F-15 Human Factors Engineer (The ranking officer in his AFSC at WPAFB)	1
5.	Hq. USAF Personnel Career Center	3
6.	Hq. Personnel Career Center, AFSC	2
7.	Hq. Personnel Career Center, ASD	2
8.	ASD SPO Managers, SPO Staff Officers and Special Projects Officers	8
9.	Air Force Institute of Technology Assignment Personnel	3
10.	Officials from various schools and educational courses	10

*Interviews that were not referenced in the text are omitted from the bibliography.

Computerized Personnel Data. We obtained permission from the ASD personnel office to extract anonymous information from the computerized military personnel records.* Information was requested on all 2911, 2916, 2921, and 2926 AFSCs assigned to ASD. The records of 178 field grade officers, assigned to ASD on 2 May 1972, were interrogated by the computer for use in the study.

Figure 1 provides a summary of the methodology used to answer the thesis research questions.

Organization of Report

Information presented in Chapters II, III, and IV of the report answer research questions 1, 2, and 3 respectively. These sections are also used as building blocks to develop the answer to research question 4, found in Chapter V. Chapter VI shows the conclusions and recommendations derived from the analysis in Chapter V.

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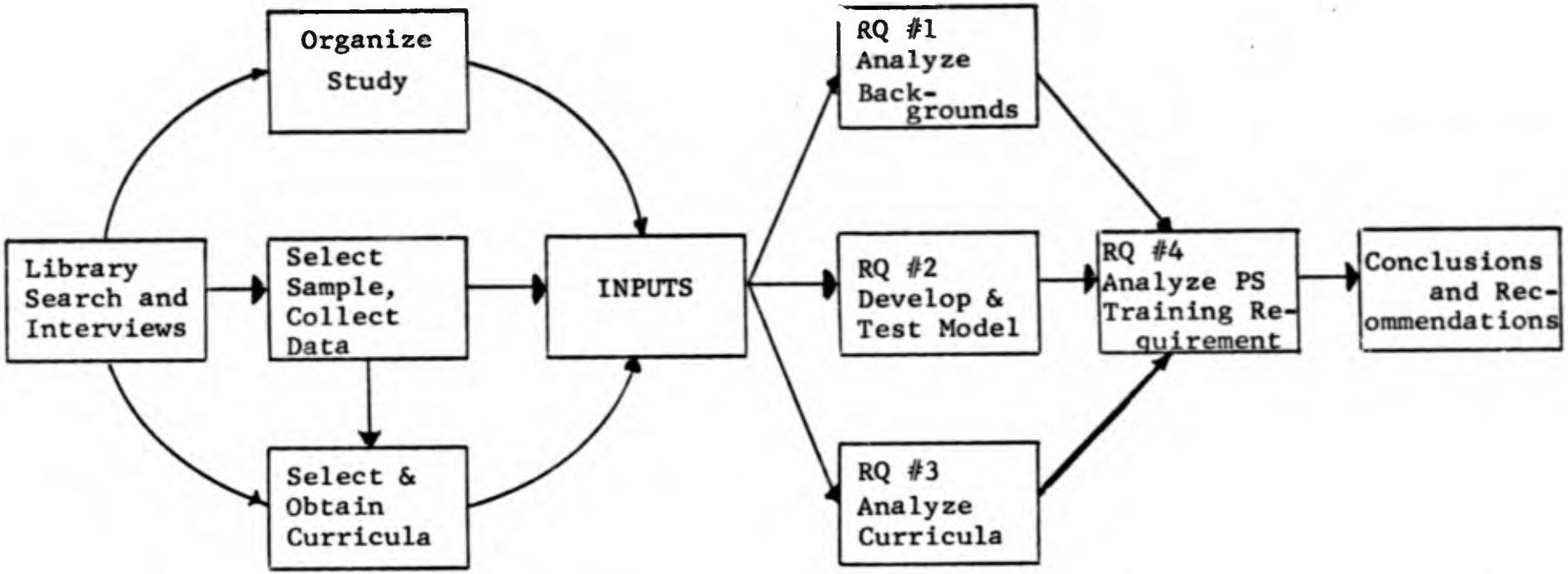
*The ASD personnel office would not release other than anonymous information without written permission from each individual or his supervisor. Since our study does not require individual identification the anonymous data was sufficient.



RQ = Research Questions

Fig. 1.--Flow Diagram of Thesis Methodology

CHAPTER II

ANALYSIS OF BACKGROUND AND TRAINING OF ASD SPO MANAGERS

In this chapter we present an analysis of the background and training of SPO Managers presently assigned to ASD, which provides the answer to the first research question. Prior to the analysis, we discuss the assignment and selection of personnel assigned to SPO management positions. Following this, we present the rationale used in selecting a sample population and the method used in obtaining the data. The remainder of the chapter is devoted to the analysis of this data.

Assignment and Selection

SPOs, by design, follow program management principles and are somewhat unique among Air Force oganizations. Major SPOs are created for a specific project, for a limited time period. They follow a pattern of an initial cadre expanding gradually to full strength succeeded by a gradual decrease in size as the weapon is developed. When the weapon system is transferred to Air Force Logistics Command,

the SPO is disbanded. It is estimated that 90 percent of the military and civilian personnel come from other SPOs within the division, located geographically on the same base. (60:9) A high percentage of the technical people in a SPO are assigned from personnel pools. For example, engineers are assigned to a SPO from a central pool of engineers and the numbers fluctuate according to the SPO's needs. Although they are assigned semi-permanently to the SPO, they still retain their association with the parent engineering organization. (58) SPO officers, such as the SPD, Deputy, and Project Managers, are permanently assigned to the SPO for its duration or until their reassignment.

SPO Directors (SPDs) are assigned through careful selection by Systems Command senior officers who closely monitor their performance. (25:4) After selection, the SPD has the freedom to select his initial SPO cadre, which, in turn, is involved in the selection process of building the SPO to authorized strength. In view of these procedures, it is easy to understand how the manning qualifications of one SPO may differ from another.

An excellent example of this diversification in assignment policy can be found in ASD. One major SPO has a very experienced SPD who has been involved in the development

of weapon systems for many years. His initial cadre, also with considerable experience in SPOs, carefully screened the official records of every individual prior to assignment selection. Their criteria were based on weapons acquisition experience and proven performance as shown in the officer effectiveness ratings. (58) A second major SPO used a different approach. The SPD was nominated by the Major Air Command that will use the weapon system. In this case, the SPD had no SPO experience whatsoever. (49) Although he has, of course, many individuals with SPO experience assigned, he has made a definite effort to infuse a great amount of new talent into the SPO. The selection criteria were based on Air Force experience and, again, proven performance, with little consideration given to prior SPO experience. (50)*

Two additional factors in assignment selection have an effect on the SPO manning, particularly in the area of the SPO Manager. One is the rated supplement. SPOs are designated as career broadening assignments, so we expected a large number of rated officers as SPO Managers. (16:20-5) The other factor is that SPO Manager positions are desirable career progression stepping stones. Many officers, of

---

*It is difficult to discern if there is an appreciable difference in the effectiveness of the two SPOs since no effort was made to evaluate them or to compare their attitudes toward the PS requirement.

all grades, seek these jobs for career advancement. (49)

From this brief discussion, it is quite evident that the assignment and selection process plays an important role in any analysis of the background and training of SPO Managers.

The Sample

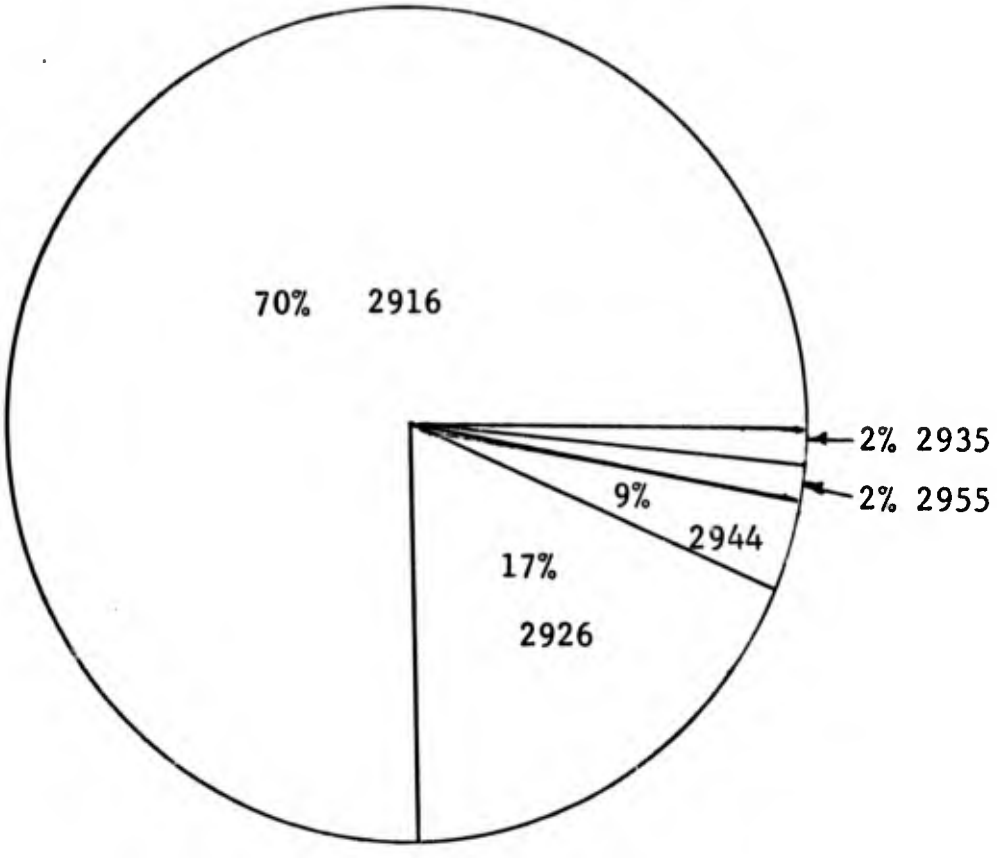
Our approach to collecting sample data was to first examine the entire SPO management career field which, by regulation, is limited to the 29XX* AFSCs. (16:20-1) The 29XX career field consists of five specialties:

Code	Title
2926	SPO Manager
2916	SPO Staff Officer
2944	SPO Management Officer
2935	SPO Data Management Officer
2955	SPO Personnel Subsystem Officer.

A graphical representation of the distribution of these specialty codes is shown in Figure 2.

Since our concern was with the senior managers who could effectively influence design policy, we restricted the study to the 2926 and 2916 career fields, including their 2911 and 2921 entry levels. As mentioned in the scope,

*Hereafter, Air Force Specialty Codes will usually be referred to by their four digit code number only, or generally as "AFSC."



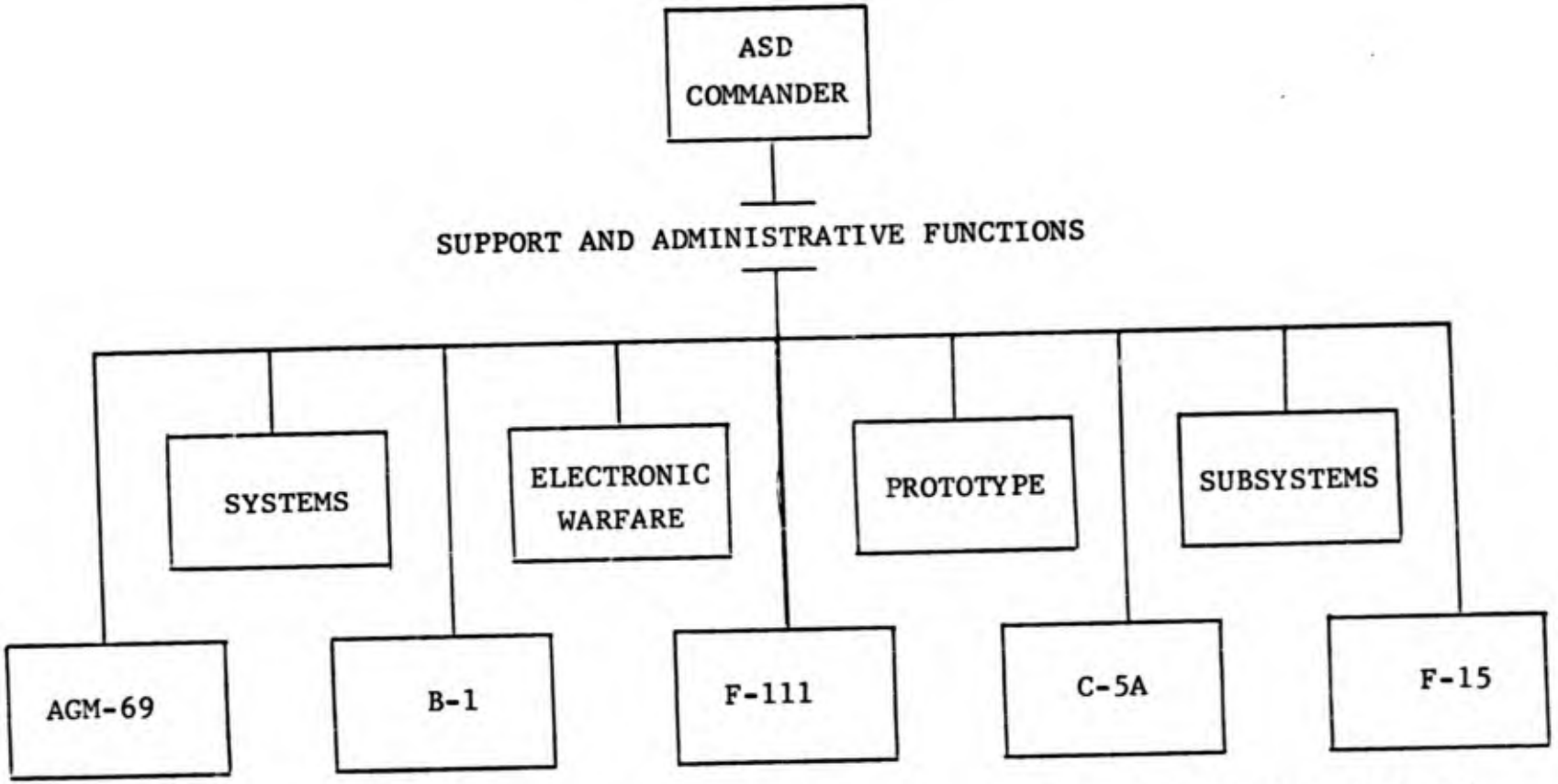
Total = 100%

Fig. 2.--Presentation of the Distribution of AFSCs in the 29XX Career Field. (16:20-1,2)

we further restricted the study to those individuals stationed at WPAFB. Thirty-four percent of the holders of the subject career fields are assigned to ASD, of which 93 percent are stationed at WPAFB and seven percent are stationed at other locations throughout the country. (45) The ASD organization at WPAFB is shown in Figure 3. A typical SPO is shown in Figure 4, illustrating the managerial positions of the individuals sampled.

The logical career progression for an SPD is to enter as a 2911 and progress to a 2916, 2921, and finally 2926. (16:20-3) In view of this progression, the four categories were often viewed individually in order to allow comparison in later analysis. There were 178 field grade officers in these career fields. Since this number was not overly cumbersome, we elected to evaluate the entire population. The data contained 13 captains in the 2911 career field. They were excluded from our analysis because they were not within the grade specified in AFM 36-1 for the 2916 AFSC. (15:A11-4)

To insure that all SPDs were included, we also secured information on the ASD officers holding specialty



Source: Aeronautical Systems Division, Air Force Systems Command, Organizational Chart, 1 February 1972.

Fig. 3.--Aeronautical Systems Division Organizational Chart

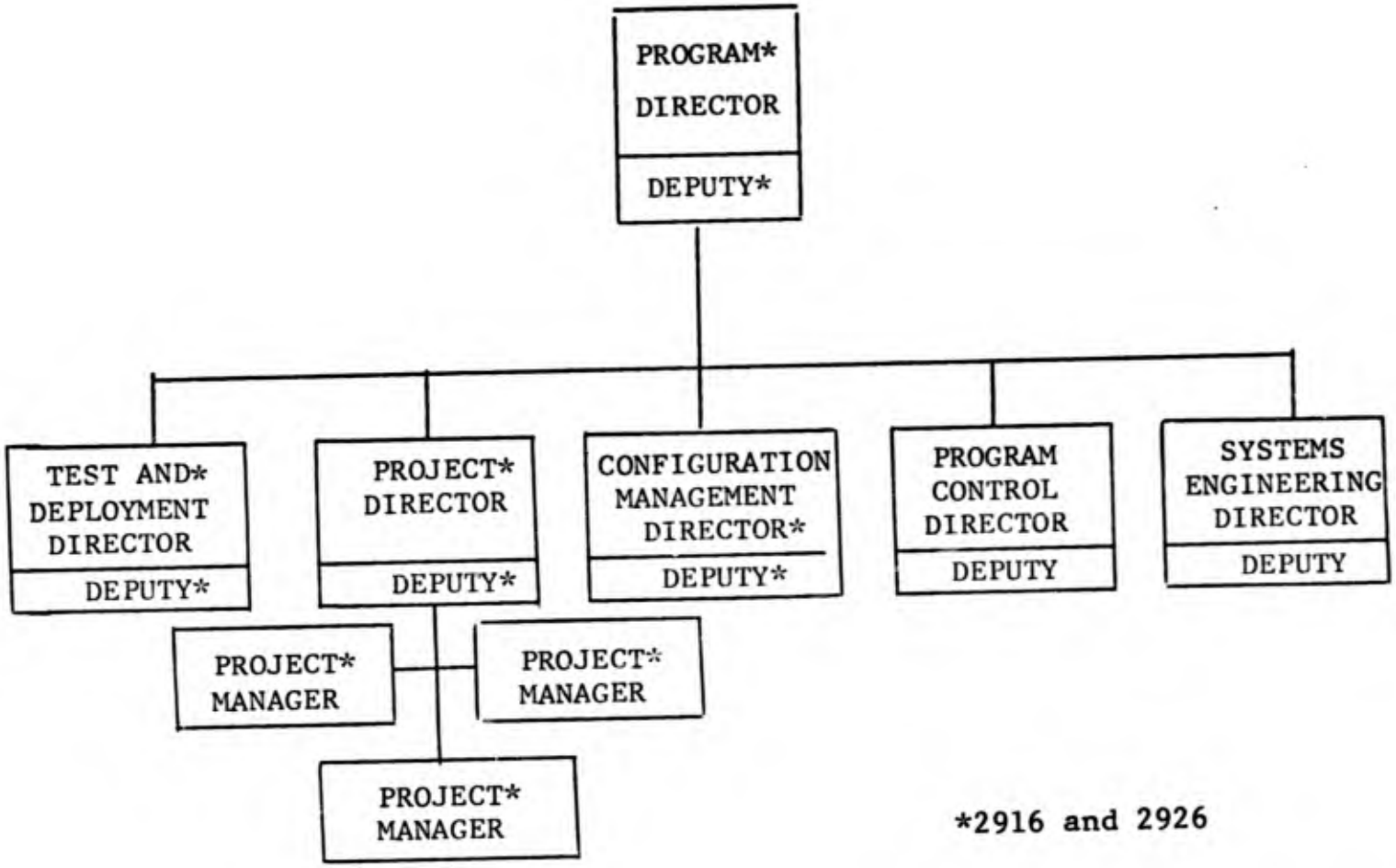


Fig. 4.--"Typical" Project Office Organizational Chart Indicating Manager Positions From Which the Sample Was Drawn. (19:7)

codes of 0002.* There were eight SPDs in this category: five general officers and three colonels. Although names and serial numbers were withheld, we felt that the information made identification of the individuals relatively easy, and elected to exclude it from the study.

Information was extracted from the computerized personnel records by sorting on the four 29XX specialty codes and the ASD organizational code. We received the following information:

- Grade
- Duty Air Force Specialty Code
- Primary Air Force Specialty Code
- Secondary Air Force Specialty Code
- Third Air Force Specialty Code
- Aeronautical rating
- Total Active Federal Commissioned Service Date
- Level of most recent formal education
  - Date graduated
  - Major field of study
- Level of second most recent formal education
  - Major field of study
- Professional Military Education
  - Most recent school
    - Date finished
    - Correspondence or resident
  - Second most recent school
    - Correspondence or resident
  - Third most recent school
    - Correspondence or resident
- Defense Program Management Course attendance
- Systems Program Management Course attendance
- Current and previous assignments.

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*AFSC 0002 is used to report the duty of all officers in the grade of brigadier general or higher, regardless of duty assignment. It is also used to report the duty AFSC of colonels serving in authorized general officer positions. (36-1:A13-1)

Appendix one contains copies of all raw computer data received and used in our analysis.*

Data Analysis Procedure

We evaluated the data primarily by separating the information into groups, i.e., specific background or training information, and then compiled information about each specific group. The groups were then separated by specialty code, or by rank structure, whichever seemed to be the most informative and useful. No effort was made to examine an individual's entire background and compare it with another's, or to the 29XX career progression guide. We conducted an analysis of this nature, using the same sample data, and discuss it in Chapter III. The results of our analysis are presented primarily in tabular form. The specific areas that were addressed are contained in the following paragraphs.

Grade Structure

Grade structure was evaluated simply by specialty code and is shown in Table 1. Specific information about

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*Air Force Form 11s (personnel records) would provide more complete data and would also be easier to decipher. However, access to the records is very difficult to obtain. (51) In view of these difficulties, and the relative accessibility of the computerized personnel records, we elected to omit AF Form 11s from our research.

TABLE 1

GRADE STRUCTURE BY SPECIALTY CODE

Grade \ Code	2911	2916	2921	2926	TOTALS
Colonel	11	8	13	16	48
Lt/Col	34	40	8	6	88
Major	26	13	3	0	42
TOTALS	71	61	24	22	178

the various grades is included in other evaluations. Table 1 is the only table in the study that is presented by actual numbers of individuals. All other tables are expressed in percentages, which, in view of the varied grade structure in the different AFSCs, is a better comparative figure.

Aeronautical Rating

We analyzed aeronautical rating because rated status is an integral part of an officer's background that cannot be omitted in any analysis of his experience. Analysis was restricted to pilot, navigator, observer and non-rated, with no delineation of command pilot, senior pilot, etc. Percentages of aeronautical ratings by specialty code and grade are shown in Table 2.

TABLE 2

AERONAUTICAL RATING BY SPECIALTY CODE AND GRADE

Code	Pilot	Nav	Observer	Non-Rated
2911	66%	12%	8%	14%
2916	57%	16%	8%	19%
2921	71%	17%	8%	4%
2926	72%	14%	0	14%
Grade	**Pilot**	**Nav**	**Observer**	**Non-Rated**
Colonel	77%	10%	2%	11%
Lt/Col	60%	12.5%	12.5%	15%
Major	57%	19%	0	24%
TOTALS	64%	14%	7%	15%

Our analysis indicates that pilots dominate the SPO manager positions in all AFSCs and grades. An average of about 15 percent of the managers are non-rated. Since the 2911 and 2916 career fields presently have a smaller percentage of pilots assigned, the number of non-rated officers in the 292X positions may increase in the future.

Time in Service

We examined the data to determine the number of officers who were passed over, and also who were promoted below-the-zone. The data did not allow us to discern when an officer was promoted below the zone several years ago and was now in the proper time sequence with his since-promoted contemporaries. Consequently, the below-the-zone figures are admittedly of interest only and cannot be considered a true representation of the number of below-the-zone promotions among SPO Managers. The following criteria were used to evaluate the time in service:

Rank	Below the Zone	In the Zone	Passed Over
Colonel	Under 22 years	22 to 30 years	-
Lt/Col	Under 17 years	17 to 22 years	Over 22 years
Major	Under 11 years	11 to 17 years	Over 17 years.

The results of the survey are illustrated in Table 3. The differences in the colonels' status was so strikingly apparent that Table 4 was prepared, illustrating the change in below-the-zone colonels from the 2911s to the 2926s. Another readily apparent difference was found in comparing the majors and colonels in the 2911 career field. The colonels' 73 percent below-the-zone promotions were in marked contrast with the majors' 27 percent* passed-over

*Not indicated in Tables 3 or 4.

TABLE 3

ANALYSIS OF PROMOTION SUCCESS BY SPECIALTY CODE AND GRADE

Code	Below the Zone	In the Zone	Passed Over
2911	16%	71%	13%
2916	5%	82%	13%
2921	29%	63%	8%
2926	5%	85%	10%
Grade			
Colonel	40%	60%	0
Lt/Col	3%	87%	10%
Major	0	76%	24%
TOTALS	12%	76%	12%

TABLE 4

ANALYSIS OF COLONELS' PROMOTIONS

Colonels Assigned to:	Below the Zone	In the Zone
2911	73%	27%
2916	37%	63%
2921	54%	46%
2926	6%	94%

status. In the middle, the lieutenant colonels (Lt/Cols) provided an 83 percent in-the-zone rate with the remainder nearly evenly split between pass-overs and below-the-zone officers.

The differences in promotion success by grade and specialty codes would require additional data and a depth of analysis beyond the scope of this paper.

Educational Background

Supportive references* almost unanimously agreed that a SPO Manager's ideal formal training should consist of a bachelor's degree in engineering, followed by about six to eight years' experience and then a master's degree in management. The sheer complexity of sorting out 178 records did not allow us to analyze the computer output to this detail. In addition, the data only included the date of the most recent degree. No effort was made to determine when the degrees were received, or what the exact academic major was. Instead, we analyzed the educational level and the general identification of the academic major, such as engineering, science, etc. The computer uses four-digit codes to denote the educational major. The first digit is

*A listing of these references is found in Chapter III in the section on sensitivity analysis.

numerical, ranging from zero through nine. Code 1XXX indicates a management major, while code 4XXX indicates an engineering major. Our analysis was confined to these two categories, with all other majors grouped together.

Academic Level. The breakout of academic levels are presented in Table 5. Academic levels among the four specialty codes were very similar and will not be presented in tabular form. The only significant difference between the specialty code groups was in the number of doctoral degrees. Five of the six doctoral degrees in the sample were assigned to the 2911 specialty. Three of the officers in the sample, also assigned as 2911s, did not have any formal degree. Since a degree is mandatory for the position, their assignment was something of a curiosity. (15:A11-4) A significant finding is that the officers in ASD have a higher percentage of master's degrees (63 percent) than the 55 percent desired by the Systems Command. (20:3-39)

Academic Major. Our formal education data was limited by the computerized extraction of the two most recent academic degrees and academic majors. There were six officers with doctorate degrees and nine with two master's degrees. For these 15 officers the basic bachelor's degree was omitted. In the sample, there were 23 officers with two

TABLE 5

EDUCATIONAL LEVEL BY GRADE

Grade	Doctorate	Masters	Bachelors	No Degree
Colonel	4%	67%	29%	0
Lt/Colonel	1%	69%	28%	2%
Major	6%	50%	41%	3%
TOTAL	3%	63%	32%	2%

bachelor's degrees, both of which are included in the academic major data.

Table 6 illustrates the two highest academic majors held by the various grades of SPO Managers. The table clearly illustrates that the majority of academic majors are in the desired fields of study. Of the 314 degrees listed in the data, 53 percent were in engineering, 34 percent in management, and 13 percent in others. Seventy-one percent of the officers had at least one engineering degree. Twenty-eight percent of the officers had the desired mix of one engineering and one management degree. Eight percent of the officers did not have a degree in management or engineering, but many of their degrees were in scientific fields which met the Air Force requirement. (16:20-4)

TABLE 6

ACADEMIC MAJORS BY GRADE

Grade	Degree	Engineering	Management	Other	No Degree
Colonel	Highest	44%	33%	23%	0
	Second	37%	23%	13%	27%
Lt/Col	Highest	47%	39%	12%	2%
	Second	54%	14%	12%	20%
Major	Highest	45%	47%	5%	3%
	Second	40%	29%	10%	21%
TOTAL	Highest	46%	40%	12%	2%
	Second	46%	20%	12%	22%

We examined Volume II of AFM 300-4* to investigate if the four-digit identification of academic majors would disclose fields of study related to the man-machine concept. We felt that the description of each academic major in AFM 300-4 would be sufficient for this purpose. (18) Key words

*AFM 300-4 is a coding manual used to convert plain language into computer alphanumeric identification codes.

or phrases used in the review were: man-machine, human engineering, and human factors. The following academic majors were extracted as possibly providing backgrounds favorable to PS requirements:

Code	Title
1AMC	Logistics Function Management
1AMY	Logistics Management
4LCO	Machine Design/Industrial Engineering
4IDE	Man-machine Translation
7AAG	Human Physiology
4LYY	Industrial Engineering
4LGE	Product Design/Production Engineering
4RYY	Safety Engineering
2AKK	Time and Motion Study
4LCE	Time and Motion Study
4LDD	Time and Motion Study
4MHA	Advance Product Design
4TBY	Cybernetics.

Only eleven of the academic majors in our data (3.4 percent) coincided with one of these codes. This fact is significant and will be mentioned again in Chapter V.

Professional Military Education

Professional Military Education (PME) consists of three levels. The lowest level is Squadron Officer School (SOS), which is offered primarily to junior officers. The intermediate level is the Air Command and Staff College (ACSC) and is primarily for majors and Lt/Cols. Some officers attend the Armed Forces Staff College or foreign command and staff schools to complete their intermediate PME.

The senior level consists of several institutions, including:

Air War College
Industrial College of the Armed Forces
National War College
Army War College
Command and General Staff.

Most of these schools are offered as both residence courses and correspondence courses. In our analysis, we did not differentiate between the residence courses and the correspondence courses. The analysis indicated by school level and grade is shown in Table 7.

TABLE 7

PROFESSIONAL MILITARY TRAINING BY GRADE

Grade	SOS	Inter-mediate	Senior	One Only	Two	Three	None
Colonel	65%	60%	44%	27%	40%	21%	12%
Lt/Col	80%	34%	17%	48%	38%	3%	11%
Major	71%	7%	5%	69%	10%	0	21%
TOTAL	74%	35%	27%*	48%	30%	8%*	14%

*Percentages do not include Majors as they are not eligible for senior service schools.

Although the percentages of PME attendance are high, we were surprised that they were not higher. Considering the status that SPO Managers supposedly have, we expected SOS attendance to approach 100 percent. The fact that only

71 percent of the majors attended SOS was particularly interesting, since we belong to the same career group and SOS has been heavily emphasized throughout our career. The intermediate and senior service schools are in a relatively better position. It is likely that the Lt/Col attendance in intermediate and senior PME schools will continue and eventually match the percentages held by the colonels.

We were under the impression that ICAF was a rather important school for officers involved in the weapon systems acquisition process so we evaluated it separately. (9:33) A total of ten colonels, eight Lt/Cols, and two majors attended ICAF, 15 of them by correspondence. The fact that less than three percent of the ASD SPO Managers have attended ICAF in residence might indicate that a lower degree of emphasis is placed on the school than we believed.

Technical Training

There are two sources of specific SPO manager training. The first is the School of Systems and Logistic's System Program Management Course, conducted at WPAFB. The second is the Defense Program Management Course conducted by the Defense Systems Management School (DSMS) located at Fort Belvior, Virginia. (11:27) Twenty-five officers attended the System Program Management Course and ten attended

the DSMS. Since only one officer attended both courses, we grouped the data for our analysis. Percentage attendance, by grade and AFSC, is shown in Table 8.

TABLE 8

SPO TRAINING COURSE ATTENDANCE
BY GRADE AND AFSC

Grade	2911	2916	2921	2926	Totals
Colonels	27%	12%	8%	12%	15%
Lt/Cols	18%	27%	12%	50%	24%
Majors	15%	7%	33%	n/a	14%
Totals	18%	21%	13%	23%	19%

Our analysis indicates that the Lt/Cols attended the specialized SPO courses more often than majors or colonels. Our data did not indicate how many of the Lt/Cols attended the courses while in the grade of major. The fact that nearly one-fourth of the Lt/Cols have attended a specialized SPO training course is a favorable trend in attendance in the two training schools.

Another SPO management course that we investigated is the technical training offered twice a year by ASD. This training consists of a one-week course and is designed

primarily for newly assigned SPO officers and civilian managers. (46) The course is limited to ASD personnel and does not teach any PS orientation, so, we made no further effort to include it in our study.

Experience

Our data indicated past experience in two ways. The first was through additional AFSCs.* The second was through the listing of past duty titles. Both sets of data were difficult to group for any type of analysis. However, an effort was made to reduce the data to a few generalities that could be grouped for comparison analysis. No effort was made to compare the AFSCs with the duty titles.

Air Force Specialty Codes. The duty code was, of course, the appropriate 29XX. In addition, 69 percent of

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*Quotes from AFM 35-1 indicate how the AFSC can identify an individual's experience:

"A primary AFSC will be designated for each commissioned officer . . . and will be the AFSC in which the individual is most highly qualified to perform, duty . . .

"That AFSC representing the best additional qualification will be designated the second or '(2)' AFSC.

"That AFSC representing the next best qualification, other than the primary '(P)' or second '(2),' will be designated the third '(3)' AFSC.

"Officers possessing a currently effective aeronautical rating or ratings will have the AFSC denoting best aircrew qualifications designated as either primary '(P),' or the second '(2)' AFSC.

"R and D AFSCs (26XX,27XX,28XX,29XX) awarded an officer will be retained as primary, 2d, or 3d AFSC." (14:6-17,19)

the sample carried their duty code as a primary or third specialty code. The usual sources for SPO Managers are listed in AFM 36-23 as development engineers (28XX), procurement officers (65XX), research and development managers (27XX), and the scientific field (26XX). Percentages of these codes are shown in Table 9. In some cases an officer had more than two of the required source specialties, consequently, the percentages in the table often add up to more than 100 percent.

Analysis of the data revealed that the scientific and procurement fields are very lightly represented as SPO Managers. Ninety of the managers had development engineering backgrounds and 26 came from the research and development (R&D) specialty. A total of 32 officers carried their duty AFSC as primary or third AFSC, with no other SPO related AFSC indicated, that is, the only SPO experience or background indicating AFSC is their present duty AFSC. AFM 36-1 states that any officer entering the 2911 or 2921 career field should have prior SPO experience or be qualified in one of the input career fields. (15:11-4) This indicates that these 32 managers were assigned directly to the 291X and 292X specialties without prior SPO experience or one of the recommended source specialties. There were also four officers who had a duty AFSC of 29XX and three

TABLE 9

ADDITIONAL SPECIALTY CODES OTHER THAN DUTY AFSC

Duty \ Additional	*	26XX	27XX	28XX	** 29XX	65XX	***
2911	23%	6%	10%	48%	11%	4%	4%
2916	17%	0	10%	56%	8%	5%	0
2921	0	0	38%	43%	12%	4%	4%
2926	14%	0	19%	38%	29%	3%	0
TOTALS	18%	2%	15%	51%	12%	5%	2%

*This column indicates officers who have an additional specialty code that is the same as their duty code, with no other applicable specialty code listed.

**This column indicates officers who have an additional specialty code in the 29XX career field that is different from their duty code, with no other specialty code listed.

***This column indicates officers who have no additional required specialty codes in the R&D field.

Note: Percentages do not add up to 100% since some officers have more than two of the required source specialty codes.

additional AFSCs in non-SPO related career fields. This infers that a total of 36 officers, or 20 percent of the SPO Managers in the sample, may lack the minimum experience required for the job.

The data was also checked to see if any of the SPO Managers held 2955 (personnel subsystem officer) or 2675 (behavioral scientist) AFSCs. The fact that not one AFSC, out of 534 possible (178x3) matched a PS-oriented code indicates that, perhaps, PS officers leave the SPO prior to advancement to the managerial level.

Duty Titles. The current and previous duty titles were the weakest element of our data. The information available in the computer included the current duty title and past assignments within ASD, up to a maximum of five duty titles. If the individual had less than five concurrent assignments in ASD, then it would also indicate the last duty title prior to assignment to ASD. Thus, some of the officers' duty titles were limited to their current title and their last duty title prior to assignment to ASD. In view of these limitations, the only significant finding was that eight officers appeared to have been assigned directly to the SPO in a managerial capacity, without the experience required by AFM 36-1. This finding is notable

only in that it supports the similar observation noted in analyzing the AFSCs. The majority of officers had from three to five assignments listed, indicating that they have recent weapon systems acquisition experience.

Combined Analysis and Comparison

For comparison purposes, in our study we used two sources that deserve further explanation. The first of these was a systems analysis entitled, "The System Program Director of the Seventies," written in 1970 by Majors J. E. Chambers, D. W. Henderson, G. A. Jones and Mr. M. L. Solomon, as a requirement for their master's degrees in aerospace operations management. During their study, Major Henderson was the Systems Command career advisor, which gave him access to high level assistance and to personnel and performance data on Systems Command SPDs. Their primary data source was a questionnaire sent to 91 Systems Command general officers, SPDs and key SPO personnel. Seventy-six of the questionnaires were returned and used in their analysis. Their secondary data source was the assignment and performance histories of present SPDs. With this data, they developed a model of an ideal SPD. We used their model and portions of their data in our analysis in Chapter III, referring to their paper as "The SPD of the Seventies

Study." (59)

The SPD of the Seventies Study was well-accepted by Systems Command headquarters and served as the basis for an official policy letter issued by the Systems Command Deputy Chief of Staff for personnel in September, 1971. (25) We refer to the attachments to this letter (which is based on SPD of the Seventies data) as the "Systems Command Career Progression Data," and use some of the data it contains for comparison purposes.

To analyze and compare our data in this chapter, we refer to the Systems Command career progression data on "all SPO colonels." (25:5) We compared these guidelines with the colonels, the 2926s, and the entire population, of our sample. The results are shown in Table 10.

Our analysis indicated that in the three areas that were compared, the background qualifications of the officers we investigated are very similar to those found in the Systems Command career progression data.

Conclusions

We summarized the answer to the first research question "What is the background of present SPO Managers?" by presenting a description of the typical SPO Manager. He is "a rated Lt/Col with a master's degree in engineering and a

TABLE 10

COMPARISON OF SAMPLE DATA WITH SYSTEMS COMMAND CAREER PROGRESSION DATA

AFSC Guide Categories	AFSC Guide All SPO Colonels	This Study Colonels	This Study 2926s	This Study All Officers
No Degree	3.7%	0	0	1.4%
Bachelors	22.4%	29%	33%	31. %
Masters	69.4%	66%	67%	63.4%
Doctorate	4.5%	4%	0	3.5%
SOS PME	34.5%	65%	47%	74. %
Intermediate	42.1%	60%	52%	35. %
Senior	35.3%	44%	52%	27. %
DSMS	9.6%	8.3%	9.1%	5.6%
Pilot	70.2%	77%	72%	64 %
Nav (Incl. Observers)	11.2%	12%	14%	21 %
Non-Rated	18.6%	11%	14%	15 %

bachelor's degree in engineering who has attended SOS and one other PME school. He has not attended any SPO training course, but he does have previous SPO experience in an engineering discipline. He was promoted with his peers and has

no apparent training or experience in personnel subsystems."

Our analysis indicated that over 98 percent of the SPO Managers have the minimum educational requirement of a bachelor's degree. Nineteen percent of the managers have attended training courses that are specifically designed for SPO management positions. Finally, we concluded that the background qualifications of SPO Managers in ASD are similar to the qualifications desired by the Systems Command.

In the next chapter we present our analysis of individual backgrounds through comparison with a career progression model.

CHAPTER III

ANALYSIS OF BACKGROUNDS AND TRAINING WITH A CAREER PROGRESSION MODEL

In this chapter we present an analysis of the sample data and compare it with the system program management career progression guide contained in AFM 36-23. This analysis is designed to complement Chapter II by evaluating the sample data with a systems approach. In Chapter II, grade, training, education and assignment data were analyzed separately. This provided information on the experience, training, and background of SPO Managers.

In this chapter the computerized data on each individual was combined and then compared to previous studies and the Air Force career progression guide. Although the comparison does not determine if an individual is qualified for his position, it does compare the manager's background with established career progression guides. The analysis also provides a method for identification of weak areas in the career progression of program managers. Supplemented by Chapter II, this information is then used to answer

research question two.

Prior to conducting an analysis of the sample data, we had to find means of combining the qualitative data of many varied backgrounds and different career progressions, no two of which were alike, so that objective comparisons could be made. We decided to develop and use a model involving the concept of additive representation of worth. (29)

The idea of using a model to represent a person's experience and training is not new. A similar procedure was used in the SPD of the Seventies study. (59:40) Our concept of transforming qualitative career information into a quantitative index for use in a model was similar to theirs. However, our model was developed to compare qualitative information, not for developing an ideal career progression guide. Also, the development of the model; i.e., its attributes, weighting factors, and sensitivity analysis, was accomplished in an entirely different manner.

The reason for using the career progression guide as the model's basis is explained next, followed by the model's development and sensitivity analysis. The latter part of the chapter will present the results from using the model to analyze the sample data.

Career Progression

The primary purpose of Air Force career progression is to insure that sufficient numbers of highly qualified officers are always available to assume positions of increasing responsibility and scope throughout the Air Force and Department of Defense (DOD). (15:1-1) This purpose is similar to the management philosophy of the civilian community. (6:506) The career progression guides contained in AFM 36-23 are based on appropriate plans and programs for the particular career area. The guides are used by individual officers, superiors, personnel officers, and commanders to promote effective use of human resources and meet the needs of the Air Force. The Officer Classification Manual, AFM 36-1, also provides more detailed information on required knowledge, education, training, and experience necessary for each specific AFSC. These two manuals complement each other and it can be inferred that, when taken together, they are representative of current Air Force policy on the desired or necessary background and training for specific Air Force Careers.* Therefore, since the AFM 36-23 career

*We have inferred the manuals complement each other since no definitive written policy stated as such could be found. It is considered acceptable practice to infer government policy from written regulations and directives when no written policy stated as such exists. (54)

progression guide for the system program management career field represents Air Force policy, it was used as the nucleus of our model. Figure 5 is a copy of the System Program Management guide contained in AFM 36-23.

Model Development

The career progression guide is divided into five areas representing grade, professional military education (PME), training, education, and assignments. In each area, corresponding with an individual's time in service, the desired and suggested schools, grades, and assignments are listed. As an officer progresses in grade the assignments and schools act as building blocks preparing him for career advancement. Since the purpose of the model was to determine how well the sample population compares to the system program management guide, it contains five terms, one for each area in the career progression guide.

For the model to be used as a standard and for comparison analysis, the following steps were taken to normalize the model output. The maximum value each attribute could contribute to a term was set at one hundred points. Thus, if an individual met all the requirements of a particular attribute, he would be given one hundred points for that attribute. The attributes were then multiplied by

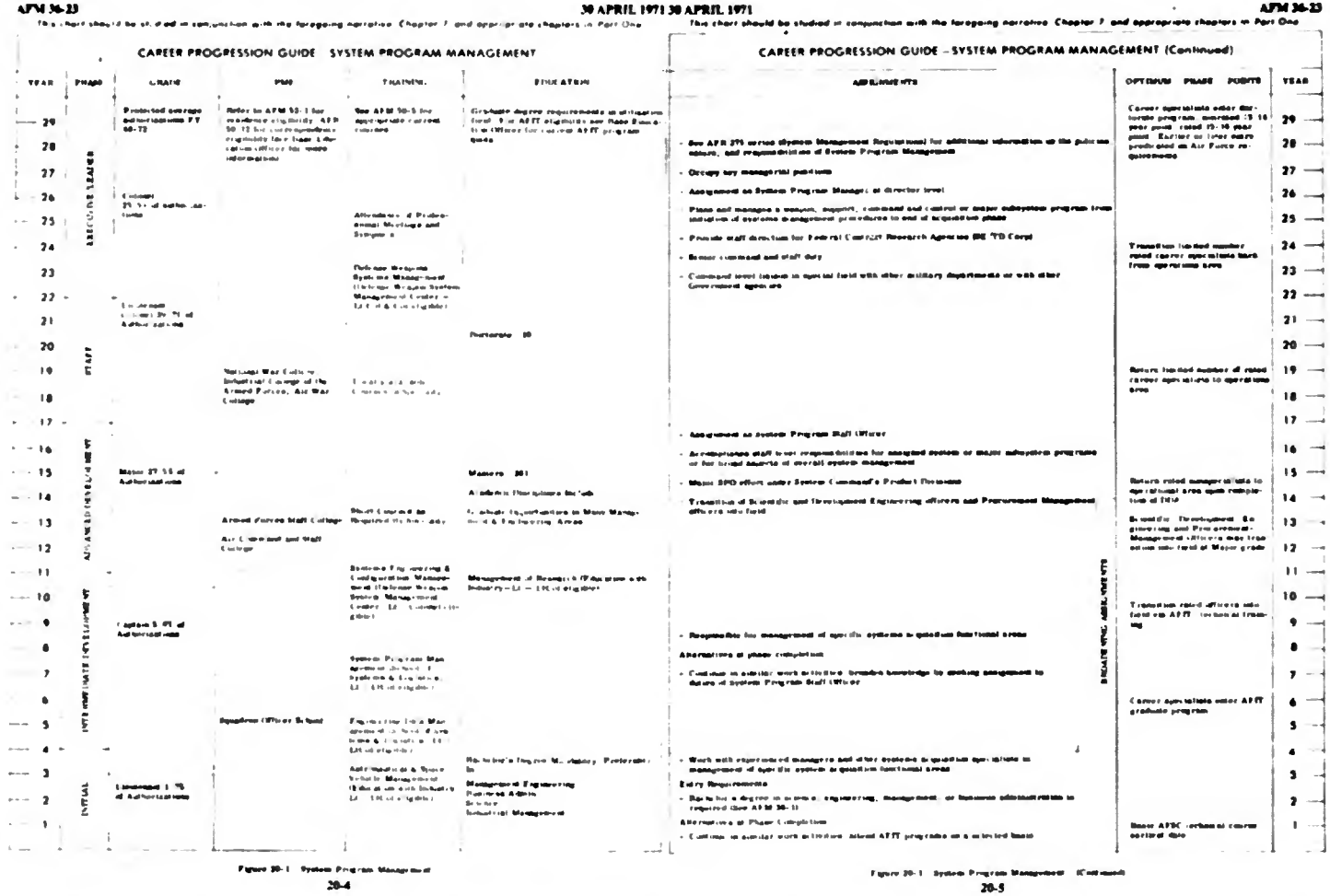

Figure 20-1 System Program Management
20-4

Figure 20-1 System Program Management (Continued)
20-5

Fig. 5.--System Program Management Career Progression Guide (16:20-4,5)

individual fractional weights, such that the sum of the five weights equalled one, and summed, providing a weighted average representing an officer's training and experience. Summarizing this discussion we have:

ATTRIBUTES FOR

GRADE=G; PME=P; TRAINING=T; EDUCATION=E; ASSIGNMENTS=A

$0 \leq G \leq 100,\ 0 \leq P \leq 100,\ 0 \leq T \leq 100,\ 0 \leq E \leq 100,\ 0 \leq A \leq 100$

WEIGHTS FOR

GRADE=g; PME=p; TRAINING=t; EDUCATION=e; ASSIGNMENTS=a

$$\text{SUM } (g+p+t+e+a) = 1$$

BASIC MODEL

$$0 \leq \text{SUM } (gG+pP+tT+eE+aA) \leq 100.$$

The reason for summing the weighted attributes versus taking a lexicographic approach, where only one attribute is considered at a time, is that all of the attributes contribute to career progression. (28:26) A deficiency in one attribute can be overcome by strengths in other attributes. In addition, a lexicographic approach would require a determination of which attribute is most important and what its minimum value should be. This might be desirable

if we wanted to determine whose career progression met or exceeded a specified standard, but this was not our intent. We wanted a model to use as a tool for comparing various career progressions. A weighted average is adequate for this purpose.

The next step in the model's development was the conversion of qualitative information into quantitative values. This involved devising a method for scaling the importance of each element that contributes to an attribute. How many points is a bachelor's degree worth or how much is a command or operations assignment worth? The slightly different procedures used for each attribute are explained in the following paragraphs.

Grade. Points were awarded for grade on the following basis. If an officer's grade was within the grade spread listed in AFM 36-1 for his AFSC, he was given one hundred points. If an officer was below the grade spread but had been promoted below the zone, he was awarded fifty points. Otherwise, an officer with a grade below the required grade received zero points. With the elimination of captains from our sample population (reference Chapter II), the only time the above situation could arise is at the entry level for the 292X career field (2921). An example of this situation would be a below-the-zone major serving

in the 292X duty AFSC. If an officer held the proper grade for the AFSC but had been passed over, he was given only fifty points. Therefore, the possible points for grade were 0, 50, and 100.*

PME. Three levels of PME are listed on the career progression guide. Points are awarded for each level completed based on the relative length of the curriculum. Since SOS in residence requires approximately one-third the time as intermediate or senior schools, it was given only one-third the points awarded for these levels. Intermediate and senior schools were given equal points. To receive a hundred points, the officer would need to complete all three levels of schooling. No differentiation was made between whether or not a course was taken in residence or by correspondence. Credit was given only once for completion of a particular level; i.e., if an officer had completed both ACSC and the Armed Forces Staff College, he would receive credit for one intermediate school. The possible combination of points for PME are 0, 14(100x(1/7)), 43(100x(3/7)), 57(100x(4/7)), 86(100x(6/7)), and 100.

*We realize that the grade of Colonel implies more experience than a Major or Lt/Col and therefore a distinction could be made between the grades. It will be shown later during the sensitivity analysis that the model output is not sensitive to grade.

Training. Technical training courses consisted of the DSMS course and the School of Systems and Logistics SPO course. These two courses were selected primarily because of their general acceptance in our literature review as being the two most important and/or recommended training courses for SPO Managers. Since very few officers had attended these courses and only one had attended both, we decided to treat them equally and award fifty points for each course. This does not imply that the courses are equal in quality or length. Our reason for awarding less than one hundred points was to provide a method for differentiating between one and two courses. Also, the career progression guide, as well as other sources, suggested that both are desirable for a system program manager. Therefore, possible values for technical training are 0, 50, and 100.

Formal Education. In subjectively arriving at a scaling method for formal education, it was again necessary to rely on our literature review. The career progression guide states that a bachelor's degree is mandatory. Therefore, if an individual did not have a bachelor's degree, he was given zero points. On the other end of the educational scale, the need for an education beyond a master's degree was considered negligible by several sources including the

career progression guide. For this reason, no special credit was given for doctoral degrees. Almost without exception, our sources of information recommended a bachelor's degree in engineering and a master's degree in management, or vice versa. Therefore, the top of the education scale represents an officer who has a master's degree in engineering or management with a bachelor's in the opposite discipline. Table 11 shows the various combinations considered and the points applied to each. These points were arrived at subjectively by ranking the different levels (or amounts of education) and then treating the intervals between the levels equally.*

The scale does not award many points for a master's degree outside the desired disciplines, since the model is designed to show how well system program managers compare with the career progression guide and not how well educated they are. Although a bachelor's degree in engineering or management is required, the Systems Command desires approximately a 50/50 ratio of master's to bachelor's degrees for staff, manager and director positions. Therefore, 50 points

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*The reasoning used was that all degrees have some value but those in the disciplines desired for system program management possess more value.

for a bachelors and 100 points for a masters was considered appropriate. (20:3-39)

TABLE 11

FORMAL EDUCATION SCALE

Degrees	Rating
Master's Degree in Engineering and a Bachelors in Management or a Masters in Management and a Bachelors in Engineering. (Also, included in this group are two Masters or a PhD and Masters as long as one is from each discipline).....	100
Two degrees, one of which is at least an advanced degree, with both in management or both in engineering.....	83
Two degrees with one of the degrees in engineering or management. These degrees could be two Bachelors, Bachelor and Masters, or PhD and Masters or two Masters.....	66.7
A degree in engineering or management.....	50.0
A Master's degree, Phd, or two Bachelors none of which are in engineering or management..	33
Bachelor's degree not in engineering or management.....	16.7
No academic degree.....	0

Assignments. Our subjective evaluation of the importance of assignments was again based on our literature review. Assignments were categorized into the following:

1. Operational experience-rated, missiles, maintenance, etc,
2. Command experience-SPD, Wing Commander, etc,
3. Staff experience (within the Systems Command),
4. Laboratory experience, Test, AFPRO, engineering,
5. SPO experience,
6. Procurement experience.

Twenty-five points were awarded for each assignment category up to a maximum of one hundred points. A particular category would not be counted twice, therefore, if an officer had only worked in a SPO he would receive only 25 points. We were liberal in awarding points for this attribute primarily because of our sample data. Previous assignments had to be inferred in many cases from AFSCs and duty titles, since we did not have access to the officers' Form 11s. If more detailed information on officers' careers is available a more exhaustive list of assignments could be developed with fewer points being applied to each. The point assessment used does provide a current (last few years) measure of differentiation between assignments and experience and it

is satisfactory for our analysis. Possible values for the assignment attribute are 0, 25, 50, 75, and 100.

Assumptions

All models are based on simplifying assumptions. In our model we assume that the five attributes meaningfully represent an officer's career. Obviously, this need not be the case since effectiveness as a manager or leader, for example, would play a vital part in progression. One means of evaluating this area for an Air Force officer might be the use of Officer Effectiveness Reports (OERs). As we did not have access to this information we could not include it in the model. Even if the data had been available, its effects on the results probably would be limited because of the high mean and general lack of any variance with the present OER system. Although the OER index is not included in the model directly, it is present indirectly in the attributes of grade, PME, and assignments. An officer's current grade indicates if he was promoted early, or if he has been passed over. Officer selection for the intermediate and senior PME schools is based on past performance and expected potential to the Air Force. Types of assignments might be a good indication that an officer has shown promise and is being groomed for future management

assignments. (6:492)

Another implied assumption is that one attribute can substitute for another, a strong attribute can overcome the deficiencies of a weak one. Although this does not appear to be unreasonable between PME, training, education and assignments (where education is sometimes considered a substitute for experience), the grade attribute is more difficult to accept. Grade normally represents an experience factor; i.e., a colonel usually has more experience than a major. On the other hand, a below-the-zone major, Lt/Col, or colonel might be more gifted in his abilities to manage resources than an officer who has been passed over. In addition, grade can restrict an officer from holding certain positions or receiving certain assignments. Therefore, promotion success, as indicated by grade, can and does play a role in an individual's career progression. As previously noted, when a sensitivity analysis was performed on the model output, grade was removed with no apparent effect on the results.

The data on the 22 officers in the 2926 career field were used to test the model. Since the career progression guide makes no apparent differentiation in the importance of the five attributes, we used Laplace's principle of

insufficient reason and treated them as equally important. (2:87) The weighting factors were all set at one-fifth, thereby implying that each attribute contributed equally to an officer's experience and training. The values used for each attribute and the resultant weighted value for each of the 22 officers is shown in Table 12. The officer's scores were then ranked, with the highest receiving a rank of one and the lowest, a rank of 22. The mean score for the 22 scores was 60. This set of ranks and mean score was then used as a basis for our sensitivity analysis which is presented next.

Sensitivity Analysis

Tests were performed on the model to determine the effect of different weighting factors. The statistical procedure used to measure the change induced in the model's output by varying the weighting factors was the Spearman rank order correlation test. This test involves a coefficient that represents the correlation between two sets of paired variables originating from the same source. For our purpose, a high correlation between two sets of values, calculated using different weights, indicates the model output is insensitive between the weights. The same relative information would be provided by the model no matter which

TABLE 12

SAMPLE DATA FOR THE 2926 CAREER FIELD

Officer	Attribute Value					Weighted Value*	Rank
	Grade	PME	Training	Education	Assignment		
1	100	57	50	66.7	75	69.7	6
2	100	0	0	100	75	55	14.5
3	100	100	0	100	100	80	1
4	100	14	0	83	100	59.4	12
5	100	43	0	33	75	50.2	19
6	100	0	50	83	50	56.6	13
7	100	100	0	100	75	75	3.5
8	50	0	0	100	50	40	22
9	100	100	50	50	75	75	3.5
10	100	0	0	33	75	41.6	21
11	100	100	50	66.7	75	78.3	2
12	100	43	0	50	75	53.6	17
13	100	14	0	83	75	54.4	16
14	100	100	0	83	75	71.6	5
15	100	0	50	50	75	55	14.5
16	100	86	0	66.7	50	60.5	10
17	100	57	0	100	50	61.4	9
18	100	86	0	83	75	68.8	7
19	100	43	0	50	50	48.6	20
20	100	86	0	83	50	63.8	8
21	100	43	0	83	75	60.2	11
22	100	14	0	66.7	75	51.1	18
Total	2150	1086	250	1613.8	1550	1329.9	
Mean	98	49	11	73.	70	60	

*Calculated Using Equal Weights

weights were applied to the attributes. Conversely, a low correlation would mean the model output is sensitive to different weights. The measure of rank correlation used in the test is the Spearman rank correlation coefficient (R). Although there are other methods for determining association, the Spearman rank test was selected for the following reasons:

1. It requires no assumptions concerning the population from which the set of values are drawn;

2. It requires only ordinal scaling of values; Ordinal scaling means you are able to distinguish that one number is larger than another but not to the extent that you can measure the interval between the numbers. For example, it is reasonable to assume that a master's degree is better than a bachelor's degree but almost impossible to state how much better;

3. The computations required to determine the coefficient are neither complicated nor extensive. This was a definite benefit considering the size of the sample and number of tests performed;

4. The discriminating power of the test, although not as strong as some requiring more information concerning the sample, was considered more than adequate for our

purposes. Discriminating power refers to the test's ability to adequately determine the degree of association between two samples. (5:202)

The calculation of R involved the following procedures. First, two sets of values are calculated from the same source by using different weights for each set. Our source was the computerized personnel data of the 22 officers with duty AFSC 2926. Each set of 22 values is then ranked, with the highest value given a rank of one and the lowest value, a rank of 22. In the case of ties within a set, each tied value is given the average of their ranks. For example, if two officers have exactly the same score, for instance a score of 89 points which is also the highest score for the set, they would each receive a rank of 1.5 or the average of one and two. Then each officer's two ranks are compared and the difference noted. If each officer's rank were the same for all 22 officers, the correlation between the two sets of data would be perfect. The difference between the ranks indicates the disparity between the two sets of rankings. If officer "A" was ranked number one using the first set of weights and ranked number three using the second set of weights, his difference in ranks (D) would be a negative two. To prevent the problem of having

negative D's cancel out positive ones when the total magnitude of the samples difference is determined, the D's for each officer are squared. After this has been accomplished, R is calculated by inserting the sum of the D's squared in the following formula:*

$$R = 1 - \frac{6\sum_{i=1}^{N} D_i^2}{N^3-N} .$$

N is the size of the sample or number of officers considered. In our case, N was equal to 22. D_i^2 is the square of the differences between the ranks. In the example of officer "A" above, this value would be a minus two squared or four. If the relation between the two sets of ranks were perfect, every D would be zero and R would equal one. As the D's increase, the degree of association decreases.

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*The general expression for the correlation coefficient is

$$R = \frac{\sum x^2+\sum y^2-\sum D^2}{2\sqrt{x^2 \cdot y^2}} .$$

The form shown, however, is equivalent and easier to evaluate. (5:203)

Using the above procedure, a series of 20 tests were conducted using various weighting factors. Each set of values was ranked and compared to the standard set of ranks shown in Table 12. The R for the standard set has the value 1.

From our literature review, we ascertained that the attributes are not necessarily considered of equal importance for program management careers. Therefore, the first test compared a model using weights, assuming some prior knowledge of the relative importance of the attributes. Our purpose was to see how weights based on insufficient reason compared with weights based on "expert" opinion.

These weights were determined in the following manner. A matrix was constructed consisting of a column for each attribute in the model and a row for each reference. Each attribute that was referenced, by indicating it was either mandatory, desirable, or nice to have, was given one point. The weight applied to each attribute was then calculated by summing the points in its particular column and then dividing by the total sum of points in the matrix. The information provided by each reference was considered of equal importance in the development of the matrix. The matrix with the final weights for each attribute is shown

in Table 13. The row numbers refer to the following sources:

1. AFM 36-1, (15)
2. AFM 36-23, (16)
3. SPD of the Seventies study, (59)
4. AFSCP 36-2, (20)
5. Systems Command Career Progression Data, (25)
6. Project/Product Manager Orientation, (13)
7. "Systems Management in the USAF--A Review and Analysis", (62)
8. "An Analysis of Possible Improvements in the Staffing of System Program Offices", (63)
9. "Weapon Systems Acquisition Curriculum", (61)
10. "Is Specialized Training Required for Newly Assigned System Program Office Personnel", (64)

TABLE 13

MATRIX USED TO DETERMINE WEIGHTS

Source	G	P	T	E	A
1	1	1	1	1	1
2	1	1	1	1	1
3		1	1	1	1
4	1	1	1	1	1
5		1	1	1	1
6		1		1	1
7			1	1	1
8				1	
9					1
10			1	1	1
Total	3	6	7	9	9 = 34
Weight	3/34 .09	6/34 .175	7/34 .206	9/34 .265	9/34 .265

Using these weighting factors in the model produced an R equal to 98 percent. This high degree of association implies that the model using weights based on LaPlace's principle of insufficient reason does not differ significantly when opinion concerning the importance of the attributes is known.

We performed a series of tests treating one or more attribute(s) as insignificant or equal to zero. This was accomplished by setting the weights of attributes not considered important to zero and treating the remaining attributes as contributing equally to career progression. Table 14 is a summary of the test results. This procedure provided us with information on the sensitivity of the model output to the elimination of attributes. We found that the output was least sensitive to the elimination of grade and extremely sensitive to PME. As a result, a review of the sample data showed that a majority of the officers met the grade requirements and received a hundred points for that attribute. Because of the high degree of association when grade is eliminated, an R of .99, the removal of grade does not invalidate the use of the model as a tool for measuring officer career progression. It actually increases the model's effectiveness by lowering an officer's score and

TABLE 14

RESULTS OF SENSITIVITY ANALYSIS

Model Number	Weights Applied to Each Model Attribute					R	M
	G	P	T	E	A		
1	.2	.2	.2	.2	.2	1.00	60
2	.09	.175	.206	.265	.265	.98	57
3	.25	.25	.25	.25	0.0	.96	58
4	.25	.25	.25	0.0	.25	.92	57
5	.25	.25	0.0	.25	.25	.94	73
6	.25	0.0	.25	.25	.25	.63	63
7	0.0	.25	.25	.25	.25	.99	52
8	0.0	0.0	.333	.33	.33	.40	52
9	0.0	.33	0.0	.33	.33	.92	64
10	0.0	.33	.33	0.0	.33	.91	44
11	0.0	.33	.33	.33	0.0	.91	45
12	0.0	0.0	.5	.5	0.0	.39	42
13	0.0	0.0	.5	0.0	.5	.40	41
14	0.0	0.0	0.0	.5	.5	.49	72
15	0.0	.5	.5	0.0	0.0	.89	30
16	0.0	.5	0.0	.5	0.0	.84	61
17	0.0	.5	0.0	0.0	.5	.88	60
18	0.0	1.0	0.0	0.0	0.0	.66	49
19	0.0	0.0	1.0	0.0	0.0	.42	11
20	0.0	0.0	0.0	1.0	0.0	.33	73
21	0.0	0.0	0.0	0.0	1.0	.43	70

highlighting his career deficiencies. It also allows the model to correspond more favorably with weights determined from our literature review. Therefore, the remainder of the tests presented in Table 14 are concerned only with the four attributes of the model other than grade.

Also included in Table 14 under the M column is the average score or mean for the 22 officers' scores in each test. The high mean of 73 indicated that the educational requirement of this group of officers is quite good. The area showing the greatest room for improvement is technical training with an extremely low mean of 11. The mean, therefore, provides a method for comparing an individual's career with that of a group of his peers, and one AFSC group's with another's, to see if there is any significant difference in their careers. The mean was used in our comparison study which is discussed next.

The model has been developed as a tool for the purpose of correlating personnel data with a specific career progression guide. The accuracy of the model is restricted by the data, the subjective evaluation of the user, and the assumptions inherent in its development. The model does provide an excellent method for personnel monitors to evaluate individual system program management careers and

determine areas of weakness. For that reason, the previous discussion on the development and sensitivity analysis of the model has been presented to provide the reader with a method of modifying or developing a similar model.

Comparison Analysis

A comparison analysis was conducted using the refined model containing the four attributes of E, P, T and A weighted equally. The purpose of this analysis was to see how the backgrounds and training of our sample compared with the Air Force career progression guide, and with other systems program management career studies. Table 15 summarizes the results of these comparisons.

The first comparison between different AFSCs in our sample indicated that officers presently with a duty AFSC of 2921 have the highest mean, one point above the group with duty AFSC 2926. This indicates that there should be some improvement in the 2926 career field as the officers at the entry level become fully qualified. Both 292X groups had higher mean scores than either 291X groups of officers. This appeared, in part, to be caused by PME. The reason for the lack of PME is probably the large number of majors in these groups who have not had the opportunity to attend senior service schools. This point precisely

TABLE 15

RESULTS OF COMPARISON ANALYSIS

Group	Mean
2926	52
2921	53
2916	49
2911	41
Total for Sample Data	46
Systems Command Career Progression Data	49
Typical Program Manager	53
SPD of the Seventies Study (20 officers)	47
SPD of the Seventies Study (10 officers)	59

shows the use of the model. A lower mean implies a weakness in the groups' career progression and further inspection makes it easy to determine which attribute is causing the problem and, therefore, needs attention or improvement.

A score was also calculated for the typical SPO Manager outlined in Chapter II. The score was equal to the 2921 group and one point above the 2926 group. This indicates that the qualitative description of the typical SPO

Manager compares favorably with the officers serving in the 292X duty AFSC.

A score was also calculated from the percentages contained in a letter concerning the career progression of program managers in the Systems Command. (25:3) The score indicates that our sample closely approximates the total Systems Command population of program managers.

A further comparison was made with the ideal career progression outlined in the SPD of the Seventies study. (59:43) We were interested in comparing their model with ours. They never calculated a score using their model for the ideal career. By using their model and data, we calculated a value of 9140. This is the highest score possible and it would correspond to our model's highest score of one hundred. To determine the degree of association between the two models, the 20 careers cited in their paper were used for calculating career scores from our model. The ranks of these scores were compared with ranks listed in their study for 20 careers by using the Spearman rank correlation test. An R of 93 indicated a good degree of association between the two models.

The mean value of 47 points for the 20 careers, was about equal to our sample mean of 46. A mean value of 59

points was determined for the ten hand-picked careers contained in their study. This value is considerably higher than ours, which is not surprising since these careers were selected as representative of the best SPO Managers.

Conclusion

Our conclusion, resulting from the comparison analysis, is that, as a group, the careers of SPO Managers in ASD fall short of the program management career guidelines established by the Air Force. This provides the answer to research question two on how closely SPO Managers' careers compare with the Air Force career progression guide. It also can be inferred that this same conclusion holds true for the Systems Command in general since our sample data compare favorably with those of the Systems Command Survey.

We could have drawn the same conclusion with just a cursory look at the data since not one officer met all the requirements of the model. The model, however, illustrates this fact more vividly by providing a measure of this disparity as the difference between an officer's score and the ideal of one hundred.

If one is also willing to assume that the model provides an accurate measure of the disparity between what is stated and what appears to be the real situation, we may

further conclude that there is considerable room for improvement in the present methods used to develop SPDs. A similar finding was reported by the Blue Ribbon Defense Panel in 1970. (24:79)

In addition to the results of our comparative analysis, this chapter presented the development and sensitivity of the model used in the analysis. This presentation provides background information on the model so that it can be used for further career field studies in the future. In the next chapter PS training curricula are analyzed.

CHAPTER IV

ANALYSIS OF PRESENT WEAPON SYSTEM MANAGEMENT COURSE CURRICULA

Our review of presently available education courses for SPO Managers is presented in this chapter. This review was conducted for the purpose of answering research question three. The question must be answered before we can determine if more training is needed.

Prior to reviewing the course curricula, we present our method of data collection, followed by our analysis of the applicable courses. The chapter concludes with the answer to research question three.

Data Collection

Several sources were used to gather data for the review of educational courses applicable to system program management. AFM's 36-1 and 36-23 were our primary sources, supplemented by the SPD of the Seventies study. In addition, Air Force Institute of Technology (AFIT) admissions personnel were interviewed to determine the availability of

other courses which had not been identified. (53) The analysis presented in the previous two chapters also provided source information.

The schools and courses selected were divided into categories of training, PME, and formal education and are listed in Table 16. The selected schools were contacted and current catalogues and course outlines were obtained, which served as our data base for the review. As a result, each school was evaluated on its own description and not on the opinions of instructors, students, or our subjective judgment. Summaries for each school reviewed, including our estimate of PS training in each curriculum, are presented in the following paragraphs.

Formal Schools

Graduate Systems Management. This program is offered by the Department of Management, School of Engineering, AFIT, WPAFB, and leads to a master of science degree in Systems Management. The program requires fifteen months and provides a broad theoretical and applied background in the concepts and principles of qualitative and quantitative management, economics, operations research, and allied disciplines for mature, technically-oriented officers interested in assignment to SPOs. (22:2)

TABLE 16

LIST OF TRAINING COURSES AND FORMAL EDUCATION PROGRAMS RECOMMENDED FOR THE SYSTEMS MANAGEMENT CAREER FIELD

Formal Education
Systems Acquisition Management
Graduate Systems Management
Graduate Logistics Management
Systems Management
PME
Industrial College of the Armed Forces
Air War College
Air Command and Staff College
Squadron Officer School
Training Courses
System Program Management
Program Management Course

This program was selected for review because it was specifically designed to provide the Air Force with System Program Managers. (53) Since the program's beginning in

1965, approximately two-thirds of the graduates have received initial assignments to SPOs. (22:4)

The course curriculum, which totals 70 credit hours, appears to offer no direct instruction in the man-machine area. The purpose of one course, Behavioral Science in Management, as stated in the curriculum, is "to gain insight, improve skills, and increase knowledge and understanding of the role and importance of human factors and forces on the system manager." (34:16) The course appears to be oriented towards the management of people in organizations and not the human factors involved in the design of weapon systems.

The curriculum also includes Production Management, a course whose aim is "to develop an improved understanding of modern manufacturing concepts, practices and techniques which can assist the student in relating to the industry-Air Force production environment." (34:8) Topics included in the course description which imply a man-machine relationship are process planning, plant layout, maintenance control, and quality control.

The course description for the remainder of the 70 hours of instruction does not indicate any emphasis in the PS area. In total, then, Graduate Systems Management offers little in the way of PS training for future system program

managers.

Graduate Logistics Management. This program is offered by the School of Systems and Logistics, AFIT, WPAFB and leads to a Master of Science degree in Logistics Management. The program entails twelve months of instruction designed to develop a cadre of logisticians for assignment to key positions throughout the military departments. (23:4)

This program was selected for review primarily on the percentage of graduates in Class 72B with SPO related assignments. Although it was not designed for the training of program managers, it is a major AFIT input into the career area. (53)

The stated mission of the program is to further the education of selected personnel in scientific management with emphasis upon the allocation and use of human, material, and fiscal resources. However, the program's curriculum of 57 hours seems to offer little in the area of PS.

Maintenance Management is a required course that offers some instruction in the man-machine relationship including problems of labor force distribution, availability, and utilization. The course emphasizes the application of the processes of planning and control of equipment maintenance and management in the USAF. Although not specifically

concerned with system design, it stresses the importance of poor design and its effects on the maintenance environment. (33:V-10)

A three-hour elective is offered entitled Human Resource Management which deals with the management of people, not the importance of humans in the design of man-machine systems. Specific subjects covered in the course include task specialization, staffing, performance appraisal, employee development, justice and collective bargaining. (33:V-11)

The remainder of the courses offered in the current catalog do not indicate any direct relationship to man-machine design.

Systems Management. This program is offered by the Institute of Aerospace Safety and Management, University of Southern California and leads to a Master's of Science in Systems Management. This program is not specifically used by the Air Force for program management development, but was included in our review because many AF officers (five in our sample) receive degrees from the school. (53)

The school's brochure states:

> The core study areas of System Management, Human-Factors, and System Technology provide a multidisciplinary academic program to understand the components and nature of a system--man, machine and environment.

> The core courses in Human Factors provide the student with the knowledge and understanding of man's overall characteristics and performance as a system component in the man-machine environment relationship. (41:2)

The human factors courses account for approximately one-third of the program's curriculum and include the following areas of instruction:

> Measurements of aptitudes, capacities, and attitudes; psychiatric considerations of human reliability; identifying and reducing human factors problems; the potential effects upon military operations of physical stress to the human body; variabilities of perception and performance under fatigue and emotional stresses affecting the pilot, crewman and support personnel. (41:4)

We concluded from our review that the Systems Management program of the Institute of Aerospace Safety and Management offers a balanced curriculum for program management with considerable emphasis in the PS area.

Systems Acquisition Management. The last curriculum reviewed involves a new System Management Program offered by the Naval Postgraduate School, Monterey, California. The purpose of the program is "to produce a graduate who can function effectively within the existing DOD acquisition system." (61:2) Although the school is not designed for the Air Force nor attended by Air Force personnel, it was reviewed because it is a program designed for military System Program Managers. It also provides additional insight into

the nature of instruction provided by other DOD agencies.

The course of instruction is divided into six terms and seems to parallel the graduate System Management and Logistic Management programs of the Air Force in course content. The curriculum includes one four-credit course entitled the Behavioral Sciences and Project Management. The object of the course is to provide students with an application of behavioral science to project management functions in industry and government. Primarily, it deals with the management and control of people to achieve the objectives of the organization. (40)

Another course in the curriculum, entitled Systems Engineering Management, covers the following engineering disciplines related to PS: reliability, maintainability, human factors, safety, configuration management and value engineering. (40)

The Navy's System Acquisition Management program, although it does not offer more in PS training than the courses offered by the Air Force, does provide a comprehensive course of instruction for Program Management and would be a viable alternative for use by the Air Force.

Training Courses

Program Management Course. This educational program is a 20-week training course taught at the Defense Systems Management School, Fort Belvoir, Virginia. DSMS is a jointly staffed triservice institution established by the Secretary of Defense to educate selected military and civilian personnel in the fundamentals and most effective methods of program management. Prior to the establishment of DSMS in July 1971, the course was taught at the Defense Weapon System Management Center, WPAFB, Ohio. (37:iii)

A review of the curriculum indicates that two courses might provide instruction in PS. One is the Defense Systems Engineering Course, which covers reliability, maintainability, system safety, and configuration management. The other course is Integrated Logistic Support which covers support planning, support engineering analysis, and personnel and training support requirements. (36:3-4) Except for these two courses which border on the PS area, there is no apparent PS instruction. Therefore, our conclusions are that the Program Management course contained little, if any, instruction in the man-machine environment.

Systems Program Management. System Program Management is a six-week course taught by the Continuing Education

Division of the School of Systems and Logistics, AFIT, WPAFB. The purpose of the course is to provide a comprehensive review of the many aspects of systems program management as accomplished in the System Program Office. The course is taught five times a year and graduates 125 military and civilian personnel a year. (52)

The course is divided into blocks of instruction, instead of separate courses, and contains a two-hour block specifically on PS. We personally reviewed the lecture outline and movie presented during the PS block of instruction. (31) We considered the coverage good but limited in scope because of the amount of time devoted to the subject. Therefore, our conclusion concerning the PS training in the Systems Program Management course is that the two-hour block of PS is better than none at all, but that it really only provides the student with an introduction to the PS area.

Professional Military Education

Air Force PME. SOS, ACSC, and AWC, the three levels of PME conducted by the Air Force at Maxwell AFB, Alabama, were reviewed. The three courses are presented together because of their similarity of purpose, instruction, and application to program management. The courses are designed for all Air Force career fields and are recommended

for program managers at different levels of their career progression, just as they are for officers in other career fields. (16:20-4) Since PME accounts for a majority of the training of the officers in our sample, a review of the PME curriculum was considered pertinent.

The PME courses provide instruction on such subjects as program management, weapon acquisition, logistic management, etc., but there is no specific instruction on PS or its importance in weapon system design. (32,35,39) From our review of the three PME courses, we concluded that they offer a substantial amount of instruction in weapon acquisition but little in the way of PS instruction.

Industrial College of the Armed Forces. ICAF is a senior joint service school located at Fort Lesley J. McNair, Washington, D.C. ICAF was selected for review because of the importance placed on it by AFM 36-23 and the survey of senior SPO Managers. The purpose of the school is to prepare selected senior officers and civilian career officers for key policy-making roles in the national and international security structure. (38:4) Although the school's curriculum provides military management training, it offers little in the way of PS training.

Three elective courses are offered in the behavioral area, all of which are concerned with the management of people in organizations. An elective is also offered in the weapons acquisition process, but, as it is only seven class periods in length, it appears to be nothing more than an introduction to the acquisition process. The net result of our review is that ICAF offers no more in PS training than the other PME courses.

From our review of schools we concluded not only that PS training for SPO Managers is almost nonexistent, but also that there is a general lack of PS training in the Air Force. The AFIT quota for PS oriented degrees; i.e., Human Factors, Human Engineering, etc., has never been significant but in the last five years has decreased to one a year. (53) In addition, the AFIT civilian school monitors, who assist officers in their selection of individual curricula in the R&D field, discourage minoring or majoring in Human Factors since there is no Air Force requirement for courses in Human Factors. Courses in Human Factors are readily available at civilian colleges and universities, and, if there were a requirement for Human Factors courses, they could be easily included in the mandatory course selection. (56)

This apparent lack of emphasis on PS is not restricted to the Air Force. The recently initiated System Acquisition Management Program by the Navy contains no specific training in PS. (40) The Defense Program Management course which was recently revised and lengthened gave no consideration to PS training since there was no expressed requirement for such training. (48)

The quotas and types of curricula for degrees is determined by the Military Personnel Center and Career Monitors based on the present and projected needs of the Air Force. (56) To determine if training courses are fulfilling the needs of the Air Force, school curricula are reviewed annually. As requirements change, curricula and quotas are changed to correspond with the new requirements. (53) Consequently, the absence of PS training could be easily remedied if the Air Force had an established requirement for PS training. Because of the absence of PS training, it is apparent that no such requirement exists.

Conclusion

During our review of schools considered pertinent to the program management career field, we did not find one course specifically designed for PS. Our review, therefore, consisted of evaluating courses attended by, or designed

for, program managers. Only one school had a concentration of instruction related to the PS area. But, this school is not presently used as a primary training source for new program managers. (53) The answer, then, to research question three is that present SPO courses are either completely lacking or extremely weak in their presentation of PS or PS-related subjects. We also concluded that the reason for this lack of PS training is that present Air Force requirements for SPO management educational programs do not require courses directly related to PS. Since curricula are reviewed annually and changed as required, we further concluded that present educational and training courses could be modified to include PS-related subjects if such an emphasis were desired by higher Air Force authorities. In the next chapter this information will be used in determining whether PS training is warranted.

CHAPTER V

AN ANALYSIS OF PERSONNEL SUBSYSTEMS TRAINING REQUIREMENTS FOR SPO MANAGERS

In this chapter we present our analysis of the SPO Manager training and background that is related to PS. In order to answer research question four, we also reviewed the effectiveness of training in changing behavior to improve a known deficiency, and the alternatives to training that could possibly improve the PS function in the SPOs.

The material and analysis presented in the first four chapters furnished most of the data for this evaluation. Chapter one provided historical aspects and current problems of PS. The next three chapters provided information on background and training available and the disparity between individual qualification of the SPO Managers and career guidelines. In this chapter we combine this information on the PS background and training and answered research question four.

Personnel Subsystems Background

In our study, an officer's background consists of his rated status, total service time, additional AFSCs and previous assignments.

Rated Status. It was shown in chapters two and three that, although not a requirement, the SPO management career field consists of predominantly rated officers. In chapter three this factor was considered as operational experience, and was an integrated part of the career progression model. If rated status is considered beneficial to PS, then certainly there is an adequate percentage of PS-oriented officers assigned as SPO Managers.

The question is, then, how perceptive and oriented toward PS are rated officers? There is some effort made to assign rated officers to aircraft SPOs of a type in which they are experienced. In our interviews we found this to be true, with a concentration of fighter pilots in fighter SPOs, bomber pilots in bomber SPOs, etc. (50) In ASD, where most SPOs involve manned aircraft, we feel that these rated managers will be aware of glaring errors in cockpit or crew station design. If a design controversy develops that is related to an aircrew function, the rated manager should have an adequate background to make the right decision.

However, the rated managers will probably have a tendency to be more engineering and performance motivated in their attitude toward overall design. (63:71) The fighter pilot desires airspeed, rate of climb, and weaponry, etc. The transport pilot is interested in range, cargo capacity, etc. Their interest in the performance criteria will, in our opinion, outweigh their interest in a design with the maintenance man in mind.

Total Service Time. We could not discern any benefit from total service time, other than the obvious factor that a longer career would offer a broader variety of assignments, one of which could possibly relate to PS.

Additional Air Force Specialty Codes. As shown in chapter two, the number of PS-oriented additional AFSCs were minimal. Not one of the officers in our sample had an additional AFSC of 267X (behavioral scientist) or 295X (personnel subsystems officer). AFM 35-1 clearly states that once an individual is qualified in a research and development career field he will retain an AFSC in that field. (14:6-17,19) Since both AFSCs are designated inputs for program managers, the complete lack of such additional AFSCs in our sample indicates, perhaps, a shortcoming in assignment policy or lack of interest in interjecting PS influence

into the management area.

We also considered the 31XX (missile maintenance) and 4XXX (aircraft maintenance) career fields as probable PS related additional AFSCs. Our ASD sample contained two 31XX and one 4XXX additional AFSCs. From the survey we concluded that additional AFSCs indicate an almost complete lack of PS background.

Previous Assignments. As would be expected after examining the additional AFSCs, previous assignments are also lacking in PS background. We reiterate that our computerized data on previous assignments is not complete. The data available did, however, substantiate our AFSC analysis by indicating a definite lack of previous assignments in PS or PS-related positions.

Training

The course curricula of relevant schools were examined in chapter four. The elements pertaining to PS are summarized next.

Formal Training. We do not contend that our analysis in chapter four fully explored the education received in behavioral sciences and expect that many of the SPO Managers' educational experiences included one or more such courses. However, we felt that such behavioral courses would rarely

be linked to machine design in such a manner as to influence the SPO Manager in PS related decisions. As noted in chapter two, a total of ten officers received degrees with majors that could be related to the PS concept. Admittedly, our evaluation of the academic majors was limited to the description shown in AFM 300-4. (18) Further investigation of the school curricula for each officer in the sample would have been beyond the scope of this thesis. From our evaluation of schools in chapter four, we concluded that there was a conspicuous absence of PS instruction. Therefore, our conclusion is that formal schooling of SPO Managers does not offer a significant PS influence.

PME. PME curricula were found in chapter four to have no courses directly related to PS. All PME schools do, to some extent, stress human relations and other fields of behavioral science that can be linked with the human factor function of PS. We felt that the composite PME attendance was very good and, consequently, consider the PME human relations emphasis to be of benefit to the PS interests. However, we do not feel that such training by itself is sufficient to insure adequate PS design requirements.

Technical Training. As noted previously, there are two SPO training schools, neither of which stresses the

support or design considerations required by the PS element. This re-emphasized the original problem that precipitated this thesis; i.e., that there is an apparent lack of concern and interest in PS requirements during the weapon systems acquisition process.

Our analysis indicated that, even if both SPO schools included additional PS orientation in their curriculum, the training would still be inadequate. The reason for this pessimistic attitude is that the SPO Managers are not attending the schools. As shown in chapter two, only 34, or 19 percent, of the managers have attended one of the courses. Furthermore, the capacity of the courses does not allow for a significant increase in this number. The DSMS produces two classes per year of 60 students each, of which 15 are allocated to USAF military SPO Managers. (9:53) Based on percentages of 29XX positions, ASD can expect about one-third of the student openings. Thus, the maximum number of students would be approximately ten officers per year. The AFIT System program management course conducts five classes per year of about 25 students each. The ASD allocation for 29XX positions averages about five students per class, or 25 per year. These include civilians with equivalent 29XX positions. (52)

Therefore, based upon the course content, capacity, and the attendance records, we conclude that the SPO technical training schools do not present sufficient opportunity for PS training of SPO Managers.

Personnel Subsystem Training Effectiveness

Prior to answering research question four, there are two assumptions that require clarification. First, if additional PS training is warranted we must assume that there is a deficiency in the present PS program. Second, we must assume that PS training administered to the SPO Managers would appreciably improve the PS position in the SPOs, with favorable results in man-machine design considerations. In this section we reconfirm the PS deficiency, and conducted a survey of training effectiveness.

The PS Deficiency. In the first chapter we validated the need for this study by confirming that there is some indication that the weapons systems acquisition process is primarily engineering and hardware-oriented during the development phase. We emphasize that the objective of this study is not to evaluate the effectiveness of the PS element, and we have made no concerted effort to do so. Consequently, for added verification of the PS deficiency we referred to the Air Force Office of the Inspector General,

and an additional related study.

In 1970 the Inspector General (IG) was directed to conduct a new type of inspection called Program Management Evaluation. The primary purpose of such evaluations is to "identify problems and latent deficiencies in evolving aerospace systems before the Air Force is so firmly committed that it has no maneuvering room." (8:51) In making the evaluations, one of the functions inspected by the Program Management Evaluation Team is the PS element. (8:52)

Some of the results of these evaluations indicate that the SPO PS element is indeed deficient. Extracts of the IG reports follows:*

> Air Force policy directs that personnel subsystem development efforts will be provided priorities commensurate with hardware elements of the system or project. However, when program changes were made, the limitations affected the program, the personnel subsystem was one of the first to feel the impact. . . .
>
> . . . the personnel subsystem engineer, who by assignment and Air Force specialty should be the personnel subsystem manager, had been made subordinate to a hardware-oriented mechanical engineer and further removed one more echelon from the SPO.
>
> The Qualitative and Quantitative Personnel Requirements Information document showed weapons

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*Passages from the IG inspection report are presented without references or identification of the SPOs involved. Extracts of the reports, concerning the PS inspection deficiencies, were obtained from the HQ USAF Office of Personnel Research.

> maintenance technicians maintaining electronics circuits to perform weapons checks and repair system line replaceable units. The aptitudes required to accomplish these tasks would exceed the ability selection criteria for the weapons maintenance technicians career field.
>
> The human factors program of the . . . SPO was deficient.

A second source confirming that there is a PS deficiency is Lt/Col Karl L. Wiegand's ICAF Student Research Report entitled "Human Resource Factors in the Systems Acquisition Process." In his report, Lt/Col Wiegand was primarily concerned with the human resources required to maintain weapons systems, and in particular how the zero draft may affect this human resource. In his introduction he stated:

> While the value of the human resource has been emphasized and, to some extent, accepted in the context of personnel management, that resource's characteristics and value have played a relatively minor role within the domain of engineering design. (65:2)

In his conclusions he states that "Failure to introduce a human resource engineering program into the system acquisition process will exacerbate the impact of the service's manpower realities upon the need to operate and support future weapon systems." (65:3)

In summary, based upon our introductory background studies, IG reports, and a parallel study, we definitely

conclude that there is insufficient PS emphasis in the systems acquisition process, and that improvement is needed. In view of this conclusion, we addressed the question: Can this need be satisfied by additional PS training of SPO Managers?

Training Effectiveness. The subject of training effectiveness is a complex topic that, in itself, could be the subject of a thesis. In our discussion we drew upon a variety of references to arrive at a conclusion. We also briefly investigated the possibility that the PS deficiency is caused by factors other than a lack of training and background.

In evaluating the possibility of increased training we assumed that the USAF Personnel Research Office was referring to a conventional training approach, such as lectures, discussions and, perhaps, case studies. Wallace Wohlking, in an article concerning behavioral changes brought about by training, states, "Research indicates that this type of program (conventional approaches) has generally failed to show significant impact on either attitudes or behavior." He summarizes his discussion of conventional training by stating "There is little, if any, change in managerial attitudes as a result of training, and managerial

development programs rarely lead to sustained on-the-job behavior change." (12:45,6)

Wohlking also essentially discounted more progressive training approaches (such as sensitivity training) and did not offer any solution to this training problem, concluding that new training concepts must be developed. (12:49)

Edgar H. Schein in his book Organizational Psychology was less pessimistic in his attitudes toward training. He described the basic steps of training as 1) identifying the training needs or goals, 2) selecting the appropriate target group for training, 3) designing the training to take into account the nature of what is to be learned and who the learners are, and 4) evaluating the outcomes. (4:39) Although he made it clear that managers needed specialized management training, he assumed that the desirable traits could be taught without any particular difficulty. (4:43)

Lt/Col Allen W. Thompson, et.al., while attending the continuing education SPO school, prepared a research paper entitled "Is Specialized Training Required for Newly Assigned System Program Office Personnel?" In their paper they stated that specialized SPO training must be substituted for a lack of experience. They felt that this required training could be effectively presented in short

courses directly oriented toward a specific functional area. (64:9) Although their study was not directed at PS orientation, the topic of SPO Manager training effectiveness is relevant.

There are alternatives to setting up specific training courses that can be used to influence management behavior. Jerome G. Peppers and Ernest W. Spitzer, in their Air University Review article "Developing Military Executives," stress that the key to developing better managers is in their supervision. They contend that too often the commanders and senior staff members demand that the managers be technicians rather than executives. Their solution for optimum development is to give the managers proper guidance but a free rein in their operations. Their article lists eight areas in which a supervisor can assist his manager in executive growth.* They do not suggest that training should be required in any specialized area. (10:34,5)

The reference to supervisory and staff influence adds a great deal of credence to the recommendations made by Lt/Col Wiegand in his ICAF report. His overall

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*The areas are: 1) his objective, 2) his authority and responsibility, 3) your information demands, 4) your control, 5) your support, 6) his information needs, 7) your challenge to him, and 8) your recognition of him. (10:34,5)

conclusion was that there is a lack of interest, at the Department of Defense level, in introducing human resource engineering into the systems acquisition process. All of his recommendations suggest action at the Department of Defense level. (65:30,1) His reasoning appears sound, and, if his recommendations are implemented, eventual DOD guidance and pressure should be felt by SPO Managers. Under such guidance and pressure their management would be more sympathetic toward the PS engineering design requirements.

Other possible solutions, in addition to increasing the PS training, were suggested during our interviews of people assigned to PS positions. In particular, these individuals thought that the PS element would be more effective if it had direct access to the SPD. The present organizational arrangement of being located under the chief engineer was unsatisfactory, particularly when design controversies developed. Based on our interviews we concluded that reorganization of the PS element within the SPOs may be a valid requirement in improving the PS deficiency.

An answer to the difficult problem of summarizing the material presented in this chapter was found in Strauss and Sayles book Personnel: The Human Problems of Management. In their discussion on training, they concluded that

technical training was effective when it was closely associated with the goals of the organization. (6:457) For manager training, they concluded that effective training that changes attitudes should run through three stages: dissatisfaction with their old behavior, receptivity to change, and ability to carry-over the training to their job. The most critical stage is the carry-over. Strauss and Sayles suggest that training rarely results in lasting behavioral change unless there is a supportive organizational atmosphere. (6:530) We consider "supportive organizational atmosphere" synonymous with high level interest in the design requirements of the personnel subsystem during the weapons acquisition process.

Conclusions

In reference to research question 4: "Can it be concluded from the analysis of background and training of SPO Managers that additional personnel subsystem training is warranted?"--our answer is a qualified yes.

We feel the need for PS training is self-evident from the present lack of PS related backgrounds of present SPO Managers and of PS instruction in present SPO educational courses. The qualification in our answer is based on our conclusion that the training will be effective only

if the Air Force re-emphasizes the importance of PS in the weapons system acquisition process. The man in the man-machine relationship will have to receive additional importance to provide the sufficient supportive organizational atmosphere that is needed for an adequate carry-over of the training. The summary of our study, including final conclusions and recommendations, is contained in the next chapter.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Summary

We have presented a logical sequence of research and analysis to determine the training and background, in personnel subsystems, of SPO Managers. We accomplished this by answering research questions that evolved from the two objectives of the thesis.

Our first objective was to determine the experience and training of the SPO Managers. In addressing this objective, the specific sub-objectives were to determine:

1. the background of present SPO Managers;

2. the conformity of the present SPO Managers' background and training with established career progression guidelines;

3. the course content of present educational and training programs provided for SPO Managers.

Our second objective was to determine if the present backgrounds of SPO Managers indicates a need to improve their training in PS.

To achieve the thesis objectives we formulated four research questions:

1. What is the background and formal training of SPO Managers currently* assigned at ASD, WPAFB?

2. Does the background and training of these officers compare favorably with the career progression guidelines for their career field?

3. What instruction in personnel subsystems do presently available weapon system management educational and training courses offer?

4. Can we conclude from analysis of the backgrounds and training of SPO Managers that additional personnel subsystem training is warranted?

Conclusions

Our first research question was addressed in Chapter II. We determined the background and training of SPO Managers primarily from computerized personnel records. Our conclusions from this study and analysis of our sample are:

1. Over 98 percent of the SPO Managers meet the minimum educational requirements of their positions,

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*The sample data was as of 2 May, 1972.

2. Less than 20 percent of the SPO Managers have attended training courses designed specifically for SPO Managers,

3. The background qualifications of SPO Managers in our sample are very similar to the qualifications desired by the Systems Command.

In Chapter III we developed a career progression model and used it to determine if the SPO Managers background and training conforms with established career guidelines. Although the majority of the officers in the sample held many of the career progression qualifications, none completely matched the career progression model. From this we concluded:

1. As a group the careers of SPO Managers in ASD do not conform with the established program management career progression guidelines,

2. The career progression of SPO Managers in our sample compared favorably with those in the Systems Command,

3. There is room for improvement in the present methods used to develop SPDs.

The third research question was answered in Chapter IV, when we analyzed the personnel subsystems aspects in present SPO management educational and training courses. We

found very little evidence of any PS-oriented subjects being offered in any of the educational or training courses. From our analysis we concluded:

1. Present SPO training courses completely lack or are extremely weak in their presentation of PS, or PS-related, subjects,

2. Present Air Force requirements for SPO management educational programs do not require courses directly related to PS,

3. Educational and training course curricula could be modified to include PS-related subjects, if such an emphasis were desired by the Air Staff.

Our final research question was answered in Chapter V. Through analysis of data from the previous three chapters we evaluated the need for additional training in personnel subsystems. We concluded that:

1. A PS training program for SPO Managers is warranted,

2. The training will be effective only if the Air Force re-emphasizes the importance of PS in the weapons acquisition process.

Recommendations

Our first recommendation is that all officers entering the SPO management career field should attend a PS training program. Such training may be incorporated into the following existing programs:

1. DSMS and Systems and Logistics SPO schools. The PS training should at least equal that in engineering-oriented subjects. For the training to be effective, more SPO Managers should attend these schools,

2. Graduate Systems Management, Logistics Management, and civilian schools used for the R&D career field. We recommend the University of Southern California curriculum in systems management as a guide in revising the present courses.

Our second recommendation is for the Air Force, or the Department of Defense, to establish a PS program for senior officers in acquisition management. We believe that active high level awareness of, and interest in, PS, either formal or informal, would effectively add impetus to the importance of PS in weapons systems designs.

In accomplishing the thesis objectives we observed other weaknesses in the PS element. Consequently, we recommend further study in the following areas:

1. Possible reorganization of the PS element in the SPOs, removing it from the chief engineer's control and placing it directly under the SPD,

2. Stronger emphasis on advancement of PS career field officers in the SPOs. Why are there no PS experienced officers in SPO Manager positions? Where do the PS officers go in lieu of advancement in the SPO Manager career fields?

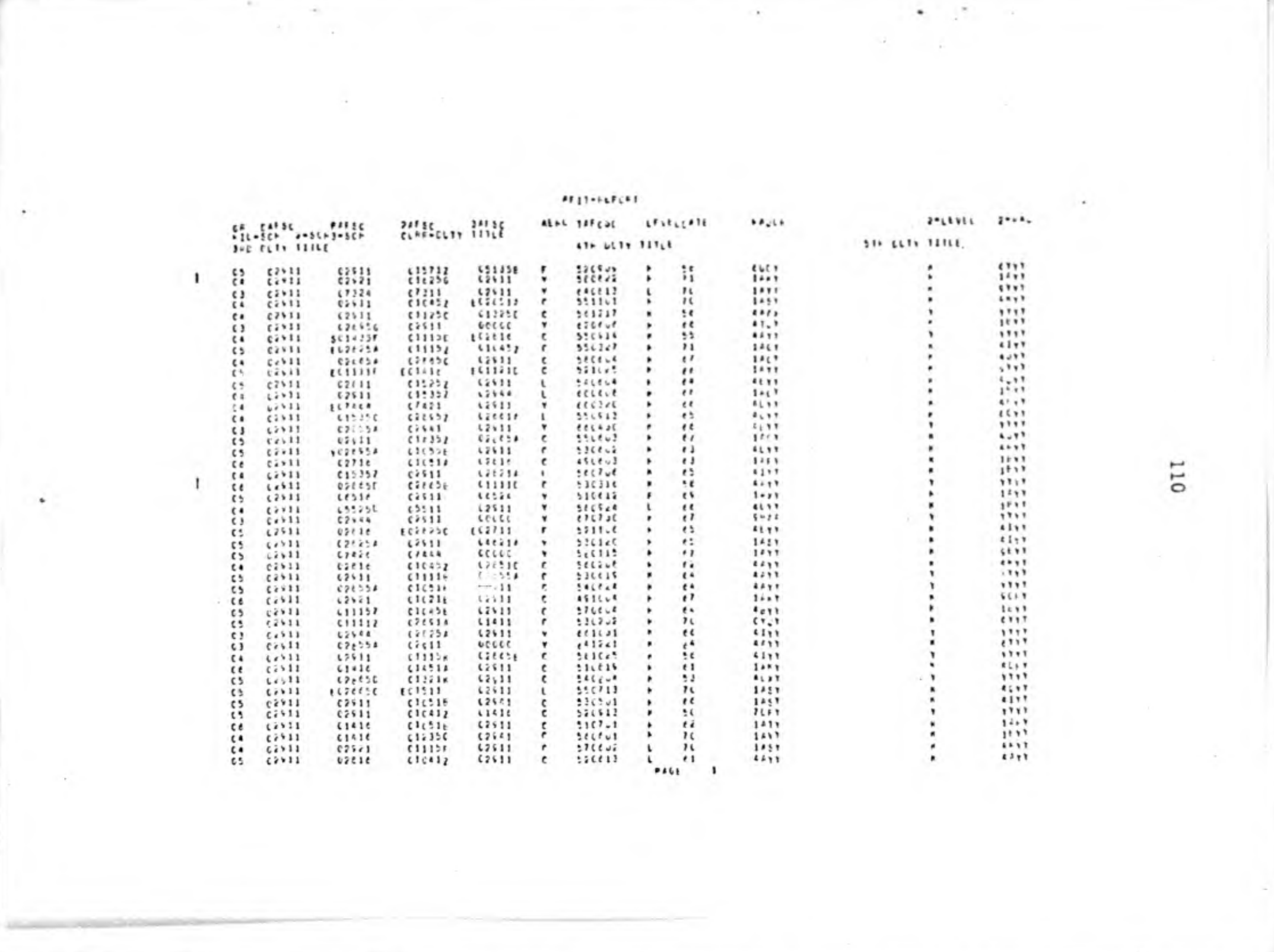
3. Increase in PS manning. Are there sufficient personnel assigned to do the PS job in the SPOs and at the contractors?

4. Why are there so few officers from the aircraft and missile maintenance career fields assigned to SPOs? Would these officers as SPO Managers be a favorable addition to the PS requirement?

5. Are present assignment policies used to fill SPO management positions adequate? Is the SPO management career field used too much as a career broadening assignment?

In closing, we propose that if our recommendations are followed, man-machine design considerations will receive more emphasis in the weapon systems acquisition process. It is time for the personnel subsystem to be considered by SPO managers in every design decision during the weapon systems acquisition process.

APPENDIX



AFIT-FEPCFT

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3RD DUTY TITLE						4TH DUTY TITLE				5TH DUTY TITLE	
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C4	02511	EC2655A	C1C452	C2511	F	5C6CW1	H	63	4PCA	N	4NYY
C4	02511	C1C25E	C1C252	C2511	C	55C3KC	M	55	6HYY	Y	YYYY
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C6	02511	EC2E16	EC1111Z	EC1416	F	51C4Z3	H	65	5LYY	N	44YY
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C5	02511	C1C41F	C2664	C2511	F	52C443	M	66	1ACY	M	4HYY
C3	02511	C1111F	C2511	C2C21A	F	E2CE24	H	76	6HYY	F	EHYY
C5	02511	C2511	C1531C	CC5C4	L	54UCU4	H	65	1AHY	M	1EYY
C4	02511	C2716	C1C55E	C2511	F	57CE1F	H	67	14CY	N	4HYY
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C4	02511	C1115F	C7E25C	C2651	C	55C23C	M	64	41CC	Y	YYYY
C6	02511	C2E25A	C1111J	CC2651A	F	521C45	H	71	4LFC	H	4LYY
C5	02511	C2616	C1115	C2655A	F	55C5A7	M	65	4DAY	M	4GYY
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C4	02511	C2816	C1111F	C2C52E	C	52CC41	M	61	44YY	M	ECYY
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L442	42	YC	NAF CH MANAGEMENT INFORMATION SYS	NAF SYS PROG STAFF OFFICER
YCCC	YC	YC	NAF SYS PROG STAFF OFFICER	NAF SYS PROG FOR DIR OF COMBAT SYS
C621	YC	YC	NAF CH LAUNCH AND RECOVERY OF	NAF CH LAUNCH RETRIEVAL OF CRUISE PROG
C621	42	YC	NAF CH PROG CONT CHEM CHASE PROG OFF	NAF CLAF FLEET FOR COMBAT ACT 2-1
YCCC	YC	YC	NAF PROG EVAL SPECL AN SPC	AVCCN EXEC OFF CCS OPS
YCCC	YC	YC	NAF CH CONFIG CHG CONTROL DIV	NAF CH CONFIG CHG CONTROL DIV
C671	YC	YC	NAF SYSTEM PROGRAM STAFF OFFICER	NAF DEV ENGR SPEC ML ENG
L742	42	YC	NAF AVIONICS MANAGER AND SPC	NAF AVIONICS MANAGER AND SPC

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GH CAFSC MIL-SCI 3RD DUTY TITLE	2-SC	4AFSC 3-SCH	2AFSC 3AFSC CURR-DUTY TITLE / 4TH DUTY TITLE	5TH DUTY TITLE
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Y000	YC	YC	AAF DIR CH PROG PERF DV	AAF CH PROGRAMMING BR
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6591	YC	YC	AAF CHIEF OF PROGRAM CONTROL	
67C1	YC	YC	AAF CHF CONTL MGR COM SECRETARIAT	AAF CHANGE CONTROL MGR
6602	YC	YC	AAF CH OF PROJECTS AMA SPC	AAF CH TEST DEV AMA SPC
6621	L1	YC	AAF ASST DEP SUBSYSTEMS	DET DIR OF TEST
6712	L2	YC	AAF FMS[illegible] SYS PROJ OFFICER	AAF CHS RSCH SCIENTIST TAC ALFT DIV
Y000	YC	YC	AAF CH TEST DEPLOYMENT	AAF CH TEST AND DEPLOY DIV AAAC SPC
Y000	YC	YC	AAF RESRCH RESCH FLIGHT TST OFF	AAF RESRCH RESCH FLIGHT TST OFF
6561	YC	YC	AAF CHF MANAGEMENT OPS OFFICE	USR AAF TAC OFFICER ADV
6531	YC	YC	AAF SYSTEM PROG STAFF OFFICER	AACW INDUSTRIAL ENGINEER ADV
6552	YC	YC	AAF CH ELECT SUPPORT MEASURES DIV	AAF STAFF DEV ENGR
Y000	YC	YC	AAF SYS PROG STF OFF	AAF SYS PROG MGT OFF
L641	L1	YC	AAF CH ECM PROG DIVISION	AAF SYS PROG STF OFF FOR TACT EW
Y000	YC	YC	AAF CH MGMT CHECKS DEP DEP FOR E 1	AAF CH [illegible] AND [illegible] BRANCH
6601	YC	YC	AAF CH PROG CONT MEIL PROG DIV	AAF TST MGT [illegible] DIV CHEM SPC
6612	YC	YC	AAF [illegible] AND POWER SUBSY MGT OF LDR	AAF PROP POWER SUBSYS OF LEADER
6611	YC	YC	AAF DEP DIR TEST AND DEPLOYMENT	AAF DEPUTY DIR TEST & DEPLOYMENT
L642	L2	YC	AAF CH PROG CONTROL SCAL SPC	AAF CH PROG CONTROL SCAL SPC
6611	YC	YC	AAF CH CONFIG MGMT DIV IFA SFW	AAF CH CONFIG MGMT DIV IFA SPC
66C2	YC	YC	AAF CH DEPLOYMENT DIV	AAF CH DEPLOYMENT DIV
Y000	YC	YC	AAF SYS PROG MGT OFFICER	AAF SYS PROG MGT OFFICER
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Y000	YC	YC	AAF SYS PROGRAM STAFF OFFICER	AAF LEVEL ENGR SPECIAL GEN
L651	L1	YC	AAF DCS FOR TECHNOLOGY	AAF DCS FOR TECHNOLOGY
6571	YC	YC	AAF CH OPERATIONAL SYS GROUP	AAF CH-SPEC [illegible] PROJECTS BRANCH
6631	YC	YC	AAF PROJ MGR DIR PROJ DEF E1	AAF PROJ MGR [illegible] PROJ DEF E-1

PAGE 3

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OF DAFSL MIL-SCH	2-SCH 3-SCH	AFSL	2AFSC 3AFSC CURR-DUTY TITLE / 3RD DUTY TITLE	ALPHA TAFCSC 4TH DUTY TITLE	SCS-LCATE RANGE 5TH DUTY TITLE	G-LEVEL
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9000	YC	YC	NAF SYS PROG STAFF OFF			
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0742	L2	YC	NAF TEST SITE ACTIVATION AC ANNEX SEC			
0682	YC	YC	NAF SYS PROG STAFF OFF-PROG PLANE OFC	CST NAVIGATOR BOMBARDIER		
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0582	YC	YC	NAF PROG MANAGER DIR - PROJECTS	NAF PROJECT MGR DIR OF PROJECTS		
9000	YC	YC	NAF CH TEST + DEP F-284 PROG OFF	NAF SYS PROG STAFF OFFICER		
0042	YC	YC	NAF SYS PROG STF OFF PROG CONT D	SC NAV EC 171		
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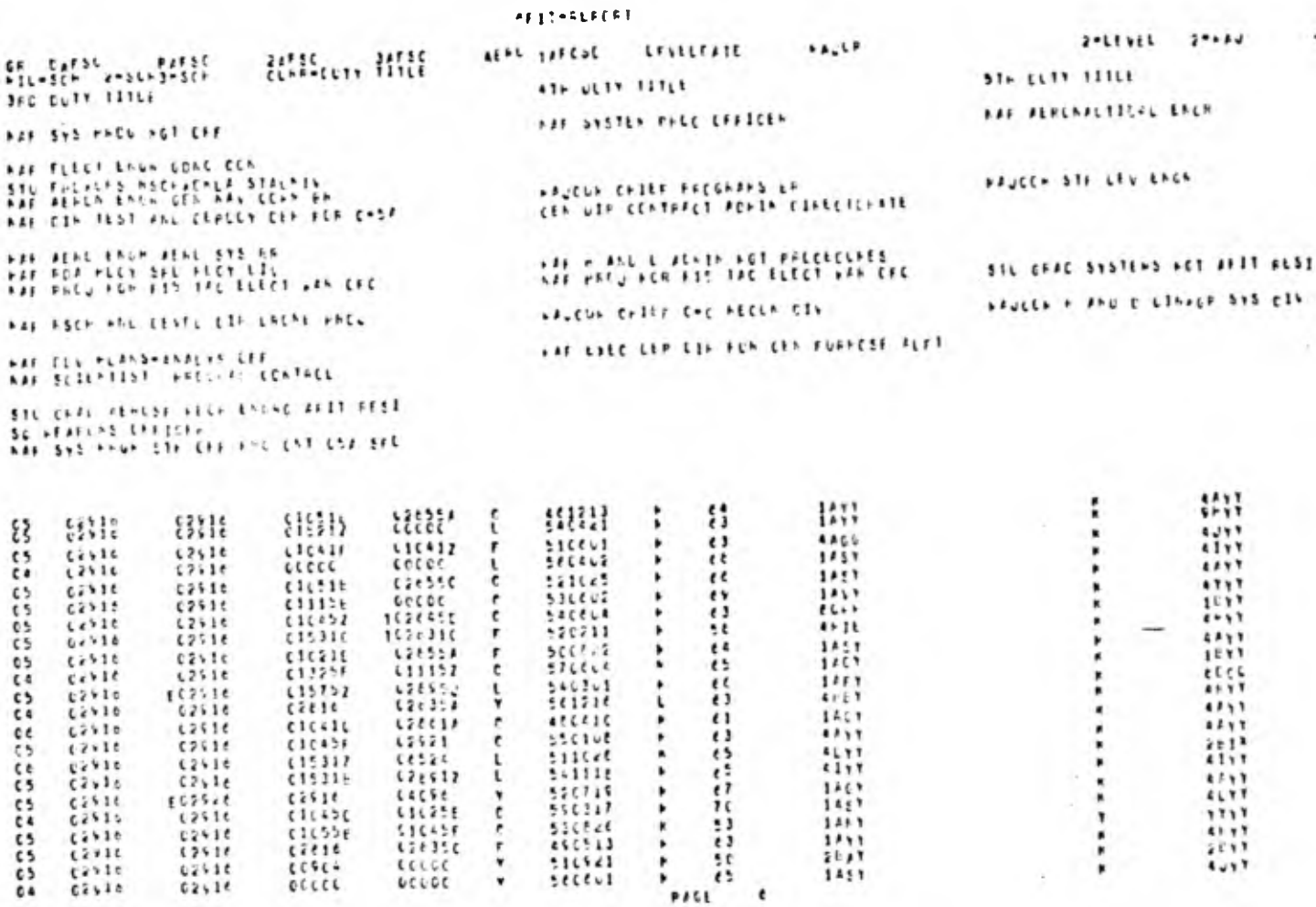
0011	YC	YC	NAF CH ADV SY [illegible] PROJECT	NAF CH ADVANCE DEV PROG LIFE SPT SPC		
9000	YC	YC	NAF SYS PROG OFF PROG CONT DEP C5A	NAF SYS PROG OFF PROG CONT DEP C5A		
9000	YC	YC	NAF ASST DIR PROG CONT PROG EVAL SRAM	NAVCOM DEP ASST FOR SYS OFF MGT		
0042	YC	YC	NAF CH CONFG MGMT DIV ADV ES SPC	NAF AERONAUTIC ENGR CONFIG MGMT DIV		
9000	YC	YC	NAF SYS PROG STAFF OFFICER	NAF SYS PROG STF OFF PROG CONT DEPCSA		
0041	YC	YC	NAF FLT MANUALS MGR	NAF FLIGHT MANUAL MANAGER F-15		
0021	YC	YC	NAF SYS PROG STAFF OFF	SC NAVIGATOR AC 136A GUNSHIP		

NAF CH SAM FLIGHT EP LIBE
NAF SYSTEM PROGRAM MANAGER — STC PRG INSTRUMENT UNIT ST DIV

NAF CH LAUNCH RETRIEVAL EN	NAF SYS PROG MGMT OFF-DIR ENGINE MGMT	NAF 354 PROJECT ENGR DIR OF ENGINE MGR
NAF CONF CONT EN SEC CONF MGT E1	NAF SYSTEM PRG STF OFF TST DEPL E-1	DET STAN EVAL FLT EXAMINER [illegible]
NAF SYS PROG STAFF OFF	STC OPNS SYS MGMT ANIT SE	
DEP CH TEST DIV ANS SPL	NAF ELECT ENGR	
NAF FLT TST OFF FLT A ENGR OPS EN	NAF FLT TST OFF FLT A ENGR OPS EN	
SC COMMANDER		
NAF CH CONFIG OFFICE CONT DIV DEP E-1	NAF CH CONFIG AND CONTROL DIV	SC NAVIGATOR AC 119K
NAF SYS PRG MGT OFF DEP F-15 SPO	NAVCOM MGMT ENGR OFF NET 3C	RANGER CH MGT ENGR EN
NAF TEST MANAGER C101-C10C	NAF TEST MANAGER	
NAF AERONAUTICAL ENGR GENERAL	NAF AERONAUTICAL ENGINEER	
NAF CH TEST DEP A-X SPO	NAF DES OFF ENGR OPS EN FLT TST OPS	NAF OPS OFF ENGR OPS EN FLT TST OPS

AFIT-PLANT .

GR DAFSC 3AFSC 2AFSC 3AFSC MIL-SCH 2-SCH 3-SCH CLRR-DUTY TITLE 3RD DUTY TITLE	ALNL TAFCUC LEVELCATE RANK 4TH DUTY TITLE	?-LEVEL 2-RA 5TH DUTY TITLE
CEN CIR OF TEST	CEN DIR OF TEST	CEF CIR OF TEST
NAF CH TEST AND DEPLOY DIV ANAC SPC	STL ENG ASTRO SPEC SER NCT MGT ANALYS	
NAF AERSP MSCH FLIGHT TST OFF	SC OPERATIONS OFFICER FICC	
NSP NAP TNG OFFICER ACV	NAF ASSOC PROFESSOR OF MGT	
NAF CH SPACE SYS DIV		
NAF STAFF OFF DEV-ECCM ELECT SYS DIV		
NAF CH AVION AND ENGR BRANCH	NAF MINE ENGR	SC HELICOPTER PILOT GR IP
NAF TST MGR FLIGHT ENG DIV CAFT SEC	NASA APOLLO FLT ENG ENGR	NASA APRCSH FLT SYS ENGR PROJ SPT OFC
NASA APOLLO FLT PLNG ENGR	NAF TST MGR A FRAME TST OFF	
NAF CH TEST DIV TEST AND DEPLOYMENT		
NAF EXECUTIVE OFFICER	NAF MGIG CH REL PROGS DIV CAPT SYS	PROJ MANAGER
NAF CH PROG CONTROL SEAL SPC	STL WEAPNSYS ANALYSIS(SAFEIT MES)	
NAF SCIEN SPEC OPNS RSCH		
NAF TEST MGR ELEC AND DEF PROG	NAF ELECTRONICS SYS MGR	NAF ELECTRONICS ENGR GENERAL
NAF ALTERNATE ENGR OFF		
CET AIRCRAFT COMDR FE 57	SC ALC STF PLNS DIV	
NAF CH TEST AND DEPLOY		
NAF SYS PROG MGMT OFF		
NAF CH OF DEPLOYMENT AGN CRA	NAF DEP CH PROG PM SYS DIV	NAF CH CH MGR SEC ENGR EN SYS DIV
MC AIR OPS OFF OFFICER OPS BRANCH	NAF SYSTEMS PROGRAM MANAGER	STL CMBC SYS MGMT AFIT SE
NAF SYS PROG MANAGEMENT OFF	NAF SUBSYS MGR	
NAF STAFF DEV ENGR CSF SPC	OCC AIR OPNS STF OFF ECPN	OCP OPS STF OFF-573
NAF CH TEST AND DEPLOY BRANCH		
NAF COMMAND PILOT		
NAF PROG MGMT MGR MLLFTH DIV CHRT SPC		
NAF PROCUREMENT MGMT STAFF OFFICER		
MAJCOM DEV ENGR SP OF SYS DIV		
NAF OCS FOR TECHNOLOGY	MAJCOM ACTIVE CHALAR PLANS	MAJCOM EXECUTIVE-OCS SYS
MAJCOM ASST EXECUTIVE	MAJCOM EXECUTIVE OCS SYSTEMS	NAF AERONAUTL ENGR GEN
NAF PROG MGMT PROJECT F-1	NAF ELEC ENGR DLIL CLNP NAV	
STL PRE OPS RSCH TEN AM UNIT		
NAF SYS PROGRAM MGMT OFFICER	NAF ASST CH CLNP CONTROL EL	
SC NAVIGATOR EC 121H		
NAF PROJ MGR DIR OF PROG CFP FOR E-3	NAF STF DEV ENGR	NAF STAFF DEV ENGR



PFIT-REPORT

GR	DAFSC	PAFSC	2AFSC	3AFSC	AERO	TAFCSC	LEVEL	RATE	MAJOR	2-LEVEL	2-MAJ
C5	C2516	C2516	C1C412	C311C	C	470723	F	47	4FYY	Y	YYYY
C6	C2516	EC2516	EC2816	EC2711	Y	51111C	F	56	4LYY	Y	YYYY
C4	C2516	C2516	C1C552	C2855C	C	53C0U2	F	63	4AYY	A	1EYY
C5	C2516	C2216	C1C49F	C1C51F	C	55C0U3	F	63	4LEY	A	4YYY
C5	C2516	C2516	C1E35	CCCCC	F	53C323	A	63	2EYY	Y	YYYY
C5	C2516	C2516	C1C41F	EC2C16	C	45C523	A	57	4AAY	Y	YYYY
C4	C2516	C2516	C4424A	C2561	Y	56C0U1	F	65	1ASY	F	1EYY
C5	C2516	C2516	C2E25C	C2E25A	F	53C0U2	A	66	4ICC	A	4IFU
C5	C2516	EC2716	C1L41F	C2516	C	55C0U3	F	6C	4IYY	A	4YYY
C5	C2516	C2516	C1C417	C2E16	C	551C43	F	64	1ASY	A	CAYY
C6	C2516	EC2516	EC2816	EC2695H	Y	55C0U2	F	66	1ACY	F	1CYY
C5	C2516	C2516	C1C41U	EC2716	C	45C023	F	61	1AYY	A	1AYY
C5	C2516	C2516	C1115Z	C2605E	C	540315	A	66	4FCC	Y	YYYY
C5	C2516	C2516	CE524	C6511	Y	526225	L	55	5HAC	A	1AYY
C4	C2516	C2516	C1115F	C2521	C	570530	F	67	1ACY	A	4YYY
C4	C2516	C2665E	C1C05C	C2511	C	56C0U3	A	55	1EYY	Y	YYYY
C5	C2516	C2516	C15212	C2155A	L	52C10E	A	65	4EAY	F	4AYY
C5	C2516	C2516	C1115Z	C2E0SC	F	55C524	A	6C	4AAY	Y	YYYY
C5	C2516	C2516	C1C452	C2655E	C	541161	F	61	1AFY	A	4FYY
C4	C2516	C2516	C1115Z	C2716	C	55C0U3	F	62	4AYY	A	1EYY
C5	C2516	C2E16	C2E35A	C2516	F	516CUE	A	64	4FYY	Y	YYYY
C5	C2516	C2515	C2516	CE124	Y	52C015	F	65	1ACA	F	1AAY
C6	C2516	C2516	C11112	EC2716	C	45C225	F	66	5LCY	A	4AYY
C5	C2516	C2516	C12212	C2EC5A	C	55C0U3	F	6C	4EYY	A	CUYY
C5	C2516	C2516	EC15712	C1511	L	51C516	L	45	5CYY	A	5CYY
C5	C2516	C2516	C1116	C2EC5C	C	[illegible]	F	54	4AYY	Y	YYYY
C5	C2516	C2516	C1C452	C2C55E	C	[illegible]	F	65	4UAY	F	4AAY
C5	C2516	C2516	C2E16	C26552	Y	[illegible]	F	7C	1AUY	A	1AYY
C4	C2516	C2516	C1355E	C2516	C	[illegible]	A	62	4FYY	F	3LYY
C5	C2516	C2516	C2855A	C2711	Y	[illegible]	F	62	4EYY	A	6AYY
C4	C2516	C2516	C1416	C1CC5C	C	[illegible]	F	67	1ACY	F	1AYY
C5	C2516	C2E16	C1C452	C2511	C	53CC2C	F	65	1AAY	A	6AAY
C5	C2516	C2516	C1115Z	C2521	F	54C02E	A	64	4FYY	Y	YYYY
C6	C2516	C2516	C2E55C	CCCCC	C	51C512	A	63	4LYY	Y	YYYY
C5	C2516	EC2516	EC1535C	EC2C35C	L	55C523	F	66	1AYY	F	4LYY

MIL-SCH	2-SCH	3-SCH	3RD DUTY TITLE	4TH DUTY TITLE	5TH DUTY TITLE
LE02	L2	YC	NAF CH CPEH SYS SPT LIFE SPT SPC	NAF CH CPH SYS SUPPORT	
JE51	C2	L2	NAF DIR PROGRAM CONTROL DIR FOR P-1	NAF CH PROC EVAL DIV DIR PRC CONTL	
CE12	YC	YC	NAF PROJ MGR ACFT PROGS DIV	NAF PROJ MGR ACFT PROGS DIV	
CE11	YC	YC	NAF CH PROGRAM CONTROL	NAF CH CONFIG MGMT DIV AWAC SPC	
CE32	YC	YC	NAF SYS PROG STF OFF ACFT PROGS DIV	NAF SYS PROG STF OFF ACFT PROGS DIV	
CE42	YC	YC	NAF CH TEST DEPUTY DIV ACL 65	NAF CH TEST DEPUTY DIV ACP 65	
LE57	L1	YC	NAF DIR OF PROG CONTROL	NAF SYSTEM PROC STAFF OFF	
YCCC	YC	YC	NAF DEPUTY TO ASST FOR SUBSYS MGT CSA	NAF DEPUTY TO ASST FOR SUBSYS MGT CSA	
LE52	L2	YC	NAF DEP DIR EPFF BASE BUILD SPC	NAF CH PLANS REQUIRE FOR AIR MOBILITY	

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PRINT-REPORT

GR DAFSC PAFSC 2AFSC 3AFSC REAL TAFCSC LEVELCATE MAJCA 2-LEVEL 2-MAJ
MIL-SCH 2-SCH 3-SCH CLASS-DUTY TITLE
3RD DUTY TITLE 4TH DUTY TITLE 5TH DUTY TITLE

GR DAFSC MIL-SCH	2-SCH	PAFSC 3-SCH	4TH DUTY TITLE	5TH DUTY TITLE
YCCC	YC	YC	NAF SYS SAFETY OFF, PROG DIV	NAF SYS PROGRAM STAFF OFF
CCE2	62	YC	NAF PAC HILL NEPSEL II CH BRCH	NAF PROG MGR FAC PRG HILL NEASEL
CA12	YC	YC	NAF PROG MANAGER TEAM FIS PROG DIV	NAF PROJ MANAGER TEAM FIS PROG DIV
CCC2	YC	YC	NAF DIR TEST-DEPLOYMENT CENTER F-111	NAF DIR TEST-DEPLOYMENT CENTER F-111
LE52	61	YC	NAF TF-34 F-1C2A ENG PROG MGR AF SPC	NAF CH ADVANCED PROGRAMS DIVISION
C7C3	61	61	NAF CH PLANS AND PROGRAMMING DIV	
LEL1	61	YC	NAF ACTG DIR SPC-HARP SYS PROJ DIR	NAF ACTG DIR SPC-HARP SYS PROG DIR
CE7C	YC	YC	NAF CH PLANS & PROGRAMS	NAF ACTG CH PROG CONTROL OFFICE
CC31	YC	YC	NAF FIS CERTIFICATION MGT OFF	NAF CONFIGURATION MGMT OFFICE
LE71	61	YC	NAF SENIOR PROG MGR TO PROC DIV	NAF PROJ MGR TRAINER PROG DIR PROG
LC31	YC	YC	NAF ASST DIR DIR OF TEST AND DEPLOY	NAF DIR TST AND DEPLOY OFF FOR AGM-69
C571	YC	YC	NAF CH PROC CONTROL DIV PRAM PROG OF	
CE52	62	YC	NAF CH PROC CONTROL ANA SEC	NAF CAREER DEV STD OFF
A511	YC	Y1	NAF DEPUTY CH PRAM PROJ OFF	NAF DEP ASST CH PROGRAM PROG
LE21	61	YC	NAF TECHNICAL ADVISOR FIS SPC	
C571	62	YC	NAF SITE MGR CH-1C PAVE NAIL PROG OFC	NAF PROG EVAL SPEC ENG DEP FOR E-3SPL
CE72	YC	YC	NAF SYS PROG STF OFF	NAF CLEARANCE DET 6
C711	62	61	NAF CH IDENTIFICATION CONTROL DIV	NAF CH CHANGE CON DIV
YCCC	YC	YC	DIR CONFIG MGT REP FOR M-X	NAF CHIEF CONFIG MGMT
CE31	YC	YC	NAF CH COMM MGMT BRANCH	STL CHAS SYS MGT ASST REST
LE22	62	YC	NAF PROG MGR ARMAMENT DIR OF PROJ	NAF PROG MGR AVIONICS FIS SPC
JE71	62	62	NAF CH PROC CONTROL DIR DEPUTY F111	CEN CHIEF PROC OPERATIONS
C5E1	YC	YC	NAF CHIEF RESOURCES MANAGEMENT DIV	NAF CH MGT RESOURCES PROG CONT DEP F1
JC51	62	YC	NAF CH PROJECTS DIV SUAL SPC	AIRA ASST AIRA ENGLAND
C5E1	YC	YC	NAF CH TEST-COT ENIC PAVE NAIL FOR	NAF SYS PRG STF OFF DEP PAVE NAIL
C713	62	YC	NAF DEP DIR PROJECTS DEP FOR B-1	NAF DEP DIR PROJECTS DEP FOR B-1
C552	61	YC	NAF DIRECTOR PROGRAM CONTROL	NAF ASST DIR PROGRAM CONTROL
CE52	YC	YC	NAF PROG MGR SECONDARY POWER ALN SYS	NAF PROJ MGR DIR OF PROGRAM FOR B-1
L7C1	62	YC	NAF PROG MGR STEEL TRANSIT PROTOTYPE	SC DIC MAINTENANCE CONTROL
C5C2	YC	YC	NAF CH RECON SYS DIGITAL CO	NAF CH SPEC ENGINE BR
C7C2	62	YC	NAF DEP DIR TST DEPLOY DEP FOR B-1	NAF DEP DIR TST DEPLOY DEP FOR B-1
CC52	YC	YC	NAF CH PLANS OPC DIV DIR PROC CONT E1	NAF CH PLANS-OPC DIV DEP B-1
L722	62	YC	NAF CH AUDIT MGMT BRANCH	NAF CH CONFIG AUDIT MGMT BR
LE52	62	YC	NAF AF ENGINE MGR-FIS SPC	
C531	YC	YC	NAF DEP DIR PROC AND PROD FIS SPO	NAF PROC OFF PROGRAMS OF AFSC-E
ACC1	61	61	NAF DIR CONFIG MGMT FIS SPC	UT OF SPACE DIVISION
LC42	61	YC	NAF LEVEL EMCH TEST MGT	NAF LEVEL EMCH TEST MGT
YCCC	YC	YC	NAF TEST MGR DIR TEST DEPLOYMENT	NAF TEST MGR DIR TEST DEPLOYMENT
CCC2	YC	YC	NAF CHIEF ACTIVE ECM DIVISION	NAF CH ACTIVE ECM BR
C722	62	YC	NAF CH CONFIG IC DIV DIR CONFIG MGT	LAB PERSONALITY ENGR ELECT ACCURACY TST
L712	61	YC	NAF, FIS SPEC CH, REC CONT MGT BP	NAF CH REQUESTS CONTROL MGMT BR
CC31	YC	YC	NAF CH TECH PUBLICATIONS DATA ACCT CT	NAF CH TECH PUB AND DATA DIV
J7C1	YC	YC	NAF FIS TECH ADV, DEP FIS	NAF SYS PROG STAFF OFF PROG DIV, DEPC
CE42	YC	YC	NAF CH FG EVAL DV DIR PROC CONTL B-1	NAF GEN SYS SPEC FG EVAL DV PC CONTROL

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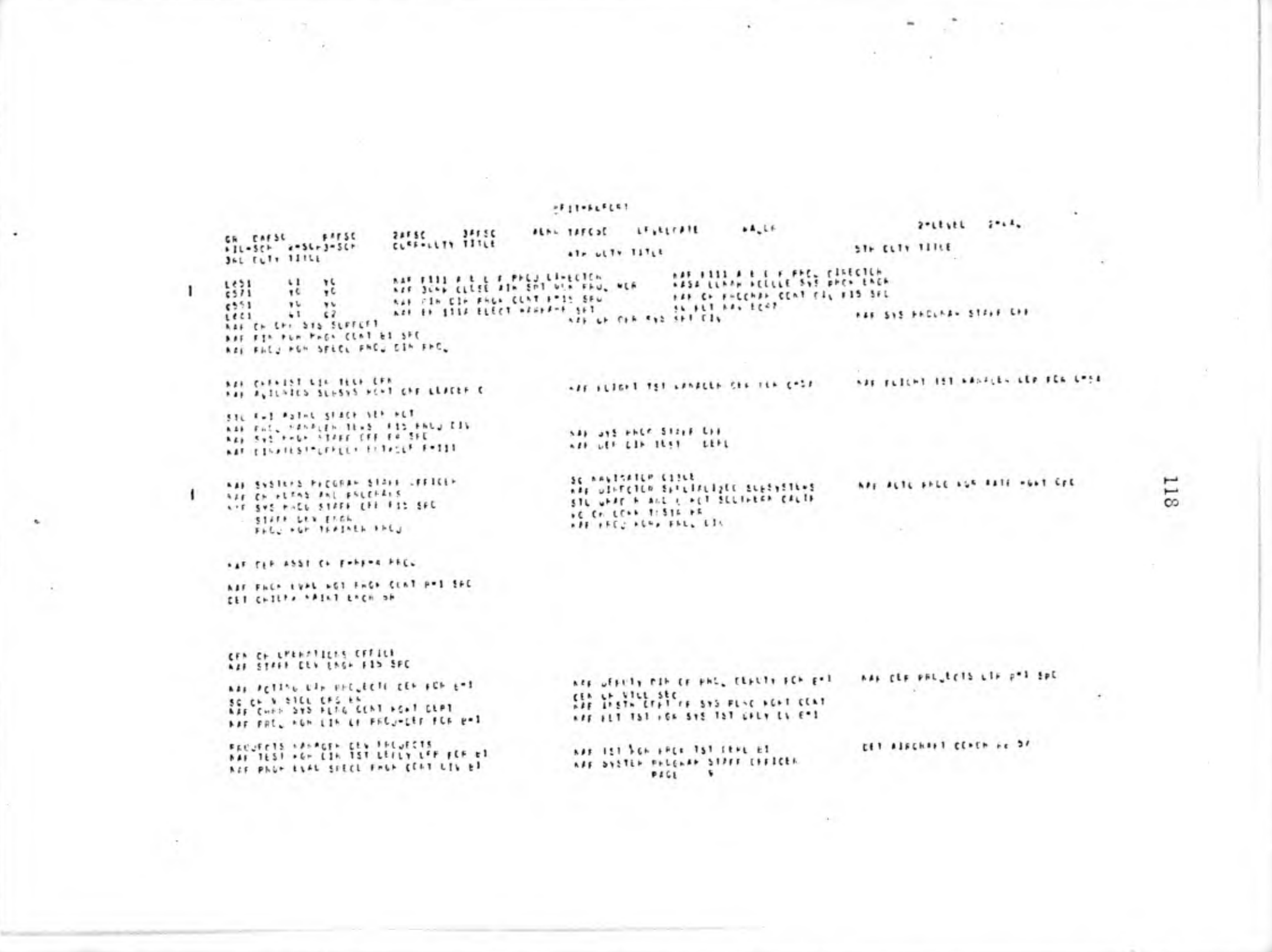

AFIT-FLFLPT

GR CAFSC PAFSC 2AFSC 3AFSC AEHL TAFCSC CFSELECATE HA,LH 2-LEVEL 2-HA,
MIL-SCH 2-SCH3-SCH CLAF-DUTY TITLE
3RD DUTY TITLE 4TH DUTY TITLE 5TH DUTY TITLE

NAF SYS PROG STF OFF

NAF PROG OFFR PROGRAMS OP

NAF TST PARAVEN F-15 STRUCT + MSLS — TST MGR SPACE RANGE MISSILE — NAF AIR EQ SHP TEST MGR F-15 SPC
NAF CH ACTIVE ECM BR
NAF SYS PROG STAFF OFF SPEC PRC, — SC CURRANCE SPARE FLT CONC MICC 117
NAF FLT TST OFF ECHECK CONS BR — NAF CH FLT & ENGR CPS BR FLT TST CPS — NAF CH FLT & ENGR CPS BR FLT TST CPS

NAF CH REQUESTS CON AND SPEC ACT BR — NAF SYS PROG MGMT OFFICER — WC CHANGE SPACE SFT CPS BR,ACL
NAF SYS PROG STAFF OFF CONFIG MGMNT — NAF STAFF OF, ENGR
NAF STAFF ENV ENGR DIV PROG F15 — STC MFSC CET 12 AL
NAF SYS PROG STAFF OFF — OPERATIONS STAFF OFFICER
MISC STUDENT

SC FLT NAV EC-7

C6	C2941	C2911	C2825A	C2825C	Y	456715	F	56	4191		F	4H1T
C6	C2921	C2716	C11112	C2921	C	520324	F	57	4491		F	CT1T
C6	C2921	C2921	C11112	C2816	C	520FW2	F	55	14G1		F	1EY1
C6	C2941	C2816	C1C511	C2716	C	A81114	F	56	44F8		F	4AC1
C6	C2941	C5516	C5525C	C4C21	F	510C3C	F	6C	CH11		Y	Y1Y1
C4	C2941	C2941	C1251C	C2821A	C	55C567	F	64	4H11		F	3A41
C5	C2921	C2921	C1C55E	C2711	L	54C6W4	F	66	1AC1		F	4U41
C4	C2941	C15752	C15212	EC2921	L	56C307	F	67	1A51		F	CCE1
C5	C2921	C1C45F	C7324	C2916	C	54C545	F	61	1A41		Y	Y1Y1
C6	C2941	C2716	EC11112	C2921	C	551114	F	61	44F1		F	44Y1
C5	C2941	EC2916	C2825A	C2921	F	45C245	F	64	41C1		F	41C1
C4	C2941	C6516	C1525E	C2921	L	5CC1W2	F	57	4U41		Y	Y1Y1
C6	C2941	C2916	C1C51E	CCCCC	F	45C245	I	56	5L41		Y	Y1Y1
C5	C2941	C2816	C1115F	C2921	C	521504	F	67	1A11		F	6W41
C6	C2941	C2716	C1C412	C2921	C	55C6W3	F	67	4E11		F	4F11
C5	C2941	EC2916	EC2816	C2921	L	51C1W2	F	62	1A11		F	4191
C5	C2941	C2916	C1115E	C2816	C	54C6W4	F	71	1AC1		F	4F11
C6	C2921	C2541	C1C41F	C2816	C	52C513	F	57	4A11		Y	Y1Y1
C5	C2941	C2816	C1C452	C2921	F	531515	F	64	4H11		Y	Y1Y1
C6	C2921	C2716	C11112	C2816	C	52C6C1	F	71	3A11		F	4HC1
C5	C2921	C2E41A	C1351C	C1C412	C	520FW3	F	61	4E11		F	1E11
C6	C2941	C2921	C2716	C2816	C	45C6W5	F	53	4EC1		F	1E11

CCC1 L1 C2 NAF CIR PROG CNTRL OFF MGR SUBSYS — NAF CIR PROG CNTRL OFF MGR SUBSYS
CCC1 A1 C2 NAF SPC PROTOTYPE PROG OFC — NAF SPC PROTOTYPE PROG OFC
CC51 YC YC NAF CIR CHECKOUT CHASE PROG OFC — NAF CIR [illegible] BASE NATL PROG OFFICE

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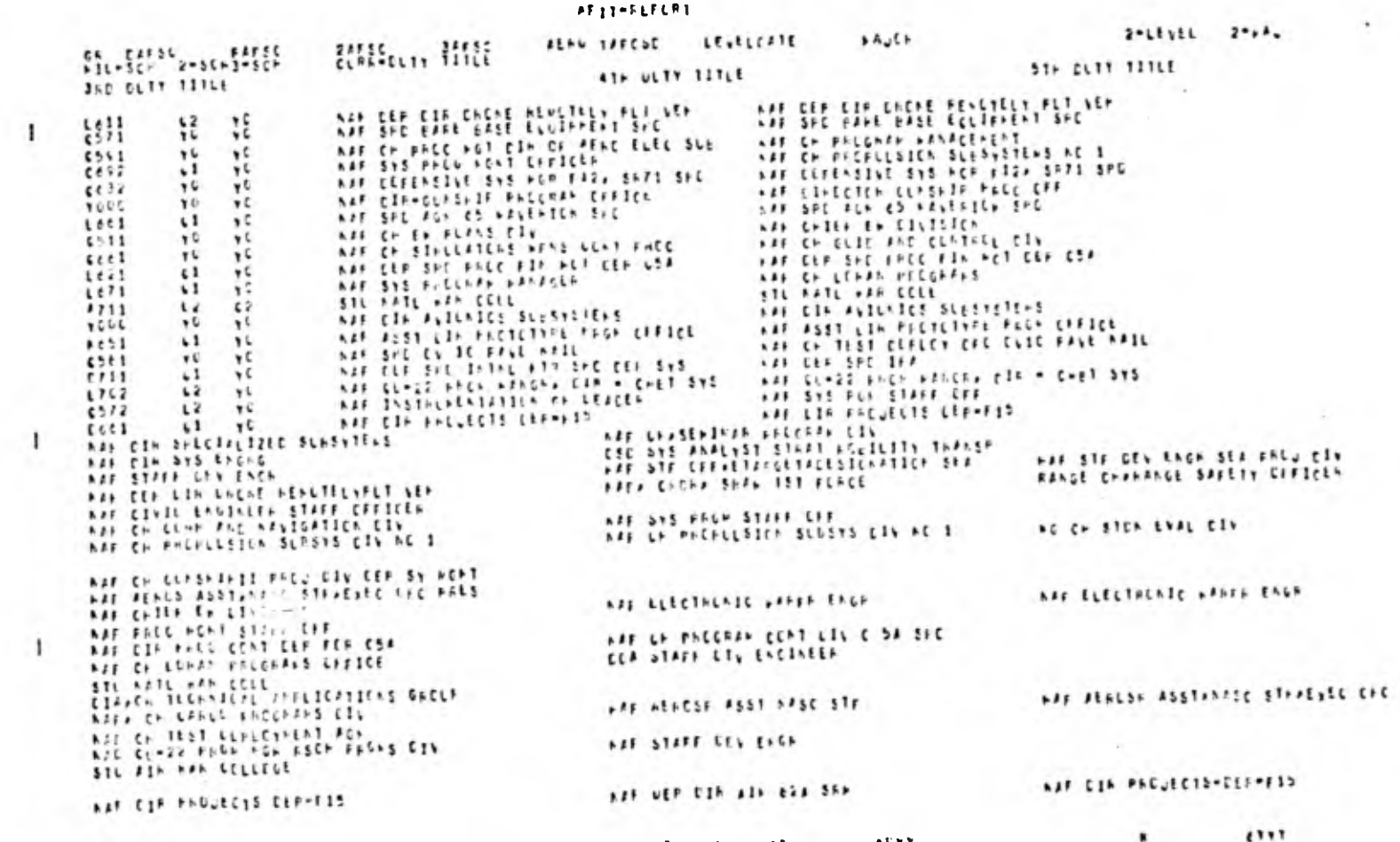

AF11-REPORT

GR	CAFSC	PAFSC	2AFSC	3AFSC	AERO	TAFCSD	UP/ALLOCATE	MAJCOM	2-LEVEL	2-LVL
C6	C2596C	C2816C	C1L412	C2596C	C	4711AC	P	66	1AYY	M	4AYY
C6	C2596C	C2996C	C1C41F	C2516C	L	4K1CAL	P	66	1ASY	P	4A1Y
C5	C2596C	C2996C	C1431F	C2635A	C	51C6A4	P	P6	6PCL	P	4I-Y
C6	C2596C	C2716C	C1521N	C2696C	L	4EC5A5	P	66	3ASY	Y	YYYY
C6	C2596C	CCCC6	C1C212	C2696C	C	43C5A5	P	65	1PCY	M	1AYY
C6	C2596C	CCCC6	C1331F	C2696C	C	45CEV5	P	52	4UCY	M	1CYY
C5	C2596C	C2596C	C2P16	C2C25P	Y	45C535	P	61	4IYY	P	1AAY
C6	C2596C	C2596C	CC516	C6524	C	4312V5	P	51	1A1C	Y	YYYY
C6	C2596C	EC2596C	C1C412	CC516	C	4CC2V1	P	61	5AYY	M	5LYY
C6	C2596C	EC2596C	C2516	C11112	C	4PCEVE	P	57	2U1C	P	1CYY
C6	C2596C	C2596C	C15312	C2516	L	43CF14	P	51	4AYY	Y	YYYY
C5	C2596C	C2596C	C11112	C2655C	C	51C7V3	P	62	4AEY	M	4YYY
C6	C2596C	C2716C	C1221A	C2596C	C	4ECCV4	P	64	1AYY	M	1CYY
C5	C2596C	C2596C	C1355A	C2516	C	52CCV3	P	52	4JYY	Y	YYYY
C6	C2596C	C2596C	C11112	C2516	C	4PC2V1	L	5C	4AYY	M	4AYY

2ND DUTY TITLE | 3RD DUTY TITLE | 4TH DUTY TITLE | 5TH DUTY TITLE

C713 L1 YC HAF CH SPT PRGMS DIV CHET SYS — HAF CH SPT PRGMS DIV CHET SYS
YCCC YC YC HAF DIR AVALANCHE SUBSYS — HAF DIR SPECIALIZED SUBSYSTEMS
C713 L1 C2 HAF DIR PROCS DEP FLR F111 — HAF DIR OF F-111 PROJECTS
CCC2 YC YC HAF CH PROGRAM MANAGEMENT — HAF CH MECH ACCESSORIES DIV
CCC1 YC YC HAF DIR TAC CARGO DEP FLR SYSTEMS — HAF DEP DIRPR
YCCC YC YC HAF SPC LIFE SPT SPC DEP SUBSYS — HAF SPC LIFE SPT SPC DEP SUBSYS
CCC1 Y1 C1 HAF ASST DEP FOR SYSTEMS — HAF DIR DIR CHET SYS DEP-SYS
YCCC YC YC HAF SYS PROG MGMT OFF = CARRIER A-C — HAF SYS PROG MANAGER
C 52 L1 C1 HAF PROJ MGR FIRE F15 JT ENG PROG — HAF DIR JT ENG PROG F15
YCCO YC YC HAF DEP SPC F15 SPC — HAF DEP SPC F15 SPC
ACC1 L1 C2 HAF ASST SPC DEPUTY FOR C 5A — HAF ASST DEP FOR ACQ ACT DEP FOR C5A
L552 YC YC HAF DEP SPC C5A — HAF DEP SPC C5A
CC71 YC YC HAF SPC ACFT CC FIRE SUP AND RES SPC — HAF SPC ACFT GC FIRE SUP AND RES SPC
CC71 L1 C2 HAF SPC TATAL FIGHTER DEP FOR SYS — HAF SPC TATAL FIGHTER DEP FOR SYS
YCOC YC YC HAF SPC ADVERSE WEATHER AER DEL SPC — HAF CH OPERATIONAL SYS SPT DIV
CCC1 L1 YC HAF DIR PROF SS DEP FOR SUBSYS — HAF DIR PROF SS DEP FOR SUBSYS

HAF CH ASW SPT PROG DIV CHET SPC — HAF 1ST MGR MISS SPT PRC DIV
HAF DIR AERO MECH SUBSYSTEMS
HAF CH HELICOPTER PROGS DIV CHET SPC — HAF CF MISSION SPT PRG DIV CHET SPC — HAF CHIEF MISSION SPT PROG
LAF SCIENTIST MECH ACOUSTIC PROJ — HAF R AND D CCS P C
HAF SYS PROG MGR
HAF SPC LIFE SPT SPC DEP SUBSYS — SPC WEAPAT SPC — VICE CMDR
HAF DIR CHET SYS DEP-SYS — HAF ASST CH ENGINEERING DIVISION
HAF ASST CH ENGINEERING DIVISION — HAF CF PROJECTS DIVISION F-15 SPC
HAF DIR ADVANCED JOINT ENGINE PROJECT — HAF DEP SPC F15 SPC — HAF CH PROG AND PROJ F-15 SPC
HAF DEP SYS F15 SPC — HAF DIR CF PROJECTS DEP FOR E-1 — HAF DEP SYS PROG DIR F 1 SPC
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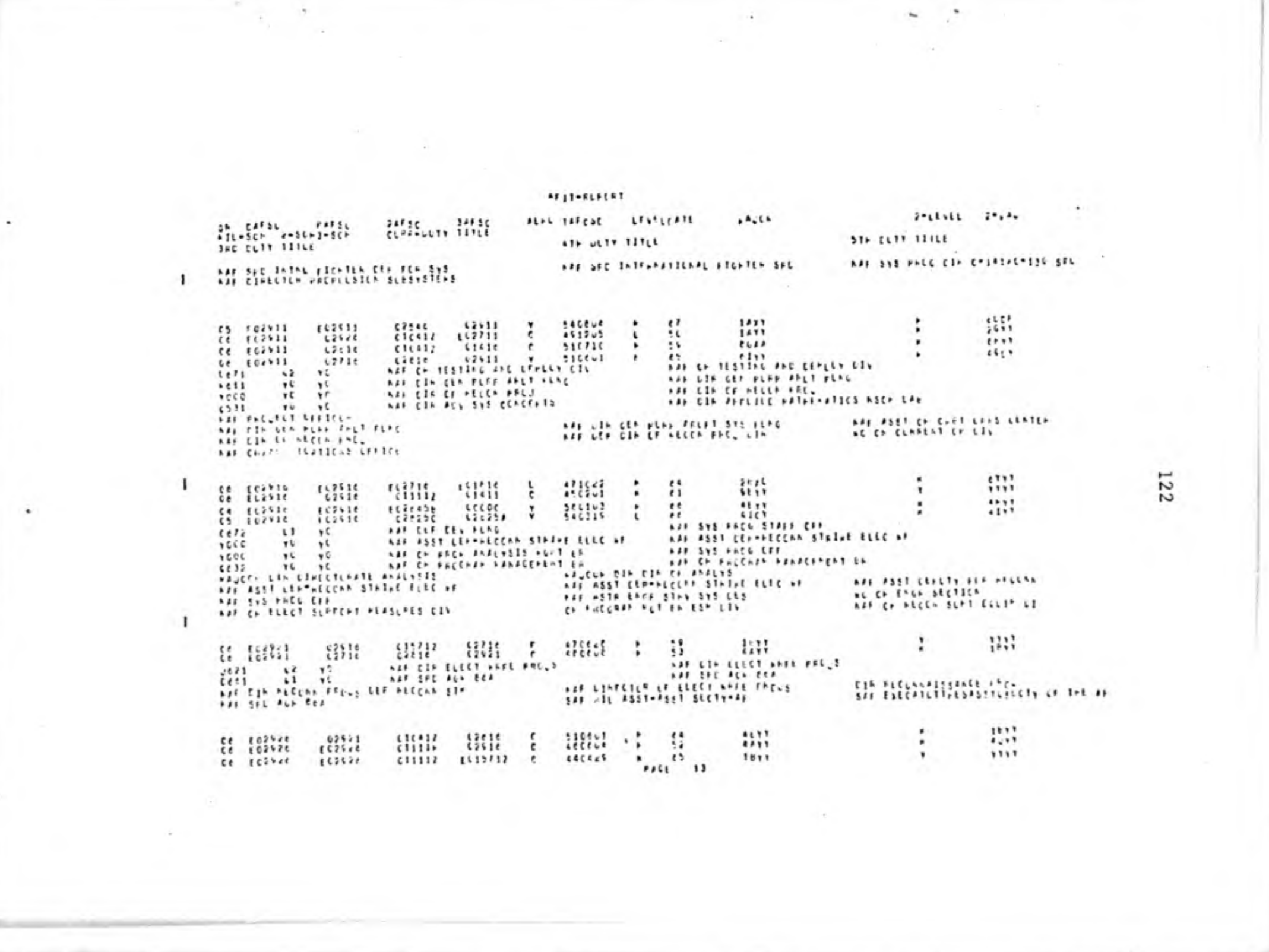

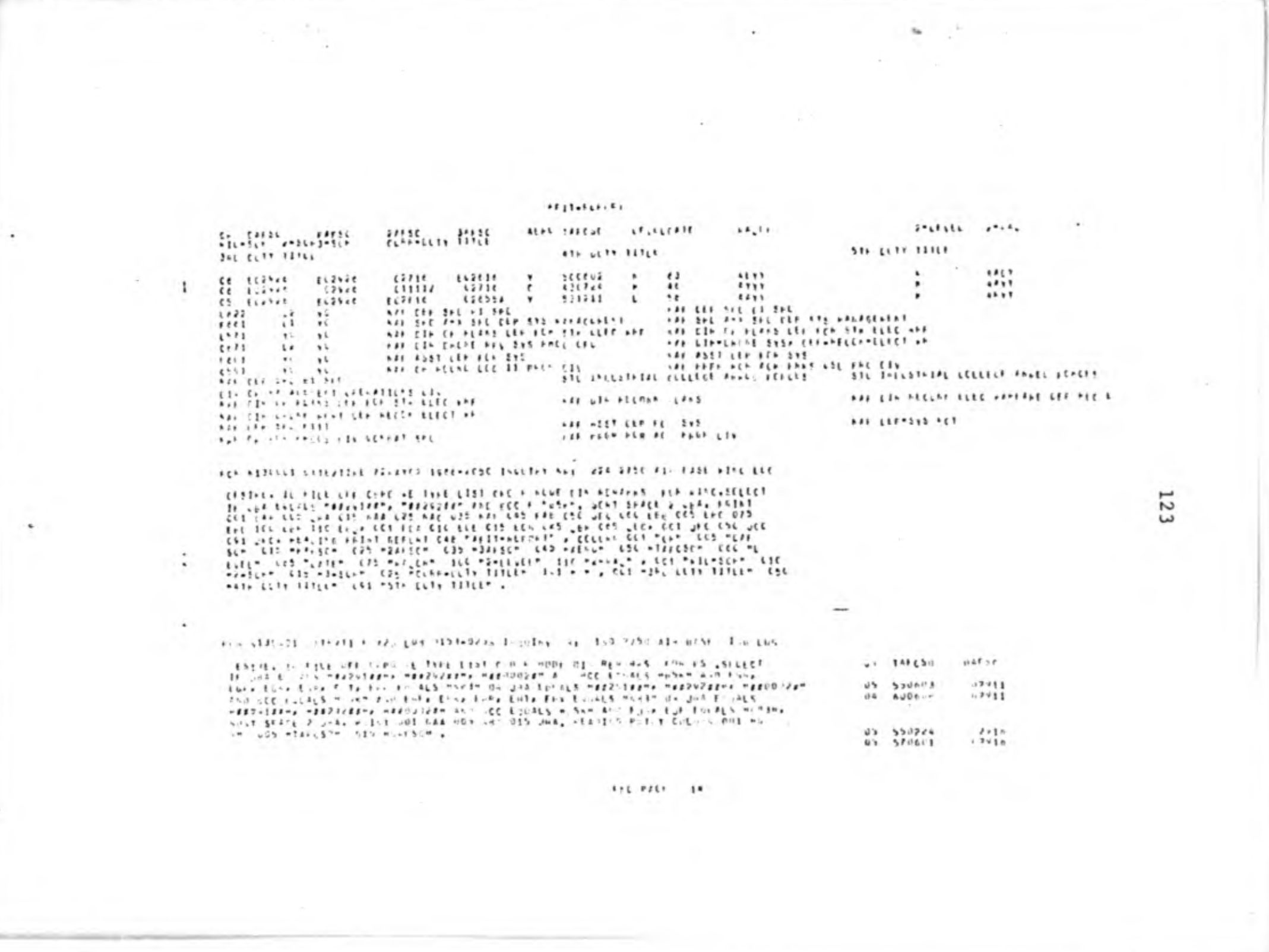

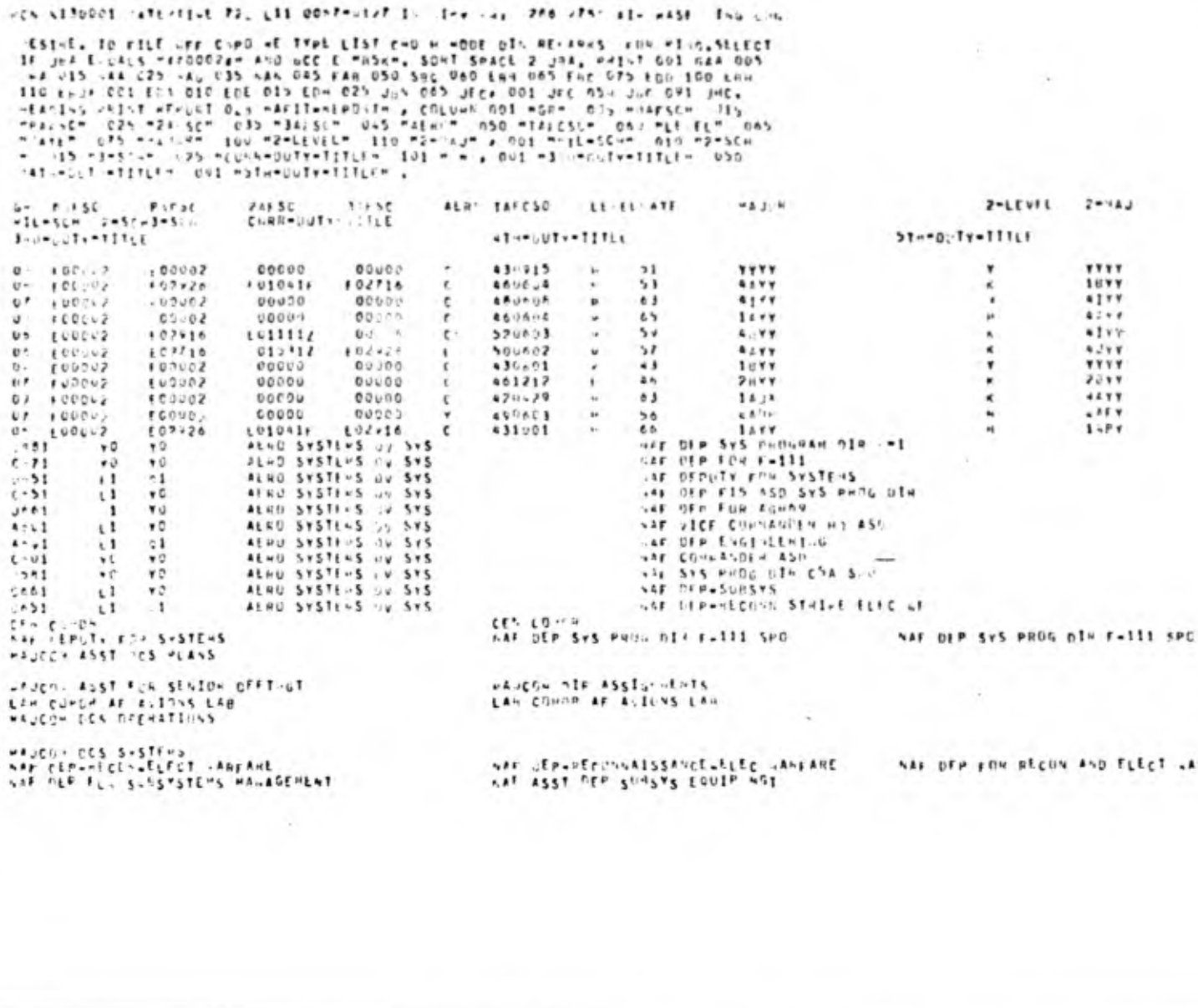

BIBLIOGRAPHY

Books

1. Buffa, Elwood S. Modern Production Management. New York: John Wiley and Sons, Inc., 1969.

2. Halter, Albert N., and Dean, Gerald W. Decisions Under Uncertainty. Cincinnati: South-Western Publishing Co., 1971.

3. Morgan, Clifford T. Human Engineering Guide to Equipment Design. New York: McGraw-Hill Book Company, Inc., 1963.

4. Schein, Edgar H. Organizational Psychology. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970.

5. Siegel, Sidney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Company, 1956.

6. Strauss, George, and Sayles, Leonard R. Personnel: The Human Problems of Management. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1972.

Articles

7. Eckstrand, Gordan A.; Askren, William B.; and Snyder, Melvin T. "Human Engineering: A New Challenge." Human Factors, VIX (December, 1967), 517-520.

8. Haygood, Lieutenant Colonel William Z. "Inspector General Evaluates Program Management." Defense Industry Bulletin, VII (Summer, 1971), 51-53.

9. Parker, Colonel Levin W., Jr. "The Defense Systems Management School: A New Concept in Program Manager Training." Defense Management Journal, VII (Fall, 1971), 50-53.

10. Peppers, Jerome G., and Spitzer, Ernest W. "Developing Military Executives." Air University Review, XX (May-June 1969), 34-35.

11. Scott, Brig. Gen. Winfield S., III. "Educating the DOD Program Manager." Defense Management Journal, VIII (April, 1972), 27-31.

12. Wohlking, Wallace. "Attitude Change, Behavior Change: The Role of the Training Department." California Management Review, XIII (Winter, 1970), 45-49.

Regulations and Manuals

13. U.S. Department of Defense. "System Project Management." DOD Directive 5010.14, Washington, D.C., 20330, May 4, 1965.

14. U.S. Department of the Air Force. "Military Personnel Classification Policy Manual (Officers, Warrant Officers, Airmen) AFM 35-1, Washington, D.C. 20330, 18 August 1970.

15. _____. "Officer Classification Manual." AFM 36-1, Washington, D.C. 20330, 28 May 1969.

16. _____. "Officer Career Management." AFM 36-23, Washington, D.C. 20330, 30 April 1971.

17. _____. "Management of Personnel Subsystem/Human Factors in System, Subsystem, Equipment and Modification Development." AFR 80-46, Washington, D.C. 20330, 23 September 1970.

18. _____. "Data Elements and Codes." Vol. II. "Personnel." AFM 300-4, Washington, D.C. 20330, 1 May 1971.

19. _____. "Systems Engineering Management Procedures." AFSCM 375-5, Andrews AFB, 19 April 1971.

20. _____. "Expanded Career Objective Statement for AFSC Officers." AFSCP 36-2, Andrews AFB, 3 March 1969.

21. _____. "Personnel Subsystem Management of Air Force Space and Missile Systems." SAMSO Manual 375-1, Los Angeles AFS, 5 June 1969.

22. _____. "Graduate Study in Systems Management." AFITP 50-8, Wright-Patterson AFB, Ohio 45433. 1 January 1971.

23. _____. "Continuing Education Program." AFITP 53-12, Wright-Patterson AFB, Ohio 45433. 1 October 1971.

Published Reports and Miscellaneous

24. Department of Defense. "Report to the President and the Secretary of Defense on the Department of Defense by the Blue Ribbon Defense Panel." Washington, D.C. 20402. July 1, 1970.

25. Esposito, Brigadier General A. L. "Career Progression for Potential SPDs." Headquarters Air Force Systems Command Letter, Andrews AFB, Maryland. 14 September 1971.

26. Hopkins, William L. Human Factors and Training Aspects of SPE. Proceedings of the NMSE Systems Performance Effectiveness Conference. U.S. Naval Applied Science Laboratory, Washington, D.C. 27-28 April 1965.

27. Meister, D. and Sullivan, D. J. The Impact of Manpower Requirements and Personnel Resources Data on System Design. Aerospace Medical Research Laboratories Report, Wright-Patterson AFB, Ohio, 1968.

28. McCrimmon, K. R. Decision Making Among Multiple Attributes: A Survey and Consolidated Approach. Santa Monica, California: The RAND Corporation, December 1968.

29. Raiffa, Howard. Preferences for Multi-Attributed Alternatives. Santa Monica, California: The RAND Corporation. April, 1969.

30. Sexon, Colonel J. E., Hq. USAF Personnel Research Office Logistics Research Proposal (71-275). School of Systems and Logistics, AFIT, Wright-Patterson AFB, Ohio. 8 October 1971.

31. U.S. Department of the Air Force. The Personnel Subsystem. Training Film #TF 6019, 1967.

Published Catalogs and Curriculums

32. Air Command and Staff College. Curriculum Catalog. Maxwell AFB, Alabama: Air University, 16 August 1971.

33. Air Force Institute of Technology. Catalog 1971-1973. Wright-Patterson AFB, Ohio: Air University, July 1971.

34. _____. "Graduate Systems Management Program." Wright-Patterson AFB, Ohio: School of Engineering, 1 August 1971.

35. Air War College. Curriculum Catalog 1971-1972. Maxwell AFB, Alabama: Air University, 1971.

36. Defense Systems Management School. Syllabus--Program Management Course. Fort Belvoir, Virginia: Defense Systems Management School, 1 April 1971.

37. _____. Information Pamphlet. Fort Belvoir, Virginia: Defense Systems Management School, 1972.

38. Industrial College of the Armed Forces. Catalog 1972-73. Fort Lesley J. McNair, Washington, D.C.: Industrial College of the Armed Forces, 1972.

39. Squadron Officer School. Curriculum Catalog. Maxwell AFB, Alabama: Air University, April 1972.

40. United States Naval Post Graduate School. Draft of Course Curriculum for Systems Acquisition Management. Monterey, California: USN Post Graduate School, June 1972.

41. University of Southern California. Master of Science in Systems Management Pamphlet. Los Angeles: Institute of Aerospace Safety and Management, 1972.

Interviews

42. Adams, Jack D. Personnel Subsystems Branch Aeronautical Systems Division, Wright-Patterson AFB, Ohio. Personal Interview, 26 January 1972.

43. Ahlborn, Major John F. Hq USAF Personnel Research. Telephone Interview, 21 January 1972.

44. Boren, Lt/Col J. D. Human Resources Engineer F-15 System Project Office, Wright-Patterson AFB, Ohio. Personal Interview, 31 January 1972.

45. Browning, Lt/Col Robert. Personnel Career Monitor, Randolph AFB, Texas. Telephone Interview, 31 January 1972.

46. Douglas, Robert T., Course Director for ASD SPO Course. Aeronautical Systems Division, Wright-Patterson AFB, Ohio. Telephone Interview, 30 June 1972.

47. Felices, Major General Salvador E. Deputy Chief of Staff Logistics, Strategic Air Command. "Major Logistics Problems of the Strategic Air Command." Lecture given at School of Systems and Logistics, Wright-Patterson AFB, Ohio. 31 January 1972.

48. Grant, CDM Edmond H., Instructor Defense Systems Management School. Personal Interview, 1 May 1972.

49. Henderson, Major Donald W., Assistant Director of Program Control AGM-69/SRAM SPO, Wright-Patterson AFB, Ohio. Personal Interview, 14 March 1972.

50. Howard, Lt/Col George H., Chief Management Operations Office B-1 SPO, Wright-Patterson AFB, Ohio. Personal Interview, May 1972.

51. Kennison, Major Robert. Personnel Career Monitor, Randolph AFB, Texas. Telephone Interview, 17 May 1972.

52. McCarty, Dyke, Professor of Weapons System Management, Continuing Education Division, School of Systems and Logistics, AFIT, Wright-Patterson AFB, Ohio. Personal Interview, 2 August 1972.

53. Pride, Addis, Chief, Records and Administration Division, AFIT, Wright-Patterson AFB, Ohio. Personal Interview, 30 June 1972.

54. Rider, Lt/Col Graham W. Associate Professor of Logistics Management, Graduate Education Division, School of Systems and Logistics, AFIT, Wright-Patterson AFB, Ohio. Seminar on Logistics Policy, 30 June 1972.

55. Snyder, Melvin T., Chief, Air Force Human Resources Laboratory, Wright-Patterson AFB, Ohio. Personal Interview, 24 January 1972.

56. Temple, Captain Glenn O., Educational Program Manager, AFIT Civilian Institutions, Wright-Patterson AFB, Ohio. Personal Interview, 17 April 1972.

57. Tetmeyer, Major Donald C. Human Resources Laboratory, Wright-Patterson AFB, Ohio. Personal Interview, 24 January 1972.

58. Walters, Col. Wilmer C., Technical Advisor F-15 SPO, Wright-Patterson AFB, Ohio. Personal Interview, 15 March 1972.

Unpublished Materials

59. Chambers, Major John E.; Henderson, Major Donald W.; Jones, Major Glenn A.; and Solomon, Marvin L. "The System Program Director of the Seventies." Unpublished Systems Analysis, University of Southern California, 1970.

60. De Paolis, Lt/Col Thomas A.; Sampson, Major James R.; Stobaugh, Major Warren K.; Scharf, Captain Marcus D.; and Uhlman, Norman L. "Criteria for the Selection of Personnel for the System Program Office." Unpublished Research Paper, School of Systems and Logistics, Wright-Patterson AFB, Ohio, 1965.

61. Halladay, Commander Maurice E. and Murray, Lieutenant Commander Joseph Walter. "Weapons Systems Acquisition Curriculum." Unpublished Master's Thesis, Naval Post Graduate School, 1970.

62. Peloquin, Major Dale B., and Roscoe, Major Arthur J. "Systems Management in the United States Air Force--A Review and Critical Analysis." Unpublished Master's Thesis. School of Engineering, Wright-Patterson AFB, Ohio, 1969.

63. Talley, Major Dorsey J., and Patchet, Major Ronald D. "An Analysis of Possible Improvements in the Staffing of System Program Offices." Unpublished Master's Thesis. School of Systems and Logistics, Wright-Patterson AFB, Ohio, 1971.

64. Thompson, Lt/Col Allen W.; Allen, Major John H.; Bell, Captain John D.; Cadena, Captain Richard E.; Winston, Captain Eldon T.; and Gerstlauer, William R. "Is Specialized Training Required for Newly Assigned System Program Office Personnel?" Unpublished Research Paper, School of Systems and Logistics, Wright-Patterson AFB, Ohio, 1965.

65. Wiegand, Lt/Col Karl L. "Human Resource Factors in the System Acquisition Process." Unpublished Student Research Report. Industrial College of the Armed Forces, Washington, D.C., 1972.

BIOGRAPHICAL SKETCH

Major Solberg attended Washington State University, graduating in 1956 with a B.S. in Conservation and a commission in the Air Force. He entered active duty in April, 1957 and completed pilot training in August 1958. He was then assigned to helicopter pilot training, which was followed by successive duty in rescue helicopter detachments in France, Washington, Vietnam, Texas and the United Kingdom. His assignment after graduation is to Osan Air Base, Korea, as a rescue helicopter pilot. Upon completion of that remote tour, he has a directed duty assignment in the System Program Management career field.

BIOGRAPHICAL SKETCH

Major Steiner was graduated from the University of Michigan with a B.S. in Materials Engineering and received his commission in the Air Force in 1961. After serving a tour as a Vehicle Maintenance Officer, he attended pilot training and received his wings in 1964. His initial flying assignment was to McGuire AFB flying C-130s for the Military Airlift Command. Later assignments included tours with the Aerospace Rescue and Recovery Service in squadrons located in Guam, Vietnam, and New Hampshire. Prior to attending school, he was the 39th ARR Wing Flying Safety Officer at Richards-Gebaur AFB. Upon graduation Major Steiner's assignment is to the Aeronautical Systems Division at Wright-Patterson AFB where he will be a program manager in a system program office.