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PRODUCTION ORIENTED MAINTENANCE ORGANIZATION: A CRITICAL ANALYSIS OF SORTIE-GENERATION CAPABILITY AND MAINTENANCE QUALITY

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LSSR 52-80

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The Production Oriented Maintenance Organization (POMO) represents an Air Force initiative directed at improving sortie-generation capability. Although POMO is currently in use within TAC, PACAF, USAFE, and AAC, its impact has not been fully evaluated. This research was directed at determining what effect, if any, POMO has had on sortie-generation capability and aircraft quality. Six research hypothesis variables relating to sortie-generation capability and three relating to aircraft quality were evaluated to make this determination. Data were obtained from HQ ADCOM and six active duty ADCOM FISs. Performance data covered each FIS before and after POMO implementation. Research findings reflected both positive and negative results. Improvement was found in four sortie-generation variables of which three were strongly related to POMO. Degradation occurred in all three of the aircraft quality variables in the post-POMO period. Within the scope of this research, the authors conclude that, within ADCOM, POMO has had some positive effects on sortie-generation capability and some negative effects on aircraft quality.

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PRODUCTION ORIENTED MAINTENANCE ORGANIZATION: A CRITICAL ANALYSIS OF SORTIE-GENERATION CAPABILITY AND MAINTENANCE QUALITY

A Thesis

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In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

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Finally, we wish to dedicate this research to the enlisted maintenance force whose daily efforts and expertise create and maintain the capability to keep our tactical aircraft fleet at the ready position.

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CHAPTER I

INTRODUCTION

> For many years, the Soviets have been increasing the capability of their standing forces for short notice combat--a reflection of their doctrinal emphasis on shock and surprise. In the past, we have never been ready when war came, relying on a large acceleration lane to build up after an attack. In modern warfare we do not have that luxury. The analogy I use is that we must view readiness not through binoculars--planning to get well at the end of a constantly receding Five Year Defense Program (FYDP) period--but through bifocals--attention to long term fixes but concentrating on maximizing our capacity to fight with what we have today [9:28].
>
> - General David C. Jones

As we move into the 1980s the Soviet Union has been investing in defense at a far greater pace than the United States. For the past few years their military investment has exceeded ours by 70 percent (1:1). The increased Soviet expenditure has been reflected in a sustained growth in their strategic, naval, and general force capabilities. Conversely, in terms of a percentage of GNP, the defense investment of the United States has continued to decline for the last four years. Further, total active U.S. Air Force personnel strength has faced reductions for ten consecutive years. The current USAF active duty strength stands at only 63 percent of the 1968 strength (2:161). Reductions in personnel and material assets have not been matched by similar reductions in the scope of required missions. To counter Soviet advantages, U.S. defense priorities have addressed technical superiority and improved readiness (13:2).

One key to readiness is effective maintenance on existing military hardware. The U.S. Air Force has over 150,000 military personnel directly involved in maintaining over 7,100 airframes and aircraft components (2:154). For each flying hour, aircraft maintenance personnel devote many hours toward repairing and maintaining the aircraft on the ground. For the past five years, the expense of maintaining and operating airframes has consumed over 26 percent of the Air Force budget (2:159). Thus, aircraft maintenance offers a continuum of opportunities to improve the effectiveness of the maintenance and the efficient use of available resources while reducing total costs. Improved maintenance performance at reduced costs, however, must not and cannot overshadow readiness (7:9). In keeping with the strategy of readiness at the lowest cost, the Air Force Chief of Staff established the Maintenance Posture Improvement Program (MPIP) in 1974 with the object of developing improved and cost effective methods of accomplishing aircraft maintenance. As a direct result of MPIP, many new or revised maintenance procedures evolved. For tactical fighter and interceptor units, the MPIP-generated program which has had the greatest impact is the Production Oriented Maintenance Organization (POMO).*

Problem Statement

The use of POMO is widespread; it has been implemented by TAC, ADCOM, USAFE, PACAF, and AAC. Thus, a large percentage of the total U.S. aircraft fleet is managed under the POMO concept. Since its inception, however, few published studies have evaluated the impact of POMO on actual maintenance performance and overall aircraft system availability. Those studies which have been conducted focus primarily on total sortie production and human behavior aspects under POMO. Further, published studies have been inconclusive as to the total positive and negative impacts. Since proponents of POMO claim it has had a positive impact, an in-depth analysis and objective evaluation is needed to determine if the premised gains have, in fact, been realized.

Research Objectives

The primary purpose of POMO is to create the capability to generate a large number of sorties through the efficient and effective use of all unit maintenance resources. The objective of sortie generation per se is

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*Within TAC, POMO is referred to as the Combat Oriented Maintenance Organization (COMO).

extremely difficult to measure in a peacetime environment because of political and economic constraints. However, the capability to generate sorties is reflected by certain key management indicators of maintenance production. Thus, the first objective of this research is an evaluation of the impact of POMO on the levels of key maintenance management performance indicators which relate to unit sortie-generation capability. The evaluation is based on a comparison of capability indicators before and after POMO implementation.

In addition to changing sortie-generation capability, POMO also causes changes within the aircraft maintenance organizations that may well impact on the overall quality of the aircraft and its systems. The second objective of this research is to assess and evaluate the impact of POMO on the levels of key maintenance management performance indicators which relate to overall quality of aircraft systems. The evaluation is based on a comparison of selected quality indicators before and after POMO implementation.

Research Hypotheses

The basic purpose of POMO is to enhance sortie-generation capability through the efficient and effective use of all unit maintenance resources. Based on this premise, this research will seek to determine the effect

POMO has had on both the unit sortie-generation capability and the overall quality of aircraft systems. Nine specific hypotheses are evaluated in this research. Six hypotheses relate to sortie-generation capability and the remaining three relate to overall airframe quality. The hypotheses are designed to identify improvements in both categories. The categories and specific hypotheses are:

1. Hypotheses relating to sortie-generation capability:

a. Hypothesis 1: The average time to return an aircraft to flyable status from Not Mission Capable for Maintenance (NMCM) status will decrease under the POMO concept.

b. Hypothesis 2: The scheduling effectiveness rate will increase under the POMO concept.

c. Hypothesis 3: The Not Mission Capable for Maintenance rate will decrease under the POMO concept.

d. Hypothesis 4: The direct labor rate will increase under the POMO concept.

e. Hypothesis 5: The Full Mission Capable (FMC) rate will increase under the POMO concept.

f. Hypothesis 6: The number of maintenance man-hours per flying hour will decrease under the POMO concept.

2. Hypotheses relating to overall aircraft system quality:

a. Hypothesis 7: The repeat discrepancy rate will decrease under the POMO concept.

b. Hypothesis 8: The total number of maintenance man-hours required to accomplish each scheduled 400 hour inspection will decrease under the POMO concept.

c. Hypothesis 9: The ground abort rate will decrease under the POMO concept.

This chapter has presented the foundation of this research study in the form of a problem statement, research objective, and research hypotheses. The following chapter provides necessary background information pertaining to this research effort. The areas discussed are an historical overview of aircraft maintenance, the specialist maintenance concept, the POMO concept, and previous research concerning POMO.

CHAPTER II

BACKGROUND

An Historical Overview of Aircraft Maintenance

With the passing of time, concepts for the maintenance management of military aircraft have slowly swung as a pendulum between mechanics with total system capability and the use of specialists for each major system. Particular needs and circumstances dictated each change in concept. This brief overview outlines the trends and fluctuations in maintenance management concepts from the earliest days of aviation to the present POMO concept.

The Early Days through World War II

The earliest aircraft were maintained and serviced primarily by their owners and operators. The first noted change in this practice came in August 1908 when Orville Wright arrived at Ft. Meyer, Virginia, to flight test an aircraft under contract to the U.S. Army Signal Corps. He brought with him a mechanic, Charley Taylor, thus introducing the aircraft mechanic career field (18:87-88).

With the approach of World War I came technological advances and modifications aimed at making the airplane functional for military use. These factors made aircraft more complex and created an increased demand for specialized aircraft mechanics. The first crew chief maintenance system was established on 8 May 1913 by the U.S. Army Aviation Section Technical Order 00-2A. A non-commissioned officer (NCO) was provided with several assistants and placed in charge of maintenance. The assistants' tasks were primarily routine inspections such as examining control wires, connections, fittings, turnbuckles, pins, belts, engines, etc. and the NCO's task was making minor repairs under the supervision of the pilot. Major repairs were handled by a master mechanic (18:88).

By 1914, pilots began to specialize in aerial tactics and maneuvers and had less time to learn the technical side of the flying machine. The maintenance mechanic thus became a more important figure in the overall care of the airplane. Additionally, the aircraft fleet owned by the Army increased in numbers. The complexity of the air machines also increased significantly with the installation of instruments, armament and electrical components (18:88). By April 1918, rapid strides in aircraft technology had produced further advances such as gun synchronization with the propeller system, elementary bombing systems, radios, and cameras. The result was the need by the Army Air Service for a large number of aircraft mechanics from a great variety of specialities. The trend was toward specialization in maintenance and away from the mechanic with total system capability (3:12).

The trend towards specialization was reversed during the 1920s. The end of World War I caused a mass exodus of trained mechanics from the Army Air Corps. This continued into the 1930s as trained mechanics were lured into the booming commercial aviation industry (3:17). The exodus practically necessitated that mechanics be trained for total system capability. The crew chief maintenance concept was formalized with teams assigned to particular aircraft. Some specialists were still available to perform maintenance on the more complex and advanced systems (18:89).

With the onset of World War II, the Air Corps faced a serious shortage of skilled maintenance personnel. The need for trained mechanics was critical overseas and there was insufficient time to train general mechanics in the broad spectrum of total system maintenance. The result was a modification of the pure crew chief system toward a system using increased specialization. Overseas, specialization was carried to the extreme; new personnel were rapidly taught narrow job requirements and put to work on repetitive tasks. Specialized teams performed specific tasks such as engine changes, cylinder changes, and propeller changes. The master mechanic soon disappeared as specialization in aircraft maintenance increased (3:20-21; 6:7).

The Specialist Maintenance Concept

The end of World War II was followed by a rapid demobilization of forces. The number of aircraft in the active inventory tumbled quickly, but not as rapidly as the level of personnel. A severe shortage of total maintenance personnel resulted. Another result of the demobilization was a declining emphasis on maintaining strong, centrally controlled maintenance organizational concepts and procedures. Each command had individual perceptions of how to conduct maintenance activities and each published its own regulations, manuals, and directives; most of these centered on a modified crew chief system (18:90). The Strategic Air Command (SAC) published SAC Regulation 66-12 in August 1949 which described a specialist maintenance concept aimed at providing sufficient workloads to keep the maintenance work force continuously occupied. Specialists were placed in intermediate maintenance squadrons (field and avionics) to work on backlogs of low priority reparables while not working directly on the aircraft (3:26-27). Tactical Air Command (TAC) Manual 66-1 (1 July 1957) was similar to SAC's 66-12 and required the crew chief to perform all maintenance on the aircraft unless the work was beyond his capabilities or was time-sensitive. In these situations, specialists could be requested (3:28). In 1959, the Air Force published AFM 66-1 which prescribed a mandatory aircraft maintenance management system. However, major commands supplemented this with their specific requirements and again the overall system grew into one with each major command having its own maintenance management system (18:92). In 1972, AFM 66-1 was rewritten with strict limitations on major command supplements. The revised AFM 66-1 emphasized decentralized maintenance activities with a strong centralized maintenance control function. This provided for moderately strong specialization (3:29). Commonly referred to as "The Specialist Concept," this form of aircraft maintenance is used by several major air commands today.

Under the specialist concept, the maintenance organizations are functionally aligned by tasks or specialty. All crew chiefs are assigned to the Organizational Maintenance Squadron (OMS). Crew chiefs are responsible for the general condition of the aircraft and the accomplishment of all the basic airframe maintenance and servicing. All personnel responsible for specific aircraft subsystems are assigned to "specialists" squadrons. Hydraulic, sheet metal, engine, and similar specialists are assigned to Field Maintenance Squadrons (FMS). Radar, Navigational Aids and Fire Control specialists are assigned to Avionics Maintenance Squadrons (AMS). Weapons and munitions specialists are assigned to Munitions Maintenance Squadrons (MMS). Under AFM 66-1, the Deputy Commander for Maintenance (DCM) is responsible for all maintenance activities (16:1-1). The DCM staff accomplishes the planning, scheduling, assigning of priorities, dispatching and controlling of work as well as the selecting of skills for accomplishment of the job.

The specialist concept has several strong attributes. A centralized pool of specialists are drawn upon for aircraft system maintenance as needed. When not required for flighttime maintenance, they work in the shop on aircraft components that have been removed and replaced. This results in high rates of utilization for available manpower. Thus, specialists have extensive training within their specialty and are generally able to perform maintenance on the aircraft system as well as the disassembly and repair of the system components in the shop with equal high proficiency. While this concept of aircraft maintenance has evolved into an effective system, critics of the concept contend that it also has some disadvantages. The specialists maintain strong identification toward their particular system. Thus, their attention and concern are generally focused on that specific area. The result of this tunnel vision is that the overall condition of the aircraft as well as deficiencies in other systems are often viewed as "not my problem." Another disadvantage is the time lag generated by transporting the specialist from the dispatch point to the aircraft. Also, demand for specialist work can be cyclical, which creates periodic high idle time. For example, one week a five-man shop might be working overtime to catch up and the following week find there is insufficient work to keep even one person effectively employed. Finally, the capability of a wing to deploy squadrons to various locations is constrained by the divisibility of the centralized pool of specialists into the requisite number of deployment teams. In short, the specialist concept is thought to lack the efficiency and flexibility needed to generate and regenerate the great number of sorties required by tactical air forces. This became especially evident when the Viet Nam conflict ended.

The POMO Concept

The end of the Viet Nam conflict was followed by a reduction of U.S. military forces. Aircraft maintenance was faced with seemingly incompatible factors of low manning and the need to produce a high number of sorties. Since no significant increases in the maintenance work force were evident, attention was focused on better utilization of available personnel (3:75-76). In October 1973, the Israelis demonstrated a dramatic sortie generation rate during the Yom Kippur War. The USAF Chief of Staff directed a joint Air Staff/TAC team to go to Israel to see what the Israelis had done to produce such a high sortie rate. The major influencing factor discovered was that specialists were assigned to the flightline organization rather than being dispatched from the intermediate maintenance shops. They were available immediately where needed and could be used in general maintenance activities not requiring specialization. Thus, the shift was toward less specialization. The method had great possibilities for the fighter environment where rapid aircraft turnaround and surge capability were the major requirements. TAC was requested in September 1974 to develop and test the basic concept of the Israelis and the test program developed was called Production Oriented Maintenance (3:77-79).

> This maintenance concept is designed to meet the peculiar needs of the tactical air forces. High sortie rates, operations from remote locations, and large numbers of aircraft, dictate a departure from the traditional centralized maintenance concept [16:1-1].

The Object of POMO. The object of POMO is to increase sortie-generation capability. As POMO developed, its theme was consistent with a DOD directive which addressed the DOD Equipment Maintenance Program. DOD

Directive 4151.16 states: "Equipment maintenance will be performed at the point of generation in order to assure attainment of readiness objectives and to assure self sufficiency [14:3]." In short, through a reorganization of people and a decentralization of authority, POMO is intended to eliminate many of the inefficiencies of the specialist concept. The end result is a provisioning of personnel, materiel, and decision-making authority to the actual point of generation.

Changes in Concepts and Organization. Using the existing manpower, materiel, and facilities, POMO reorganizes resources previously assigned to OMS, AMS, FMS, and MMS into direct and indirect sortie-producing elements. The direct sortie-producing element is the Aircraft Generation Squadron (AGS). The indirect sortie-producing element consists of the Component Repair Squadron (CRS) and the Equipment Maintenance Squadron (EMS). These squadrons provide AGS with serviceable assets with which to produce sorties. In addition to the direct and indirect sortie-producing elements, POMO provides a distinction between on-equipment maintenance and off-equipment maintenance. On-equipment maintenance is performed by AGS and consists of those operations which are performed directly on an aircraft or on installed equipment. Specific on-equipment operations include aircraft inspection, servicing, and lubrication; adjustment and replacement of aircraft assemblies, subassemblies, and parts; and weapons system servicing and munitions loading operations. Off-equipment maintenance includes actions which support aircraft operations such as in-shop repair of aircraft components (CRS), extensive aircraft maintenance and repair, AGE maintenance and munitions maintenance (EMS) (16:1-1).

Personnel Realignment. Under POMO all maintenance personnel are assigned by AFSC into one of the broad areas of off- or on-equipment maintenance. Members of the DCM staff remain the same while crew chiefs and specialists from OMS, FMS, AMS, and MMS are integrated into CRS, EMS, and AGS. Those who transition into CRS and EMS perform essentially the same tasks as under the specialist concept. Depending on the needs of the particular unit, however, portions of various specialists' pools are also taken from the shop environments of AMS, FMS, and MMS and placed into AGS. The Aircraft Generation Squadron thus becomes the largest of the three squadrons and the hub of activity for POMO.

The Aircraft Generation Squadron. The Aircraft Generation Squadron or AGS, is broken into branches or Aircraft Maintenance Units (AMUs). The Aircraft Generation Squadron of a standard maintenance organization within TAC will usually consist of three AMUs. Each of the AMUs corresponds to an individual aircraft flying squadron within a tactical fighter wing. Depending on the type and quantity of aircraft to be maintained, an AMU is generally assigned the maintenance responsibility of between eighteen and twenty-four aircraft. Although aircraft are segregated for maintenance purposes and assigned to specific AMUs, all airframes are scheduled and flown as combined wing resources (5:5).

The Autonomous Units. Each AMU within an Aircraft Generation Squadron is largely self sufficient. Crew chiefs and maintenance personnel of various specialties are assigned to each AMU. Working together with an integrated effort toward total system support, each AMU has the capability of performing all on-equipment maintenance required for their respective aircraft. The capability and flexibility of the AMU is expanded by task-assist training and cross utilization training (CUT). All specialists receive task-assist training on basic aircraft servicing, such as launch and recovery, towing and jacking. Thus, within each AMU there is a basic level of on-equipment maintenance that can be performed by all. CUT training provides for further flexibility by a cross utilization of specialities. For example, following CUT training an electrician can perform an instrument specialist's tasks and a radio technician is equally capable of performing Navigation Aids tasks. Proponents of POMO claim that with the assignment of specialists to AMUs, many of the inherent problems of the specialist concept are resolved. Under POMO, technician response time for required maintenance operations is said to be minimized. Further, task-assist and CUT training smooth out the cyclical nature of specialist work requirements and provide for a more efficient utilization of all maintenance personnel. Finally, working in an autonomous unit is said to create rapport between all maintenance personnel and redirect the specialist perception from "my system" to "our aircraft." The final ingredient required by the autonomous AMU is the authority to make decisions and control resources.

Decentralization of Control. Under POMO the centralized control previously maintained by the DCM through Job Control, is provided to the individual squadrons. While Job Control continues to operate as a coordinating activity for insuring maintenance continuity, managers and supervisors within the squadrons direct scheduled and unscheduled maintenance without the specific involvement of Job Control. Management and control of maintenance resources within the Aircraft Generation Squadron is delegated from the Job Control function to expediters assigned to each AMU. The expediter remains on the flight line and acts as a central point for all maintenance performed within the AMU. The expediter's mobility and current knowledge of all on-going AMU maintenance operations enhance the ability to make on-the-spot assessments and draw technician support from within the AMU (5:3). Thus, the expediter is a central figure within the AMU. The AMU, in turn, is the focal point of unit sortie-generation capability under POMO. The question remains, however, whether or not sortie-generation capability actually increases under POMO. This question has not been adequately answered by previous research studies of POMO.

Previous Research

Few published studies have attempted to quantify the impact of POMO in terms of maintenance production and quality of maintenance performance. Rather, the majority of POMO studies have investigated only the organizational and behavioral impacts. Halsell (6) discussed POMO as an innovation in maintenance management. He related the supposed advantages of POMO to the development of management theory. Beu and Nichols (3) investigated the history of the aircraft crew chief and examined initiatives aimed at more efficient uses of the entire maintenance work force. POMO was one of the initiatives discussed in terms of its conception, theoretical development, perceived benefits and disadvantages. Kenney (8) focused on the Air National Guard and the relationship of the mission to successful POMO implementation. Monheim (10) evaluated POMO only in behavioral terms. White (17:26) discussed quantifiable results of the POMO test program at MacDill AFB. The initial data generally indicated increased performance over prior maintenance management concepts. However, the probability of significant testing effects is high. The POMO test program received a great deal of high-level attention and created a new and challenging work environment for the participating personnel. A likely effect was increased work motivation for the individuals involved in the test program. The results, then, were most likely to be atypical of normal operations under the POMO concept.

One study attempted to examine the maintenance production impact of POMO. Foster and Olson (5) conducted a study of eighteen variables relating to maintenance performance and maintenance personnel behavior/ attitudes and the resulting impact of POMO. While Foster and Olson did address impacts on production, they focused primarily on the behavior/attitudes of the personnel in the aircraft maintenance organizations. In the areas of performance studied, their research showed no improvement in maintenance performance and degradation in some areas. The results were inconclusive in their view because many confounding factors were present and unsuccessfully eliminated between the test and comparison groups. Further reexamination of the study revealed several deficiencies in the Foster and Olson study. First, several maintenance performance hypotheses concerned areas which are not related to the type of maintenance management concept used. These are the non-availability of repair parts, the number of cannibalizations, and the percentage of satisfactory equipment evaluations by Quality Control. Second, the maintenance performance data for POMO used in the analysis was from the first eight months following implementation of the concept. It is reasonable to believe that the implementation of POMO requires at least two months for changes and operating problems to be resolved and flying and maintenance activities to once again operate in a steady-state fashion. Many negative effects occur during the initial months of POMO, which bias the conclusions regarding performance. Thus, Foster and Olson in effect had approximately six months of valid data. Further, another unknown at this time is how long it actually takes to realize the full effects of POMO. It is possible that none of the Foster and Olson data accurately reflect the true results of POMO operations because the impacts of change were still occurring. The Foster and Olson study was a good first step in attempting to quantify the impact of POMO. However, data and methodological deficiencies prevented conclusive findings.

This study is the next research step and focuses on the maintenance performance impacts of POMO. The overall objective of this research is to quantitatively assess sortie-generation capability and quality of maintenance to determine whether POMO has indeed resulted in the advantages intended during its conceptualization.

To achieve the research objective, a thorough comparison and analysis of pre- and post-POMO maintenance performance (as measured by the hypothesis variables) must be designed and logically executed. The next chapter covers the development of this research design and analysis strategy.

CHAPTER III

METHODOLOGY

The purpose of this chapter is to develop the methodology used in evaluating the impact of POMO in the levels of key maintenance management performance indicators relating to unit sortie-generation capability and the overall quality of aircraft systems. This chapter begins with a discussion of general research design followed by an explanation of test group selection, operational definitions of hypothesis variables and related terms, discussion of the hypotheses, the sources of data, the strategy and technique of data analysis, and a summary of assumptions and limitations.

Overview of Research Design

For the purpose of this study, an ex post facto survey methodology was selected to allow an objective analysis of the stated research hypotheses. The universe included all USAF fighter/interceptor units. The specific population consisted of all ADCOM active duty Fighter-Interceptor Squadrons (FIS) within the continental United States. From this population, two distinct groups were selected. The first group consisted of all active duty

ADCOM FISs for at least ten months preceeding POMO implementation. The second group was composed of the same FISs for the period since their respective POMO implementation through December 1979. These periods of time were selected as being reasonably representative of each FIS's performance. Additionally, monthly data was compiled to statistically derive a median figure for each period for each FIS which were input to statistical tests.

POMO has been implemented throughout the Tactical Air Command (TAC) and the Air Defense Command (ADCOM). Further, all tactical fighter units within the Pacific Air Forces (PACAF) and the Alaskan Air Command (AAC) have transitioned into POMO. Lastly, almost all tactical fighter units within the United States Air Forces in Europe (USAFE) are operating under the POMO concept. The two fighter units in USAFE that have not yet transitioned into POMO are scheduled to do so by August 1980. Each of these major air commands offer an opportunity for investigating the impacts of POMO. While each command has slightly different missions and in some cases, different weapon systems, the maintenance personnel are all maintaining fighter/interceptor aircraft and the POMO concept and structure remains consistent throughout all units. Thus, the results of an evaluation of POMO within any one command, should apply generally to all commands currently operating under the POMO concept. This research project, therefore, concentrates on only one major air command: ADCOM. The rationale for selecting ADCOM as the sample for this research is discussed in the following section.

Test Group Selection

Of all the commands operating under the POMO concept, ADCOM offers the greatest potential for minimizing confounding factors which can otherwise distort test results. Within the past few years, TAC has received many new weapon systems including A-10s, F-15s, and F-16s. Each of these advanced weapon systems require specially trained maintenance personnel. Since the primary weapon system within TAC was the F-4, a large percentage of the maintenance personnel working on A-10s, F-15s, and F-16s have worked on the F-4 and subsequently retrained into the newer systems. Unlike TAC, ADCOM has maintained the same weapon system, the F-106, for almost two decades. The long association of ADCOM maintenance personnel with a single weapon system has generated a force of especially well qualified and experienced F-106 maintenance personnel. Further, since ADCOM is the only command maintaining the F-106, the turnover of maintenance from ADCOM to other MAJCOMs and vice versa has remained small. Overseas rotational requirements also offer a strong potential for distortion of key indicators. The turbulence created by the rotation could have a negative influence. Further, when overseas, TDY units often fly an extraordinary number of missions with an emphasis on "fly now, fix later," with subsequent maintenance manhour documentation weak at best. Unlike TAC, ADCOM has no overseas rotational requirements. Finally, unlike PACAF, AAC, and USAFE, which have essentially the same climate throughout each command, ADCOM has units which are located in both northern and temperate climates. Thus, by selecting ADCOM as a test group, the merits of POMO may be objectively measured under diverse weather conditions. Finally, the groups being tested were exceptionally stable prior to and during the period under study. By minimizing confounding factors, changes which are identified in the selected variables can more reasonably be attributed to POMO.

Test Groups

ADCOM maintains active-duty Fighter Interceptor Squadrons (FIS) which provide a limited defense against manned bombers. The active duty squadrons located within the continental United States have maintained the F-106A for over eighteen years. Although introduced into the USAF inventory almost two decades ago, the F-106 has been periodically updated. Modifications have included inflight refueling capability, the installation of a 20mm cannon and an improved electronic guidance and fire control system. Despite its age, the F-106 maintains the first line air defense for the continental United States. Thus, prior to, during, and following POMO implementation, the ADCOM active duty Fighter Interceptor Squadrons have maintained the same number and type of aircraft with the same mission requirements.

This research project will evaluate the impact of POMO on all CONUS ADCOM active duty Fighter Interceptor Squadrons. Units included in this study are identified in Table I along with their respective dates of POMO implementation, and average numbers of possessed aircraft. Thus the impact of POMO will be evaluated by comparing maintenance performance indicators before POMO against the same maintenance performance indicators after POMO for all six FISs. The performance indicators of interest are, in turn, the hypothesis variables.

Operational Definitions

Hypothesis Variables

Aircraft maintenance management information is identified, collected, and processed through maintenance management information systems. The majority of this information is in the form of quantitative indicators relating to the quality and quantity of the maintenance effort. From the available maintenance performance indicators, the following variables were determined to be the most important and the most measurable indicators of

Table 1

ACTIVE DUTY FISs INCLUDED IN STUDY

Unit	Location	Date of POMO Transition	Average Number of Possessed Aircraft 1976	1977	1978	1979
5th FIS	Minot AFB, North Dakota	January 1976	17	16	16	19
48th FIS	Langley AFB, Virginia	December 1976	16	16	16	16
49th FIS	Griffiss AFB, New York	July 1977	16	17	17	17
84th FIS	Castle AFB, California	January 1978	16	17	17	17
87th FIS	K. I. Sawyer AFB, Michigan	August 1977	17	17	18	18
318th FIS	McChord AFB, Washington	April 1978	17	16	16	17

sortie-generation capability and aircraft quality. All references made to "aircraft" in these variables are considered as "unit possessed aircraft."

Average Manhours Needed to Return an Aircraft to Flyable Status. The average total number of direct manhours needed after a sortie to return an aircraft from a NMCM status to either FMC or PMC status.

Scheduling Effectiveness Rate. The number of sorties scheduled and flown divided by the number of sorties scheduled (corrected by subtracting the non-chargeable deviations from the total sorties scheduled).

Not Mission Capable Maintenance (NMCM) Rate. The total number of hours aircraft were not capable of flying because of maintenance divided by the total number of hours aircraft were available.

The Direct Labor Rate. The number of maintenance manhours spent working directly on aircraft or aircraft-related subsystems divided by the total available maintenance manhours.

Full Mission Capable (FMC) Rate. The number of hours an aircraft is in a full mission capable status divided by the total number of hours aircraft were available.

The Number of Maintenance Man-hours Per Flying Hour. The total number of direct labor man-hours divided by the total number of hours flown.

Repeat Discrepancy Rate. The total number of repeat discrepancies divided by the total sorties flown.

Total Number of Maintenance Man-hours Needed to Accomplish Each Scheduled 400 Hour Inspection. The total number of direct labor man-hours required to accomplish scheduled 400 hour inspections divided by the number of scheduled 400 hour inspections.

Ground Abort Rate. The total number of ground aborts divided by the total number of attempted sorties.

Related Terms

The following definitions refer to terminology which is used throughout this report.

Condition Status Reporting. The condition status of all aircraft with selected possession codes must be reported through the RCS: HAF-LGY(BM) 7503 report. The status of an aircraft is based on its unit mission. The unit missions, in turn, are those the unit must fly to comply with war plans and training requirements. All aircraft are carried in one of three categories of status FMC, PMC, and NMC.

1. FMC. Full Mission Capable. An aircraft in FMC status must have the full use of all subsystems needed to fly all assigned missions under peacetime and wartime conditions.

2. PMC. Partial Mission Capable. An aircraft in PMC status must have the full use of sufficient subsystems to fly at least one wartime mission.

3. NMC. Not Mission Capable. An aircraft in NMC status is unable to fly any of its assigned wartime missions.

An aircraft which is unable to fly all of its assigned missions is therefore categorized as either PMC or NMC. The reason the aircraft is in PMC or NMC status is shown by adding an "M" (Maintenance), an "S" (Supply), or a "B" (Both). For example:

1. PMCM. partial Mission Capable Maintenance. An aircraft in PMCM status can fly at least one, but for maintenance reasons is unable to fly all its wartime missions.

2. NMCM. Not Mission Capable Maintenance. An aircraft in NMCM status is unable to fly any wartime missions for reasons which are maintenance related.

Deviation. Any change from the weekly published schedule that results in a late takeoff, ground abort, addition, cancellation, and/or deletion of a sortie.

1. Chargeable Deviation. Deviations which are unit caused and can be controlled by local management.

2. Non-Chargeable Deviations. Deviations which are attributed to circumstances beyond local management control, i.e., higher headquarters, supply, weather, etc.

3. Maintenance Deviations. Aborts, missed takeoffs, cancellations/deletions, and additions to the published weekly schedule resulting from either aircraft maintenance discrepancies or from an action taken for maintenance convenience.

Direct Labor. Maintenance manhours spent working directly on aircraft or aircraft-related subsystems.

Ground Abort. The failure of an aircraft to become airborne due to maintenance reasons following aircrew arrival.

Maintenance Capability. A quantitative estimate of maintenance capacity. Additionally, it refers to those resources, facilities, tools, test equipment, drawings, technical publications, trained maintenance personnel, and engineering support, as well as an assured availability of spare parts which are required to modify, retain components in, or restore components to a serviceable condition.

Maintenance Complex. Those staff, management support, and maintenance production elements, or activities, directly or functionally responsible to a single Deputy Chief for Maintenance (DCM).

Maintenance Production. The physical performance of equipment maintenance and related functions of servicing, repairing, testing, overhauling, modifying, calibrating, modernizing, configuring, inspecting, etc.

Monthly Mean Skill Level. [(Number of 3-levels) x 3 + (Number of 5-levels) x 5 + (Number of 7-levels) x 7 + (Number of 9-levels) x 9], divided by (Total number of assigned personnel minus officers).

Possessed Aircraft. Those aircraft for which a particular unit has been designated responsibility.

Sortie. A flight of a single aircraft from initial launch until engine shut down.

Sortie Flown as Scheduled. A sortie flown by a specific aircraft, on the date and time indicated on the published weekly schedule.

Sorties Scheduled. The total number of scheduled sorties on the published weekly schedule.

Repeat Discrepancy. A repeat discrepancy is generated when an aircrew member identifies and records a need for maintenance, the problem is worked by maintenance personnel and recorded as corrected, and the problem is subsequently identified and recorded again by an aircrew member on the first sortie following corrective action by maintenance personnel.

Discussion of Hypotheses

Each of the hypotheses selected were designed to determine if POMO has had a positive impact on ADCOM performance levels. The independent variables within each hypothesis offered ample opportunity for POMO to reflect a positive, neutral, or negative impact.

Hypothesis 1

The hypothesis 1 variable is the average time to return an aircraft to flyable status from a NMCM status. Flyable status is defined as FMC or PMC. This variable reflects sortie-generation capability in the sense that the potential to generate more sorties is increased if aircraft are more quickly repaired. Proponents of POMO claim that POMO does this by assigning maintenance specialists to flightline units and by placing them under the control of a single flightline manager. Further, the specialists can aid in decreasing overall work time by assisting on non-specialized work tasks. The overall premised gain is the reduction in the time to repair aircraft through more efficient use of all maintenance personnel. Therefore, if POMO does in fact result in this situation, the average time to return an aircraft to flyable status from a NMCM status should decrease and this should increase sortie-generation capability.

Hypothesis 2

The hypothesis 2 variable is the scheduling effectiveness rate. This variable reflects how effectively maintenance resources are used to meet a flying schedule within time constraints. The greater the effectiveness, the greater is the potential to generate sorties. POMO purports to increase the effective use of personnel resources with decentralized control. If this is true, then the level of this variable should increase under the POMO concept and will thus reflect an increased capability to generate sorties.

Hypothesis 3

The hypothesis 3 variable is the NMCM rate. If POMO results in more efficient use of maintenance personnel by assigning specialists to the flightline work units under a single manager, then the NMCM rate should decrease. A decrease in the NMCM rate generally means that the aircraft are in flyable condition more often and this creates the potential for flying more sorties.

Hypothesis 4

The hypothesis 4 variable is the direct labor rate. Proponents of POMO claim that with POMO, maintenance personnel are more efficiently used by involving more of them in productive work through task assist and cross-utilization training. Further, specialists are controlled by one manager whose focus is on the entire aircraft rather than any one particular system. If this is true, this variable should increase under the POMO concept. This reflects sortie-generation capability; since more personnel are involved in direct productive labor, the potential for generating more sorties is increased.

Hypothesis 5

The hypothesis 5 variable is the FMC rate. The FMC rate reflects sortie-generation capability in the sense that a higher FMC rate generally means that more aircraft are available to fly because no maintenance is required on them. If POMO does foster more efficient and effective use and control of maintenance personnel, the FMC rate should increase.

Hypothesis 6

The hypothesis 6 variable is the number of maintenance man-hours per flying hour. Proponents of POMO claim that maintenance specialists are more efficiently used by assigning them under a single manager near the aircraft location, and by allowing their use in assisting in non-specialized tasks. If this is true, this variable should decrease under the POMO concept. This relates to sortie-generation capability because a decrease means more sorties can be generated with the same number of available man-hours.

Hypothesis 7

The hypothesis 7 variable is the repeat discrepancy rate. If the quality of maintenance has improved by integrating specialists into flightline work units via POMO implementation, then this variable should decrease.

Hypothesis 8

The hypothesis 8 variable is the total number of maintenance man-hours required to accomplish each scheduled hourly inspection. POMO purports to increase effective and efficient use of maintenance personnel by involving them in task-assist and cross utilization situations. Quality should increase as more and better maintenance is done between scheduled 400 hour inspections, thus reducing the amount of time required to accomplish the inspections.

Hypothesis 9

The hypothesis 9 variable is the ground abort rate. POMO should reduce this variable if it does in fact allow more efficient and effective use of maintenance personnel through a teamwork approach. A decrease in this variable would therefore reflect an increase in the quality of maintenance performed.

With the rationale for each hypothesis established, the next step involves specifying a data collection plan. The data collection plan identifies sources of data with which the hypotheses are tested.

Data Collection

The data used for this research were obtained from standard reports, award nomination packages, and administrative files. The standard reports were prepared by each FIS for local use as management tools within the maintenance complex and for submission to HQ ADCOM. The standard reports were:

1. Monthly Maintenance Summaries (prepared by each FIS).

2. Monthly Maintenance Statistical Summary RCS: ADCOM-LGM(M) 7306 (maintained by HQ ADCOM).

Each year all ADCOM FISs prepare a Daedalian Award nomination package for submission to HQ ADCOM. The packages include historical information, manning statistics, and maintenance production information for the preceeding year. Copies of these Daedalian Award nominations were obtained from HQ ADCOM-LGM for use in this research. Data presented in the nomination package essentially duplicates data presented in monthly summaries. Since monthly summaries are prepared for local use, the content, format, and occasionally the methodology used to develop the data, differ between FISs. The nomination package, however, is prepared in a standardized manner throughout ADCOM. Thus, when similar data were found in both the monthly summaries and the Daedalian award nominations, the award nominations were used as a cross reference.

The administrative files used as a data source addressed flying hour allocation and man-hour utilization during depot-level maintenance. The sources of administrative records were:

1. HQ ADCOM/DOO (Flying hour allocation).
2. Sacramento ALC/MABEC Maintenance (manhour consumption during F-106 depot level maintenance).

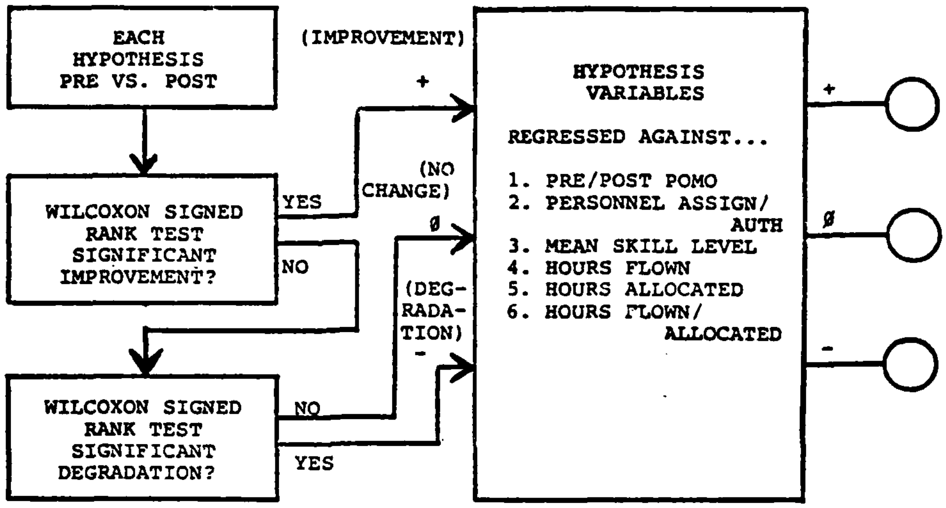
The sources of data were standard reports from ADCOM and each FIS, Daedalian Award nominations, and administrative reports. All of these reports were in existence and did not require special preparation by ADCOM or the

FISs; testing effects are thus not a factor in this research. With the sources of data identified, techniques of analysis were planned which would derive meaningful information from the accumulation of the data.

Strategy and Technique of Analysis

Data for each hypothesis were analyzed in two steps. The first step was to determine if significant differences exist in the levels of the hypothesis variables between pre- and post-POMO periods. The second step was to analyze the aggregate performance of all FISs as measured by the hypothesis variable to determine the probable cause of any differences between pre- and post-POMO performance. Figure 1 graphically displays the analysis procedure and appropriate conclusions for each hypothesis variable. The implementation of POMO cannot be realistically viewed as happening on one particular day. Rather, it occurs over several months and tends to influence normal operations. It continues to evolve for several more months after which steady-state operations are once again realized. Therefore, monthly data for all FISs for the two months before and after POMO implementation dates were not included in any of the analysis steps.

The first step in analyzing the data in this research effort involved the Wilcoxon signed rank test.



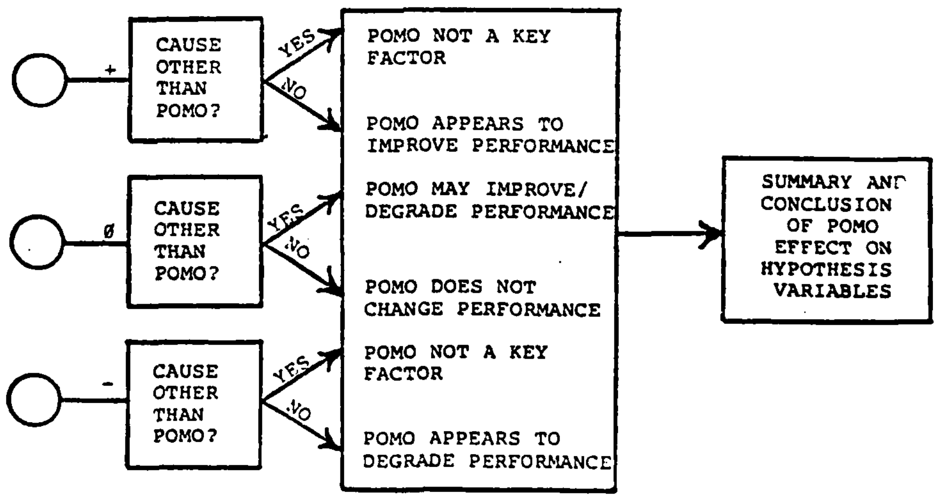


Fig. 1. Analysis Flow Chart

This nonparametric technique was used to statistically determine if significant differences for each hypothesis variable existed between the pre- and post-POMO periods. The Wilcoxon signed rank test involves two assumptions: (1) The population of differences (post-POMO performance minus pre-POMO performance) is continuous and symmetrical, and (2) the differences used in the test are a random sample from the population of differences (11:379). Both assumptions were determined to be reasonable and appropriate for this research effort.

The level of each hypothesis variable for each period was computed as the median monthly value for each FIS. These data were then grouped by FIS, resulting in a matched data pair of performance levels for the pre- and post-POMO periods. Each data pair was then grouped by hypothesis to be tested. Thus, for each hypothesis, six data pairs were input to the Wilcoxon test. These values were used via the signed rank test to calculate T values for each hypothesis variable. Critical T values which are necessary for hypothesis testing were obtained from statistical tables (4:165) based on the sample size and a 0.05 level of significance.

Each hypothesis variable was analyzed using one-sided hypothesis tests with a significance level of 0.05. The basic premise which determined the direction of the null and alternate hypotheses was that POMO should reflect improved performance. For hypothesis 1, 3, 6, 7, 8, and 9, improved performance would be reflected by a decrease in the hypothesis variable from the pre-POMO period to the post-POMO period. Therefore, the statistical hypothesis alternatives for the hypotheses were:

H_0: $\eta_D \geq 0$ (no improvement)

H_1: $\eta_D < 0$ (improvement)

The appropriate decision rule used to determine whether performance had significantly improved was:

If $T_{calc} < T_{crit}$, then reject H_0 and conclude H_1 (improvement),

If $T_{calc} \geq T_{crit}$, then conclude H_0 (no improvement).

If the initial conclusion was no improvement, the statistical hypothesis was reversed and the hypothesis variable was tested for a degradation in performance. The appropriate statistical hypotheses and decision rules then became:

H_0: $\eta_D \leq 0$ (no change)

H_1: $\eta_D > 0$ (degradation).

If $T_{calc} > T_{crit}$, then reject H_0 and conclude H_1 (degradation).

If $T_{calc} \leq T_{crit}$, then conclude H_0 (no change).

The final conclusion then was one of three possibilities: improvement, no change, or degradation.

For the remaining hypotheses (2, 4, and 5), improved performance would be reflected by an increase in the hypothesis variable from the pre-POMO period to the post-POMO period. Therefore, the statistical hypothesis alternatives were:

H_0: $\eta_D \leq 0$ (no improvement)

H_1: $\eta_D > 0$ (improvement).

The appropriate decision rule used to determine whether performance had significantly improved was:

If $T_{calc} > T_{crit}$, then reject H_0 and conclude H_1 (improvement).

If $T_{calc} \leq T_{crit}$, then conclude H_0 (no improvement).

If the initial conclusion was no improvement, the statistical hypothesis was reversed and the hypothesis variable was tested for a degradation in performance. The appropriate statistical hypotheses and decision rules then became:

H_0: $\eta_D \geq 0$ (no change)

H_1: $\eta_D < 0$ (degradation).

If $T_{calc} < T_{crit}$, then reject H_0 and conclude H_1 (degradation).

If $T_{calc} \geq T_{crit}$, then conclude H_0 (no change).

The final conclusion then was either improvement, no change, or degradation.

The above analysis steps allowed a conclusion based on the Wilcoxon signed rank test as to whether the data supported or did not support the research hypothesis. These conclusions were then used as inputs and considerations for the second analysis step.

The second step was to evaluate the relative impacts of selected key factors on the performance levels as measured by each hypothesis variable. These factors were regressed against each hypothesis variable using multiple linear regression with forward (stepwise) inclusion. This method (12:345) enters independent variables (factors) into a prediction equation on the basis of the greatest respective contribution to explained variance. Thus, a prediction equation is derived containing those factors which best explain or predict the dependent or hypothesis variable. The final outcome was interpreted as the probable primary cause or influencing factor of the performance level of each particular hypothesis variable.

The key factors selected for inclusion in the analysis were (1) the maintenance management concept, i.e., whether or not POMO was being used, (2) the number of mainteneance personnel assigned versus the number authorized, (3) the skill level manning (as measured by the mean skill level), (4) the number of actual flying hours, (5) the number of flying hours allocated, and (6) the number of hours flown versus the number allocated. These factors are an attempt to capture the major possible explanations for any differences in performance levels between the pre- and post-POMO periods that could not be ascribed to POMO itself. Other factors do exist but are largely unquantifiable or less meaningful. For example, since this research addresses sortie-generation capability, "total sorties flown" also received strong consideration for inclusion. This factor was ultimately rejected due to its tendency to cause distortion in a peacetime environment. For example, in a war scenario, total sorties flown is a function of *maintenance capability*. *In* peacetime, however, total sorties flown is a function of the types of missions flown (sortie length) and total hours allocated (many short sorties versus a smaller number of longer sorties). Thus, the controlling factors for number of sorties flown in peacetime are the missions and total flying hours allocated. Inclusion of total sorties flown would also tend to distort the maintenance man-hour outputs. For example, one aircraft flying three consecutive sorties seldom require three times the maintenance effort needed to recover one aircraft flying a single sortie. Finally, in a peacetime environment, if one squadron flys many short sorties versus a second squadron flying fewer but longer sorties, the sortie-generation capability of the former is not necessarily better than the latter. Thus, total sorties flown was rejected as an input. Instead, the major constraints for total sorties flown, hours allocated, and hours flown, were used. As a result, the factors selected for inclusion were limited to those which could be meaningfully quantified and interpreted.

With the Wilcoxon signed rank test results and the key factors identified, the decision tree in Figure 1 was then applied and the corresponding conclusion made for each hypothesis. The next step was to determine whether the results of the statistical tests and analyses supported the research hypotheses. Upon completion, the next process was to apply decision rules to formulate an overall conclusion regarding POMO's impact on sortie-generation capability and quality of maintenance based on the ADCOM sample.

The following are the decision rules used:

Decision Rule 1: Hypotheses relating to sortie-generation capability.

a. If at least two of the conclusions for hypothesis 1, 2, and 3 and at least one of the conclusions for hypothesis 4 through 6 support positive effects

OR

b. If one of the conclusions for hypothesis 1, 2, and 3 and at least two of the conclusions for hypotheses 4 through 6 support positive effects,

Conclude that POMO appears to have increased sortie-generation capability. Otherwise, conclude that POMO does not appear to increase sortie-generation capability.

Decision Rule 2: Hypotheses relating to overall aircraft systems quality.

a. If the conclusion for hypothesis 7 supports a positive effect

OR

b. If the conclusions for hypothesis 8 and 9 support positive effects,

Conclude that POMO appears to have increased the maintenance quality of the overall aircraft system. Otherwise, conclude that POMO does not appear to increase the maintenance quality of the overall aircraft system.

Hypotheses 1 though 3 were determined to be the strongest indicators of sortie-generation capability. The remaining hypotheses (4 through 6) are also important, but not as significant. As a result, the first three hypotheses (1 through 3) were given more weight in constructing Decision Rule 1. Therefore, if the majority of the hypotheses 1 through 3 support increased sortie-generation capability, only one of hypotheses 4 through 6 need to reflect positive changes to conclude that POMO appears to increase sortie-generation capability. On the other hand, if only one of hypotheses 1 through 3 indicates increased sortie-generation capability, then at least two of hypotheses 4 through 6 must show a likewise conclusion, before an overall increased sortie-generation capability can be concluded. Also, if none of the first three hypotheses reflect increased sortie-generation capability, the remaining three hypotheses are not significant enough by themselves to conclude that sortie-generation capability has increased.

Of the hypotheses relating to overall aircraft system quality, hypothesis 7, was determined to be the strongest indicator followed by hypothesis 8 and hypothesis 9. As a result, hypothesis 7 was given the greatest weight in constructing Decision Rule 2. Therefore, only if hypothesis 7 reflected a positive result (improved quality of maintenance) <u>or</u> both hypothesis 8 and 9 reflected improved quality of maintenance, was the conclusion made that POMO appears to increase the overall quality of aircraft systems.

The final step in this research concerned the possibility of the generalization and logical extension of the conclusions from the ADCOM sample towards the POMO maintenance management concept in general and its use in other major commands. Also included in this step are implications and the identification of areas requiring future research.

Assumptions and Limitations

When the aim of a research study is to quantify aircraft maintenance performance, certain assumptions and limitations must be used to narrow the topic into a workable size and still obtain meaningful conclusions. The major assumptions and limitations which affect this research are as follows:

Assumptions. The first assumption made is that changes in ADCOM FISs' maintenance performance are representative of changes in performance levels of any tactical Air Force unit when changes are defined as the difference between pre-POMO and post-POMO maintenance performance. Differences in mission requirements, reporting procedures, and overall operational environment do exist between MAJCOMs with tactical fighter units. However, the aircraft maintenance philosophy and organization as prescribed by AFR 66-5 (Production Oriented Maintenance Organization or POMO) is essentially the same within all of these MAJCOMs. Therefore, it is logical to assume that the general effects of POMO implementation, as evidenced by changes in direction of ADCOM FISs' performance, are generally applicable to all tactical fighter units operating under the POMO concept.

The second assumption is that other than POMO implementation and the other key quantifiable factors included in this study (number of personnel assigned, assigned versus authorized strength, skill level distribution, hours flown, and hours allocated), no additional major programs, policies, or other factors had a major impact on ADCOM maintenance performance levels during the period studied. This includes the assumption that the age of the F-106 aircraft has caused no significant changes in levels of maintenance performance for the period studied.

The final assumption is that the hypothesis variables are the most relevant and significant indicators of sortie-generation capability and overall quality of aircraft systems.

Limitations. A major limitation of this research concerns a number of variables which impact maintenance performance levels and are largely unquantifiable. These variables concern the personalities and individual attributes of personnel in key maintenance management positions. These variables further influence the effectiveness of leadership, various management philosophies, and general integrity. Since variables of this nature are extremely difficult to characterize and define, let alone quantify, this research must necessarily accept them and assume that the differences balanced out during the period of this study.

A second limitation concerns the data used for analysis. This research is conducted entirely within the confines of data produced by the Maintenance Data Collection (MDC) system and records maintained during daily maintenance and flying operations. Other specially conceived measurements of performance peculiar to this research may have been better indicators than data provided by the above methods, but were not practical in terms of time and money for a longitudinal research study of this nature.

Summary

The purpose of this chapter was to develop and describe the methodology and analysis used in evaluating the impact of POMO on unit sortie-generation capability and the overall quality of aircraft systems. ADCOM FISs were identified as a representative sample of all fighter/interceptor units throughout the USAF being managed under the POMO concept. Data were obtained from each FIS and HQ ADCOM in the form of standard reports, Daedalian Award nominations, and administrative reports. Techniques were developed to compare and evaluate each FIS in terms of sortie-generation capability and quality of overall aircraft systems before and after POMO implementation. Statistical tests were used to identify significant differences in performance. Step-wise regression analysis was used as a method of identifying the key independent factors which best predict the levels of each hypothesis variable. A decision tree was identified to integrate the results of the Wilcoxon signed rank test and the regression analysis into an overall conclusion for each hypothesis variable. Next, decision rules were used to derive an overall conclusion of the impact of POMO on ADCOM FISs' sortie-generation capability and quality of maintenance. Finally, assumptions and limitations inherent in this research were identified.

CHAPTER IV

DATA ANALYSIS AND RESULTS

The comprehensive analysis and evaluation of the performance data of the six FISs involved in this research provided significant and meaningful insights into the impact of POMO on sortie-generation capability and quality of maintenance. This chapter discusses the analysis of the data and is divided into four major sections. The first section presents an overview of the analysis procedure and some preliminary analysis of the data. The second section presents the results of the Wilcoxon signed rank test as applied to the hypothesis variables and the independent factors. The third presents the results of the regression analysis of the independent factors with each hypothesis variable. The chapter then concludes with a summary of all analysis results.

Overview of Data Analysis

The data analysis follows the strategy outlined in the preceding chapter. Monthly data inputs were identified by FIS and by the maintenance management concept being used. These inputs are presented in Appendix A. The first analysis step was the Wilcoxon signed rank test which determined if significant improvements or degradations in performance occurred from the pre-POMO period to the post-POMO period. The signed rank test was also applied to the independent factors to determine if significant changes in their levels occurred between the two periods. The second analysis step was to regress the independent factors against each hypothesis variable using multiple linear regression with stepwise inclusion. This method identified the factors which best predict or explain the level of the hypothesis variable. The results of the Wilcoxon signed rank test and the regression analysis were then analyzed and evaluated to determine whether or not the use of the POMO concept was a key factor influencing each hypothesis variable.

Preliminary analysis of the data is presented in Table 2 as a fundamental view of the performance data relating to each hypothesis variable and independent factor in the pre- and post-POMO periods. A more comprehensive breakdown of the data is presented in Appendix B. These data structures were not directly involved in the analysis, but provided a general, comparative overview of performance between the two periods. The first analysis step then followed with the analysis of results using the Wilcoxon signed rank test.

Table 2

PRELIMINARY ANALYSIS OF HYPOTHESIS VARIABLES AND INDEPENDENT FACTORS

Hypothesis Number	Variable or Factor	Pre-POMO (N=58) Mean	Pre-POMO (N=58) Standard Deviation	Post-POMO (N=152) Mean	Post-POMO (N=152) Standard Deviation
1	Average Turn Time	11.86	5.67	8.89	2.58
2	Scheduling Effectiveness Rate	75.26	7.16	77.03	8.94
3	NMCM Rate	24.61	6.31	19.59	8.12
4	Direct Labor Rate	56.55	9.13	62.34	12.36
5	FMC Rate	65.61	8.98	59.34	9.30
6	Man-hours per Flying Hour	45.37	8.52	45.33	9.45
7	Repeat Rate	7.47	3.65	8.63	4.24
8	Average Hours per Inspection	745.76	484.00	926.94	548.52
9	Ground Abort Rate	2.90	1.43	3.42	1.61
	Number Personnel Assigned	454.07	27.54	446.10	23.89
	Number Assigned vs. Authorized	105.68	5.62	102.63	5.61
	Mean Skill Level	5.23	.21	5.37	.19
	Hours Flown	469.79	50.16	483.12	49.57
	Hours Allocated	470.02	58.74	483.81	49.86
	Hours Flown vs. Allocated	100.34	5.68	99.91	3.16

Wilcoxon Signed Rank Test Results

Results Relating to the Hypothesis Variables. When the Wilcoxon signed rank test was applied to the nine hypothesis variables, four were determined to reflect significantly improved performance, two were determined to have not significantly changed, and three were determined to reflect significantly degraded performance. Analysis results for the application of this test are presented in Table 3. The level of significance was 0.05 for all variables. The individual FIS median values (pre- and post-POMO) and subsequent calculations necessary to execute the test for each hypothesis variable are presented in Appendix C. The hypothesis tests applied were identified in the previous chapter.

When applying the Wilcoxon signed rank test to the hypothesis variables, three aberrations were noted and analyzed. The first situation involved the Hypothesis 3 variable, NMCM rate. As can be seen in Appendix C, the median values for both Langley and Castle reflected no change from the pre- to the post-POMO period. This resulted in a difference of zero for both FISs. The procedure for handling differences of zero is to discard the data pair and reduce the sample size accordingly. In this case, then, the sample size was reduced by two to $n = 4$; statistical tables do not reflect a critical T value for

TABLE 3

RESULTS OF WILCOXON SIGNED RANK TEST
APPLIED TO HYHPOTHESIS VARIABLES

Hypothesis Number/ Variable	Calculated T Value	Critical T Value	Initial Conclusion[1]	New Critical T Value[2]	Final Conclusion[1]
1. Average Turn Time	-15	-2	+	NA	+
2. Scheduling Effectiveness Rate	+1	+2	-,0	-2	0
3. NMCM Rate	-10	0	+	NA	+
4. Direct Labor Rate	+9	+2	+	NA	+
5. FMC Rate	+5	+1	+	NA	+
6. Man-hours per Flying Hour	+1	-2	-,0	+2	0
7. Repeat Rate	+9	-2	-,0	+2	-
8. Average Hours per Inspection	+15	-2	-,0	+2	-
9. Ground Abort Rate	+9	-1	-,0	+1	-

[1] + represents improved performance; 0 represents no significant change in performance; - represents degradation in performance.

[2] NA = not applicable.

n = 4 at a 0.05 level of significance. Therefore, the next step was to examine the mean NMCM rate for each of the two FISs in the pre- and post-POMO periods. As shown in Appendix B, Langley showed a slight decrease in mean NMCM rate, and Castle showed a slight increase. The conclusion of this analysis was that no significant change had taken place in either case and that the most stringent test would be to set the critical T value to zero and proceed with the test. Further, the conclusion from the test would not have changed if the critical T value had remained at -2 (for n = 6 at 0.05 significance level). The overall conclusion, then, was that the results of the data analysis as calculated by the Wilcoxon signed rank test so heavily favored improved performance that the two cases of no difference in medians did not affect that finding.

The second aberration or peculiarity involved the Hypothesiss 5 variable, the FMC rate. The median values for Castle showed a decrease of 20.85 percent from the pre- to the post-POMO period (see Appendix C). In comparison to the differences of the other FISs, this magnitude is extreme. Also, the pre-POMO median value is extreme in comparison to the other FISs. A telephone conversation with the current maintenance analysis section at Castle confirmed the suspicion of the researchers that Castle incorrectly reported FMC rates in the pre-POMO period. As a result, the Castle data were dropped from the test and the sample size reduced to n=5. The results indicated an improved FMC rate as compared to no change when the Castle data were included. The calculations of both cases are contained in Appendix C.

The third aberration involved the Hypothesis 9 variable, the ground abort rate. The difference in the median values from pre- to post-POMO periods for Griffiss was -0.05. Since data inputs were carried out to a single decimal place, a difference in median values of 0.05 was considerd insignificant. Therefore, the sample size was reduced to n = 5 and the Wilcoxon signed rank test applied. Analysis revealed that the final conclusion from the test would not have changed if the Griffiss data pair remained in the test. Therefore, results of the test were determined to be appropriate.

<u>Results Relating to the Independent Factors</u>. The Wilcoxon signed rank test was next applied to the key independent factors which were identified as quantifiable: the number of maintenance personnel assigned, the number assigned versus the number authorized, the mean skill level, the number of hours flown, the number of hours allocated, and the number of hours flown versus the number allocated. The results of the signed rank test are presented in Table 4. The FIS median values (pre- and

TABLE 4

RESULTS OF WILCOXON SIGNED RANK TEST
APPLIED TO INDEPENDENT FACTORS

Factor	Calculated T Value	Critical T Value	Initial Conclusion[1]	New Critical T Value[2]	Final Conclusion[1]
Number Assigned	-19	+2	-,0	-2	-
Number Assigned versus Authorized	-16	+2	-,0	-2	-
Mean Skill Level	+19	+2	+	NA	+
Hours Flown	+21	+2	+	NA	+
Hours Allocated	+17	+2	+	NA	+
Hours Flown versus Allocated	0	0	0	NA	0

[1] + represents increase in the level of the factor,

0 represents no change in the level of the factor,

- represents decrease in the level of the factor.

[2] NA = not applicable.

post-POMO) and subsequent calculations for each factor are presented in Appendix C. The signed rank test could not be applied to the number of hours flown versus number allocated because the differences between pre- and post-POMO period median values for all FISs were not significantly different. All FISs reflected median values of 100 percent in both periods. Therefore, it was concluded that no change in this factor had occurred, as is displayed in Table 4. The findings from this part of the analysis were used as inputs or considerations when analyzing the results of the next analysis step, the regression of each hypothesis variable against the key independent factors (the above factors plus the maintenance management concept used, i.e., POMO or non-POMO).

Results of the Regression Analysis

The results of the regression analysis of the independent factors and hypothesis variables are summarized in Table 5. The complete results are presented in Appendix D. Before discussing the interpretation of the results for each hypothesis variable, it is necessary to discuss some overall results of the regression procedure. As is seen in Table 5,the levels of the R^2s were low across all the hypothesis variables. This means that, although several key factors were quantified, a large portion of the variation remains unexplained. However, the levels of confidence are very high.

TABLE 5

SUMMARY OF RESULTS OF REGRESSION ANALYSIS OF INDEPENDENT FACTORS AND HYPOTHESIS VARIABLES RELATING TO SORTIE-GENERATION CAPABILITY

Hypothesis Number/ Variable	Factors	Correlation Coefficient*	R^2	ΔR^2	Beta	F-Statistic	Confidence Level
1. Average Turn Time	1. Main. Concept	-.34061	.11601	.11601	-.28929	21.046	.999
	2. No. Assigned	+.30684	.18424	.06822	+.23880	14.051	.999
	3. Hrs. Flown	-.22491	.27468	.02044	-.14617	5.296	.995
2. Sched. Effectivenss Rate	1. No. Assigned	+.19562	.03827	.03827	+.22668	8.584	.999
	2. Main. Concept	+.09293	.05312	.01486	+.14371	4.126	.995
	3. Mn. Skill Level	-.15190	.07014	.01701	-.17502	5.357	.999
	4. No. Assigned vs. Author.	-.00237	.08462	.01449	-.14354	3.244	.999

*Correlation between factor and hypothesis variable.

Table 5--Continued

Hypothesis Number/ Variable	Factors	Correlation Coefficient*	R^2	ΔR^2	Beta	F-Statistic	Confidence Level
3. NMCM	1. No. Assigned	+.53136	.28235	.28235	+.55842	74.754	.999
	2. Main. Concept	-.28186	.32588	.04354	-.23245	15.844	.999
	3. No. Assigned vs. Author.	+.19627	.33759	.01171	-.12559	3.642	.975
	4. No. Assigned vs. Authorized	+.19627	.33759	.01171	-.12559	3.642	.975
4. Direct Labor Rate	1. Main. Concept	+.21965	.04825	.04825	+.22191	9.873	.999
	2. No. Assigned vs. Author.	+.08221	.06733	.01909	+.18865	6.699	.999
	3. Mn. Skill Level	+.13564	.08337	.01604	+.14098	3.605	.975
5. FMC Rate	1. Main. Concept	-.17047	.02906	.02906	-.17047	5.267	.975
6. Man-Hours per Flying Hr.	1. Hrs. Flown	-.25316	.06409	.06409	-.29917	20.423	.999
	2. No. Assigned	-.19346	.12387	.05978	-.24879	14.124	.999

What has been quantified is therefore highly significant and the prediction equation accurately reflects the relationships as presented by the performance data. Hence, although the R^2s are small, the ΔR^2s and the standardized or normalized coefficients (beta weights) allow a comparison of the respective factors to determine the relative importance of each in the prediction equation for each hypothesis variable. From this analysis, the primary factors are evaluated to formulate an overall conclusion regarding the role of POMO in affecting performance levels. In the following discussion, the positive and negative relationships that are identified are based on the correlation coefficients reflecting the relationship between the respective factor and the hypothesis variable.

Results Relating to Sortie-Generation Hypothesis Variables

Hypothesis 1

Average Turn Time. When the average turn times were regressed, the independent variables entered in the following order: (1) maintenance concept (negative correlation), (2) number of assigned personnel (positive correlation), and (3) hours flown (negative correlation). The results (summarized in Table 5) indicate that the maintenance concept was the key factor of those quantified in explaining the average turn time. This conclusion is based on the relative magnitudes of the ΔR^2s and further supported by the beta weights. In addition this conclusion is supported by an analysis of the correlation coefficients of the three factors with the average turn time and the actual changes in the factors from the pre-POMO period to the post-POMO period.

As shown in Tables 2 and 3, the signed rank test indicated an improved turn time with a pre-POMO mean of 11.9 hours decreasing to a post-POMO mean of 8.9 hours. The negative correlation with the maintenance concept suggests that POMO corresponds to a decrease in the turn time. The positive correlation between turn time and assigned personnel results from the decrease in each. Finally, the negative correlation between turn time and hours flown results from by the decrease in turn time and the increase in hours flown. Intuitively, a decrease in assigned personnel suggests an increased turn time. As mentioned above, the number of personnel and the turn time both decreased. Finally, an increase in flying hours does not present a clear intuitive direction for turn time. Since the number of assigned personnel actually decreased while the turn time improved, it appears that POMO was the key quantifiable factor in the improved performance in terms of decreased turn time.

Hypothesis 2

Scheduling Effectiveness Rate. When the scheduling effectiveness rates were regressed, the independent variables entered in the following order:

(1) number of assigned personnel (positive correlation), (2) the maintenance concept (positive correlation), (3) the mean skill level (positive correlation), and (4) the assigned versus authorized strength (negative correlation). The results (summarized in Table 5) indicate that the number of assigned personnel was the key factor of those quantified in explaining the scheduling effectiveness rate. The relative magnitude of the ΔR^2s as well as the beta weights further support this conclusion. However, an analysis of the correlation coefficients of each of the entering variable suggest that the maintenance concept (POMO) may have also been a key factor in affecting the scheduling effectiveness rate.

As shown in Table 3, the results of the Wilcoxon signed rank test indicated that the scheduling effectiveness rate did not significantly change following the implementation of POMO. The mean scheduling effectiveness rate, however, increased from a pre-POMO mean of 75.3 to a post-POMO mean of 77.0 (Table 3). The first entering variable (number of assigned personnel) actually decreased, which suggests that scheduling effectiveness should also decrease. Of the other entering independent variables, the mean skill level increased (scheduling effectiveness should increase), and the percentage of assigned versus authorized decreased (scheduling effectiveness should decrease). The maintenance concept (POMO) remains the unknown. Since the results indicate positive correlations with the scheduling effectiveness rate, POMO and the increase in the mean skill level appear to have helped the scheduling effectiveness remain stable despite a loss of assigned personnel and a decrease in the assigned versus authorized strength. As shown in Table 5, however, the relatively low R^2 for the maintenance concept does not support a strong positive effect. Thus, the effect of POMO on the scheduling effectiveness is inconclusive.

Hypothesis 3

Not Mission Capable for Maintenance (NMCM) Rate. When the NMCM rates were regressed, the independent variables entered in the following order: (1) number assigned (positive correlation), (2) maintenance concept (negative correlation), and (3) assigned versus authorized strength (positive correlation). The results summarized in Table 5 indicate that of all the quantifiable factors, the number of assigned personnel was the key factor in explaining the NMCM rate. This conclusion is supported by the relatively high ΔR^2 and strong beta weight. While this relationship proved to be strong, a closer examination of the correlation coefficients and a logical evaluation of their extended impact, suggest that the maintenance concept may have also been a key factor in the improved NMCM rate.

As shown in Tables 2 and 3, the signed rank test indicated a decrease in the NMCM rate with the mean dropping from 24.6 in the pre-POMO period to 18.6 in the post-POMO period. Each of the entering variables was correlated to the NMCM rate such that each supported a decrease in the NMCM rate. Intuitively, however, a continued decrease in the number of assigned personnel and/or a continued decrease in the assigned versus authorized strength logically suggest a degraded (higher) NMCM rate. Since the NMCM rate actually improved (decreased) it appears that the maintenance concept (POMO) was a more important factor in the improved performance.

Hypothesis 4

Direct Labor Rate. When the direct labor rates were regressed, the independent variables entered in the following order: (1) maintenance concept (positive correlation), (2) assigned versus authorized strength (positive correlation), and (3) mean skill level (positive correlation). The results in Table 5 indicate that the maintenance concept was the key factor in accounting for the variation in the direct labor rate. The ΔR^2 and the beta weight for this factor are relatively greater than those of the other two entering factors. Further support for this conclusion is gained through an analysis of each factor's correlation with the direct labor rate.

As shown in Tables 2 and 3, the Wilcoxon signed rank test indicated an increase in the direct labor rate with the mean increasing from 56.5 during the pre-POMO period to 62.3 during the post-POMO period. An increase in the mean skill level indicates that personnel are relatively higher qualified and able to perform maintenance tasks with greater efficiency. This greater efficiency suggests a decrease in the direct labor rate, while a decrease in the assigned versus authorized strength (fewer available manhours if authorizations remain constant) would logically suggest an increase in the direct labor rate. The unknown variables would then be the maintenance concept (POMO) and the emphasis placed on accurate man-hour documentation by supervisory personnel. Since the emphasis on man-hour documentation cannot be quantified, but can reasonably be expected to average out over the long run, the implementation of POMO appears to be the key factor affecting the direct labor rate.

Hypothesis 5

FMC Rate. As shown in Table 3, the results of the signed rank test indicated that the FMC rate significantly increased from the pre- to the post-period. When the regression analysis was conducted, Castle data were not included because of incorrect reporting, as discussed above. When the FMC rates were regressed, the only independent variable to enter was the maintenance concept (negative correlation). The results are summarized in

Table 5. As shown here, the R^2 indicates that approximately 97 percent of the variation remains unexplained. Further, the results of the Wilcoxon signed rank test (Table 3) indicated that the FMC rate significantly increased. The negative correlation between the FMC rate and the maintenance concept indicates POMO was not a contributing factor in this increase.

Hypothesis 6

Man Hours per Flying Hour (MH/FH). When the MH/FH data were regressed, the maintenance concept did not enter as an independent variable. The variables which did enter were (1) hours flown (negative correlation) followed by (2) number assigned (negative correlation). An analysis of the relative magnitude of the ΔR^2s and beta weights, as shown in Table 5, indicate that hours flown was the key factor in determining MH/FH. Although this conclusion remains firm, a closer look at the correlation coefficients suggests that POMO may have influenced the level of MH/FH.

As shown in Table 3, the signed rank test indicated no change in MH/FH between the pre- and post-POMO periods (the mean of the pre-POMO period was 45.37 versus 45.33 in the post-POMO period). Intuitively, since the hours flown increased and assigned personnel decreased, the amount of work performed during each man-hour of maintenance appears to have increased. This suggests that while POMO is not associated with a change in the MH/FH, it may have accounted for more maintenance per man-hour thereby allowing MH/FH to remain constant even though the total hours flown increased and the number of assigned personnel decreased.

Results Relating to Quality of Maintenance Hypothesis Variables

Hypothesis 7

Repeat Rate. When the repeat rates were regressed, the only variable which entered was the mean skill level. Table 6 reflects the correlation coefficient, the ΔR^2 and the beta weight. As shown in Tables 2 and 3, the signed rank test indicated an increase in the repeat rate with the mean increasing from 7.47 during the pre-period to 8.62 during the post-period. Since the mean skill level actually increased, the positive correlation is understandable in terms of the regression. Intuitively, however, an increase in the mean skill level logically suggests a decrease in the repeat rate. This situation suggests that other variables may have interacted to cause the unexplained positive correlation between the repeat rate and the mean skill level. The role of POMO is inconclusive as to its contribution to the degraded quality in terms of an increased repeat rate.

Hypothesis 8

Scheduled Inspection Hours. During the data collection stage of this research, approximately 10 percent of the data relating to scheduled inspections were unavailable due to inadequate maintenance documentation. Nevertheless, the available data reflected a substantially higher consumption of man-hours required to accomplish 400 hour inspections in the post-POMO period. When the available scheduled inspection hours were regressed, the independent variable entered in the following order: (1) maintenance concept (positive correlation) and (2) the number of assigned personnel (positive correlation). As shown in Table 6, the relative magnitudes of the ΔR^2s and the beta weights indicate that the maintenance concept was the key quantifiable factor in explaining the change in the man-hours required to perform 400 hour inspections. A closer analysis of the correlations of the key factors with the scheduled inspection hours, however, suggests that unknown factors may also have influenced the level of this hypothesis variable.

As shown in Tables 2 and 3, the signed rank test indicated an increase in required man-hours with a pre-POMO mean of 745.8 increasing to a post-POMO mean of 926.9. This increase is further supported by the positive correlation between the maintenance concept and the scheduled inspection man-hours. The positive correlation between the second factor, number of personnel assigned (which decreased), and the scheduled inspection man-hours (which increased) is both unexpected and unexplained. This suggests that interrelationships between independent variables, both quantified and unquantified, may have caused the unexplained positive correlation. Nevertheless, it appears that pOMO may be associated with degraded quality in terms of increased man-hours required to perform scheduled 400 hour inspections.

Hypothesis 9

Ground Abort Rate. When the ground abort rates were regressed, the independent variables entered into the prediction equation in the following order: (1) number of assigned personnel (negative correlation), (2) assigned versus authorized strength (negative correlation), (3) the maintenance concept (positive correlation), and (4) hours flown (negative correlation). Table 6 reflects the ΔR^2s and beta weights for each of these factors relating to the ground abort rate. Based on an initial analysis of the relative magnitudes of these figures, the number of assigned personnel is the key factor in explaining the ground abort rate. A further analysis of the correlation coefficients indicates that POMO may also have been an important factor.

Table 6

SUMMARY OF RESULTS OF REGRESSION ANALYSIS OF INDEPENDENT FACTORS AND HYPOTHESIS VARIABLES RELATING TO QUALITY OF MAINTENANCE

Hypothesis Number/ Variable	Factors	Correlation Coefficient*	R^2	ΔR^2	Beta	F-Statistic	Confidence Level
7. Repeat Rate	1. Mn. Skill Level	+.16738	.02801	.02801	+.16738	5.995	.975
8. Average Hrs. per Inspection	1. Main. Concepts	+.15135	.02291	.02291	+.17385	6.437	.995
	2. No. Assigned	+.13411	.04760	.02469	+.15875	5.367	.995
9. Ground Abort	1. No. Assigned	-.29143	.08493	.08493	-.38554	27.180	.999
	2. No. Assigned vs. Author.	-.0055	.10811	.02318	+.18781	6.360	.999
	3. Main. Concept	+.1489	.12799	.01988	+.15568	5.454	.999
	4. Hrs Flown	-.08337	.14598	.01799	-.13778	4.319	.995

*Correlation between factor and hypothesis variable.

As shown in Tables 2 and 3, the signed rank test reflected an increase in the ground abort rate, with the mean ground abort rate increasing from 2.9 in the pre-period to 3.4 in the post-period. The negative correlation between the ground abort rate and both the number of assigned and assigned versus authorized strength is consistent with the increased ground abort rate. While the ground abort rate increased, both the number of assigned personnel and the assigned versus authorized strength decreased from the pre-to the post-POMO period. The third entering variable, the maintenance concept, was positively correlated, suggesting that POMO implementation was associated with the increased ground abort rate. Thus, while POMO is not the most important factor in terms of the regression, it appears that POMO may have contributed to degraded quality in terms of an increased abort rate.

Summary

The purpose of this chapter was to analyze the data relevant to accomplishing the objectives of this research. The first step was to provide an initial analysis of available data. The results of the initial analysis are shown in Table 2. The second step was to analyze the results of the Wilcoxon signed rank test as applied to the hypothesis variables and the independent variables. These results are presented in Tables 3 and 4. The third step was to analyze the results of a regression between the independent factors and each hypothesis variable. Results of this analysis are presented in Tables 5 and 6. Finally, a synthesis of the results of the initial analysis, the Wilcoxon signed rank test and the regression analysis, was accomplished. This step led to findings relating to the impact of POMO on each of the hypothesis variables. These findings are summarized in Table 7.

The next chapter discusses the conclusion for each hypothesis variable, the conclusion concerning the impact of POMO implementation on sortie-generation capability and quality of aircraft systems, an overall conclusion of the impact of POMO implementation, and implications for the management of aircraft maintenance functions.

Table 7

SUMMARY OF ALL ANALYSIS

Hypothesis Number/ Variable	Signed Rank Test Conclusion*	POMO a Key Factor	Conclusion	Support for Research Hypothesis
Hypotheses Relating to Sortie-Generation Capability				
1. Average Turn Time	+	Yes	POMO appears to improve performance	Yes
2. Scheduling Effectiveness Rate	Ø	Yes	Inclusive Results	No
3. NMCM Rate	+	Yes	POMO appears to improve performance	Yes
4. Direct Labor Rate	+	Yes	POMO appears to improve performance	Yes
5. FMC Rate	+	No	Inconclusive Results	No

*+ represents improved performance
Ø represents no significant change in performance
\- represents degradation in performance

Table 7--Continued

Hypothesis Number/ Variable	Signed Rank Test Conclusion*	POMO a Key Factor	Conclusion	Support for Research Hypothesis
6. Man-hours per Flying Hour	Ø	Yes	POMO appears to improve performance	Yes
Hypotheses Relating to Quality of Maintenance				
7. Repeat Rate	-	No	Inconclusive results	No
8. Average Hours per Inspection	-	Yes	POMO appears to degrade performance	No
9. Ground Abort Rate	-	Yes	POMO appears to degrade performance	No

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

This chapter presents conclusions and discusses resulting implications of the impact of the POMO maintenance management concept on sortie-generation capability and quality of aircraft systems. Conclusions for each research hypothesis are presented first, followed by a conclusion concerning sortie-generation capability and a conclusion concerning quality of aircraft systems. Next, the conclusion and implications of the research results pertaining to the POMO concept in general are presented. Finally, areas for future research are identified.

POMO and Sortie-Generation Capability

The basic purpose of POMO is to enhance sortie-generation capability through the more efficient and effective use of all unit maintenance resources. The first objective of this research was to evaluate the impact of POMO on the levels of key maintenance management performance indicators which related to unit sortie-generation capability. Six hypotheses were proposed in this research to accomplish this objective. Each was designed to identify improvements in performance and sortie-generation capability. Each hypothesis is restated below with the conclusions drawn based on the results of the research analysis. Finally, a conclusion is presented for the overall impact of POMO on unit sortie-generation capability.

Hypothesis 1: The average time to return an aircraft to flyable status (FMC or PMC) from Not Mission Capable for Maintenance status will decrease under the POMO concept. This hypothesis was supported by the results of this research. POMO appears to have significantly improved the average turn-time within the ADCOM FISs.

Hypothesis 2: The scheduling effectiveness rate will incease under the POMO concept. Since the Wilcoxon signed rank test indicated that the scheduling effectiveness remained unchanged, this hypothesis was not directly supported by the results of this research. Further, the results of the regression were inclusive in determining the effect of POMO on the scheduling effectiveness rate.

Hypothesis 3: The Not Mission Capable for Maintenance (NMCM) rate will decrease under the POMO concept. This hypothesis was supported by the results of this research. There was a significant decrease in the NMCM rate following the change in maintenance concept. POMO appears to be related to the improved NMCM rate.

Hypothesis 4: The direct labor rate will increase under the POMO concept. This hypothesis was supported by the results of this research. There was a significant increase in the aggregate ADCOM direct labor rate following the implementation of POMO. POMO appears to have influenced the increase in the direct labor rate.

Hypothesis 5: The Full Mission Capable (FMC) rate will increase under the POMO concept. Since the Wilcoxon signed rank test indicated that the FMC rate had improved. This hypothesis was supported by the results of this test. However, the regression results were inconclusive and the impact of POMO on the FMC rate appear insignificant.

Hypothesis 6: The number of maintenance man-hours per flying hour will decrease under the POMO concept. Since the Wilcoxon signed rank test indicated that the maintenance man-hours per flying hour remained unchanged, this hypothesis was not supported by the results of this research. Further analysis, however, led to the conclusion that POMO may actually improve performance by allowing more maintenance per man-hour.

Conclusion: POMO's impact on sortie-generation capability. POMO was found to be a key factor in the improved performances of turn time (Hypothesis 1), the NMCM rate (Hypothesis 3), and the direct labor rate

(Hypothesis 4). Further, POMO may have had a positive influence on the maintenance man-hours required to support each flying hour (Hypothesis 6). Based on the application of the decision rule relating to sortie-generation capability (as presented above), POMO does appear to increase sortie-generation capability.

POMO and Quality of Aircraft Systems

In addition to changing sortie-generation capability, POMO also causes changes within the aircraft maintenance organizations that may well impact on the overall quality of the aircraft and its systems. The second objective of this research was to assess and evaluate the impact of POMO on the levels of key maintenance management peformance indicators which relate to overall quality of aircraft systems. Three hypotheses were proposed in this research to accomplish this objective. Each was designed to identify improvements in the quality of aircraft systems. Each hypothesis is restated below with the conclusions drawn based on the results of the research analysis. Finally, a conclusion is presented for the overall impact of POMO on the quality of aircraft systems.

Hypothesis 7: The repeat discrepancy rate will decrease under the POMO concept. This hypothesis was not supported by the results of this research. In fact, the

Wilcoxon signed rank test indicated that the repeat rate increased. The regression analysis results however, were inconclusive as to the influence of POMO on the repeat rate.

Hypothesis 8: The average number of maintenance man-hours required to accomplish each scheduled 400 hour inspection will decrease under the POMO concept. This hypothesis was not supported by this research. The Wilcoxon signed rank test indicated that the average number of maintenance man-hours required to accomplish a 400 hour inspection actually increased in the post-POMO period. Since the maintenance concept was found to be the key variable, the conclusion was that POMO appears to degrade quality as measured by the number of maintenance man-hours required to accomplish a 400 hour inspection.

Hypothesis 9: The ground abort rate will decrease under the POMO concept. This hypothesis was not supported by the results of this research. The Wilcoxon signed rank test indicated that the ground abort rate increased following the implementation of POMO. Further analysis led to the conclusion that POMO appears to degrade quality as measured by the ground abort rate.

Conclusion: POMO's impact on overall aircraft systems quality. POMO was found to be a key factor in the degraded performance in terms of hours required to perform a scheduled 400 hour inspection (Hypothesis 8). Further, POMO may have influenced the degraded repeat rate (Hypothesis 7) and the degraded ground abort rate (Hypothesis 9). Based on the application of the decision rule relating to overall aircraft systems quality, POMO does not appear to improve overall aircraft systems quality. Rather, the conclusion is that POMO appears to degrade overall aircraft systems quality.

Overall Conclusion. The findings of this research suggest that POMO provides some positive as well as negative results. Based on the application of the decision rule and as presented in Table 7, the conclusion is that POMO appears to enhance sortie-generation capability and to degrade overall airframe systems quality in ADCOM. These findings present implications for current and future aircraft maintenance managers and policy makers. The following section discusses implications for management.

Implications for Management

Based on the results of this research, it appears that the POMO concept has produced changes in the quality and quantity of output from the aircraft maintenance organizations. On the premise that the primary objective of POMO is to enhance sortie-generation capability with existing resources, the results of this research indicate that, within ADCOM, this objective has been attained. If a secondary objective was to enhance sortie-generation capability through the efficient use of fewer maintenance personnel resources, the results of this research indicate that the secondary objective has also been attained. If, on the other hand, policy makers established as a tertiary objective, the achievement of greater sortie-generation capability, with fewer maintenance personnel and no degredation of maintenance quality, the results of this research suggest that this objective was not met. In retrospect, it appears that the changes in structure, organization, and maintenance philosophy designed to enhance sortie-generation capability may have led to a lower quality of aircraft maintenance.

While this research involved only three hypotheses relating to quality, each of the three indicated that maintenance quality had been degraded in the post-POMO period. This suggests that the quality of maintenance performed on F-106 interceptor aircraft declined following POMO implementation. This in turn presents a strong implication for aircraft maintenance managers. If, as this research suggests, quality of maintenance has been degraded on the F-106 fleet, then the quality of maintenance performed on other weapons systems maintained under the POMO concept may have also decreased. Before final conclusions are drawn, however, further study is needed to develop meaningful and quantifiable indicators of maintenance quality. These indicators may then be used to confirm the changes (if any) in maintenance quality on all weapons systems maintained under the POMO concept. If additional study confirms that degredation has occurred on fighter/interceptor systems, maintenance managers must consider the following question: Is there a trade-off between enhanced sortie-generation capability and aircraft maintenance quality? The results of this research suggest that changes in maintenance brought about through POMO have increased sortie-generation capability. Decreased turn times and decreased NMCM rates suggest that maintenance is performed more efficiently. This increased efficiency is partly due to the cross-utilization of specialists working together in repairing and launching aircraft for flight. Further efficiency is promoted through the use of supervisory specialists as flight chiefs and/or expeditors. These duties, in turn, reduce the supervisory involvement in the work of their particular AFSC. Thus, the efficient use of maintenance personnel in increasing sortie-generation capability, may be at the expense of the higher degree of quality experienced when specialists worked under the "specialist concept." The results of this research suggest that a trade-off does exist. This leads to the next question: Is a trade-off between increased sortie-generation capability and decreased maintenance quality acceptable? Aircraft maintenance managers will typically respond with a firm no. This response, however, should be tempered with a consideration of just how much sortie-generation capability has been increased and to what extent maintenance quality has been lowered. Perhaps, under POMO, a limited trade-off is inevitable. If a trade-off is unavoidable, challenges exist for the maintenance managers as well as maintenance policy makers. For maintenance managers, the challenge is to maintain the efficiency levels generated under POMO while striving for higher quality of maintenance. For maintenance policy makers, the challenge is threefold: first, to determine what level of sortie-generation capability is needed to meet current and future needs; second, to determine what the trade-off relationship is between sortie-generation capability and aircraft maintenance quality; and finally, based on the trade-off relationship, establish standards of quality which are both acceptable and achievable. Failure to recognize the trade-off relationship and failure to establish parameters and goals for sortie-generation capability and maintenance quality may produce long-range negative affects on the ability to successfully maintain defense readiness posture.

Future Research

This research effort attempted to quantify and assess the impacts of POMO on sortie-generation capability and quality of aircraft systems by analyzing the performance of ADCOM FISs. Significant areas for further study remain to be investigated to fully understand the effects of POMO. Some of these areas are presented for future research.

Quality of Aircraft Systems

This research indicated that POMO appeared to have a negative impact on the quality of aircraft systems. This conclusion has far-reaching implications; thus future research is required in this area. More and better measures of maintenance quality need to be identified, measured, and assessed with respect to POMO. The study requires a broad spectrum of evaluation ranging from base-level to depot activities.

Application to Other MAJCOMs

This research was directed strictly at the performance of tactical fighter units within ADCOM. An unanswered question remains as to whether the same or similar results are being realized in other MAJCOMs with tactical fighter units operating under the POMO concept. The methodology used in this research may be applied to evaluate the effects of POMO within TAC, USAFE, AAC, and PACAF.

Application to Future Performance

This research covered ADCOM FIS performance through 1979, thus analyzing at least two years of operation under the POMO concept for all FISs. The possibility remains that the full effects of POMO have not yet been realized. This suggests that this research should be replicated in the future to determine if different results of performance occur over a longer performance history.

Cost-Effectiveness of POMO

A premised gain of POMO is that it allows more efficient and effective use of maintenance resources. Future research is needed to determine if savings have in fact resulted from reduced requirements for maintenance support equipment and maintenance technicians while meeting the same or similar mission requirements. This evaluation of the cost-effectiveness of POMO is particularly important when the prospect of fewer defense dollars and fewer maintenance personnel in the future are becoming more and more likely.

Autonomy of Aircraft Maintenance Units (AMUs)

The POMO concept allows for autonomous AMUs, each corresponding to a tactical fighter squadron. The underlying philosophy is that each squadron and AMU would operate as a single unit in a wartime environment as a more or less independent entity. Minimal maintenance support would be required from other AMUs. Future research is needed to assess the following areas: How autonomous are these "automonous" units?; What is the degree of inter-AMU interaction with regard to sharing test equipment and maintenance technicians?; Can these units really operate effectively as independent units?; and are the quantities and types of resources from EMS and CRS sufficient to support two or more AMUs deployed to different locations? This research would help to identify whether the autonomy of AMUs is actually being realized and can be supported in a wartime environment.

Behavioral Impacts

Past research has addressed the behavioral impacts of POMO on maintenance personnel. However, most were done in the early stages of POMO; therefore, it was difficult to identify the behavioral impacts as due to POMO or due to the process of change itself from one maintenance concept to another. Future research is needed to study the behavioral impacts and results of POMO on personnel in such areas as retention, promotion, job satisfaction, attitudes, perceptions, etc. Research in this area will allow additional understanding of POMO effects as the process of implementation stabilizes.

APPENDIXES

APPENDIX A

RESEARCH DATA

MINOT PRE-POMO PERIOD--JANUARY-OCTOBER 1977

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
455	407	8.9	67.5	31.2	52.7	67.0	44.0	9.1	5.4	256	4.85	463	463
457	407	7.4	76.6	25.7	53.4	69.7	44.2	6.7	0.5	410	4.84	399	399
465	407	6.2	72.0	22.3	46.8	65.3	37.5	5.5	1.9	150	4.85	502	494
460	407	8.6	67.2	22.7	50.4	71.3	37.3	6.1	3.2	535	4.80	493	493
453	414	8.2	70.4	22.7	44.1	75.3	32.8	6.2	5.1	207	4.88	497	497
452	414	8.8	69.9	27.3	52.1	66.3	43.0	9.3	1.6	295	4.88	479	510
452	414	7.9	80.0	31.0	58.9	62.2	47.8	13.0	3.7	168	4.86	475	475
418	414	8.5	84.1	27.3	58.4	62.6	44.2	9.1	0.8	344	4.74	559	559
425	414	10.2	79.0	27.3	54.8	62.6	40.6	12.2	1.5	316	4.86	481	447
442	435	10.4	67.7	20.6	52.5	63.8	37.6	11.7	5.3	475	4.96	464	464

NAS - NUMBER ASSIGNED
NAU - NUMBER AUTHORIZED
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NM - NMCM RATE
DLR - DIRECT LABOR RATE
FMC - FMC RATE
MF - MAN-HOURS PER FLYING HOUR
RR - REPEAT RATE
GAB - GROUND ABORT RATE
SI - AVERAGE HOURS PER 400 HOUR INSPECTION
MSL - MEAN SKILL LEVEL
HF - HOURS FLOWN
HA - HOURS ALLOCATED

MINOT POST-POMO PERIOD--MARCH 1978-DECEMBER 1979

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
434	421	7.1	84.1	11.1	44.3	70.5	32.3	6.4	3.6	156	5.16	473	482
434	421	11.2	91.0	6.6	41.8	69.4	40.9	1.7	1.7	140	5.17	484	484
438	421	6.6	91.4	9.0	61.9	73.6	55.6	3.6	1.9	398	5.19	503	503
438	421	5.8	84.3	8.[illegible]	58.8	72.4	41.7	3.8	4.6	163	5.19	530	505
438	412	8.3	83.2	9.3	40.9	71.3	30.4	6.7	2.3	551	5.38	458	495
436	412	5.7	80.9	14.8	53.3	62.8	43.1	4.8	3.0	265	5.22	529	529
436	412	5.8	85.1	7.2	68.1	68.1	47.0	2.1	1.4	1473	5.22	571	500
441	433	10.8	78.5	15.6	48.4	69.2	36.2	4.4	4.2	207	5.28	472	472
440	434	11.7	75.0	12.4	53.4	66.8	37.9	8.2	3.7	1830	5.29	472	472
449	434	5.2	75.1	10.7	51.1	54.4	45.3	2.8	3.2	21[illegible]	[illegible]39	472	472
457	445	6.2	78.7	10.6	67.6	72.7	40.5	7.1	2.9	862	5.53	558	558
457	443	5.9	74.1	14.2	71.4	65.4	48.2	10.4	4.8	420	5.53	463	463
461	448	5.8	78.8	10.5	56.6	49.9	54.6	8.3	3.4	261	5.51	418	418
457	448	4.8	81.1	10.1	57.2	70.0	43.3	4.2	1.1	1509	5.49	499	499
454	447	3.8	83.2	14.2	53.4	65.9	32.7	5.7	0.6	1063	5.45	605	605
433	447	4.8	75.6	11.4	49.1	70.7	40.2	6.5	3.4	425	5.49	438	419
447	447	7.9	84.9	14.0	52.1	67.6	33.4	5.8	1.0	305	5.47	531	531
446	447	5.4	80.9	8.0	56.9	72.2	47.1	5.5	3.5	571	5.46	530	530
448	448	6.4	76.0	8.6	55.3	69.5	35.4	3.8	0.8	848	5.44	490	489
446	441	4.1	84.1	19.1	52.6	63.4	34.0	4.8	0.7	1453	5.42	578	578
446	441	5.1	74.9	27.1	46.4	59.7	36.6	5.2	1.8	395	5.42	492	492
445	443	5.4	76.0	26.6	71.0	57.4	43.1	6.4	4.8	585	5.39	436	420

LANGLEY PRE-POMO PERIOD--JANUARY-OCTOBER 1976

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
477	428	25.0	67.1	35.3	72.0	50.4	54.0	16.5	1.5	581	5.14	397	397
477	428	27.1	76.5	32.3	75.0	52.0	50.1	9.7	2.1	797	5.14	398	398
477	428	16.1	87.9	30.5	51.0	53.0	49.5	9.0	1.8	1861	5.14	433	633
473	424	11.6	86.9	22.5	77.0	58.5	35.7	4.8	2.5	486	5.25	547	547
473	424	13.5	81.3	28.1	79.0	58.7	41.4	5.2	3.4	2100	5.25	486	486
473	424	13.8	83.4	24.3	74.2	68.8	56.4	4.7	4.1	776	5.25	377	367
454	424	16.1	84.5	17.8	58.7	72.4	35.7	2.0	3.5	947	5.19	499	499
454	424	10.6	76.4	31.1	65.0	59.9	36.8	5.5	3.7	597	5.19	518	518
454	424	7.8	79.2	24.9	49.8	63.8	34.1	4.3	3.8	808	5.19	407	386
458	477	7.8	84.6	21.2	44.7	66.8	42.1	3.8	0.4	681	5.37	504	504

NAS - NUMBER ASSIGNED
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MF - MAN-HOURS PER FLYING HOUR
RR - REPEAT RATE
GAB - GROUND ABORT RATE
SI - AVERAGE HOURS PER 400 HOUR INSPECTION
MSL - MEAN SKILL LEVEL
HF - HOURS FLOWN
HA - HOURS ALLOCATED

LANGLEY POST-POMO PERIOD--MARCH 1977-DECEMBER 1979

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
458	481	8.8	86.0	27.5	49.1	68.7	46.7	9.5	3.8	220	5.26	435	491
458	481	15.1	91.0	29.7	53.0	62.3	44.5	4.8	0.8	200	5.26	443	443
457	481	11.3	82.9	35.6	84.9	60.8	51.3	7.3	1.6	792	5.29	500	500
455	481	11.6	77.7	33.6	72.4	63.4	47.2	15.4	4.2	644	5.26	456	482
465	481	8.3	88.0	24.1	64.0	69.2	33.0	13.5	2.6	687	5.24	440	440
453	481	8.7	93.1	26.2	56.8	69.2	33.3	7.4	2.1	604	5.20	411	411
450	481	11.8	79.2	35.8	64.6	58.0	38.3	12.6	3.7	432	5.20	485	455
471	533	10.6	85.9	21.0	52.8	68.3	41.7	5.2	3.1	748	5.22	490	490
463	532	10.1	73.8	29.8	63.2	59.4	52.5	11.8	5.0	1535	5.19	507	507
456	528	8.8	77.3	20.9	52.7	71.5	44.9	9.4	3.0	1046	5.22	477	528
476	498	9.0	74.5	29.0	60.8	63.7	55.8	7.6	3.8	1039	5.16	438	438
469	473	11.1	78.6	25.1	53.5	63.8	52.0	10.5	2.9	1693	5.25	414	414
465	473	9.4	79.5	26.9	65.2	65.2	55.1	9.5	4.7	846	5.33	509	505
431	473	8.7	79.0	26.6	65.5	62.0	53.4	6.5	3.5	1638	5.32	489	489
428	473	2.6	87.7	24.3	72.4	64.0	61.0	1.9	2.1	1161	5.37	519	519
429	473	8.5	84.2	23.0	70.0	60.9	60.7	9.4	3.3	2410	5.33	432	409
438	473	6.9	80.6	8.2	49.3	72.3	43.8	3.5	3.7	456	5.36	433	433
436	473	10.5	71.6	26.4	68.6	57.2	57.0	10.6	3.7	394	5.50	512	512
433	433	11.3	58.4	21.6	53.6	60.8	42.3	7.6	0.8	1695	5.54	478	467
448	448	9.1	70.2	24.3	63.7	54.9	49.0	3.5	3.0	393	5.53	503	503
448	448	8.9	79.2	19.1	71.7	60.0	46.2	2.3	2.8	477	5.53	519	519
448	448	8.1	77.2	18.9	63.8	61.6	65.7	13.6	6.8	1364	5.53	328	321
436	403	8.1	84.4	29.6	97.5	38.2	60.0	10.8	4.4	579	5.20	495	495

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
436	403	6.6	84.2	35.7	92.3	42.3	53.1	4.6	1.5	677	5.20	466	466
436	403	9.6	78.8	31.9	64.2	48.1	62.4	8.5	2.5	381	5.20	421	432
429	428	9.1	84.0	22.5	53.3	43.1	48.1	5.4	3.5	391	5.49	523	523
429	428	8.5	83.9	24.6	72.1	43.0	47.8	5.6	1.7	741	5.49	540	540
429	428	9.5	84.7	31.4	70.0	55.2	59.5	13.7	0.8	869	5.49	460	455
431	433	4.8	85.5	25.2	76.1	55.2	48.0	6.4	3.3	880	5.41	474	474
431	433	6.2	82.3	24.5	74.1	42.4	51.3	5.9	3.8	970	5.41	537	537
431	433	9.1	72.6	29.1	86.5	43.9	60.4	11.0	4.2	175	5.41	441	439
427	399	8.2	81.7	27.0	71.0	32.0	56.6	10.7	2.9	2069	5.34	517	517
427	399	9.5	84.6	28.2	81.2	29.0	47.9	4.5	3.5	353	5.34	566	566
427	399	12.9	80.9	28.0	78.9	27.0	54.4	9.7	3.7	735	5.34	419	437

GRIFFISS PRE-POMO PERIOD--OCTOBER 1976-APRIL 1977

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
501	462	10.4	81.6	29.5	44.3	64.7	42.5	2.2	2.3	721	5.41	576	576
482	478	12.3	71.4	26.2	48.9	63.7	40.3	3.7	3.4	209	5.29	474	474
481	454	28.2	81.8	32.3	50.4	55.1	45.1	1.9	2.9	696	5.42	411	360
487	450	14.6	80.1	36.9	49.0	50.5	48.1	5.8	4.2	334	5.38	455	455
504	449	8.8	88.8	29.2	52.6	45.1	46.6	3.6	1.6	166	5.45	464	464
503	452	24.2	79.9	34.5	64.7	43.8	70.9	4.7	1.4	501	5.38	422	422
500	464	16.8	90.5	22.3	47.9	70.0	43.4	4.7	0.8	597	5.33	456	456

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GRIFFISS POST-POMO PERIOD--SEPTEMBER 1977-DECEMBER 1979

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
481	480	8.6	77.7	25.0	24.9	64.3	32.3	5.8	2.7	180	5.27	430	430
485	469	9.1	71.0	27.8	24.3	66.1	22.8	2.4	1.4	876	5.20	513	513
482	447	16.6	73.3	29.0	54.6	58.1	33.2	2.1	5.0	547	5.21	507	507
482	447	9.8	68.5	29.6	41.1	60.5	38.2	2.8	3.6	212	5.21	392	392
500	448	9.1	85.8	23.9	55.0	64.8	46.4	8.1	3.1	1505	5.10	464	464
472	438	7.7	75.5	26.3	84.2	59.6	54.6	6.3	1.9	1100	5.29	438	438
476	446	12.9	75.7	30.4	75.6	47.3	62.4	6.8	0.4	1041	5.39	455	465
478	449	7.7	95.2	21.9	69.5	59.0	49.0	8.2	1.6	180	5.38	413	413
480	455	7.5	73.3	37.2	92.2	49.6	36.0	10.1	2.1	1317	5.35	464	464
481	454	13.5	75.9	27.1	62.9	57.0	37.9	11.6	1.9	1869	5.32	551	540
480	455	10.4	77.8	25.6	65.5	57.3	32.6	9.6	4.6	1275	5.52	456	456
475	454	10.7	72.3	34.9	54.1	44.5	30.4	15.0	3.3	774	5.57	471	471
479	445	12.3	76.7	21.0	74.7	63.1	32.9	16.9	1.2	708	5.62	488	485
500	463	12.0	78.9	27.1	63.6	63.2	28.3	13.4	1.6	1426	5.29	512	512
500	463	10.7	64.2	29.5	75.3	59.7	38.4	7.5	2.6	1885	5.29	428	428
500	463	11.1	85.9	28.2	49.7	59.2	25.9	5.9	2.0	817	5.29	484	485
479	463	10.1	77.6	28.3	60.8	62.8	34.2	13.5	3.1	967	5.29	479	479
479	463	9.4	70.3	41.0	86.5	47.2	61.8	17.4	2.4	1831	5.29	426	426
479	463	10.2	78.3	29.5	78.4	59.8	47.1	12.5	0.8	2261	5.29	481	480
482	463	9.7	73.6	27.7	62.7	54.3	34.1	11.9	2.5	2437	5.34	482	482

CASTLE PRE-POMO PERIOD--JANUARY-OCTOBER 1977

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
394	407	11.2	76.5	9.5	60.0	76.1	42.3	5.6	4.3	391	5.33	473	473
405	410	10.6	79.6	21.5	60.2	70.2	39.8	5.4	2.0	720	5.24	456	456
422	413	14.3	67.9	17.4	69.2	79.0	53.9	15.4	4.5	2413	5.35	432	432
429	411	15.1	71.5	14.6	63.2	79.5	42.5	8.3	1.0	1072	5.39	463	463
421	411	19.8	73.9	15.7	54.0	80.6	29.1	6.1	0.7	437	5.44	452	452
402	412	7.9	75.1	15.6	46.6	83.6	49.3	7.8	2.0	803	5.38	481	495
401	412	6.9	80.3	14.4	64.0	81.5	45.0	4.8	2.2	627	5.42	460	460
404	413	9.1	65.3	17.7	57.5	78.7	40.7	6.2	3.9	793	5.36	527	527
422	412	10.6	74.1	16.7	59.5	77.9	40.9	4.7	1.9	454	5.45	494	494
433	423	7.9	64.9	19.5	56.0	69.8	43.3	7.4	1.5	933	5.41	467	467

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MSL - MEAN SKILL LEVEL
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CASTLE POST-POMO PERIOD--MARCH 1978-DECEMBER 1979

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
430	414	14.2	61.9	19.1	55.5	63.2	65.2	11.5	4.1	1398	5.33	442	459
432	406	9.8	58.6	23.9	55.0	65.0	66.6	17.6	4.1	1775	5.45	405	405
426	406	8.1	57.3	24.8	65.6	55.6	61.9	12.7	6.5	537	5.48	457	457
419	408	8.8	53.9	19.2	53.5	60.6	41.1	6.8	4.6	1236	5.48	531	630
409	404	7.1	58.7	18.9	63.9	66.8	45.8	4.5	6.5	455	5.50	499	499
403	405	6.4	69.0	15.4	69.2	71.0	46.6	9.8	4.4	870	5.53	546	546
413	405	8.5	60.9	14.4	62.1	64.8	50.5	9.4	4.9	784	5.51	443	442
414	404	11.6	45.7	23.6	68.6	50.4	58.1	10.0	5.9	1429	5.53	466	466
421	404	8.2	57.6	16.5	72.3	55.9	60.7	3.8	5.5	421	5.51	467	467
419	406	10.2	54.2	13.7	70.8	45.2	57.5	10.1	6.9	854	5.52	471	471
421	406	13.9	59.6	17.6	78.3	38.8	55.5	11.3	5.1	246	5.51	509	509
417	406	9.0	91.2	9.4	63.0	58.7	47.4	5.1	5.8	106	5.58	444	444
412	408	9.6	61.0	15.0	62.2	58.2	45.5	11.8	7.5	470	5.59	464	456
411	408	7.4	59.7	19.4	82.8	57.2	59.8	9.3	7.8	335	5.61	485	485
408	408	9.2	74.6	16.0	74.1	55.5	46.7	6.9	3.5	693	5.50	550	550
415	408	9.0	54.0	15.8	66.7	56.7	46.7	7.0	5.1	637	5.54	502	465
422	408	5.8	62.8	15.8	59.1	59.5	45.8	8.1	4.6	825	5.56	465	465
423	408	6.8	79.8	13.1	57.2	62.0	38.1	6.2	4.1	275	5.55	589	589
420	408	5.6	70.2	16.4	61.9	57.8	41.5	7.9	4.9	527	5.55	498	496
412	390	5.5	71.6	15.5	59.6	61.7	40.6	6.4	4.1	295	5.60	539	539
412	390	6.1	62.2	17.7	69.1	56.2	42.5	5.0	7.1	761	5.61	453	453
412	390	5.6	69.5	11.7	59.2	55.4	38.4	6.5	6.2	827	5.60	478	484

K. I. SAWYER PRE-POMO PERIOD--OCTOBER 1976-MAY 1977

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
475	428	25.6	69.9	30.4	64.9	57.6	47.8	9.2	3.7	923	5.04	548	548
485	428	10.8	90.3	24.3	47.3	61.8	36.3	9.2	4.9	1152	5.07	420	420
463	428	15.3	79.0	34.1	46.6	58.8	39.5	9.2	4.9	941	5.27	410	397
475	428	14.7	74.7	33.9	49.6	54.6	40.2	9.7	5.4	756	5.28	428	428
479	427	11.0	80.0	28.5	47.8	59.5	36.4	3.0	1.7	493	5.21	410	410
478	427	20.2	70.1	23.3	51.9	69.3	47.6	10.0	4.5	1105	5.14	415	416
470	427	11.9	78.5	24.1	58.5	69.4	41.7	13.3	5.0	385	5.13	433	433
463	427	18.7	73.0	29.4	63.9	60.3	45.3	9.2	3.0	1170	5.15	465	465

NAS - NUMBER ASSIGNED
NAU - NUMBER AUTHORIZED
TT - AVERAGE TURN TIME
SE - SCHEDULING EFFECTIVENESS RATE
NM - NMCM RATE
DLR - DIRECT LABOR RATE
FMC - FMC RATE
MF - MAN-HOURS PER FLYING HOUR
RR - REPEAT RATE
GAB - GROUND ABORT RATE
SI - AVERAGE HOURS PER 400 HOUR INSPECTION
MSL - MEAN SKILL LEVEL
HF - HOURS FLOWN
HA - HOURS ALLOCATED

K. I. SAWYER POST-POMO PERIOD--OCTOBER 1977-DECEMBER 1979

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
461	413	10.2	82.3	13.4	57.9	68.4	41.8	6.1	3.6	1829	4.76	455	455
466	413	11.6	69.0	17.7	50.1	56.8	52.0	4.2	4.5	967	4.71	372	372
467	413	12.4	75.2	16.4	51.7	57.1	37.2	2.8	7.0	688	4.70	440	505
465	413	8.0	79.8	20.8	61.3	62.3	43.8	3.6	3.1	1126	4.79	473	473
467	413	10.3	76.2	19.1	67.9	62.6	51.5	7.0	3.2	1879	4.31	416	416
454	413	10.7	79.9	17.9	64.6	58.1	59.8	7.3	5.6	1855	5.21	441	448
461	413	7.1	79.2	11.8	61.8	68.0	39.7	4.4	3.2	1301	4.98	515	515
465	413	6.7	84.4	13.8	65.3	60.0	45.7	4.8	2.3	1319	5.14	464	464
458	413	6.3	92.5	15.7	55.1	69.8	44.0	7.5	2.2	1124	5.39	415	418
461	413	6.5	81.7	14.5	63.8	77.4	45.5	6.9	2.0	1161	5.41	420	420
465	413	10.2	79.1	20.0	73.6	62.7	54.7	6.7	2.7	991	5.40	514	514
466	413	12.7	78.6	23.5	75.9	67.7	58.3	8.4	3.6	986	5.38	456	458
467	410	9.0	81.5	26.5	83.8	63.6	52.4	5.9	3.8	1207	5.34	577	577
459	410	8.0	79.6	9.6	71.2	79.7	52.4	8.0	5.1	942	5.32	454	454
445	410	6.7	87.6	9.6	60.7	76.6	49.9	11.8	3.0	1215	5.35	353	356
445	410	15.1	77.8	15.9	67.5	64.2	55.2	9.6	3.6	1393	5.36	444	444
447	410	7.8	83.0	23.1	58.8	51.1	44.9	5.7	2.6	1298	5.30	401	401
445	410	7.7	80.0	16.8	56.5	63.5	42.9	7.5	3.7	888	5.32	481	482
441	416	6.6	83.3	11.2	63.2	67.3	40.1	5.8	2.9	1090	5.35	543	543
430	416	5.7	90.5	11.0	69.8	67.9	43.7	8.2	0.7	896	5.47	535	535
436	416	7.3	86.8	13.3	53.9	67.4	45.8	9.9	1.0	1186	5.37	373	373

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
442	409	8.2	79.9	14.8	61.4	62.8	38.8	6.3	6.6	268	5.40	513	513
433	409	7.9	85.4	15.2	59.6	47.1	37.2	6.8	5.5	420	5.45	545	545
429	409	6.7	80.6	9.6	69.9	54.1	42.0	5.5	3.5	1432	5.52	467	469
424	414	7.2	88.6	10.7	77.9	53.8	44.0	6.7	3.8	1522	5.48	572	572
423	414	7.1	80.6	9.4	80.5	53.1	46.3	9.3	3.8	649	5.54	492	492
422	414	7.5	80.6	10.3	77.5	55.7	39.9	9.9	5.3	557	5.50	462	462

McCHORD PRE-POMO PERIOD--JANUARY 1977-JANUARY 1978

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
472	440	8.0	64.8	27.8	60.1	66.8	57.8	6.6	4.7	778	5.42	470	470
472	440	9.6	69.8	28.1	60.8	67.7	53.7	3.9	4.1	1290	5.44	462	462
471	440	7.3	77.0	24.7	67.3	68.4	58.6	5.9	2.9	550	5.52	494	493
454	440	7.1	63.7	25.3	65.3	70.6	52.9	3.3	3.2	403	5.43	534	534
450	440	4.1	75.5	15.7	63.2	78.8	46.4	3.5	1.7	679	5.40	531	531
423	437	9.6	67.8	22.7	54.5	70.8	56.8	9.4	1.4	1186	5.40	370	384
422	437	6.5	65.0	19.6	52.4	70.4	41.6	6.7	2.2	262	5.41	485	485
448	436	8.1	68.6	28.8	61.6	59.5	51.8	16.3	5.3	1035	5.31	572	572
438	436	7.9	65.1	32.0	44.0	58.0	37.5	13.0	2.3	508	5.34	449	374
423	449	6.0	77.7	20.0	63.9	67.9	64.2	6.5	2.7	699	5.45	578	578
435	449	5.6	71.8	18.9	37.8	70.1	40.7	6.0	1.8	1881	5.39	525	525
448	449	7.0	69.2	23.3	49.0	60.9	64.9	13.6	3.6	1707	5.35	418	384
452	446	9.9	68.4	12.6	50.9	64.2	61.2	13.1	2.6	694	5.33	490	490

NAS - NUMBER ASSIGNED
NAU - NUMBER AUTHORIZED
TT - AVERAGE TURN TIME
SE - SCHEDULING EFFECTIVENESS RATE
NM - NMCM RATE
DLR - DIRECT LABOR RATE
FMC - FMC RATE
MF - MAN-HOURS PER FLYING HOUR
RR - REPEAT RATE
GAB - GROUND ABORT RATE
SI - AVERAGE HOURS PER 400 HOUR INSPECTION
MSL - MEAN SKILL LEVEL
HF - HOURS FLOWN
HA - HOURS ALLOCATED

McCHORD POST-POMO PERIOD--JUNE 1978-DECEMBER 1979

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
438	419	9.4	57.8	24.8	35.2	57.9	35.2	26.0	3.9	588	5.55	543	466
440	435	10.5	81.0	27.8	53.0	58.6	63.4	18.3	3.7	1186	5.55	453	453
435	435	7.5	74.0	21.8	51.7	61.7	47.5	20.8	2.7	734	5.66	529	529
442	434	14.7	69.8	21.7	49.0	54.4	46.1	20.8	2.9	1008	5.60	532	530
430	431	6.9	81.7	17.7	51.0	63.7	44.1	15.4	4.3	1619	5.58	518	518
430	431	8.6	81.7	12.2	51.0	68.2	44.7	9.3	2.5	930	5.58	527	527
430	431	8.6	68.1	8.6	52.6	64.7	44.9	10.2	2.9	369	5.58	449	464
425	436	8.7	77.4	4.1	49.0	50.7	36.3	7.5	6.3	1737	5.48	528	528
425	436	9.2	77.7	4.4	60.6	44.2	48.0	14.6	6.8	1437	5.48	440	440
425	436	10.7	77.8	4.3	57.7	63.2	49.2	10.9	2.7	877	5.48	506	506
425	438	11.9	82.4	12.2	55.0	51.5	46.7	17.6	5.4	1878	5.43	503	503
425	438	9.7	86.6	9.5	55.7	62.6	42.5	10.9	2.0	1550	5.43	525	525
425	438	12.1	80.3	6.2	37.3	54.4	28.0	11.2	3.9	714	5.43	535	513
405	438	14.5	82.3	9.8	85.4	51.4	62.8	17.5	4.7	1496	5.43	508	508
405	438	11.2	80.7	10.8	63.7	58.0	51.2	12.4	2.3	416	5.41	561	560
405	438	8.7	85.3	15.4	51.0	70.4	44.4	12.5	4.7	565	5.41	457	457
426	437	11.6	79.4	13.5	47.0	51.7	40.0	7.8	3.9	528	5.36	516	516
426	437	12.0	75.6	11.3	52.9	53.2	37.4	8.9	3.9	1436	5.36	516	516
426	437	10.7	70.4	12.5	46.1	59.0	37.7	5.2	2.7	181	5.36	465	516

NAS	NAU	TT	SE	NM	DLR	FMC	MF	RR	GAB	SI	MSL	HF	HA
482	463	8.5	68.8	23.1	67.6	61.6	38.5	9.7	1.8	965	5.34	511	511
482	463	7.7	73.3	24.6	51.6	63.1	30.8	10.8	4.1	1579	5.34	475	472
483	464	6.7	82.8	17.9	72.2	60.5	37.3	8.7	2.4	459	5.43	494	494
483	464	8.0	75.5	29.0	54.7	42.2	25.8	12.3	2.3	1957	5.43	600	600
483	464	6.3	73.5	38.0	68.5	37.5	44.8	18.1	0.8	64	5.43	449	456
486	456	11.8	69.1	21.8	81.9	55.3	43.9	14.3	2.4	1847	5.29	550	550
485	456	15.5	71.4	23.0	56.9	53.6	25.0	6.8	1.4	785	5.35	571	571
477	456	7.4	78.5	21.8	70.9	54.1	38.6	12.2	2.2	1438	5.41	444	454

APPENDIX B

SUPPLEMENTAL DATA ANALYSES

SUMMARY OF MEANS IN THE PRE- AND POST-POMO PERIODS

Variables Relating to Sortie Generation

FIS	Average Turn Time		Scheduling Effectiveness		NMCM Rate	
	Pre	Post	Pre	Post	Pre	Post
Castle	11.3	8.5	72.9	63.4	16.3	17.0
Griffiss	16.5	10.0	82.0	75.7	30.1	27.5
K.I. Sawyer	16.0	8.6	76.9	81.6	28.5	15.2
Langley	14.9	9.2	80.8	80.7	26.8	26.3
McChord	7.4	10.4	69.6	77.4	23.0	13.1
Minot	8.5	6.5	73.4	80.8	25.8	12.7

FIS	Direct Labor Rate		FMC Rate		MH/FH	
	Pre	Post	Pre	Post	Pre	Post
Castle	59.0	65.0	77.7	58.0	42.7	50.1
Griffiss	51.1	63.6	56.1	56.6	48.1	38.0
K.I. Sawyer	53.8	65.2	61.4	62.9	41.9	46.3
Langley	64.6	67.3	60.4	55.8	43.6	50.7
McChord	56.2	52.9	67.2	57.8	52.9	44.7
Minot	52.4	55.1	66.6	66.5	40.9	40.9

Independent Variables

	Assigned Personnel		Assigned vs. Authorized Strength		Monthly Hours Flown	
	Pre	Post	Pre	Post	Pre	Post
Castle	413.6	416.9	100.2	103.1	470.5	486.5
Griffiss	494.0	483.3	107.8	105.6	465.4	474.6
K.I. Sawyer	473.5	449.8	110.8	109.1	441.1	467.1
Langley	467.0	444.2	108.6	97.7	456.6	472.9
McChord	446.8	425.6	101.2	97.9	490.6	505.8
Minot	447.9	444.2	108.4	102.2	481.2	500.1

	Monthly Hours Allocated		Monthly Hrs. Flown vs. Allocated		Mean Skill Level	
	Pre	Post	Pre	Post	Pre	Post
Castle	471.9	489.8	99.7	99.5	5.4	5.5
Griffiss	458.1	479.9	102.0	99.9	5.4	5.3
K.I. Sawyer	439.6	469.5	100.4	99.5	5.2	5.2
Langley	473.5	475.2	97.7	99.6	5.2	5.3
McChord	483.2	503.9	101.9	100.4	5.4	5.5
Minot	480.1	496.2	100.3	100.8	4.9	5.4

Variables Relating to Quality

	Repeat Rate		400 Hour Inspection Man-Hours		Ground Abort Rate	
	Pre	Post	Pre	Post	Pre	Post
Castle	7.2	8.5	864.3	716.2	2.4	5.4
Griffiss	3.8	10.0	460.6	1,153.6	2.4	2.3
K.I. Sawyer	9.1	6.9	865.6	1,118.1	4.1	3.6
Langley	6.6	8.2	963.4	861.6	2.7	3.1
McChord	8.3	13.6	897.8	1,013.0	3.0	3.8
Minot	8.9	5.4	315.6	641.1	2.9	2.7

DATA TABLES 04/11/80

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * *
X7 NUMBER ASSIGNED BY X1 MAINTENANCE MGT CONCEPT
* *

X7	X1: COUNT / ROW PCT / COL PCT / TOT PCT	PREPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 400	1	1	0	1
		100.0	0.	0.5
		1.7	0.	
		0.5	0.	
400-424	2	11	25	36
		30.6	69.4	17.1
		19.0	16.4	
		5.2	11.9	
425-449	3	8	67	75
		10.7	89.3	35.7
		13.8	44.1	
		3.8	31.9	
450-474	4	23	32	55
		41.8	58.2	26.2
		39.7	21.1	
		11.0	15.2	
475-499	5	11	24	35
		31.4	68.6	16.7
		19.0	15.8	
		5.2	11.4	
MORE THAN 500	6	4	4	8
		50.0	50.0	3.8
		6.9	2.6	
		1.9	1.9	
COLUMN TOTAL		58	152	210
		27.6	72.4	100.0

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * *
X9 AVG TURN TIME BY X1 MAINTENANCE MGT CONCEPT

X9		COUNT / ROW PCT / COL PCT / TOT PCT	X1: IMRSPOND 0	POSTPOND 1	ROW TOTAL
LESS THAN 5 HRS	1	COUNT	1	6	7
		ROW PCT	14.3	85.7	3.3
		COL PCT	1.7	3.9	
		TOT PCT	0.5	2.9	
5-5.9 HRS	2	COUNT	1	14	15
		ROW PCT	6.7	93.3	7.1
		COL PCT	1.7	9.2	
		TOT PCT	0.5	6.7	
6-6.9 HRS	3	COUNT	4	18	22
		ROW PCT	18.2	81.8	10.5
		COL PCT	6.9	11.8	
		TOT PCT	1.9	8.6	
7-7.9 HRS	4	COUNT	10	18	28
		ROW PCT	35.7	64.3	13.3
		COL PCT	17.2	11.8	
		TOT PCT	4.8	8.6	
8-8.9 HRS	5	COUNT	8	26	34
		ROW PCT	23.5	76.5	16.2
		COL PCT	13.8	17.1	
		TOT PCT	3.8	12.4	
9-9.9 HRS	6	COUNT	4	22	26
		ROW PCT	15.4	84.6	12.4
		COL PCT	6.9	14.5	
		TOT PCT	1.9	10.5	
10-10.9 HRS	7	COUNT	7	17	24
		ROW PCT	29.2	70.8	11.4
		COL PCT	12.1	11.2	
		TOT PCT	3.3	8.1	
COLUMN TOTAL			58 27.6	152 72.4	210 100.0

(CONTINUED)

X9		COUNT / ROW PCT / COL PCT / TOT PCT	X1: IMRSPOND 0	POSTPOND 1	ROW TOTAL
11-11.9 HRS	8	COUNT	4	14	18
		ROW PCT	22.2	77.8	8.6
		COL PCT	6.9	9.2	
		TOT PCT	1.9	6.7	
12-12.9 HRS	9	COUNT	1	8	9
		ROW PCT	11.1	88.9	4.3
		COL PCT	1.7	5.3	
		TOT PCT	0.5	3.8	
13-13.9 HRS	10	COUNT	2	2	4
		ROW PCT	50.0	50.0	1.9
		COL PCT	3.4	1.3	
		TOT PCT	1.0	1.0	
14-14.9 HRS	11	COUNT	3	3	6
		ROW PCT	50.0	50.0	2.9
		COL PCT	5.2	2.0	
		TOT PCT	1.4	1.4	
15 HRS OR MORE	12	COUNT	13	4	17
		ROW PCT	76.5	23.5	8.1
		COL PCT	22.4	2.6	
		TOT PCT	6.2	1.9	
COLUMN TOTAL			58 27.6	152 72.4	210 100.0

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * *

X10 SCHED EFFECTIVENESS RATE BY X1 MAINTENANCE MGT CONCEPT

* *

X10		COUNT / ROW PCT / COL PCT / TOT PCT	X1 IPRSPONO 0	POSTPONO 1	ROW TOTAL
LESS THAN 50%	1	COUNT	0	1	1
		ROW PCT	0.	100.0	0.5
		COL PCT	0.	0.7	
		TOT PCT	0.	0.5	
50-54.9%	2	COUNT	0	3	3
		ROW PCT	0.	100.0	1.4
		COL PCT	0.	2.0	
		TOT PCT	0.	1.4	
55-59.9%	3	COUNT	0	8	8
		ROW PCT	0.	100.0	3.8
		COL PCT	0.	5.3	
		TOT PCT	0.	3.8	
60-64.9%	4	COUNT	3	6	9
		ROW PCT	33.3	66.7	4.3
		COL PCT	5.2	3.9	
		TOT PCT	1.4	2.9	
65-69.9%	5	COUNT	15	8	23
		ROW PCT	65.2	34.8	11.0
		COL PCT	25.9	5.3	
		TOT PCT	7.1	3.8	
70-74.9%	6	COUNT	10	21	31
		ROW PCT	32.3	67.7	14.8
		COL PCT	17.2	13.8	
		TOT PCT	4.8	10.0	
75-79.9%	7	COUNT	14	44	58
		ROW PCT	24.1	75.9	27.6
		COL PCT	24.1	28.9	
		TOT PCT	6.7	21.0	
		COLUMN TOTAL	58	152	210
			27.6	72.4	100.0

(CONTINUED)

X10		COUNT / ROW PCT / COL PCT / TOT PCT	X1 IPRSPONO 0	POSTPONO 1	ROW TOTAL
80-84.9%	8	COUNT	11	39	50
		ROW PCT	22.0	78.0	23.8
		COL PCT	19.0	25.7	
		TOT PCT	5.2	18.6	
85-89.9%	9	COUNT	3	14	17
		ROW PCT	17.6	82.4	8.1
		COL PCT	5.2	9.2	
		TOT PCT	1.4	6.7	
90% OR MORE	10	COUNT	2	8	10
		ROW PCT	20.0	80.0	4.8
		COL PCT	3.4	5.3	
		TOT PCT	1.0	3.8	
		COLUMN TOTAL	58	152	210
			27.6	72.4	100.0

DATA TABLES 06/11/80

FILE NONAME (CREATION DATE = 06/11/80)

* * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * *
X11 NHCM RATE BY X1 MAINTENANCE MGT CONCEPT
* *

X11	COUNT / ROW PCT / COL PCT / TOT PCT	X1: ZEROPOMO 0	POSIPOMO 1	ROW TOTAL
LESS THAN 10%	1	1 4.8 1.7 0.5	20 95.2 13.2 9.5	21 10.0
10-14.9%	2	3 8.8 5.2 1.4	31 91.2 20.4 14.8	34 16.2
15-19.9%	3	10 25.6 17.2 4.8	29 74.4 19.1 13.8	39 18.6
20-24.9%	4	17 37.8 29.3 8.1	28 62.2 18.4 13.3	45 21.4
25-29.9%	5	14 29.8 24.1 6.7	33 70.2 21.7 15.7	47 22.4
30-34.9%	6	11 68.8 19.0 5.2	5 31.3 3.3 2.4	16 7.6
35% OR MORE	7	2 25.0 3.4 1.0	6 75.0 3.9 2.9	8 3.8
	COLUMN TOTAL	58 27.6	152 72.4	210 100.0

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * *
X12 DIRECT LABOR RATE BY X1 MAINTENANCE MGT CONCEPT
* *

X12	COUNT / ROW PCT / COL PCT / TOT PCT	X1: IPRPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 50%	1	16	18	34
		47.1	52.9	16.2
		27.6	11.8	
		7.6	8.6	
50-54.9%	2	14	27	41
		34.1	65.9	19.5
		24.1	17.8	
		6.7	12.9	
55-59.9%	3	7	22	29
		24.1	75.9	13.8
		12.1	14.5	
		3.3	10.5	
60-64.9%	4	12	26	38
		31.6	68.4	18.1
		20.7	17.1	
		5.7	12.4	
65-69.9%	5	4	19	23
		17.4	82.6	11.0
		6.9	12.5	
		1.9	9.0	
70-74.9%	6	2	18	20
		10.0	90.0	9.5
		3.4	11.8	
		1.0	8.6	
75-79.9%	7	3	9	12
		25.0	75.0	5.7
		5.2	5.9	
		1.4	4.3	
	COLUMN TOTAL	58	152	210
		27.6	72.4	100.0

(CONTINUED)

X12	COUNT / ROW PCT / COL PCT / TOT PCT	X1: IPRPOMO 0	POSTPOMO 1	ROW TOTAL
80-84.9%	8	0	7	7
		0.	100.0	3.3
		0.	4.6	
		0.	3.3	
85-89.9%	9	0	3	3
		0.	100.0	1.4
		0.	2.0	
		0.	1.4	
90% OR MORE	10	0	3	3
		0.	100.0	1.4
		0.	2.0	
		0.	1.4	
	COLUMN TOTAL	58	152	210
		27.6	72.4	100.0

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * *
X13 FMC RATE BY X1 MAINTENANCE MGT CONCEPT
* *

X13	X1	COUNT / ROW PCT / COL PCT / TOT PCT	IPRNPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 50%	1	COUNT	2	21	23
		ROW PCT	8.7	91.3	11.0
		COL PCT	3.4	13.8	
		TOT PCT	1.0	10.0	
50-54.9%	2	COUNT	5	17	22
		ROW PCT	22.7	77.3	10.5
		COL PCT	8.6	11.2	
		TOT PCT	2.4	8.1	
55-59.9%	3	COUNT	9	35	44
		ROW PCT	20.5	79.5	21.0
		COL PCT	15.5	23.0	
		TOT PCT	4.3	16.7	
60-64.9%	4	COUNT	11	40	51
		ROW PCT	21.6	78.4	24.3
		COL PCT	19.0	26.3	
		TOT PCT	5.2	19.0	
65-69.9%	5	COUNT	13	24	37
		ROW PCT	35.1	64.9	17.6
		COL PCT	22.4	15.8	
		TOT PCT	6.2	11.4	
70-74.9%	6	COUNT	8	12	20
		ROW PCT	40.0	60.0	9.5
		COL PCT	13.8	7.9	
		TOT PCT	3.8	5.7	
75-79.9%	7	COUNT	7	3	10
		ROW PCT	70.0	30.0	4.8
		COL PCT	12.1	2.0	
		TOT PCT	3.3	1.4	
COLUMN TOTAL			58 27.6	152 72.4	210 100.0

(CONTINUED)

X13	X1	COUNT / ROW PCT / COL PCT / TOT PCT	IPRNPOMO 0	POSTPOMO 1	ROW TOTAL
80% OR MORE	8	COUNT	3	0	3
		ROW PCT	100.0	0.	1.4
		COL PCT	5.2	0.	
		TOT PCT	1.4	0.	
COLUMN TOTAL			58 27.6	152 72.4	210 100.0

DATA TABLES 04/11/80

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * *
X14 MANHOURS PER FLYING HOUR BY X1 MAINTENANCE MGT CONCEPT
* *

X14	COUNT / ROW PCT / COL PCT / TOT PCT	X1: IPENPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 35	1	3	21	24
		12.5	87.5	11.4
		5.2	13.8	
		1.4	10.0	
35-39.9	2	11	23	34
		32.4	67.6	16.2
		19.0	15.1	
		5.2	11.0	
40-44.9	3	19	33	52
		36.5	63.5	24.8
		32.8	21.7	
		9.0	15.7	
45-49.9	4	11	32	43
		25.6	74.4	20.5
		19.0	21.1	
		5.2	15.2	
50-54.9	5	6	16	22
		27.3	72.7	10.5
		10.3	10.5	
		2.9	7.6	
55-59.9	6	4	13	17
		23.5	76.5	8.1
		6.9	8.6	
		1.9	6.2	
60 OR MORE	7	4	14	18
		22.2	77.8	8.6
		6.9	9.2	
		1.9	6.7	
	COLUMN TOTAL	58	152	210
		27.6	72.4	100.0

DATA TABLES 04/11/80

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * *
X15 REPEAT RATE BY X1 MAINTENANCE MGT CONCEPT
* *

X15	COUNT / ROW PCT / COL PCT / TOT PCT	X1: PREPONO 0	POSTPONO 1	ROW TOTAL
LESS THAN 2	1	1 33.3 1.7 0.5	2 66.7 1.3 1.0	3 1.4
2-3.9	2	9 39.1 15.5 4.3	14 60.9 9.2 6.7	23 11.0
4-5.9	3	14 33.3 24.1 6.7	28 66.7 18.4 13.3	42 20.0
6-7.9	4	11 24.4 19.0 5.2	34 75.6 22.4 16.2	45 21.4
8-9.9	5	12 31.6 20.7 5.7	26 68.4 17.1 12.4	38 18.1
10-11.9	6	2 8.7 3.4 1.0	21 91.3 13.8 10.0	23 11.0
12 OR MORE	7	9 25.0 15.5 4.3	27 75.0 17.8 12.9	36 17.1
	COLUMN TOTAL	58 27.6	152 72.4	210 100.0

DATA TABLES 04/11/80

FILE NONAME (CREATION DATE = 04/11/80)

* C R O S S T A B U L A T I O N O F * * * * * * * * * * *
X16 GROUND ABORT RATE BY X1 MAINTENANCE NOT CONCEPT
* *

X16	COUNT / ROW PCT / COL PCT / TOT PCT	X1: PREPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 2	1	19 40.4 32.8 9.0	28 59.6 18.4 13.3	47 22.4
2-2.9	2	12 26.7 20.7 5.7	33 73.3 21.7 15.7	45 21.4
3-3.9	3	12 21.4 20.7 5.7	44 78.6 28.9 21.0	56 26.7
4-4.9	4	9 28.1 15.5 4.3	23 71.9 15.1 11.0	32 15.2
5-5.9	5	6 33.3 10.3 2.9	12 66.7 7.9 5.7	18 8.6
6-6.9	6	0 0. 0. 0.	8 100.0 5.3 3.8	8 3.8
7-7.9	7	0 0. 0. 0.	4 100.0 2.6 1.9	4 1.9
	COLUMN TOTAL	58 27.6	152 72.4	210 100.0

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * C R O S S T A B U L A T I O N O F * * * * *
X17 AVG HRS PER INSPECTION BY X1 MAINTENANCE MGT CONCEPT

X17		COUNT / ROW PCT / COL PCT / TOT PCT	X1: IPMAPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 200 HR	1	COUNT	3	9	12
		ROW PCT	25.0	75.0	5.7
		COL PCT	5.2	5.9	
		TOT PCT	1.4	4.3	
200-399 HRS	2	COUNT	10	21	31
		ROW PCT	32.3	67.7	14.8
		COL PCT	17.2	13.8	
		TOT PCT	4.8	10.0	
400-599 HRS	3	COUNT	14	22	36
		ROW PCT	38.9	61.1	17.1
		COL PCT	24.1	14.5	
		TOT PCT	6.7	10.5	
600-799 HRS	4	COUNT	13	19	32
		ROW PCT	40.6	59.4	15.2
		COL PCT	22.4	12.5	
		TOT PCT	6.2	9.0	
800-999 HRS	5	COUNT	6	22	28
		ROW PCT	21.4	78.6	13.3
		COL PCT	10.3	14.5	
		TOT PCT	2.9	10.5	
1000-1199 HRS	6	COUNT	6	13	19
		ROW PCT	31.6	68.4	9.0
		COL PCT	10.3	8.6	
		TOT PCT	2.9	6.2	
1200-1399 HRS	7	COUNT	1	11	12
		ROW PCT	8.3	91.7	5.7
		COL PCT	1.7	7.2	
		TOT PCT	0.5	5.2	
1400-1599 HRS	8	COUNT	0	15	15
		ROW PCT	0.	100.0	7.1
		COL PCT	0.	9.9	
		TOT PCT	0.	7.1	
1600-1799 HRS	9	COUNT	1	6	7
		ROW PCT	14.3	85.7	3.3
		COL PCT	1.7	3.9	
		TOT PCT	0.5	2.9	
1800-1999 HRS	10	COUNT	2	10	12
		ROW PCT	16.7	83.3	5.7
		COL PCT	3.4	6.6	
		TOT PCT	1.0	4.8	
2000 HRS OR MORE	11	COUNT	2	4	6
		ROW PCT	33.3	66.7	2.9
		COL PCT	3.4	2.6	
		TOT PCT	1.0	1.9	
COLUMN TOTAL			58	152	210
			27.6	72.4	100.0

(CONTINUED)

DATA TABLES 04/11/80

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * *

X18 MEAN SKILL LEVEL BY X1 MAINTENANCE MGT CONCEPT

* *

X18	COUNT / ROW PCT / COL PCT / TOT PCT	X1: IPRMPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 4.90	1	9	5	14
		64.3	35.7	6.7
		15.5	3.3	
		4.3	2.4	
4.90-4.99	2	1	1	2
		50.0	50.0	1.0
		1.7	0.7	
		0.5	0.5	
5.00-5.09	3	2	0	2
		100.0	0.	1.0
		3.4	0.	
		1.0	0.	
5.10-5.19	4	9	8	17
		52.9	47.1	8.1
		15.5	5.3	
		4.3	3.8	
5.20-5.29	5	8	30	38
		21.1	78.9	18.1
		13.8	19.7	
		3.8	14.3	
5.30-5.39	6	14	33	47
		29.8	70.2	22.4
		24.1	21.7	
		6.7	15.7	
5.40-5.49	7	14	36	50
		28.0	72.0	23.8
		24.1	23.7	
		6.7	17.1	
	COLUMN TOTAL	58	152	210
		27.6	72.4	100.0

(CONTINUED)

X18	COUNT / ROW PCT / COL PCT / TOT PCT	X1: IPRMPOMO 0	POSTPOMO 1	ROW TOTAL
5.50-5.59	8	1	32	33
		3.0	97.0	15.7
		1.7	21.1	
		0.5	15.2	
5.60-5.69	9	0	7	7
		0.	100.0	3.3
		0.	4.6	
		0.	3.3	
	COLUMN TOTAL	58	152	210
		27.6	72.4	100.0

DATA TABLES 04/11/80

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * *
X19 HOURS FLOWN BY X1 MAINTENANCE MGT CONCEPT
* *

X19		COUNT / ROW PCT / COL PCT / TOT PCT	X1 IPRKPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 400	1		5 50.0 8.6 2.4	5 50.0 3.3 2.4	10 4.8
400-424	2		8 42.1 13.8 3.8	11 57.9 7.2 5.2	19 9.0
425-449	3		5 18.5 8.6 2.4	22 81.5 14.5 10.5	27 12.9
450-474	4		15 31.3 25.9 7.1	33 68.8 21.7 15.7	48 22.9
475-499	5		12 34.3 20.7 5.7	23 65.7 15.1 11.0	35 16.7
500-524	6		3 10.7 5.2 1.4	25 89.3 16.4 11.9	28 13.3
525-549	7		6 24.0 10.3 2.9	19 76.0 12.5 9.0	25 11.9
		COLUMN TOTAL	58 27.6	152 72.4	210 100.0

(CONTINUED)

X19		COUNT / ROW PCT / COL PCT / TOT PCT	X1 IPRKPOMO 0	POSTPOMO 1	ROW TOTAL
550-574	8		2 18.2 3.4 1.0	9 81.8 5.9 4.3	11 5.2
575-599	9		2 40.0 3.4 1.0	3 60.0 2.0 1.4	5 2.4
600 OR MORE	10		0 0. 0. 0.	2 100.0 1.3 1.0	2 1.0
		COLUMN TOTAL	58 27.6	152 72.4	210 100.0

DATA TABLES 04/11/80

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * *
X21 ASSIGNED VS AUTHORIZED BY X1 MAINTENANCE MGT CONCEPT
* *

X21	X1 COUNT / ROW PCT / COL PCT / TOT PCT	PREPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 90%	1	0	3	3
		0.	100.0	1.4
		0.	2.0	
		0.	1.4	
90-94%	2	1	11	12
		8.3	91.7	5.8
		1.7	7.3	
		0.5	5.3	
95-99%	3	10	25	35
		28.6	71.4	16.8
		17.2	16.7	
		4.8	12.0	
100-104%	4	14	63	77
		18.2	81.8	37.0
		24.1	42.0	
		6.7	30.3	
105-109%	5	15	34	49
		30.6	69.4	23.6
		25.9	22.7	
		7.2	16.3	
110-114%	6	18	14	32
		56.3	43.8	15.4
		31.0	9.3	
		8.7	6.7	
	COLUMN TOTAL	58	150	208
		27.9	72.1	100.0

FILE NONAME (CREATION DATE = 04/11/80)

* * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * *

X22 HRS FLOWN VS ALLOCATED BY X1 MAINTENANCE MGT CONCEPT

X22	COUNT / ROW PCT / COL PCT / TOT PCT	X1: IPANPOMO 0	POSTPOMO 1	ROW TOTAL
LESS THAN 90%	1	1 / 33.3 / 1.7 / 0.5	2 / 66.7 / 1.3 / 1.0	3 / 1.4
90-94%	2	1 / 16.7 / 1.7 / 0.5	5 / 83.3 / 3.3 / 2.4	6 / 2.9
95-99%	3	3 / 15.8 / 5.2 / 1.4	16 / 84.2 / 10.6 / 7.7	19 / 9.1
100-104%	4	48 / 28.1 / 82.8 / 23.0	123 / 71.9 / 81.5 / 58.9	171 / 81.8
105-109%	5	3 / 50.0 / 5.2 / 1.4	3 / 50.0 / 2.0 / 1.4	6 / 2.9
110-114%	6	1 / 50.0 / 1.7 / 0.5	1 / 50.0 / 0.7 / 0.5	2 / 1.0
115% OR MORE	7	1 / 50.0 / 1.7 / 0.5	1 / 50.0 / 0.7 / 0.5	2 / 1.0
COLUMN TOTAL		58 / 27.8	151 / 72.2	209 / 100.0

APPENDIX C

WILCOXON SIGNED RANK TEST CALCULATIONS

HYPOTHESIS 1: AVERAGE TURN TIME

FIS	(Before) X_i	(After) Y_i	(Y_i-X_i) D_i	$\lvert D_i \rvert$	Rank	Signed Rank
Langley	13.65	9.05	-4.6	4.6	4	-4
Castle	10.6	8.35	-2.25	2.25	1	-1
Griffiss	14.6	9.75	-4.85	4.85	5	-5
K.I. Sawyer	15.0	8.7	-7.2	7.2	67	-6
McChord	7.3	10.5	3.2	3.2	3	+3
Minot	8.55	5.8	-2.75	2.75	2	-2

$T = -15$

HYPOTHESIS 2: SCHEDULING EFFECTIVENESS RATE

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\lvert D_i \rvert$	Rank	Signed Rank
Langley	82.35	81.30	-1.05	1.05	1	-1
Castle	74.0	60.05	-13.05	13.05	6	-6
Griffiss	81.6	-6.1	-6.1	6.1	3	-3
K.I. Sawyer	78.1	80.6	+2.5	2.5	2	+2
McChord	68.6	79.4	10.8	10.8	5	+5
Minot	71.2	80.9	+9.7	9.7	4	+4

T = 1

HYPOTHESIS 3: NMCM RATE

FIS	(Before) X_i	(After) Y_i	(Y_i-X_i) D_i	$\|D_i\|$	Rank	Signed Rank
Langley	26.5	26.5	0	Discard: n=5	--	--
Castle	16.2	16.2	0	Discard: n=4	--	--
Griffiss	29.5	27.4	-2.1	2.1	1	-1
K.I. Sawyer	28.95	14.8	-14.15	14.15	3	-3
McChord	23.3	12.2	-11.1	11.1	2	-2
Minot	26.5	10.9	-15.6	15.6	4	-4

T = -10

HYPOTHESIS 4: DIRECT LABOR RATE

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\lvert D_i \rvert$	Rank	Signed Rank
Langley	68.5	65.35	-3.15	3.15	2	-2
Castle	59.75	63.45	+3.7	3.7	3	+3
Griffiss	49.0	64.55	+15.55	15.55	6	+6
K.I. Sawyer	50.75	63.8	+13.05	13.05	5	+5
McChord	60.1	51.7	-8.4	8.4	4	-4
Minot	52.6	53.4	+0.8	0.8	1	+1

T = 9

HYPOTHESIS 5: FMC RATE

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\lvert D_i \rvert$	Rank	Signed Rank
Langley	59.3	60.4	+1.1	1.1	1	+1
Castle	78.85	58.0	-20.85	20.85	6	-6
Griffiss	55.1	59.1	+4.0	4.0	4	+4
K.I. Sawyer	59.9	62.8	+2.9	2.9	3	+3
McChord	67.9	58.0	-9.9	9.9	5	-5
Minot	65.8	68.65	+2.85	2.85	2	+2

$T = -1$

HYPOTHESIS 5: FMC RATE (WITHOUT CASTLE)

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\lvert D_i \rvert$	Rank	Signed Rank
Langley	59.3	60.4	+1.1	1.1	1	+1
Griffiss	55.1	59.1	+4.0	4.0	4	+4
K.I. Sawyer	59.9	62.8	+2.9	2.9	3	+3
McChord	67.9	53.0	-9.9	9.9	5	-5
Minot	65.8	68.65	+2.85	2.85	2	+2

T = +5

HYPOTHESIS 6: MH/FH

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\lvert D_i \rvert$	Rank	Signed Rank
Langley	41.75	51.3	+9.55	9.55	6	+6
Castle	42.4	46..7	+4.3	4.3	3	+3
Griffiss	45.1	36.65	-8.45	8.45	4	-4
K.I. Sawyer	40.95	44.9	+3.95	3.95	2	+2
McChord	53.7	44.7	-9.0	9.0	5	-5
Minot	41.8	40.7	-1.1	1.1	1	-1

T = 1

HYPOTHESIS 7: REPEAT RATE

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\|D_i\|$	Rank	Signed Rank
Langley	5.0	8.05	+3.05	3.05	3	+3
Castle	6.15	8.00	+1.85	1.85	1	+1
Griffiss	3.7	9.9	+6.2	6.2	6	+6
K.I. Sawyer	9.2	6.8	-2.4	2.4	2	-2
McChord	6.6	12.4	+5.8	5.8	5	+5
Minot	9.1	5.35	-3.75	3.75	4	-4

T = 9

HYPOTHESIS 8: GROUND ABORT RATE

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\|D_i\|$	Rank	Signed Rank
Langley	2.95	3.30	+ .35	.35	1	+1
Castle	2.00	5.10	+3.1	3.1	5	+5
Griffiss	2.3	2.25	- .05	.05	Discard: n=5	--
K.I. Sawyer	4.7	3.6	-1.1	1.1	3	-3
McChord	2.7	3.9	+1.2	1.2	4	+4
Minot	2.55	2.95	+ .4	.4	2	+2

T = 9

HYPOTHESIS 9: AVERAGE HOURS FOR 400 HOUR INSPECTION

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\|D_i\|$	Rank	Signed Rank
Langley	787	738	-49	49	1	-1
Castle	757	665	-92	92	2	-2
Griffiss	501	1071	+570	570	6	+6
K.I. Sawyer	932	1126	+194	194	4	+4
McChord	699	930	+231	231	5	+5
Minot	306	427	+121	121	3	+3

T = 15

NUMBER ASSIGNED

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\|D_i\|$	Rank	Signed Rank
Langley	473	473	-36	36	6	-6
Castle	413	416	+3	3	1	+1
Griffiss	500	482	-18	18	3	-3
K.I. Sawyer	475	454	-21	21	4	-4
McChord	448	426	-22	22	5	-5
Minot	452	443	-9	9	2	-2

T = -19

MEAN SKILL LEVEL

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\lvert D_i \rvert$	Rank	Signed Rank
Langley	5.19	5.33	+.14	.14	3	+3
Castle	5.38	5.53	+.15	.15	4	+4
Griffiss	5.38	5.33	-.05	.05	1	-1
K.I. Sawyer	5.15	5.36	+.21	.21	5	+5
McChord	5.40	5.48	+.08	.08	2	+2
Minot	4.85	5.405	+.555	.55	6	+6

T = 19

HOURS FLOWN

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\lvert D_i \rvert$	Rank	Signed Rank
Langley	459	477	+18	18	3	+3
Castle	465	475	+10	10	1	+1
Griffiss	456	477	+21	21	4	+4
K.I. Sawyer	424	462	+38	38	6	+6
McChord	490	516	+26	26	5	+5
Minot	480	491	+11	11	2	+2

T = 21

HOURS ALLOCATED

FIS	(Before) X_i	(After) Y_i	$(Y_i - X_i)$ D_i	$\|D_i\|$	Rank	Signed Rank
Langley	492	485	-7	7	2	-2
Castle	465	469	+4	4	1	+1
Griffiss	456	476	+20	20	4	+4
K.I. Sawyer	424	464	+40	40	6	+6
McChord	490	516	+26	26	5	+5
Minot	484	494	+10	10	3	+3

$T = 17$

NUMBER PERSONNEL ASSIGNED VERSUS AUTHORIZED

FIS	(Before) X_i	(After) Y_i	(Y_i-X_i) D_i	$\|D_i\|$	Rank	Signed Rank
Langley	111	98	-13	13	6	-6
Castle	100	103	+3	3	2.5	+2.5
Griffiss	108	105	-3	3	2.5	-2.5
K.I. Sawyer	111	110	-1	1	1	-1
McChord	101	97	-4	4	4	-4
Minot	109	102	-7	7	5	-5

T = -16

APPENDIX D

REGRESSION RESULTS

POMO ANALYSIS

CORRELATION COEFFICIENTS

	X1	X7	X9	X10	X11	X12	X13
X1	1.00000	-0.14173	-0.34061	0.09293	-0.28186	0.21965	-0.29260
X7	-0.14173	1.00000	0.30684	0.19562	0.53136	-0.06570	-0.06740
X9	-0.34061	0.30684	1.00000	-0.06083	0.33629	-0.00185	-0.15266
X10	0.09293	0.19562	-0.06083	1.00000	-0.09143	0.01681	0.04472
X11	-0.28186	0.53136	0.33629	-0.09143	1.00000	0.16416	-0.35331
X12	0.21965	-0.06570	-0.00185	0.01681	0.16416	1.00000	-0.35453
X13	-0.29260	-0.06740	-0.15266	0.04472	-0.35331	-0.35453	1.00000
X14	-0.00205	-0.19346	0.06460	-0.13579	0.11562	0.44993	-0.19089
X15	0.12601	-0.05555	0.12681	-0.22264	0.17715	0.11003	-0.21464
X16	0.14098	-0.29143	-0.02998	-0.35936	-0.17489	0.08055	-0.15526
X17	0.15135	0.13411	0.06706	-0.01598	0.01272	0.17419	-0.04682
X18	0.30085	-0.33078	-0.10287	-0.15190	-0.24403	0.13564	-0.14379
X19	0.11951	-0.18495	-0.22491	0.01865	-0.18981	0.05289	-0.05298
X21	-0.23692	0.47779	0.23718	-0.00237	0.19627	0.08221	-0.09922
X22	-0.04757	-0.04470	-0.02563	-0.06966	0.01355	-0.00348	0.00547

	X14	X15	X16	X17	X18	X19	X21	X22
X1	-0.00205	0.12601	0.14098	0.15135	0.30085	0.11951	-0.23692	-0.04757
X7	-0.19346	-0.05555	-0.29143	0.13411	-0.33078	-0.18495	0.47779	-0.04470
X9	0.06460	0.12681	-0.02998	0.06706	-0.10287	-0.22491	0.23718	-0.02563
X10	-0.13579	-0.22264	-0.35936	-0.01598	-0.15190	0.01865	-0.00237	-0.06966
X11	0.11562	0.17715	-0.17489	0.01272	-0.24403	-0.18981	0.19627	0.01355
X12	0.44993	0.11003	0.08055	0.17419	0.13564	0.05289	0.08221	-0.00348
X13	-0.19089	-0.21464	-0.15526	-0.04682	-0.14379	-0.05298	-0.09922	0.00547
X14	1.00000	0.17658	0.17189	0.12659	0.10790	-0.25316	-0.06673	-0.03874
X15	0.17658	1.00000	0.12781	0.25854	0.16738	-0.08180	-0.15066	0.00032
X16	0.17199	0.12781	1.00000	-0.04050	0.10546	-0.00337	-0.00550	0.01139
X17	0.12659	0.25854	-0.04050	1.00000	-0.01548	-0.02613	0.01977	-0.04407
X18	0.10799	0.14738	0.10546	-0.01548	1.00000	0.19991	-0.38221	0.08283
X19	-0.25316	-0.08180	-0.00337	-0.02613	0.19991	1.00000	-0.15690	0.06033
X21	-0.06673	-0.15066	-0.00550	0.01977	-0.38221	-0.18499	1.00000	-0.04382
X22	-0.03874	0.00032	0.01139	-0.04407	0.08283	0.06033	-0.04382	1.00000

LEGEND:

X1	Maintenance Concept
X7	Number Assigned
X9	Average Turn Time
X10	Scheduling Effectiveness Rate
X11	NMCM Rate
X12	Direct Labor Rate
X13	FMC Rate
X13	Man-hours per Flying Hour
X15	Repeat Rate
X16	Ground Abort Rate
X17	Average Hours per 400-Hour Inspection
X18	Mean Skill Level
X19	Hours Flown
X21	Number Assigned vs. Authorized
X22	Hours Flown vs. Allocated

POMO ANALYSIS 04/08/80

FILE NONAME (CREATION DATE = 04/08/80)

* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X9 AVG TURN TIME

VARIABLE(S) ENTERED ON STEP NUMBER 1.. X1 MAINTENANCE NOT CONCEPT

MULTIPLE R	0.34061
R SQUARE	0.11601
ADJUSTED R SQUARE	0.11176
STANDARD ERROR	3.69098

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	1.	371.00073	371.00073	27.29727
RESIDUAL	208.	2833.46021	13.62337	

---------------- VARIABLES IN THE EQUATION ----------------

VARIABLE	B	BETA	STD ERROR B	F
X1	-2.9762931	-0.34061	0.56966	27.297
(CONSTANT)	11.8637931			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X7	0.26386	0.27781	0.97991	17.312
X18	-0.08840	-0.08967	0.90949	1.678
X19	-0.18687	-0.19733	0.98572	8.387
X21	0.16052	0.16587	0.94392	5.856
X22	-0.04193	-0.04454	0.99774	0.412

* *

VARIABLE(S) ENTERED ON STEP NUMBER 2.. X7 NUMBER ASSIGNED

MULTIPLE R	0.42923
R SQUARE	0.18424
ADJUSTED R SQUARE	0.17635
STANDARD ERROR	3.55425

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	2.	590.57709	295.28854	23.37490
RESIDUAL	207.	2614.96386	12.63268	

---------------- VARIABLES IN THE EQUATION ----------------

VARIABLE	B	BETA	STD ERROR B	F
X1	-2.6495967	-0.30321	0.55415	22.860
X7	0.0411024	0.26396	0.00988	17.312
(CONSTANT)	-6.7995265			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X18	-0.00530	-0.00533	0.82476	0.006
X19	-0.14617	-0.15831	0.95691	5.296
X21	0.04619	0.04407	0.74254	0.401
X22	-0.02840	-0.03137	0.99504	0.203

PONG ANALYSIS 04/08/80

FILE NONAME (CREATION DATE = 04/08/80)

* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X9 AVG TURN TIME

VARIABLE(S) ENTERED ON STEP NUMBER 3.. X19 HOURS FLOWN

MULTIPLE R	0.45242
R SQUARE	0.20468
ADJUSTED R SQUARE	0.19318
STANDARD ERROR	3.51793

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	3.	656.11421	218.70474	17.67100
RESIDUAL	286.	2549.42673	12.37586	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X1	-2.5274994	-0.28929	0.55163	21.846
X7	0.0371985	0.23880	0.00992	14.051
X19	-0.0114553	-0.14617	0.00498	5.296
(CONSTANT)	0.3547249			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X18	0.01526	0.01541	0.81105	0.049
X21	0.03024	0.02980	0.73542	0.173
X22	-0.02007	-0.02241	0.99169	0.103

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X9 AVG TURN TIME

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
X1	MAINTENANCE MGT CONCEPT	0.34061	0.11601	0.11601	-0.34061	-2.5278994	-0.28929
X7	NUMBER ASSIGNED	0.42923	0.18424	0.06822	0.30604	0.0371985	0.23880
X19	HOURS FLOWN	0.45242	0.20468	0.02044	-0.22491	-0.0114553	-0.14617
(CONSTANT)						0.3547249	

PONO ANALYSIS 04/08/80

FILE NONAME (CREATION DATE = 04/08/80)

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X10 SCHED EFFECTIVENESS RATE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. X7 NUMBER ASSIGNED

			ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
MULTIPLE R	0.19562		REGRESSION	1.	578.81898	578.81898	8.27659
R SQUARE	0.03827		RESIDUAL	208.	14546.36698	69.93446	
ADJUSTED R SQUARE	0.03364						
STANDARD ERROR	8.36260						

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X7	0.0661929	0.19562	0.02301	8.277
(CONSTANT)	46.9652558			

-------------- VARIABLES NOT IN THE EQUATION --------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X1	0.12312	0.12428	0.97991	3.240
X18	-0.09798	-0.09421	0.89858	1.854
X19	0.05677	0.05689	0.96579	0.672
X21	-0.12419	-0.11125	0.77172	2.594
X22	-0.06103	-0.06217	0.99808	0.803

* *

VARIABLE(S) ENTERED ON STEP NUMBER 2.. X1 MAINTENANCE NOT CONCEPT

			ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
MULTIPLE R	0.23049		REGRESSION	2.	803.50544	401.75272	5.80678
R SQUARE	0.05312		RESIDUAL	207.	14321.68051	69.18686	
ADJUSTED R SQUARE	0.04398						
STANDARD ERROR	8.31786						

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X7	0.0720976	0.21307	0.02312	9.726
X1	2.3376536	0.12312	1.29686	3.240
(CONSTANT)	42.5265166			

-------------- VARIABLES NOT IN THE EQUATION --------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X18	-0.14363	-0.13485	0.82476	3.769
X19	0.04538	0.04554	0.95691	0.428
X21	-0.10183	-0.08947	0.74254	1.662
X22	-0.05454	-0.05591	0.99584	0.646

WORD ANALYSIS 04/08/80

FILE NONAME (CREATION DATE = 04/08/80)

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1

DEPENDENT VARIABLE.. X10 SCHED EFFECTIVENESS RATE REGRESSION LIST 1

VARIABLE(S) ENTERED ON STEP NUMBER 3.. X18 MEAN SKILL LEVEL

MULTIPLE R	0.26484	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.07014	REGRESSION	3.	1060.85264	353.61755	5.17943
ADJUSTED R SQUARE	0.05660	RESIDUAL	286.	14064.33332	68.27346	
STANDARD ERROR	8.26278					

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X7	0.0579069	0.17084	0.02412	5.746
X1	3.0434391	0.16315	1.33869	5.169
X18	-6.0531295	-0.14343	3.11782	3.769
(CONSTANT)	88.6245545			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X19	0.06355	0.06303	0.94180	0.841
X21	-0.14354	-0.12482	0.70310	3.244
X22	-0.04346	-0.04436	0.98608	0.484

* *

VARIABLE(S) ENTERED ON STEP NUMBER 4.. X21 ASSIGNED VS AUTHORIZED

MULTIPLE R	0.29090	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.08462	REGRESSION	4.	1279.95880	319.98952	4.73794
ADJUSTED R SQUARE	0.06676	RESIDUAL	285.	13845.22788	67.53778	
STANDARD ERROR	8.21813					

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X7	0.0767019	0.22668	0.02618	8.584
X1	2.7278815	0.14371	1.31295	4.126
X18	-7.3759328	-0.17582	3.18675	5.357
X21	-0.2117938	-0.14354	0.11759	3.244
(CONSTANT)	101.4195871			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X19	0.05586	0.05568	0.93630	0.634
X22	-0.04588	-0.04600	0.98661	0.448

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1

DEPENDENT VARIABLE.. X10 SCHED EFFECTIVENESS RATE REGRESSION LIST 1

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
X7	NUMBER ASSIGNED	0.19562	0.03827	0.03827	0.19562	0.0767019	0.22668
X1	MAINTENANCE MGT CONCEPT	0.23049	0.05312	0.01486	0.09293	2.7278815	0.14371
X18	MEAN SKILL LEVEL	0.26484	0.07014	0.01701	-0.15190	-7.3759328	-0.17582
X21	ASSIGNED VS AUTHORIZED	0.29090	0.08462	0.01449	-0.08237	-0.2117938	-0.14354
(CONSTANT)						101.4195871	

NMMD ANALYSIS   04/08/80

FILE NONAME (CREATION DATE = 04/08/80)

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X11 NMCM RATE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. X7 NUMBER ASSIGNED

MULTIPLE R	0.53136
R SQUARE	0.28235
ADJUSTED R SQUARE	0.27889
STANDARD ERROR	6.76727

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	1.	3747.61227	3747.61227	81.83208
RESIDUAL	208.	9525.55253	45.79593	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X7	0.1684292	0.53136	0.01862	81.833
(CONSTANT)	-54.5315783			

-------------- VARIABLES NOT IN THE EQUATION --------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X1	-0.21078	-0.24638	0.97991	13.369
X18	-0.07665	-0.08539	0.89858	1.528
X19	-0.09478	-0.10995	0.96579	2.533
X21	-0.07465	-0.07741	0.77172	1.248
X22	0.03738	0.04408	0.99808	0.403

* *

VARIABLE(S) ENTERED ON STEP NUMBER 2.. X1 MAINTENANCE MOT CONCEPT

MULTIPLE R	0.57486
R SQUARE	0.32588
ADJUSTED R SQUARE	0.31937
STANDARD ERROR	6.57461

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	2.	4325.47352	2162.73676	50.03379
RESIDUAL	207.	8947.69128	43.22556	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X7	0.1589598	0.50149	0.01827	75.673
X1	-3.7479345	-0.21878	1.02586	13.369
(CONSTANT)	-47.5735341			

-------------- VARIABLES NOT IN THE EQUATION --------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X18	-0.01786	-0.01976	0.82476	0.080
X19	-0.07511	-0.08949	0.95691	1.663
X21	-0.12559	-0.13181	0.74254	3.642
X22	0.02687	0.03168	0.99584	0.207

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MMMO ANALYSIS                                                                    04/08/80

FILE    NONAME    (CREATION DATE = 04/08/80)

* * * * * * * * * * * * * * * * * * * * * * *  M U L T I P L E   R E G R E S S I O N  * * * * * * * * * * * * *    VARIABLE LIST  1
DEPENDENT VARIABLE..    X11        MMCM RATE                                                                         REGRESSION LIST  1

VARIABLE(S) ENTERED ON STEP NUMBER  3..    X21        ASSIGNED VS AUTHORIZED

MULTIPLE R            0.58103                 ANALYSIS OF VARIANCE      DF      SUM OF SQUARES      MEAN SQUARE           F
R SQUARE              0.33759                 REGRESSION                3.        4480.92194        1493.64065       34.99562
ADJUSTED R SQUARE     0.32795                 RESIDUAL                206.        8792.24286          42.68079
STANDARD ERROR        6.53305

----------------- VARIABLES IN THE EQUATION ------------------        ------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE              B            BETA      STD ERROR B        F         VARIABLE    BETA IN     PARTIAL    TOLERANCE        F
X7               0.1770062      0.55842        0.02047      74.754       X18       -0.04786    -0.05197    0.78896      0.555
X1              -4.1332897     -0.23245        1.03840      15.844       X19       -0.08677    -0.10379    0.94774      2.232
X21             -0.1735923     -0.12559        0.09096       3.642       X22        0.02210     0.02786    0.99368      0.150
(CONSTANT)     -37.4228106

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

* * * * * * * * * * * * * * * * * * * * * * *  M U L T I P L E   R E G R E S S I O N  * * * * * * * * * * * * *    VARIABLE LIST  1
DEPENDENT VARIABLE..    X11        MMCM RATE                                                                         REGRESSION LIST  1

                                                    SUMMARY TABLE

VARIABLE                                       MULTIPLE R  R SQUARE  RSQ CHANGE  SIMPLE R          B              BETA
X7          NUMBER ASSIGNED                      0.53136    0.28235    0.28235    0.53136     0.1770062        0.55842
X1          MAINTENANCE MGT CONCEPT              0.57086    0.32588    0.04354   -0.28186    -4.1332897       -0.23245
X21         ASSIGNED VS AUTHORIZED               0.58103    0.33759    0.01171    0.19627    -0.1735923       -0.12559
(CONSTANT)                                                                                  -37.4228106
```

HOHO ANALYSIS 04/08/80

FILE NONAME (CREATION DATE = 04/08/80)

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X12 DIRECT LABOR RATE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. X1 MAINTENANCE NOT CONCEPT

MULTIPLE R	0.21965
R SQUARE	0.04825
ADJUSTED R SQUARE	0.04367
STANDARD ERROR	11.56211

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	1.	1409.55594	1409.55594	10.54487
RESIDUAL	288.	27885.91678	133.68229	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X1	5.7944873	0.21965	1.78448	10.544
(CONSTANT)	56.5482759			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X7	-0.03528	-0.03580	0.97991	0.266
X18	0.07648	0.07476	0.98949	1.163
X19	0.02703	0.02754	0.98572	0.157
X21	0.14220	0.14162	0.94392	4.236
X22	0.00699	0.00715	0.99774	0.011

* *

VARIABLE(S) ENTERED ON STEP NUMBER 2.. X21 ASSIGNED VS AUTHORIZED

MULTIPLE R	0.25949
R SQUARE	0.06733
ADJUSTED R SQUARE	0.05837
STANDARD ERROR	11.47319

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	2.	1967.21116	983.60558	7.47227
RESIDUAL	287.	27248.26156	131.63411	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X1	6.6024712	0.25331	1.82260	13.444
X21	0.2916165	0.14220	0.14168	4.236
(CONSTANT)	25.7336070			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X7	-0.12600	-0.11527	0.77085	2.774
X18	0.14098	0.13114	0.80784	3.605
X19	0.05131	0.05203	0.95984	0.559
X22	0.01489	0.01537	0.99459	0.049

HMO ANALYSIS 04/08/80

FILE NONAME (CREATION DATE = 04/08/80)

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X12 DIRECT LABOR RATE

VARIABLE(S) ENTERED ON STEP NUMBER 3.. X18 MEAN SKILL LEVEL

MULTIPLE R	0.28875
R SQUARE	0.08337
ADJUSTED R SQUARE	0.07003
STANDARD ERROR	11.40168

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	3.	2435.83406	811.94469	6.24581
RESIDUAL	286.	26779.63866	129.99825	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X1	5.8541282	0.22191	1.86389	9.873
X21	0.3868600	0.18865	0.14947	6.699
X18	8.2575744	0.14898	4.34920	3.605
(CONSTANT)	-27.5581913			

-------------- VARIABLES NOT IN THE EQUATION --------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X7	-0.10423	-0.09403	0.74594	1.829
X19	0.03546	0.03598	0.94359	0.266
X22	0.00372	0.00386	0.98679	0.003

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X12 DIRECT LABOR RATE

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
X1	MAINTENANCE MGT CONCEPT	0.21965	0.04825	0.04825	0.21965	5.8541282	0.22191
X21	ASSIGNED VS AUTHORIZED	0.25949	0.06733	0.01909	0.08221	0.3868600	0.18865
X18	MEAN SKILL LEVEL	0.28875	0.08337	0.01604	0.13564	8.2575744	0.14898
(CONSTANT)						-27.5581913	

POMO ANALYSIS 05/12/80

FILE NONAME (CREATION DATE = 05/12/80)

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X13 FMC RATE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. X1 MAINTENANCE MGT CONCEPT

MULTIPLE R	0.17047	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0. 2906	REGRESSION	1.	438.22086	438.22086	5.26739
ADJUSTED R SQUARE	0. 2334	RESIDUAL	176.	14642.33508	83.19509	
STANDARD ERROR	9.12113					

------------------ VARIABLES IN THE EQUATION ------------------ ------------------ VARIABLES NOT IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F	VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X1	-3.5356 90	-0.17047	1.58052	5.267	X7	-0.00806	-0.00796	0.94811	0.011
(CONSTANT)	63. 979167				X18	-0.12496	-0.12093	0.9 923	2.597
					X19	-0.02719	-0.02743	0.98768	0.132
					X21	-0.11880	-0.11468	0.9J485	2.332
					X22	0.01360	0.01378	0.99721	0.033

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X13 FMC RATE

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
X1	MAINTENANCE MGT CONCEPT	0.17047	0.02906	0.02906	-0.17047	-3.5356090	-0.17047
(CONSTANT)						63.0979167	

POMO ANALYSIS 04/08/80

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X14 MANHOURS PER FLYING HOUR

VARIABLE(S) ENTERED ON STEP NUMBER 1.. X19 HOURS FLOWN

		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
MULTIPLE R	0.25316	REGRESSION	1.	1129.15176	1129.15176	14.24320
R SQUARE	0.06409	RESIDUAL	208.	16489.52580	79.27657	
ADJUSTED R SQUARE	0.05959					
STANDARD ERROR	8.90374					

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X19	-0.0465130	-0.25316	0.01232	14.243
(CONSTANT)	67.6344737			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X1	0.02861	0.02936	0.98572	0.179
X7	-0.24879	-0.25273	0.96579	14.124
X18	0.16500	0.16711	0.96883	5.947
X21	-0.11820	-0.12002	0.96504	3.025
X22	-0.02355	-0.02430	0.99636	0.122

* *

VARIABLE(S) ENTERED ON STEP NUMBER 2.. X7 NUMBER ASSIGNED

		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
MULTIPLE R	0.35195	REGRESSION	2.	2182.37297	1091.18648	14.63275
R SQUARE	0.12387	RESIDUAL	207.	15436.38459	74.57152	
ADJUSTED R SQUARE	0.11540					
STANDARD ERROR	8.63548					

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X19	-0.0549671	-0.29917	0.01216	20.423
X7	-0.0908568	-0.24879	0.02418	14.124
(CONSTANT)	112.4243017			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X1	-0.00168	-0.00169	0.97890	0.001
X18	0.09799	0.09768	0.87865	1.984
X21	-0.00499	-0.00465	0.76165	0.004
X22	-0.03197	-0.03407	0.99520	0.239

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X14 MANHOURS PER FLYING HOUR

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
X19	HOURS FLOWN	0.25316	0.06409	0.06409	-0.25316	-0.0549671	-0.29917
X7	NUMBER ASSIGNED	0.35195	0.12387	0.05978	-0.19346	-0.0908568	-0.24879
(CONSTANT)						112.4243017	

POND ANALYSIS 04/08/88

FILE NONAME (CREATION DATE = 04/08/88)

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X15 REPEAT RATE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. X18 MEAN SKILL LEVEL

MULTIPLE R	0.16738
R SQUARE	0.02801
ADJUSTED R SQUARE	0.02334
STANDARD ERROR	4.06207

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	1.	98.92021	98.92021	5.99503
RESIDUAL	208.	3432.07987	16.50038	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X18	3.4082545	0.16738	1.39199	5.995
(CONSTANT)	-9.0640474			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X1	0.08318	0.08046	0.99949	1.349
X7	-0.00020	-0.00019	0.89058	0.000
X19	-0.12006	-0.11932	0.96003	2.990
X21	-0.10151	-0.09515	0.85392	1.891
X22	0.06692	0.06765	0.99314	0.952

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X15 REPEAT RATE

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
X18	MEAN SKILL LEVEL	0.16738	0.02801	0.02801	0.16738	3.4082545	0.16738
(CONSTANT)						-9.0640474	

BMD ANALYSIS 04/08/80

FILE NONAME (CREATION DATE = 04/08/80)

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. X16 GROUND ABORT RATE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. X7 NUMBER ASSIGNED

MULTIPLE R	0.29143
R SQUARE	0.08493
ADJUSTED R SQUARE	0.08053
STANDARD ERROR	1.50810

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	1.	43.90859	43.90859	19.30500
RESIDUAL	208.	473.06765	2.27436	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X7	-0.0182512	-0.29143	0.00415	19.306
(CONSTANT)	11.4480589			

-------------- VARIABLES NOT IN THE EQUATION --------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X1	0.10980	0.11363	0.97991	2.700
X18	0.01017	0.01083	0.89058	0.021
X19	-0.14213	-0.14601	0.96579	4.509
X21	0.17331	0.15915	0.77172	5.380
X22	-0.00164	-0.00171	0.99800	0.001

* *

VARIABLE(S) ENTERED ON STEP NUMBER 2.. X21 ASSIGNED VS AUTHORIZED

MULTIPLE R	0.32880
R SQUARE	0.10811
ADJUSTED R SQUARE	0.09949
STANDARD ERROR	1.49247

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	2.	55.89120	27.94564	12.54595
RESIDUAL	207.	461.08496	2.22746	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X7	-0.0234111	-0.37424	0.00467	25.085
X21	0.0472764	0.17331	0.02038	5.380
(CONSTANT)	8.8784319			

-------------- VARIABLES NOT IN THE EQUATION --------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X1	0.14520	0.14929	0.94286	4.696
X18	0.05083	0.05583	0.82547	0.644
X19	-0.12698	-0.13034	0.95319	3.560
X22	0.00226	0.00240	0.99735	0.001

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* * * * * * * * * * * * * * * * * * * * * *  M U L T I P L E   R E G R E S S I O N  * * * * * * * * * * * * *   VARIABLE LIST  1
                                                                                                                 REGRESSION LIST  1

DEPENDENT VARIABLE..    X16        GROUND ABORT RATE

VARIABLE(S) ENTERED ON STEP NUMBER  3..    X1        MAINTENANCE NOT CONCEPT

MULTIPLE R           0.35776          ANALYSIS OF VARIANCE    DF     SUM OF SQUARES     MEAN SQUARE          F
R SQUARE             0.12799          REGRESSION               3.         66.16781        22.05594       10.07861
ADJUSTED R SQUARE    0.11529          RESIDUAL               206.        450.88843         2.18839
STANDARD ERROR       1.47932

----------------- VARIABLES IN THE EQUATION -----------------        ------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE          B          BETA      STD ERROR B        F          VARIABLE     BETA IN      PARTIAL    TOLERANCE        F
X7           -0.0238747   -0.36886      0.00464       24.776         X18          0.02325      0.02201     0.78896      0.099
X21           0.0559556    0.20512      0.02868        7.381         X19         -0.13778     -0.14364     0.94774      4.319
X1            0.5995345    0.14520      0.23513        4.696         X22          0.01087      0.01160     0.99368      0.020
(CONSTANT)    7.4687398
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

VARIABLE(S) ENTERED ON STEP NUMBER  4..    X19        HOURS FLOWN

MULTIPLE R           0.38208          ANALYSIS OF VARIANCE    DF     SUM OF SQUARES     MEAN SQUARE          F
R SQUARE             0.14598          REGRESSION               4.         75.46942        18.86735        8.76047
ADJUSTED R SQUARE    0.12932          RESIDUAL               205.        441.58682         2.15369
STANDARD ERROR       1.46755

----------------- VARIABLES IN THE EQUATION -----------------        ------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE          B          BETA      STD ERROR B        F          VARIABLE     BETA IN      PARTIAL    TOLERANCE        F
X7           -0.0241183   -0.38554      0.00463       27.108         X18          0.04042      0.03842     0.77154      0.302
X21           0.0517786    0.18981      0.02053        6.360         X22          0.01837      0.01970     0.99864      0.080
X1            0.5462968    0.15568      0.23393        5.454
X19          -0.0043364   -0.13778      0.00209        4.319
(CONSTANT)   10.4132186

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  M U L T I P L E   R E G R E S S I O N  * * * * * * * * * * * * *   VARIABLE LIST  1
                                                                                                                 REGRESSION LIST  1

DEPENDENT VARIABLE..    X16        GROUND ABORT RATE

                                              SUMMARY TABLE

VARIABLE                                MULTIPLE R   R SQUARE   RSQ CHANGE   SIMPLE R          B              BETA
X7         NUMBER ASSIGNED                0.29143     0.08493     0.08493    -0.29143     -0.0241183      -0.38554
X21        ASSIGNED VS AUTHORIZED         0.32888     0.10811     0.02318    -0.09950      0.0517786       0.18981
X1         MAINTENANCE NOT CONCEPT        0.35776     0.12799     0.01988     0.14890      0.5462968       0.15568
X19        HOURS FLOWN                    0.38208     0.14598     0.01799    -0.08337     -0.0043364      -0.13778
(CONSTANT)                                                                                10.4132486
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POMO ANALYSIS 04/08/80

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * *   VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE..   X17   AVG HRS PER INSPECTION

VARIABLE(S) ENTERED ON STEP NUMBER 1..   X1   MAINTENANCE NOT CONCEPT

MULTIPLE R	0.15135	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.02291	REGRESSION	1.	1378107.81221	1378107.81221	4.87615
ADJUSTED R SQUARE	0.01821	RESIDUAL	208.	58785455.08779	282622.38023	
STANDARD ERROR	531.52240					

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X1	181.1821488	0.15135	82.04973	4.876
(CONSTANT)	745.7586787			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X7	0.15875	0.15898	0.97991	5.367
X18	-0.06708	-0.06472	0.94949	0.871
X19	-0.04486	-0.04586	0.98572	0.421
X21	0.05892	0.05791	0.94392	0.697
X22	-0.03695	-0.03734	0.99774	0.289

* *

VARIABLE(S) ENTERED ON STEP NUMBER 2..   X7   NUMBER ASSIGNED

MULTIPLE R	0.21817	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.04760	REGRESSION	2.	2863800.25568	1431900.12784	5.17285
ADJUSTED R SQUARE	0.03840	RESIDUAL	207.	57299762.64437	276810.44756	
STANDARD ERROR	526.12779					

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
X1	208.1165089	0.17385	82.02976	6.437
X7	3.3877454	0.15975	1.46238	5.367
(CONSTANT)	-792.5114078			

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
X18	-0.01851	-0.01723	0.82476	0.061
X19	-0.01834	-0.01838	0.95691	0.070
X21	-0.02007	-0.01772	0.74254	0.065
X22	-0.02084	-0.02948	0.99584	0.179

* M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * *   VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE..   X17   AVG HRS PER INSPECTION

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
X1	MAINTENANCE NOT CONCEPT	0.15135	0.02291	0.02291	0.15135	208.1165089	0.17385
X7	NUMBER ASSIGNED	0.21817	0.04760	0.02469	0.13411	3.3877454	0.15975
(CONSTANT)						-792.5114078	

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BIOGRAPHICAL SKETCHES

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Captain Diener is a distinguished graduate of the United States Air Force Academy with a B.S. degree in management and economics. After receiving his commission, he entered the Aircraft Maintenance career field and was assigned to Moody AFB GA (TAC) prior to entering AFIT.

During the tour at Moody, Captain Diener supervised activities in flightline maintenance (OMS), Job Control, and shop maintenance (CRS). Captain Diener was also involved in the transition of the Wing to the POMO concept. Following graduation from AFIT, Captain Diener will be assigned to HQ USAFE/LGM.

Captain Hood enlisted in the Air Force in 1959 and received his commission through the Airmen Education and Commissioning Program (AECP). Following graduation from Florida State University with a B.S. degree in Business Administration, Captain Hood was commissioned in 1973 and served as a Personnel Officer for two years. In 1975 he became an Aircraft Maintenance Officer and was assigned to the Air Defense Weapons Center at Tyndall AFB FL. His experience as an Aircraft Maintenance Officer include Branch OIC (AMS), Maintenance Supervisor (FMS), and finally F-106 AMU supervision during POMO transition.

Upon graduation Captain Hood will be assigned to the Quality Assurance Division, San Antonio Air Logistics Center, Kelly AFB, Texas.