DETAILED REQUIREMENTS ANALYSIS FOR A MANAGEMENT INFORMATION SYSTEM FOR THE DEPARTMENT OF FAMILY PRACTICE AND COMMUNITY MEDICINE AT SILAS B. HAYS ARMY COMMUNITY HOSPITAL, FORT ORD, CA

by

Elbert T. Shaw, Jr.
and
Joan P. Zimmerman

March 1989

Thesis Advisor Thomas P. Moore

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This thesis analyzes the current management information systems in place at Silas B. Hays Army Community Hospital with in-depth research into the hospital's largest department, the Department of Family Practice and Community Medicine. The findings of the research indicate these systems are not meeting the needs of department managers within the hospital. This thesis contains a requirements analysis for an improved information system for the department. The process of identifying the targeted users, selecting the appropriate development methodology, and identifying the users' information requirements is discussed. The value of the information required by the department manager, both in content and format, is examined. The requirements analysis is based on a combination of systems development life cycle and prototyping methodologies for information systems development and can be used to design, construct, and implement an information system for the targeted department. The requirements analysis can also be used to study the expandability of the proposed information system to departments throughout Silas B. Hays Army Community Hospital.
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by

Elbert Turner Shaw, Jr.
Captain(P), United States Army
B.S., University of South Alabama, 1979

and

Joan Phillips Zimmerman
Captain, United States Marine Corps
B.S., Purdue University, 1983

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March 1989

Authors: ____________________________
Elbert Turner Shaw, Jr.
Joan Phillips Zimmerman

Approved By: ________________________________
Thomas P. Moore, Thesis Advisor
Thomas J. Semarge, Second Reader
David R. Whipple, Jr., Chairman,
Department of Administrative Sciences

Kneale T. Marshall
Dean of Information and Policy Sciences
ABSTRACT

This thesis analyzes the current management information systems in place at Silas B. Hays Army Community Hospital with in depth research into the hospital’s largest department, the Department of Family Practice and Community Medicine. The findings of the research indicate these systems are not meeting the needs of department managers within the hospital. This thesis contains a requirements analysis for an improved information system for the department. The process of identifying the targeted users, selecting the appropriate development methodology, and identifying the user’s information requirements is discussed. The value of the information required by the department manager, both in content and format, is examined. The requirements analysis is based on a combination of systems development life cycle and prototyping methodologies for information systems development and can be used to design, construct, and implement an information system for the targeted department. The requirements analysis can also be used to study the expandability of the proposed information system to departments throughout Silas B. Hays Army Community Hospital.
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I. INTRODUCTION

A. BACKGROUND

Silas B. Hays Army Community Hospital (SBHACH) is a large, full service medical department activity (MEDDAC) providing health care to active duty, retired, and dependent personnel living in and around Fort Ord. The MEDDAC also provides regional medical services to personnel from Hunter Liggett Military Reservation, Presidio of Monterey, Sacramento Army Depot, United States Naval Postgraduate School, and the Sharpe Army Depot. SBHACH's annual operating budget is over seven million dollars and in fiscal year 1988, over 460,000 patients were treated. The hospital consists of 13 major medical departments which provide inpatient and outpatient service, major surgical services, military medical support, and veterinary service. In addition, SBHACH is a teaching hospital for Army doctors and provides occupational health to civilian employees. The goal of SBHACH is to provide its patients with the best medical care possible.

The quality of the medical care provided depends on factors such as the quality of the hospital personnel and the effective use of available resources, e.g. personnel, money, time, and medical supplies. Another factor, the efficient use of resources, indirectly affects the quality of care provided because this factor will determine the continued availability of the resources. One of the biggest obstacles SBHACH faces in trying to reach its goal is the limited resources with which it must operate.
SBHACH doctors and administrators must constantly deal with resource constraints. They are continually searching for more efficient and effective resource management to deal with these constraints while, at the same time, improving the quality of care provided to the patients. In searching for the balance between cost efficiency and quality of care, hospital administrators are turning to information systems, both automated and manual, in the belief that better information will help them operate more cost effectively.

B. PURPOSE

The purpose of this thesis is to study the current management information systems in place at Silas B. Hays Army Community Hospital and determine if these systems are meeting the needs of department managers within the hospital. In identifying the requirements of key department decision makers, we will propose improvements to the information system where the current system fails to meet the department manager’s needs. Ultimately, the thesis will provide a design for an information system which will meet the needs of department decision makers more effectively and efficiently than current systems.

C. SCOPE

Due to time limitations, the research did not encompass the entire hospital operation. Therefore, after initial interviews and some detailed study, one department was selected based on its high volume and overall impact on the hospital. The department chosen for the research was the Department of Family Practice and Community Medicine (DFPCM). The DFPCM is one of the 13 major departments
within SBHACH and serves nearly 53 percent of the hospital's patients. An additional motivation for limiting the scope of the research was the increased depth of the analysis and design of an information system that would otherwise be possible.

In addition to the direct study of the DFPCM, it was necessary to conduct research in the many supporting units which influence the department's overall ability to function. The following support divisions were contacted during the course of research:

- Resource Management Division
- Information Management Division
- Clinical Support Division
- Department of Nursing
- Logistics Division
- Personnel Division
- Patient Administration Division

D. METHODS AND ORGANIZATION

The thesis research followed the information systems development life cycle described in the first two sections of Chapter II. Chapter II discusses the theory of information systems and the analysis and design of such systems. The last section of Chapter II introduces the application of information systems to health care. Research was conducted to discover the history, current status, and future of hospital information systems (HISs) and the critical nature of these specialized systems.

The DFPCM organization and functions are described in detail in the first section of Chapter III. Section 2 of Chapter III discusses the results of the current systems
analysis. Data Flow Diagrams (DFDs) are introduced in Chapter III. DFDs diagrammatically portray the current information systems within the DFPCM.

Chapter IV covers the requirements for improving the existing information systems within the DFPCM and how these improvements can be accomplished using an automated information management system. The findings in Chapter IV are a direct result of the analysis conducted in Chapter III and described what is necessary for the information system to meet the needs of the department managers.

The detailed systems requirements analysis is presented in Chapter V, incorporating the functional requirements and alternatives selected in the previous chapters. User Concept Diagrams (UCDs) are introduced in Chapter V to diagrammatically portray the proposed information systems for the DFPCM. The requirements analysis, as described in the chapter, is for the DFPCM alone. This analysis can be used to design and implement a management information system for this department, or with additional study, may be expandable to other clinics within the hospital.

Conclusions and recommendations resulting from this thesis are given in Chapter VI. Chapter VI also suggests directions for further research work.
II. INFORMATION SYSTEMS

A. INTRODUCTION

This chapter introduces the concepts of an information system and the systems development process and discusses the impact of information systems within a hospital environment.

Section B, System Design Concepts, describes the information systems development methodologies used in the thesis to design the information system for the Department of Family Practice and Community Medicine. The process of selecting the most appropriate system development methodology(ies) is also examined.

Section C, Hospital Information Systems (HISs), describes the critical nature of the hospital organization and its impact on the role of information systems within the hospital environment, both historically and in the near future. Also presented in Section C is a description of the information systems currently used at SBHACH.

B. SYSTEM’S DESIGN CONCEPTS

An information system has been described as a collection of human, computerized, and mechanical agents that work together to acquire, produce, handle, store, use, and disseminate information (Lockeman, 1986, p. 617). Information systems are meant to support the day to day operations, management, and decision making needs of an organization. An effective information system does not necessarily have to be automated. Information systems exist, with or without automation, because workers within the organization require some sort of a system to collect, process, and
exchange the information they need. When automation is deemed necessary and properly designed, it can provide the organization with an increase in both the efficiency and effectiveness of operations. (Whitten, Bently, and Ho, 1986, p. 40)

There are four important considerations in the development of an effective information system. First and foremost, the system must be designed to serve the needs of the users. The analyst has a responsibility to provide the user with a product that is both useful and correct. Secondly, the analyst should understand the organization’s mission to build the system to effectively support that mission. Thirdly, information systems provide one or more of the three information functions depicted in Table I. The analyst must determine which of these functions the system should support and how the information system will fit within the organization to fulfill those functions. Lastly, the system’s components, as depicted in Figure 1, should be designed to harmoniously work together to support the system’s intended purpose within the organization. (Whitten, Bently, and Ho, 1986, p. 692) This requires the analyst to systematically analyze the data inputs, data flows, processes, and information outputs. (Kendall and Kendall, 1988, p. 6)

Table I. INFORMATION FUNCTIONS

Data Processing Systems
Processes large amounts of data for routine organization transactions.

Management Information Systems
Provides periodic reports for planning, control and decision making.

Decision Support Systems
Supports decision makers by providing information on demand.
Computer equipment or Hardware. Information systems may include a variety of hardware components, including copiers, calculators, and computer systems.

Computer Programs or Software. A system is a mixture of programs that either control the computer or provide applications to the users.

Users (Knowledge workers) are the most vital part of the information system's components. They are the central theme in any design methodology.

Methods and Procedures. Methods refer to how the system works whereas procedures describe how to perform the job and how to make decisions.

Data Storage. This is a fundamental component of the system. This is the raw data that must be accessed to process into useful information.

Internal Controls. Feedback and control are system concepts that must be added to any system to ensure its proper operation.

Figure 1. Information System Components (Whitten, Bently, and Ho, 1986, p. 692)
Prior to attempting the design of an information system, the systems analyst must choose a design methodology which will best meet his or her needs and the user's needs. This selection process and a description of the methodology used in this thesis is described in the following sections.

1. Systems Development Life Cycle Methodology

System development in the late 1960s\(^1\) was often behind schedule, over budget, expensive, and poorly suited to the users' requirements. As a result, the early system designers developed a set of structured methodologies to make the development process more orderly and manageable. The emergence of structured methodologies provided the analyst with a welcome escape from the haphazard approaches used to develop the requirements, specifications, and programs used in the early design models (Ceri, 1982, p. 208).

As the structured approaches became accepted as a viable systems design alternative, more analysts began to perceive that the structured methodology could even be further improved with the inclusion of a life cycle within the model. This enhanced structured approach, dubbed the Systems Development Life Cycle, was used by these analysts to bring together all of the already proven systems design techniques with the successful project management techniques. This system development life cycle methodology emerged as the most preferred method of all of the system design methodologies. (Wassermann, 1984, p. 44)

\(^1\) This continues to be the case in the eighties.
Figure 2 portrays the Systems Development Life Cycle methodology. This approach provided several significant advantages over the non-structured approaches and the early forms of the structured methodologies. This design approach gave the systems analyst a better understanding of the user's requirements while increasing the user's comprehension and participation in the design process. (Willis, Huston, and d'Ouville, 1988, p. 56) Users also tended to be a lot more satisfied with the final outcome of a system designed using this methodology. Information systems designed using this methodology were also found to be more flexible and maintainable than the early approaches. (Sumner and Sitek, 1986, p. 235)

As Figure 2 shows, the life cycle begins with a project development request. Before a more detailed systems study is started, the systems analyst surveys the problem, opportunity, or directive that initiated the request. This survey is used to determine whether or not significant resources should be committed to the project. If the system development is approved, the development enters the first major phase of the SDLC, the study phase. The goal of the study phase is to educate the analyst about the current system, thus allowing the causes and effects of the problems to be discovered. This type of analysis is presented in Chapter III of this thesis.

The next phase, the requirements phase, is the most critical of the life cycle phases because it provides the foundation for all subsequent phases (Willis, Huston, and d'Ouville, 1988, p. 56). This phase is concerned with the analyst understanding the problems found in the study phase and describing them in terms of the activities, data,
information flows, relationships, and system constraints necessary to solve the problem (Ceri, 1982, p. 205). This type of analysis is presented in Chapters IV and V of this thesis.

![Systems Development Life Cycle Diagram](image-url)

**Figure 2. Systems Development Life Cycle.**
The evaluation phase looks at how the new system should be developed. The analyst must seek out all possible solutions to the problem and generate a set of alternative proposals to solve the problem. Each alternative is then evaluated on technical, operational, and economic feasibility. The outcome of this phase should be a technically feasible solution. (Whitten, Bently, and Ho, 1986, p. 149)

If this solution calls for new hardware or software, the selection phase becomes necessary. During the selection phase, the analyst determines which system specifications are important for the equipment or software required for the new system. Proposals are then developed and sent to vendors. Once the vendors’ proposals are returned, the systems analyst selects the hardware and software configurations that best meets the project’s needs at the most reasonable cost. (Whitten, Bently, and Ho, 1986, p. 151)

Given the user requirements, a feasible solution, and the hardware or software configurations from the selection phase, the analyst can now design and construct the information system. Computer outputs are normally designed first, followed by files/databases, and subsequently the user inputs and terminal dialogues. The design phase is where system controls, as implemented in methods and procedures, first enter the developmental life cycle. The deliverable of this phase is the completed design specification and the preliminary procedures necessary for the construction of the new system. The construction and design phases are frequently the most time consuming and tedious phases, particularly if the requirements are incomplete or do not
reflect the actual user's requirements. Finally the system is delivered, the users are trained, and the system enters the maintenance phase. (Whitten, Bently, and Ho, 1986, pp. 151-155)

Throughout the various phases, the analyst is collecting facts, documenting the system, presenting ideas, and reevaluating the feasibility of the system. All of the phases of the system development life cycle are not discreet and distinct phases. Figure 3 illustrates how each phase can overlap within the life cycle. (Whitten, Bently, and Ho, 1986, p. 157) As a life cycle model should indicate, the process will begin again as new project requests are generated, the organization evolves, or the system once again fails to meet the user's requirements.

Figure 3. Overlap Opportunities within the Systems Development Life Cycle. (Whitten, Bently, and Ho, 1986, p. 157)

In spite of the large number of structured methodologies available, this type of systems analysis is not widely used (Sumner and Sitek, 1986, p. 235). Today, only about ten percent of the data processing organizations in North America practice
structured techniques in a disciplined fashion even though 90% of the community is at least superficially familiar with the basic concepts (Yourdon, 1986, p. 133).

Prior to selecting the use of one of these methodologies in our thesis, a closer look was taken to determine why these methodologies, so often taught at universities, were not being used. Yourdon explains that there are many reasons for this reversal in the attitudes toward structured analysis. He felt that the primary reason for this reversal was the frustration of analysts over the amount of manual labor required to develop systems using the structured methodologies. Analysts in a real business environment did not have the time to do the time consuming requirements documentation necessary for the requirements analysis when there was a large backlog of projects awaiting development. The analysts also became increasingly frustrated with the inability to apply these methodologies to complex, real-time systems. (Yourdon, 1986, p. 133) Additionally, many systems analysts were not trained in the use of the methodologies and tools and were unsure as to which tools could be effectively used within the phases of the life cycle (Ceri, 1982, p. 208). One of the major reasons for this reversal of attitudes was the development of the prototyping methodologies discussed in the following section. Many analysts were lured away from the structured approaches to systems development by the promise that prototyping could be used to interactively design and progressively tune the systems design without the rigorous requirements of the structured approaches (Ceri, 1982, p. 208).

Too often, even though the structured techniques were used, the end result was a better design that still did not meet the users' needs. Because of the time lag between the analysis and implementation phases in the structured methodology, the
users' environment changed even after the system's requirements were set in the requirements and design phases. The users also had difficulty communicating their requirements to the analyst. Senn points out "users can point to features they like or dislike in an existing system more easily than they can describe them in an imaginary or proposed system." (Senn, 1987, p. 611) These observations led to the conclusion that a better design methodology was needed to meet system development requirements.

2. Prototyping Methodologies

Information systems analysts saw the need for an improved design method. They felt that any systems development approach required the concurrent learning of both the analyst and the users. During the requirements phase, the major functions of the analyst are to help users formalize their tasks and decision processes, ensure that the users learn the analyst's modeling techniques, and help the users understand the scope of the project (Cerveny, 1987, p.98). The structured methodologies simply did not fulfill this requirement. Recent developments in computer technology, primarily the introduction of user friendly code generators, allowed the systems analysts to develop a better approach to the systems development process. This new approach, prototyping, was designed to alleviate some of the problems that concerned the systems analysts about the traditional approaches. (Willis, Huston, and d'Ouville, 1988, p. 57)

The concept of prototyping is not new. In engineering, prototyping has long been a standard for developing and testing new products and systems (Scharer, 1983, p. 60). Prototyping was not designed to replace the systems development life cycle. Instead, prototyping enhances the life cycle by promoting the mutual learning processes between the analyst and user (Cerveny, 1987, p. 98, 103). Prototyping uses the power
of demonstration to enable the user and the analyst to literally see their specification in action (Scharer, 1983, p. 60). Prototyping has the following significant advantages over the traditional structured methodologies:

- Gets the user more actively involved in design and development.
- Provides the user with a tangible means of comprehending and evaluating the proposed system.
- Achieves more meaningful user feedback in terms of their needs and requirements.
- Develops better relationships between systems analysts and user groups.
- Results in fewer post implementation changes, resulting in lower maintenance costs. (Kroenke, 1987, p. 157)

The system that had been prototyped could be developed in one quarter of the time required of the structured methodologies. (Willis, Huston, and d'Ouville, 1988, p. 58) (Harrison, 1985)

The main benefit of using a prototype methodology is the development of an information system that more closely fits the needs of the organization. Prototyping also reduces the risks involved with the development cycle by getting the system into operation quickly and keeping the system simple. (Cerveny, 1987, p.57) Prototyping is not superior to the traditional methods in all cases. Table II depicts the factors that favor either the traditional or prototype methodologies.

Figure 4 depicts the modified systems development life cycle where prototyping techniques have been integrated into the life cycle. After the users have specified their needs, the analyst can then demonstrate how the proposed system can meet those needs. Design by prototyping consolidates the requirements definition, design, and construction stages of the typical system development life cycle discussed
earlier. These three activities take up approximately 60 percent of the manhours required for a system study. Consequently, prototyping yields a net saving in effort when it is utilized in the design of information systems. (Willis, Huston, and d'Ouville, 1988, p. 58)

Table II. FACTORS FAVORING ALTERNATIVE DEVELOPMENT METHODS
(Willis, Huston, and d'Ouville, 1988, p. 58)

Project Characteristics of Alternative Development Methods

Factors Favoring Traditional Systems Development
- Data needs are clearly defined.
- Systems have long life expectancy.
- Tight controls are required.
- Development risks are clearly defined.
- Essential system features are known in advance.
- Operational characteristics are well understood.

Factors Favoring Prototyping
- User requirements are uncertain.
- Procedure changes are extensive.
- User environment is volatile.
- System has relatively short life expectancy.
- System needs to be operational in short period of time.
- Changes in specifications are anticipated.

The construction of a prototype model requires that the systems analyst follow the six basic steps listed in Table III and described below.

Table III. STEPS IN PROTOTYPE DEVELOPMENT (Willis, Huston, and d'Ouville, 1988, p. 57)

Prototyping Design Steps

1. Select an appropriate application.
2. Identify basic needs.
3. Develop the working model.
4. Refine the model and system interface characteristics.
5. Implement revisions and enhancements.
6. Prepare prototype documentation and plan for development.
Figure 4. Prototyping Systems Development Life Cycle

a. **Step One: Select Appropriate Application**

The first consideration for the systems analyst is to determine if the system under development favors the prototyping design methodology. This methodology is not superior to the structured approaches in all cases. The analyst takes into consideration all the factors listed in Table II, Factors Favoring Alternative Development Methods, the user's environment, and the availability of prototyping tools to determine if the system can best be developed with the prototyping approach. (Willis, Huston, and d'Ouville, 1988, p. 58)
The environment within the DFPCM favored the use of prototyping for the following reasons:

- Uncertain user requirements.
- The environment was particularly unstable, subject to wide swings of personnel availability and work procedures.
- The new system is needed immediately to meet the department's expanding role within the hospital.
- The system was expected to have a relatively short life cycle.
- Numerous changes were expected in the specifications, as reports, procedures, and requirements for information appeared to be changing daily.

b. Step Two: Identify Basic Needs

The second step in prototyping involves getting a better understanding of the problem or opportunity that was developed in the study phase. (Willis, Huston, and d'Ouville, 1988, p. 59) The goal of this step is to develop enough of an understanding of the problem to enable the design and construction of the initial prototype model (Boar, 1984, p. 67).

c. Step Three: Develop Working Model

The purpose of this step is to build the initial version of the prototype. Screens and documents layout are defined, data records are specified, and other model characteristics are established (Willis, Huston, and d'Ouville, 1988, p. 59). Content, not presentation, should be the primary goal of this initial model (Boar, 1984, p. 69). The analyst's intent, in this stage, is not to come up with the perfect model but to develop a model that best matches the user's view of the problem. Quality is critical. If the model is incomplete, it results in a poor foundation for the rest of the
development cycle. The target time for delivery of the initial model, depending on the prototype environment, should be three to six weeks. (Boar, 1984, p. 69)

d. Step Four: Refine Model and System Interface Characteristics

In this step, the system is refined so that each of the initial prototypes tested earlier are now required to work together. The analyst's goal in this step is to immediately test new ideas to see what refinements will satisfy the majority of the users. As users review this refined prototype and changes are made, the important changes are documented for later reference. (Willis, Huston, and d'Ouville, 1988, p. 59)

e. Step Five: Implement Revisions and Enhancements

The objective of this step is to allow the users to review the information system in as complete a context as possible. This review occurs after all the changes and enhancements have been implemented and serves as the final evaluation of the information system in the eyes of the user. (Willis, Huston, and d'Ouville, 1988, p. 59) Except for minor problems, the prototype is essentially complete.

f. Step Six: Prepare Prototype Documentation and Plan for Development

This stage of the prototype cycle involves the completion of the documentation for the system and the determination of the fate of the prototype. The format and the extent of the documentation rests largely with the project manager. The final decision is made concerning how the prototype should be used in the new system. At this stage the analyst can go in three directions with the prototype.
• If the implementation of this prototype is too expensive or infeasible, the system can be abandoned.

• Depending on the analyst’s prototyping development tools, the prototype could actually be implemented directly.

• As is the case with this thesis, the prototype could be used simply as a step to another stage of the development process. The prototype provides the analyst with a knowledge base for the design of the new system. (Willis, Huston, and d’Ouville, 1988, p. 59)

The successful prototype clearly enhances the traditional approaches. It is usually considerably cheaper, less risky, and conveniently keeps the system simple from the user’s perspective. It’s primary advantage is that it allows the user to see the application in its operational context and determine if the current design fits his or her needs. (Willis, Huston, and d’Ouville, 1988, p.60)

C. HOSPITAL INFORMATION SYSTEMS (HIS)

1. The Critical Nature of Hospital Information Systems

The health care delivery system in a hospital environment is generally viewed as an industry. This industry has seen major changes in recent decades due to breakthroughs in medicine and technology. The cost of health care nationwide has increased more than tenfold since 1950 to over $120 billion making health care one of this nation’s largest industries (Rakich and Darr, 1978, p. 1). In addition to the major changes taking place in the health care industry, the very nature of health care delivery creates a complex organization for the hospital administrator. Rakich and Darr suggest the hospital is one of the most complex organizations in existence based on the characteristics discussed below.
There is a wide diversity of objectives and goals for different personnel and subsystems (e.g., patient care, education, research, accommodations, administration).

The diversity of personnel ranges from highly skilled physicians and administrators to unskilled laborers.

The hospital is in continual operation.

Hospitals deal with life and death decisions.

Measuring the major product (patient care) is difficult. (Rakich and Darr, 1978, p. 1)

These often conflicting attributes can cause problems for hospital decision makers. A dichotomy is created by the conflicting goals of the hospital’s two components, management and operations, and becomes most evident and important in an environment where societal pressures and legal implications concerning ethical behavior are greatest. The non-medical management component (sometimes referred to as "bean counters") measures efficiency, i.e., the maximum amount of output (hospital services) for a given input (cost). The medical component (health care providers) measures performance by the quality of care provided to the patient (Longest, 1978, p. 125). This difference of purpose and objective will impact the manner in which information is managed and used in the hospital environment. Figure 5 is a humorous portrayal of the conflicts which exist between doctors and administrators when considering the use of computer resources (Covvey and McAlister, 1980, p. 141). However, the consequences of such conflicts are quite serious and play an important role in the potential effectiveness of a hospital information system (HIS).

Another factor influencing the HIS is the complexity of the relationship between the doctor and the patient. The ethics and responsibilities involved make
doctors wary of new technologies and methods unless the benefits to the patients can be proven. (Safir, 1978, p. 98)

Figure 5. Conflicts

The complexity and significance of health care organizations described in the preceding paragraphs creates a critical environment for a HIS. The conflicts which exist have affected the use and advancement of HISs throughout their life span and continue to influence the way in which hospital personnel view the quality and effectiveness of the HIS. (Safir, 1978, p. 98)

2. HIS Environmental Overview

Early hospital information systems were developed primarily to support hospital administration. Hospitals applied computer resources in conventional ways for accounting and other business related administration. Computers were also used in
medical research but were not generally considered suitable for directly supporting the medical care given to patients.

Figure 6 (Covvey and McAlister, 1980, p. 137) shows three main areas where medical computing can be applied in a hospital environment. The two large circles represent the more traditional applications of computers in health care, administration and research. The intersection of these circles represents the area of medical computing related to the care provided to patients. This area overlaps both medical research computing and administrative computing and is affected by the conflicting objectives of doctors and managers discussed earlier. We targeted this area of medical computing in our research and found a tremendous lag in the computer technology applied to medical care delivery.

Figure 6. Three Areas of Medical Computing
Experts in both the medical and computer fields began to recognize the medical computing lag in the mid-1970s and have made concerted efforts to catch up. A Symposium on Computer Applications in Medical Care (SCAMC) has met annually since 1976. In 1978, hearings were held before the Subcommittee on Domestic and International Scientific Planning, Analysis and Cooperation to discuss the topic of computers in health care. The reasons for the medical computing lag can be traced back to the critical nature of the HIS introduced in the previous section. In 1978, Aran Safir M.D. wrote:

...the complexity that characterizes human interactions is perhaps nowhere better demonstrated than in the relationship of doctor and patient. Representing such complex human interactions effectively within the computer is exceedingly difficult. (Safir, 1978, p. 98).

In 1980, Covvey and McAlister found it was rare for hospitals to devote a portion of its budget to data processing equivalent to that spent by most other industries of comparable size (Covvey and McAlister, 1980, p. vi). The following barriers to medical computing were suggested in 1985 by Bonnie Kaplan, Ph.D. at the annual SCAMC symposium (Kaplan, 1985, p. 400):

- Lack of funding, technology, staffing, training, and effort.
- Poor management including difficulties of interdisciplinary teams, planning and approach, and lack of attention to human factors and methodologies.
- Difficulty of translating medical knowledge into a form suitable for computing.
- Institutional constraints and physician resistance.

These barriers will exist to some degree in every organization. Many hospitals are attempting to hurdle the barriers through improved communication and
cooperation between doctors and administrators. Large hospitals are moving toward a HIS which integrates administrative, research, and medical service computing into one complete system. An example of an integrated HIS is the University Hospital Information System (UHIS), introduced in 1980 when the University Hospital at State University of New York first opened its doors. UHIS offered a wide range of patient care services including registration, medical records, automated lab data, quality control, pharmacy, radiology and nursing (Vegoda and Dyro, 1986, p. 261).

The medical computing future shows a trend toward increased integration of hospital information system functions like that described in the UHIS. The Yale-New Haven Hospital began implementing the Patient Care Support System (PCSS) in 1986. PCSS is expected to take several years to implement. When complete, PCSS is expected to improve the quality of care rendered to patients by allowing physicians to more efficiently and accurately order tests, lab work, and prescriptions. Medical record tracking and results reporting is also expected to improve (Sadock, 1986, p. 114).

The Department of Defense's answer to an integrated HIS is the Composite Health Care System (CHCS) scheduled for completion in 1991. The objectives for CHCS include: "improving the quality of patient care, increasing the efficiency of operations, increasing the accuracy and availability of information, and providing standardized, but flexible support." (Regional Training Conference Manual, 1988, p. 135). In 1988, a Regional Training Conference was held in Monterey, CA to update attending medical professionals on military and other government medical information system initiatives (Regional Training Conference Manual, 1988). One of the topics covered at the conference was the planned implementation of CHCS. The following
patient care benefits of the CHCS were cited (Regional Training Conference Manual, 1988, p. 140):

- Improved quality of care.
- Reduced time spent handling information.
- Improved management control of operations.
- Increased patient satisfaction.
- Increased compliance with standards and regulations.
- Increased service capacity with same staff levels.
- Improved personnel morale and job satisfaction.

Doctors and hospital administrators are trying to recover from the medical computing lag which has continually plagued the industry. They are beginning to realize the importance of quality information for providing high quality patient care. Integrated HISs are the future for medical computing and, if properly used, will enable the health care industry to provide better quality medical care.

3. Information Technology at Silas B. Hays Army Community Hospital

The current information technology at Silas B. Hays Hospital consists of three major systems, the Medical Expense and Performance Reporting System (MEPRS), the Automated Quality of Care Evaluation Support System (AQCESS), and the Computer Stored Ambulatory Record System (COSTARS). These three systems are completely independent and are maintained through separate government contracts. No attempt has been made to link these information systems into one large database. Because of the inherent incompatibility of the systems and the eminent arrival of the Composite Health Care System, SBHACH administrators believe it would be cost
prohibitive to attempt systems integration at this time. The next three sections describe the basic function of each of these systems.

a. **MEPRS**

The purpose of MEPRS is to collect, process, and report to the Health Services Command (HSC) all data on the medical workload, staffing, and expenses incurred by each workcenter within the hospital (Regional Training Conference, 1988, p. 47). Each hospital department maintains various worksheets to record manpower utilization and workcenter expenses. Each department reports the hours for clinicians (doctors) and non-clinicians (all others) to the MEPRS section, a subdivision of the Resource Management Division (RMD). Also recorded are the inpatient bed days and the number of outpatient visits for each of the workcenters. This workload information is maintained in both the AQCESS and COSTARS systems but because the systems are incompatible, the data must be manually extracted from each of the systems for entry into the MEPRS system. Direct expense data on such items as electricity and water is received from the Fort Ord Finance and Accounting Office and manually extracted by the MEPRS personnel and recalculated based on the square footage of each departments' assigned space. This expense information is then manually entered into the MEPRS computer. Each month all hospital data is loaded onto a magnetic tape and sent to the Health Services Command (HSC) at Fort Sam Houston, Texas. The data is used by the HSC for determining funding allotments for Silas B. Hays. The information maintained in the MEPRS system is not considered useful to the department managers because it is not kept in a format consistent with department resource measures.
b. AQCESS

AQCESS was introduced early in 1986 for all Department of Defense Hospitals. The primary purpose of the system was to provide a standardized method for the collection and reporting of patient and provider information and to assist in quality assurance decision making for all military hospitals. AQCESS was intended to improve the quality of the information provided to administrators, doctors, and quality assurance personnel and to save hospital staff time. Initially implemented with three main modules, AQCESS has since been expanded to six modules. All six modules are in operation at Silas B. Hays:

1. Quality Assurance Module
2. Appointment and Scheduling Module
3. Medical Services Accounts Module
4. Clinical Records Module
5. Registration Module
6. Emergency Services Module

The Appointment and Scheduling Module affects each individual department the most as it determines the daily workload for each doctor in the department.

The AQCESS system is used to capacity. Although ad hoc reports can be obtained by the users of AQCESS, only the system manager in the Information Management Division (IMD) currently uses this function. The system is heavily used during normal working hours for interactive appointment scheduling and clinical records. To help keep system response time low during the day, all AQCESS reports
are generated at night using batch processing. The AQCESS modules produce many reports which show hospital operations and performance in many areas. Statistical reports on workload, productivity, and appointment scheduling histories are just a few of the topics covered.

e. COSTARS

The COSTAR System is unique to the Family Practice Clinic at Silas B. Hays Hospital. This system receives, records, and retrieves administrative and medical information for the active duty families enrolled in the Family Practice Program (Libra Technology, 1982, p. 2). This system was actually a prototype system introduced in 1982 and initially had the five main functions described below:

- **Registration** - This function allows patients to be enrolled in the Family Practice Program.

- **Appointment and Scheduling** - This function allows the COSTARS data entry clerk to book, cancel, or view appointments. It also prints daily schedules and appointment lists and produces a pull list for the medical records department indicating which patients records will be required for the following day's appointments.

- **Medical Records** - This function maintains a history of a patient examination, including administrative, physical, diagnostic and procedural data.

- **Pharmacy Orders** - This function was intended to provide full pharmacy support by allowing prescription orders to be automatically forwarded to the pharmacy. Records on pharmaceutical history were also to be kept for the patients. Currently, only prescription refills are managed by this system.

- **Laboratory Orders** - This function permits physician orders for lab work to be automatically sent to the lab before the patient arrives. Results are also entered and a daily report is sent to the physician showing the patient and the results of the lab tests ordered for that patient.

Like AQCESS, the COSTARS system maintains a large data base and is capable of producing many reports. COSTARS also accepts ad hoc queries but none
are currently being used. The pharmacy and laboratory functions offer capabilities not found in AQCESS. As with the other major systems, we believe this system is not being exploited to full advantage. This system, and the potential benefits of the data maintained within it, are discussed further in subsequent chapters.

In addition to the three major information systems discussed above, Silas B. Hays makes extensive use of microcomputers for office automation and individual data processing functions. These computers are not currently networked nor is there any standardization of software or procedures.

The current information systems available at Silas B. Hays Hospital are cumbersome and cannot be integrated to provide timely, reliable, and useful information to hospital decision makers. The lack of integration is seen as a major problem by many hospital personnel and, until the CHCS comes on line, stop-gap measures are being used to fill the void and provide the best information available with the limited resources.

The remainder of this thesis describes how one department, the Department of Family Practice and Community Medicine (DFPCM), uses the current information systems available at SBHACH. Also examined is the need for an improved system and how these improvements might be realized through the use of a responsive microcomputer-based information system.
III. CURRENT SYSTEMS ANALYSIS

A. INTRODUCTION

Chapter II introduced information systems development methodologies and the application of information systems within a hospital environment. This chapter describes the current information systems in the Department of Family Practice and Community Medicine, using the development principles discussed in Chapter II. This chapter introduces data flow diagrams as a pictorial way to represent the existing information system and presents data flow diagrams and narrative descriptions for the department's information system.

B. THE DEPARTMENT OF FAMILY PRACTICE AND COMMUNITY MEDICINE

Early in 1988, Health Services Command approved a reorganization for Silas B. Hays Hospital which combined the Department of Family Practice with the Department of Primary Care and Community Medicine, creating the Department of Family Practice and Community Medicine (DFPCM). This new department is the hospital's largest and most diverse in terms of both the services it provides and its overall affect on the hospital. Figure 7 is the department's organization chart. The department has three general service areas: Family Practice and Residency, Primary Care, and Consolidated Troop and Family Member Services. These are further divided into specialized clinics (sometimes referred to as sections) as shown in the chart. All of these clinics are outpatient oriented and are literally the gateways to all other hospital services (e.g.,
pharmacy, lab, and specialized medical departments). The DFPCM affects every aspect of the hospital: every patient treated at Silas B. Hays must first be seen by a doctor working in one of the DFPCM clinics. The mission of the DFPCM, as stated in the Health Services Command Regulation 10-1, is "to provide diagnosis, care, and treatment of all patients commensurate with the highest standards of quality." (HSC Reg 10-1, 1987, p. 3-1) The task of accomplishing this mission is not nearly as simple as the mission statement itself.

The size of the department, the volume of work done, and the impact on overall hospital resources combine to create a highly visible, management challenge. The Chief of the DFPCM (currently a Lieutenant Colonel) is responsible for meeting this
challenge. The resources he commands include over 150 people and an annual budget of nearly half a million dollars. In addition, there are five separate service locations, one of which is 100 miles from the main hospital (Fort Hunter Liggett). Unfortunately, these resources are limited compared with the task at hand. Since his time is extremely valuable, the information he gets should be summary in nature in order that he not be overwhelmed with meaningless data, and yet at the same time, complete enough to allow him to make informed, confident decisions. All of these factors must be considered when designing an information system for use by the Chief of the DFPCM.

Initial interviews with the Department Chief allowed us to identify those management areas which demand the greatest attention and for which he requires the best possible information. These areas fell into the following seven broad categories:

- Fiscal Resources.
- Material Resources.
- Personnel and Scheduling.
- Productivity.
- Patient Satisfaction.
- Medical Procedure Suspense Information.
- Patient Check-In and Records Procedures.

The last two areas were determined to be beyond the scope of this thesis because of time constraints and the inherent size and complexity of the projects themselves.
The Department Chief agreed with our decision and prioritized the remaining five areas as shown below:

- Fiscal Resources.
- Material Resources.
- Personnel and Scheduling.
- Patient Satisfaction.
- Productivity.

The remainder of this thesis describes the research into each of these areas and the requirements for an information system which would serve the Department Chief in making management decisions concerning these key areas.

The five major areas listed above were divided into the following six specific systems:

- Budget System.
- Equipment System.
- Personnel System.
- Scheduling System.
- Patient Satisfaction System.
- Productivity System.

The following section describes the six existing information systems listed above (with diagrams and written narrative) and how information is gathered, stored, and presented for decision making. As described in Chapter II, the current system should be well understood before any attempt is made to improve any part of it. Subsequent
chapters discuss where and why improvements are needed and how those improvements can be achieved through system redesign and automation.

C. DATA FLOW DIAGRAMS

In the preliminary description of the information system within the DFPCM, we used Data Flow Diagrams (DFDs) to represent the current system to department personnel. The Data Flow Diagram enables the designer to describe the existing system or the proposed new system at a logical level without considering the physical environment in which the data flows (e.g., telephone calls, mail, etc.) or the physical environment in which the data is stored (e.g., card file, microfiche, disk, floppy disk, or tape). (Atkas, 1987, p. 57) The DFD describes the system as a network of processes (subsystems) connected to each other and/or to data stores, sources and sinks. (Atkas, 1987, p. 58) The basic symbols used in the DFD’s are described below.

- **Data Flow.** An arrow is used to represent either the flow of information or objects. Occurrences of the data flow must contain data.

- **Process.** A rounded rectangle represents a process. Processes are work performed by people, machines, or computers on incoming data flows to produce outgoing data flows. (Whitten, Bently, and Ho, 1986, p. 226)

- **External Entity or Boundary.** A square is used to represent an area in which data originates or terminates. In essence, the sources and sinks define the boundaries of the system.

- **Data Store.** An open-ended rectangle represents a store of information or objects, irrespective of the storage medium. (Atkas, 1987, p. 59)
The components of the information system correspond to the DFD symbols as follows (Whitten, Bently, and Ho, 1986, p. 234):

<table>
<thead>
<tr>
<th>Information System Component</th>
<th>DFD Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data (Input)</td>
<td>Data Flow</td>
</tr>
<tr>
<td>Information (Output)</td>
<td>Data Flow Users</td>
</tr>
<tr>
<td>Entity/Process</td>
<td>Methods/Procedures</td>
</tr>
<tr>
<td>Process Data Storage</td>
<td>Data Store</td>
</tr>
<tr>
<td>Computer Equipment</td>
<td>Process/Data Store</td>
</tr>
<tr>
<td>Computer Programs</td>
<td>Process</td>
</tr>
</tbody>
</table>

To achieve clarity, DFD’s are prepared at several levels. The highest level DFD is the "context diagram," which merely shows the boundaries of the system under study. The processes are further decomposed as necessary into lower level diagrams (Atkas, 1987, p. 68). The following sections use DFD’s to illustrate the six current information systems.

1. **Budget System (see DFD, Figure 8).**

   The Resource Management Division (RMD) receives the hospital’s budget from the Health Services Command on an annual basis via the MED 304 report. RMD divides this budget into quarterly budget targets for each department and distributes the budget allocations at the beginning of each quarter. The department Non-commissioned Officer in Charge (NCOIC) (currently a Master Sergeant) is the principle administrator of all incoming budgetary information. He serves both as the Department Chief’s budget administrator and the clinics central point of contact on all
budgetary matters. This practice of using the NCOIC as the monitor appears to be common practice throughout the hospital.

Once the department’s budget is received from RMD it is allocated by the NCOIC into 16 separate accounts. The 16 budget accounts reflect the current organizational structure with a few exceptions required by funding needs. The 16 sections are listed below:

- Primary Care. This is an overall budget category for any department wide requirements.

- Family Practice Clinic. This is the eighth floor Family Practice clinic at the hospital.

- CTMC-Family Practice. This is the Family Practice clinic operated at the CTMC.

- Emergency Medical Services. This is the emergency room excluding the ambulance section requirements.

- Ambulance Section. Supply budget for the ambulance section which is a subsection of the emergency room.

- Flight Surgeon Office.

- General Outpatient Clinic. Serves walk-in patients and active duty sick call in the Hospital.

- Presidio of Monterey-Health Clinic. Though the POM clinic is run by PRIMUS, the department assigns a doctor as liaison to handle sickcall and official military matters for which it receives department funds.

- Consolidated Troop Medical Clinic (CTMC). Medical care for 7th Light Infantry Division personnel.

- Battalion Aid Station. This money is provided to the Division Medical Supply Office to reimburse medical supplies used by the battalion aid stations throughout the division.

- Fort Hunter Liggett Clinic.
• CTMC (Pathology). Funds in this category pay for supplies needed by the pathology section located at the CTMC.

• CTMC (Radiology). Funds in this category pay for supplies needed by the X-Ray section at the CTMC.

• CTMC (Pharmacy). Funds in this category pay for supplies needed by the Pharmacy Section at the CTMC.

• CTMC (Immunization). Funds in this category pay for immunization supplies for the CTMC.

• Battalion Aid Station (Immunization). Funds in this category pay for immunization supplies used by the battalion aid stations.

Each section prepares requisitions and monitors its expenditures in its own Document Control/Funds Control register (DC/FC). This document serves as a record for items ordered and an indicator of the account’s remaining funds once the supplies are received. The DC/FC register is currently maintained manually in each clinic’s supply section. One important location for the expenditure of supply dollars is the Self Service Supply Center (SSSC). The SSSC is a self service supply point for certain office, medical and computer supplies. These supplies are charged against the individual section’s account and are usually recorded on a weekly recap basis by an entry into the DC/FC register. These expenditures are reconciled on a weekly basis with the Detailed Obligation Report (DOR). This report confirms correct obligation amounts and recorded orders. Four copies of the DOR are received weekly from RMD in microfiche form. The four copies are distributed to the CTMC, Fort Hunter Liggett clinic, the main Family Practice clinic, and the department NCOIC. There are a limited amount of DOR’s available, so every section cannot receive it’s own copy. This shortage is caused by a number of microfiches actually delivered to RMD.
Figure 8. Budget System Data Flow Diagram

The NCOIC provides the Department Chief with budget information via the department Budget Status Report (see Figure 9). This report is prepared at the beginning of the quarter, at the beginning of each month, and on a recap basis at the end of each quarter and the Fiscal Year. The Budget Status Report is the department's principle source of information on current budget and expenditure status for each of the 16 accounts. The report is currently generated using a LOTUS 1-2-3 spreadsheet program maintained by the NCOIC. The spreadsheet printout shows expenditures by
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<th>APC</th>
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<th>TOTAL SPENT THIS QTR</th>
<th>UNCOMMITTED FUNDS PER MONTH</th>
<th>% SPENT THIS QTR</th>
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</table>
section, their uncommitted funds and appropriate percentages of expenditures for the reporting period. The printout is given to the Chief monthly and maintained by the NCOIC in a file on a microcomputer disk.

Monthly, the NCOIC receives a month-end report from RMD that reflects the expenditures by medical and non-medical categories for each of his separate clinics. The month-end report is used to update the Budget Status Report for review by the Department Chief and the section chiefs. The principle problem with this system concerns the end of year constraints. As the end of the year approaches, the expenditure of funds becomes crucial. The amount that is reflected in the month-end report may be several obligations behind the actual expenditures recorded in the section's DC/FC register. This requires a direct matching of available funds by monitoring the sections through telephonic expenditure reports.

Quarterly, the Resource Information Report is generated to be used in a meeting between the Department Chief and his section chiefs (see Figure 10). This report serves as the agenda for the meeting. The primary topic in this meeting is the projected budget shortfalls for the quarter based on unforeseen requirements.

On an as needed basis, the Budget and Equipment Analysis and Review report (the BEAR) is requested from the section chiefs. This report reflects much the same budget information contained in the Resource Information Report but includes important information on the status of critical department equipment such as replacement or maintenance requirements (discussed below). The BEAR is collected by the NCOIC for comments and delivered to the Chief for his review.
The OIC/HDIC of all services/clinics will report to the Chief, Department of Family Practice and Community Medicine on the following items:

1. PERSONNEL:
   a. Officers AUTH ______  ABSN ______  SHORT ______  PROJ LOSS ______
   b. Enlisted AUTH ______  ABSN ______  SHORT ______  PROJ LOSS ______
   c. Civilian AUTH ______  ABSN ______  SHORT ______  PROJ LOSS ______

2. BUDGET:
   a. Allocated for Quarter # ______
   b. Spent in _____ Quarter # ______
   c. Uncommitted Funds # ______
   d. Projected Shortfalls # ______

3. EQUIPMENT STATUS:
   a. Old Equipment Status:
      (1) ______________________________
      (2) ______________________________
      (3) ______________________________
   b. New Equipment Status:
      (1) ______________________________
      (2) ______________________________
      (3) ______________________________
   c. MEDICARE ITEMS (Equipment needed):
      (1) ______________________________
      (2) ______________________________
   d. DEEP ITEMS (Equipment needed):
      (1) ______________________________
      (2) ______________________________

The OIC/HDIC will report to the Chief, Department of Family Practice and Community Medicine on the following items:

1. List three (3) things that are going well:
   a. ________________________________________
   b. ________________________________________
   c. ________________________________________

2. List three (3) things being worked on:
   a. ________________________________________
   b. ________________________________________
   c. ________________________________________

3. List any and all items and/or issues that you require the assistance of the C, OPF/CH:
   a. ________________________________________
   b. ________________________________________
   c. ________________________________________
   d. ________________________________________
   e. ________________________________________
2. Equipment Procurement System (see DFD, Figure 11).

The equipment requirements for the department are interrelated with the budget system described above in that all expenditures for equipment must be budgeted and tracked within that system. The department's equipment needs occur in the four areas listed below:

- **Durable Equipment.** This includes low cost, less than $1000, equipment that is used on a day to day basis. This equipment is funded through the normal supply budget.

- **Capital Expense Equipment Program (CEEP).** Medical equipment that costs more than $1000 but less than $5000. The budget for this equipment is maintained by RMD.

- **Medical Care Support Equipment (MEDCASE).** Equipment that costs more than $5000. This budget is maintained by RMD.

- **Computer/Electronic Equipment.** Although the cost of this equipment is taken out of the department's budget, the approval to order it comes from outside the department (discussed below).

The primary source of equipment authorizations is the Table of Distribution and Allowances (TDA) which shows the equipment authorized to be procured and held by each department section. Special medical equipment not included in the TDA must be specifically identified and requested by the department.

Each section identify their equipment requirements by determining equipment authorization levels, the equipment currently on hand, the status of equipment on order, and the equipment that requires replacement. The sections have numerous sources they can use to determine the status of their equipment. The Logistics Division's Property Management Branch maintains property records for all equipment held by each section. They also produce reports on the status of equipment on order, the useful life of
equipment on hand, and the number of years the equipment has been extended over its defined useful life. The Medical Maintenance Division maintains cumulative status reports on the maintenance performed on all medical equipment along with the one-time expenditure limit which defines the maximum limit for future repair costs for each equipment item. This information is critical in determining if a piece of equipment has exceeded its allowed maintenance expense.

The problem with all of these reports is their relative inaccessibility to the sections. The reports are not distributed to the sections and the maintenance reports are maintained in the Medical Maintenance building, separate from the hospital. Because of these difficulties, not all sections attempt to obtain this information. Another major factor affecting the availability of this information is that the reports are not divided into sections or departments but maintained on a hospital-wide basis.

Often, equipment needs are not identified until failure of the old equipment. The Department Chief and NCOIC recently created the Budget and Equipment Analysis Report (BEAR) to help them plan for equipment expenditures and better manage their equipment budget (see Figure 12). This report will be completed by each section on an annual basis to identify critical equipment needs. The BEAR report not only identifies critical needs but was intended to promote interest in identifying those needs in a more timely manner. The sections must identify their replacement requirements for the upcoming fiscal year and for four subsequent years. The sections also report the requirements for CEEP and MEDCASE items, along with the status of equipment on order.
Figure 11. Equipment System Data Flow Diagram

Once the section's requirements are identified with the BEAR, the Department Chief, in conjunction with his service chiefs, determines the priorities for the department. The appropriate paperwork is completed and forwarded to the RMD Logistics Division to await the next hospital wide Program and Budgeting Advisory Committee (PBAC). The PBAC consists of key hospital personnel who review and prioritize MEDCASE and CEEP requirements for each department. If approved, these items go onto a list of prioritized and approved equipment, either MEDCASE or CEEP, and await the availability of funds.
Figure 12. Budget and Equipment Analysis Report (BEAR)

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**Budget and Equipment Analysis & Review**

1. Money allocated for each quarter ___ and FY ___
2. Money spent each quarter ___ and FY ___
3. Money saved each quarter ___ and FY ___
4. Money shortfall each quarter ___ and FY ___
5. Equipment status.
6. Equipment needing to be replaced now (FY - 99):
   A. 
   B. 
7. Money needed for equipment replacement now ___ (TOTAL): 17A + 7B)
   A. 0 (ITEM 6A)
   B. 0 (ITEM 6B)
8. Equipment needing to be replaced in one (1) year (FY - 90):
   A. 
   B. 
9. Money needed for equipment replacement in one (1) year ___ (TOTAL): 17A + 7B)
   A. 0 (ITEM 6A)
   B. 0 (ITEM 6B)
10. Equipment needing to be replaced in two (2) years (FY - 91):
    A. 
    B. 
11. Money needed for equipment replacement in two (2) years ___ (TOTAL): 17A + 17B
    A. 0 (ITEM 10A)
    B. 0 (ITEM 10B)
12. Equipment needing to be replaced in three (3) years (FY - 92):
    A. 
    B. 
13. Money needs for equipment replacement in three (3) years ___ (TOTAL): 17A + 17B
    A. 0 (ITEM 10A)
    B. 0 (ITEM 10B)
14. Actual approved items on CEEP program now:
    A. __________________________ priority 6 __o_ __
       (1) Date item ordered or to be ordered __
       (2) Projected arrival date of item __
    B. __________________________ priority 6 __o_ __
       (1) Date item ordered or to be ordered __
       (2) Projected arrival date of item __
15. Paper work in progress for placing equipment on CEEP program:
    A. __________________________ priority 6 __o_ __
       (1) Status: __________________________
       (2) Status: __________________________
16. Actual approved items on MEDCASE program now:
    A. __________________________ priority 6 __o_ __
       (1) Date item ordered or to be ordered __
       (2) Projected arrival date of item __
    B. __________________________ priority 6 __o_ __
       (1) Date item ordered or to be ordered __
       (2) Projected arrival date of item __
17. Paper work in progress for placing equipment on MEDCASE program:
    A. __________________________ priority 6 __o_ __
       (1) Status: __________________________
       (2) Status: __________________________
Currently, there is no consolidated list of the department's needs but each section maintains its own list. The only source of consolidated information on equipment needs are the quarterly Resource Information Reports, discussed in the previous section.

Needs for electronic and communications equipment are separately identified by each section on an Information Capability Request (CAPR). Once the CAPRs are approved by the Department Chief, they must be countersigned by the Chief, Information Management Division, the Deputy Commander for Clinical Services, and eventually by the Directorate of Information Management for Fort Ord (DOIM). Once approved, it is the responsibility of the department to obtain the funds and order the equipment.

The Department Chief needs all of this information to plan for equipment expenditures. He can use the information provided by his sections to plead his case to the hospital administrators who allocate the funding dollars for his department. The "out year" information provides him with a projection of future equipment needs and helps improve the department budgets.

3. Personnel System (see DFDs, Figures 13 and 14)

The DFPCM employs more than 150 people. To effectively manage these people, the Department Chief requires personnel information in three main areas: authorized positions and vacancies, educational travel funding requirements, and personnel leave and temporary duty requests.
Each department in the hospital is authorized a certain number of people, by position, based on the Table of Distribution and Allowances (TDA). The Department NCOIC uses a word processing program to keep a list of all authorized positions, both filled and vacant, for the DFPCM. This list contains appropriate TDA line numbers and position descriptions plus the personal data for all assigned persons (or a "vacant" indication if the position is unfilled). On an as-needed basis, the NCOIC prints the personnel position list for each section. Each section NCOIC, if necessary, updates his list and returns it to the Department NCOIC who then updates the master roster. The updated master roster is forwarded to the Department Chief and is also sent to the MEPRS section to update their Position Control Roster.

Figure 13. Personnel System Data Flow Diagram

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Figure 14. Leave and TDY Absence Data Flow Diagram

The Continuing Medical Education (CME) program provides the doctors within the hospital the necessary funds for continuing their medical education. Each doctor determines his or her educational needs and prepares a CME request which includes the estimated cost of travel. These requests are reconciled with the department’s allocated CME funds and, if sufficient funds are available, the request is approved by the Department Chief and forwarded to the Deputy Commander for Clinical Support (DCCS) for approval. The DCCS publishes a master list of doctors approved for CME travel. The NCOIC requires each doctor who has completed his
or her CME travel to provide a copy of the travel claim voucher. Through this information, the NCOIC can capture actual CME costs well before they are reported by the travel personnel at finance (which can be one to three months after the travel). The CME funds are managed closely because actual costs often exceed the estimates originally stated in the request. The CME funds are maintained separately from supply funds.

The Department Chief expressed a desire to monitor leave and temporary duty (TDY) status. Leave and TDY information is collected in two separate methods depending on the person involved (see Figure 14). Doctors send leave and TDY requests to the Department Chief, via their chain of command. Requests approved by the Chief are recorded in a journal kept by the department administration section and forwarded to the DCCS. The doctor must also notify the Assistant Department Chief (ADC) of any planned absences for scheduling purposes (see Figure 9, Scheduling). The hospital Personnel Administration Center (PAC) types approved requests on a Department of the Army (DA) Form 31. This form is routed through the hospital distribution system to the NCOIC who distributes it to the doctor's respective section. Other personnel leave and TDY requests are routed through the Medical Company chain of command. After approval by the Medical Company First Sergeant and Commander, these requests are forwarded to the PAC, typed on a DA Form 31, and distributed via the department NCOIC to the appropriate section.

The Department Chief's main concern in managing personnel is planning for position vacancies and temporary absences due to leave and TDY. Presently, section chiefs report upcoming losses on an exception basis only, primarily when the position
invoked is critical to section operations. The PAC has the capability to report military personnel losses on a 30, 60, 90, 120, 150, 180, 270, and 300 day basis, but this information is available only on a hospital-wide basis.

4. Scheduling System (see DFDs, Figures 15 and 16)

The Department Chief’s primary concern for scheduling lies in two clinics, the Family Practice clinic and the CTMC/FP clinic. Figures 15 and 16 show the doctor scheduling process as it currently exists in each of these clinics, respectively.

a. Family Practice Scheduling

The Family Practice scheduling system involves two primary schedules, the On-Call Schedule and the Clinic Schedule, and a secondary schedule, the Walk-In Schedule. The Assistant Department Chief (ADC) creates each of these schedules. This process is very subjective and difficult to define precisely. Each of the following sections describes the process for each of the schedules discussed above.

(1) On-Call Schedule. The On-Call Schedule establishes which doctor will be on-call for each night of the month. The On-Call Schedule affects every clinic within the department except the Emergency Medical Services which have their own on-call schedule. To create this schedule, the Assistant Department Chief (ADC) maintains several different files which help him determine which doctor to schedule for each day.

Every clinic has a minimum number of doctors which are required to be on duty each day. This information is maintained on a sheet of paper in the ADC’s scheduling folder and is necessary for creating the On-Call Schedule because a doctor who is on-call one day will not be available for duty the following day. The
ADC also maintains historical data for each doctor showing the number of times the doctor has been on call on holidays and weekends. The ADC keeps 3" x 5" cards with special requirements for each doctor such as continuing education, or conference dates for which the doctor would be unavailable for on-call duty. The doctors must also inform the ADC when they are requesting leave or when they will be away on temporary duty (TDY). The last information kept by the ADC is a cumulative monthly tally of the number of times each doctor has stood on-call duty for the last calendar year. After considering all of this information, the ADC creates the On-Call Schedule in a manner which will be fair to all of the doctors and yet fill the requirements for on-call duty and the following day's clinic schedule. The on-call schedule is distributed to each doctor, the patient care nursing stations on each ward, the emergency room, and the Clinical Support Division. In addition, the on-call schedule is used to create the clinic schedule for the Family Practice doctors.

(2) Clinic and Walk-In Schedules. As with the on-call schedule, the clinic schedule is created by the ADC after considering all of the information relating to doctor availability. Staff doctors have a permanent clinic schedule for each month. This is affected only by leave requests and TDY orders from the doctors themselves. The ADC must also schedule residents-in-training for clinic duty. Each resident is assigned a primary location for each month by the Resident Director. The ADC keeps this information in his scheduling folder along with special instructions for each resident from his assigned clinic. These instructions, on 3" x 5" cards, contain information on the daily availability of the resident for duty in the Family Practice clinic. Also affecting the clinic schedule is the previous day's on-call schedule: the
doctor who was on call the previous day will not be available for work in the clinic on the day in question. The ADC creates the clinic schedule based on the number of doctors available for each day of the month. The final clinic schedule is submitted to the COSTARS data entry clerk so the appointment system can be updated to show which doctors will be available to see patients in the scheduled month. Also, for each day on the clinic schedule, the ADC schedules one doctor to see walk-in patients. This doctor is then responsible, on the day assigned, to see all family practice patients who could not get an appointment but required immediate care. The walk-in schedule is attached to the final clinic schedule and distributed to each doctor.

![Family Practice Scheduling Data Flow Diagram](image)

**Figure 15. Family Practice Scheduling Data Flow Diagram**

**b. CTMC/FP Clinic Schedule**

The Chief of the CTMC/FP clinic completes his clinic schedule in much the same manner as described for the family practice clinic. The on-call
schedule created by the ADC includes CTMC/FP doctors and therefore impacts the CTMC/FP daily clinic schedule. The Chief of CTMC/FP uses the previous day's on-call schedule to determine which doctor will not be available for duty on the current day. Additionally, he receives each of the CTMC/FP doctors leave and TDY requests and special availability requirements which he maintains in one log book. He consults this log book and the on-call schedule for the upcoming month to create the CTMC/FP schedule for that month. He distributes this schedule to each doctor and one copy is sent to the AQCESS data entry clerk who updates the appointment scheduling database to reflect the doctors available for appointments in the CTMC/FP clinic for the upcoming month.

As can be seen from the previous discussion, the scheduling process is subjective and dependent on the historical files and log books maintained by the clinic schedulers. The most difficult part of this process is obtaining and coordinating all of the information sources which affects the doctors' availability for duty on any given day of the month. The ADC estimated that it required 3 to 4 hours to create the monthly schedules because of the many factors influencing the entire process.

![Figure 16. CTMC/FP Scheduling Data Flow Diagram](image-url)
5. Patient Satisfaction (see DFD, Figure 17)

Determining patient satisfaction is a subjective process and is currently performed by the department's quality assurance representative. The QA representative created a questionnaire to obtain subjective responses from patients on various topics. The patients are asked to respond "Yes", "No", or "Not Applicable" to eleven questions concerning the care they received in the Family Practice clinic. This is the only clinic currently using the patient satisfaction survey.

![Figure 17. Patient Satisfaction Data Flow Diagram](image)

On one day of each month, the doctors in the FP clinic are asked to distribute the questionnaires to the patients they see, with instructions that the patient return the surveys to the receptionist at the nurses station. The receptionist gives all
of the collected surveys to the QA representative who then calculates the percentage responses for each of the questions and produces Monitor and Evaluation Reports.

Each Monitor and Evaluation (M&E) report prepared by the department QA representative represents an important aspect of care recognized by the hospital QA Division (see example, Figure 18). Each question in the survey is an indicator of one of these important aspects of care. Each question (indicator) has an assigned threshold (listed on the M&E report) which the clinic desires to remain above. When the results of the survey are tallied, the QA representative pencils in the patient response rate for each question next to the corresponding threshold on the M&E report. The completed Monitor and Evaluation report's are used as an indicator of how successful the department was in reaching the thresholds for each of the important aspects of care.

These Monitor and Evaluation reports are maintained in a binder kept by the QA representative and are used at the monthly QA meetings to report on the general level of patient satisfaction for each of the important aspects of care. No other reports are created using the information obtained from the questionnaires and trends in patient responses are not maintained. The Department Chief does not receive a copy of the Monitor and Evaluation reports unless he requests them.

6. Productivity (see DFD, Figure 19)

The DFD in Figure 19 depicts the current information processes involved in reporting productivity for the DFPCM. The CTMC/FP section is the only section reporting productivity to the Department Chief. The primary reason for this is the fact that the CTMC is an ancillary service specially monitored by the Clinical
MONITOR & EVALUATION

SCOPE: Patient satisfaction

IMPORTANT ASPECT OF CARE: patients will be treated courteously and professionally by the staff.

INDICATORS:
1) Survey indicates records ready at the front desk 90%
2) Survey indicates screening prompt and private 90%
3) Survey indicates waiting time will be 30 min or less 90%

THRESHOLD

SOURCE OF DATA: patients' survey

METHOD OF COLLECTION: Family practice receptions clerk provides patients with survey to be completed after appointment.

WHO TO COLLECT DATA: Receptions clerk to forward to nurse or QA co-ordinator

SAMPLE SIZE: 30

TIME FRAME: One day per month, every other month starting with August 88

Figure 18. Monitor and Evaluation Report

Support Division. The CTMC/FP appointments and patient visits are tracked by the AQCESS system.

The AQCESS system produces a report called the Validated Appointment Roster which shows the actual patients seen the previous day. This report is sent to the Clinical Support Division which counts the number of patients actually seen by the CTMC, per provider. A cumulative total is kept for the entire month. At the end of the month, the Clinical Support Division enters this information into a LOTUS 1-2-3 spreadsheet. The resulting productivity reports are sent to the Chief,
DFPCM. These reports provide information on daily, weekly, monthly, quarterly, and yearly workload in tabular and graphical formats. Provider productivity is also reported in a tabular report showing the number of patients seen each day, by provider, for the reported month.

Although the productivity of all of the sections is not directly reported to the Chief, the data necessary for producing clinical productivity information is gathered by each section. The remaining sections use either AQCESS, COSTARS or manual logs for gathering workload data. Patient visit information is then reported to the Patient Administration Division (PAD). PAD collects and forwards all hospital workload information to the Health Services Command on the MED 302 report both electronically and in paper format. This report is used in the formulation of future budgetary allocations to the hospital. Figure 20 illustrates how the various department clinics currently input their workload information to PAD. All of the workload data collected by the department's various sections is also stratified according to patient demographics, e.g., active duty, dependents, retired, service, etc.

Figure 19. Productivity System Data Flow Diagram
The Department Chief wants productivity information for all of his clinics, similar to that provided to him by the Clinical Support Division for the CTMC/FP clinic. The raw data for creating most of this information exists in the current systems but is not being used because of time and personnel constraints, and other factors which were not readily identifiable.

Figure 20. Clinic Workload Data Flow Diagram
IV. FUNCTIONAL SPECIFICATIONS

A. INTRODUCTION

Chapter III presented the DFPCM's current information systems relating to six specific areas: budget, equipment procurement, personnel, scheduling, patient satisfaction, and productivity. This chapter summarizes the current system's deficiencies and examines the failure of automation to meet the department's information requirements.

Additionally, this chapter proposes general improvements for each of the six areas and discusses the impact of these solutions, and the impact of automation on the department's information systems. The detailed system improvements for each of the information systems are presented fully in Chapter V, Requirements Analysis.

B. CURRENT INFORMATION SYSTEM DEFICIENCIES

The Chief of the DFPCM makes many decisions which affect both his personnel and resources, and greatly impacts the entire hospital. The nature of his responsibilities and the span of control he is required to exercise place additional emphasis on the significance of these decisions. Facing both time constraints and limited resources, he needs the right information, at the right time, and in the best format to accomplish his objectives and meet the needs of the department and the hospital. In analyzing the existing department information system, we discovered many deficiencies which hinder the Department Chief's ability to make informed decisions.
In general, the reports and other information the Department Chief receives are complex and difficult to quickly comprehend because they are not summary in nature. In interviews with the Department Chief, he expressed a desire for information which would depict long term trends and show department performance over a predetermined period of time. Much of the information he gets now is a "snap-shot" in time which does not allow him to see the "bigger picture" without pouring through many similar reports. In a few cases, the data is simply too time consuming to analyze (e.g., budget, equipment and personnel information) and, therefore, never becomes meaningful information for the Department Chief.

In addition to poor information, the Department Chief occasionally has difficulty getting enough information. One of the Department Chief's concerns is having sound information to help justify his decisions to higher authorities and support his actions in managing resources and personnel. Missing information due to informal reporting standards or poor data collection impedes his decision abilities in these areas.

Another concern of the Department Chief is the importance of feedback. The Department Chief feels it is critical for each section to receive sufficient, and timely, feedback on their performance to allow them to become more effective and efficient on their own initiative. The sections currently receive very little in the way of constructive feedback and the information they do get is prone to the same problems discussed above.

Unfortunately, inconsistent reporting requirements and system capabilities exist throughout the department so that each section is substantially different from the others in the information it is able to report. This contributes to many of the problems
described in the preceding paragraphs. Succinctly, the current information system is not meeting the requirements of the Department Chief. We feel the majority of these obstacles can be attributed to limited personnel resources, time constraints, and ultimately, the incompatibility of the hospital’s automated information systems.

C. THE FAILURE OF AUTOMATION TO MEET INFORMATION REQUIREMENTS

Chapter II introduced the three major automated information systems in place in the hospital: MEPRS, AQCESS, and COSTARS. These systems hold huge stores of data which can potentially produce meaningful information. In addition to these medical information systems, the hospital uses other Army-wide systems for accounting and logistical data. Microcomputers are scattered throughout the hospital providing individual computing capabilities in some functional areas. With all of these resources at hand and with the rapid advance in information systems technology, the question arises, "Why hasn’t automation solved the information problems within the DFPCM?"

There are many reasons why the automated systems at Silas B. Hays have failed to meet the information needs of it’s key decision makers. The primary factors which have contributed to this failure are listed below:

- The AQCESS, MEPRS, and COSTARS systems are independent and incompatible with each other. Data sharing is impractical and duplication of data collection and data reporting are wasteful of time and resources.

- All of the sections within the department do not use the same system. For instance, the Family Practice Clinic uses COSTARS for appointments and patient records while the Consolidated Troop Medical Clinic, the Family Practice Clinic at the Consolidated Troop Medical Center, and the General Outpatient Clinic use AQCESS for appointments and patient information. The Fort Hunter Liggett and Presidio of Monterey Clinics, the Emergency Medical Services, and the Flight Surgeon’s Office are completely manual.
• Much of the data kept by the accounting and logistical information systems is not divided by departments or sections, making information extraction difficult and time consuming.

• The method of inputs to the various systems are different, making it impossible to create standards for data collection and reporting.

• Hospital personnel are not adequately educated on the capabilities of the current information systems. In discussions with various department and hospital personnel, it was apparent they were unaware of the information available to them or of the procedures required to obtain the information.

• The reports produced by these systems are in tabular format and reflect the data for one period of time. Trend analysis over time is impossible without further manual manipulation of the data. Summary information is also difficult to obtain.

Although most of these problems are unsolvable within the scope of this thesis, evaluating the difficulties they create within the department's information system will assist us in identifying specific requirements for an improved information system.

D. PROPOSED INFORMATION SYSTEMS

The first two sections of this chapter addressed the overall problems which exist in the current information system. In identifying what the system lacks, we have thus helped identify what an improved system will require:

• Consistent data collection methods.

• Consolidated information.

• Concise, summary reports which are easy to read.

• Analysis of department and section performance trends over time.

• Easy data input methods.

• Feedback for department and section leaders.
Standard reports.

Complete and up to date information.

The remainder of this chapter is an analysis of the requirements for each of the specific areas described in Chapter III. Each section below summarizes the solutions we propose, supported by the Department Chief’s requests, for the six major areas under consideration.

1. Budget Information System

   a. System Deficiencies

   The Department Chief has a budgetary system that meets only his minimal needs. The information listed below is provided to the Department Chief in tabular format by the microcomputer based spreadsheet program.

   - Account Processing Code (APC). This code is generated by the Resource Management Division to identify separate identified fund accounts. A single section can have several fund accounts.

   - Section name. The name the department assigns to each APC listed above.

   - Allocated funds for the Quarter. The funds allocated for each APC for the quarter.

   - Supply Expenditures for the Month.

   - Total Department Expenditures for the Month.

   - Total Spent this Quarter (cumulative)

   - Uncommitted Funds this Quarter.

   - Funds per Month (target expenditure for the section).

   - Percent Spent for Month.

   - Percent Saved for Month. This percentage is calculated by subtracting the percent spent for the month from 100 percent.
- Percent Spent for Quarter.
- Percent Saved for Quarter. This percentage is calculated by subtracting the percent spent for the quarter from 100 percent.

This information, though adequate, does not provide him with an easily decipherable format nor the capability to track spending habits for more than one month. The data used to generate the report, the Month End Report, is accurate but does not necessarily reflect any recent section expenditures. In spite of this problem, the information from the Month End Report is still considered accurate enough to be a good indicator of expenditures for the Department Chief.

The Department Chief also receives budget information from the two intradepartmental reports, the Resource Information Report (RIR) and the Budget and Equipment Analysis Report (BEAR). The budget sections of these reports are meant to provide the Department Chief with up to date budget information that is not currently reflected on the monthly budget worksheet. Though these reports were designed to report more current budget information, the information actually reported on the RIR and BEAR reports is a duplicate of the budget information already provided on the budget worksheet. In fact, the Department NCOIC stated that he often recopies the budget data onto the reports from the Month End Report.

The Department NCOIC currently maintains old copies of each budget report on computer disks. As each new report is needed, the Department NCOIC gathers the current information necessary to complete the spreadsheet. He gathers this data from either the current Month End Report or in the case of a quarterly or yearly recap report, from previous monthly reports. Once this new spreadsheet is created for
the report, he enters the sections' expenditures for the period into the spreadsheet. The input of each section's expenditure requires the Department NCOIC to search through the spreadsheet and find the location where the information must be entered. Although this process is not necessarily difficult, it is cumbersome and requires the Department NCOIC to have a working knowledge of both the spreadsheet's format and the application program. This system can be handled by a highly computer literate individual like the current Department NCOIC, but could easily become unworkable under a different NCOIC.

Data analysis requiring more than one month's data would involve the combination of several separately maintained spreadsheets. The old data is replaced each time a new report is created. The elimination of historical data makes long term trend analysis extremely difficult and cumbersome.

b. Proposed System Improvements

Data entry can be made simpler by standardizing the screen displays and inputs and by making the program environment transparent to the user. This data can also be maintained in a more accessible format, such as a database, for ad hoc inquiries. Maintaining the data within one consolidated database will also provide the capability to do long term analysis of expenditures. This ability to access the data allows the sections to retrieve information on their performance in the same format as seen by the Department Chief.

The data output can be improved through the use of graphs. The graphs will be used to display budgetary trends on a yearly basis which provides the Department Chief with a clearer picture of the budget fluctuations and trends over
time. These graphical printouts allow better analysis of the budget information with a lot less mental manipulation of the data. Printed tabular reports can be improved by reorganizing the presentation of the information.

c. Impact of Automation

Dr. Ertel best characterized the role of the microcomputer in automation by his statement:

The proper role for the computer is to do what it does best: scan large numbers of records...rapidly, apply its infallible memory for detail, and serve as a communications link. (Ertel, 1984, p. 485)

The primary goal in our requirements specification is to avoid the creation of any additional and senseless work. This means avoiding the automation of something that does not need automating while automating those things that best fit the advantages of the microcomputer.

The budget system is already automated, though only in a limited sense. The improvements described in the previous section will have the following impact on the current information system:

- Simplification of the input process.
- The capability to maintain a larger database to facilitate trend analysis and graphing.
- Enhance the information's worth to the decision maker.
- The capability to graph the data versus displaying it in its current tabular format.
- Reduce the amount of time the person who receives the information must spend in deciphering the data to turn it into useful information.
- Provide for a user friendly system that will not require the user to master a computer or to learn a particular applications program.
• Providing the user with a menu driven work environment should make the transition between users less complicated.

• Enhance the choice of outputs (the ways the data can be viewed) for the Department Chief and his sections.

d. Impact of Proposed System

The information provided by the new budget information system will provide the decision maker with a more succinct view of the budget information than he currently receives. As discussed in the introductory sections, the Department Chief’s time is limited and the ability to see the impact of information quickly without any major data manipulations is critical. The addition of a trend analysis capability will provide the Department Chief with the ability to forecast and manage his future budget requirements. By being able to pictorially depict his budget trends and status, the Chief can keep himself, his subordinates, and his superiors better informed.

2. Equipment Procurement System

a. System Deficiencies

The current equipment needs are identified through three sources: the Resource Information Report (RIR), the Budget and Equipment Analysis Report (BEAR), and the Information Capability Request (CAPR). The equipment needs identified by each of the department’s sections are provided by the equipment sections of the RIR and BEAR reports. The Department Chief identifies new automated equipment requirements through the Information Capability Requests (CAPR).

The RIR contains the following equipment information:

• Old Equipment Status.
• New Equipment Status.
• Medical Care Support Equipment (MEDCASE) items (equipment needed).
• Capital Expense Equipment Program (CEEP) items (equipment needed).

The BEAR contains the following equipment information:

• Equipment to be replaced (immediately, within one year, within two years, and within three years).

• Money needed for equipment replacement (immediately, within one year, within two years, and within three years).

• Actual approved items now on the CEEP and MEDCASE program with the date item ordered and its projected arrival date.

• Paper work in progress for placing equipment either on the CEEP or MEDCASE programs and its paperwork status.

The problem with the information provided in the RIR and BEAR reports is redundancy. Each report seeks to collect information on only the high priority MEDCASE and CEEP requirements but within two different timeframes, quarterly for the BEAR and monthly for the RIR. These reports provide the Department Chief with only a limited look at his equipment needs and tend to track only those needs that are the most urgent (usually only MEDCASE and CEEP items). The reports do not give the Department Chief a consolidated look at all of his department’s requirements. This fragmented approach to capturing the data makes it an intricate process for the Department Chief to estimate his future equipment needs. Since funds are limited, the Department Chief stated that he needs a consolidated listing of all his requirements to set replacement priorities throughout the department. The consolidation of this information would also be beneficial when bargaining with the hospital’s equipment acquisition board (Programmed Budget Advisory Committee).
The CAPR requests provide the Department Chief with the following information:

- Functional area supported. i.e., automation, communications, records management, printing/publishing, and visual information.

- Justification for the equipment.

- A description of the changes and the reasons for the change to the existing service (if applicable).

- Source of funding for the equipment.

These requests are only tracked as they are generated.

The process of consolidating the equipment requirements identified in the BEAR, RIR, and CAPR requests is tedious and requires the Department Chief to manually consolidate all the section's separate reports. The current system also does not allow him to track the long term equipment requirements needed to determine if there are department-wide problems in the acquisition of equipment.

Other equipment needs that may not be as critical are not tracked or monitored. In addition, the Department Chief cannot track the section's past reported requirements which are either inadvertently or deliberately not listed on the current report. This requires him to either remember all of the past requests or manually search through the old RIR and BEAR reports to obtain this information.

The status of high priority equipment requests are reported on the BEAR and RIR reports. The only way to see the status for this equipment is to review each section's RIR and BEAR reports for this information. The Department Chief simply does not have the time to do this.
b. Proposed System Improvements

Any solution proposed for the equipment information system will undoubtedly create some additional work for the department. Therefore, the primary consideration for the new equipment information system will be ease of data entry and familiarity with the entry format. The greatest improvement to the current system can be accomplished by the creation of a consolidated database where all equipment requests can be recorded and easily tracked. To identify equipment requirements, the Department NCG:NC suggested the following types of information be used in the database:

- Item description.
- National Stock Number.
- Section requesting the equipment.
- Date requested.
- Type of request (MEDCASE, CEEP, CAPR, Other).
- Priority of equipment within a category.
- Urgency of need (immediate, one year, etc.).
- Quantity desired.
- Unit price and associated extended price.
- Status of request (requisition number).
- Cumulative recap of required expenditures.

Once an item is deleted from the active database due to the delivery of the equipment, its data should be relegated to a historical database for the analysis of long term equipment trends.
The design of the user interface is critical. Once again, data entry should be simple and straightforward. The outputs can reflect either a recap by equipment category or a consolidated listing of all equipment requirements. The current reports should be consolidated into a single report and standardized and simplified to match the inputs required by the user data entry interface. The system should be built to facilitate ad hoc inquiries on the database and to do limited mathematical calculations to subtotal categories and run cumulative totals within categories.

c. Impact of Automation

The equipment procurement information system is not currently automated. The most far reaching impact of automating this system will be the work required to enter data from the consolidated Resource Information Report into the new equipment database. On the other hand, the Department Chief considers the availability of this information important for resource management. As stated earlier, a well designed user interface should limit data entry to the format recognized in the RIR. Specifically, automation will:

- Provide the department with a consolidated listing of all equipment requirements and the capability to report separate categories without leaving the database.
- Provide the Department Chief with the ability to request the information in the format he needs for a particular situation.
- Provide a historical database of equipment requirements that can be analyzed to determine equipment procurement trends over the long term.

The Department Chief currently feels that the benefits associated with automation in this area will far exceed the costs, provided the user interface is kept simple.
d. **Impact of Proposed System**

The proposed system will provide the Department Chief with a consolidated listing of all his sections' equipment requirements. This information will provide him with a capability to sort equipment needs by cost, category, or priority within the separate equipment categories, e.g., CEEP, MEDCASE, etc. In this information lies the ability to bargain with the hospital resourcing committees by having the information readily at hand and in a format which will facilitate this "give and take" environment. By knowing all of his requirements, the Chief can better manage his resources to meet those equipment needs that are the most critical to his department's success. With his limited time, the consolidated format allows him to digest the information quickly. Through the listings of future needs, he can better plan the budgets to meet those needs. This new system will serve to facilitate unique information needs quickly and with less inconvenience in obtaining that data.

3. **Personnel System**

a. **System Deficiencies**

As discussed in the previous chapter, the Department Chief has two areas of concern with the personnel information system: tracking and reporting manpower levels and funding for the Continuing Medical Education (CME) program.

The Department Chief currently tracks personnel manning levels by maintaining this information within a word processing shell. This format is not easy to update. It limits the types of reports you can generate and the type of analysis that can be done on the data. Without an ad hoc capability, the Department Chief must visualize position vacancies by scanning the complete listing. This format also restricts
the types of additional data that can be maintained with the personnel listing, i.e., doctor patient panels, productivity information, or leave and absence requests. This also precludes any data interfaces with other information systems, such as scheduling. The update process is complicated in that it involves printing the entire form and then cutting the report into individual sections. Likewise a section which requests a listing must be satisfied with a department-wide listing.

The CME listing is currently maintained on a spreadsheet. This type of format, though adequate, hampers the ability of anyone to do ad hoc analysis. Any trend analysis beyond the current year is limited. A person unfamiliar with the application program may have difficulty updating the CME spreadsheet.

b. Proposed System Improvements

The current personnel listing can be integrated into a database to provide the Department Chief with the capability to keep critical personnel information. The database should contain the following database files:

- Position Information (TDA position, authorization, etc.).
- Personnel Information (Name, SSN, and Known Loss Date).
- Personal Information (Protected, including address, spouses name, children, birthday, telephone number, etc.).
- Leave/Absence Log (Interfaces with CME listing and scheduling system, but would also include other types of absences, i.e., leaves, emergency leaves, other TDY, or unusual planned absences).
- CME listing. (Interface with the Doctor listing and the Absence Log but also includes critical CME information, i.e., estimated costs, actual costs, qualification, etc.).
The various relationships between the database files can be kept transparent to the user. All requested reports can be created by linking the needed database files. The Department Chief will have access to a list of planned absences, anticipated losses, and vacancies that he did not have previously. The consolidation of the CME listing with the personnel listing will consolidate the data entry requirements under one person, therefore freeing critical personnel to do their primary jobs. This type of data format facilitates any type of report the sections or the Department Chief could request. In addition, the scheduler can receive a list of the planned absences and not have to rely on verbal notifications from the doctors (see Section D.4., Scheduling).

Once again, by building a user interface that is independent of the program used, the requirement for any application programming familiarity is no longer necessary.

The current system requires two separate routes for leave requests, depending on the person requesting leave. The flow of information can be improved by centralizing all the data entry and flows for leaves into one location. By centralizing this data flow, the leave requests, as well as personnel updates, can be combined to avoid the redundancy of the data maintained.

c. Impact of Automation

Automation will improve the system in the following areas:

- Improved user interface. The system can be independent of the knowledge of the user.

- The choice and diversity of reporting capabilities will be enhanced.

- The leave log is currently maintained manually. By automating this log, the data can be linked to the other systems, particularly the scheduling system.
• The data will be made easier to maintain and to update.

• The Department Chief will be able to maintain a protected personal database on his personnel.

• The need to consolidate all data flows through one central location will involve changing some internal procedures within the department. These changes must be validated to meet regulations and will cause some personnel changes.

• The initial setup will be costly in terms of the database. The maintenance of this large database will require the use of a data entry clerk, but the work can be minimized by a well designed user interface.

d. Impact of Proposed System

With an enhanced database, the Department Chief can maintain the type of data he needs to track his personnel. Through a vacancy listing and the anticipated loss listing, the Department Chief can always know, with one simple listing, the vacancies or projected losses that exist in his department. This information can then be used at critical hospital meetings to quickly identify his needs in a straightforward format. At the same time, the addition of personal information, readily accessible to him, makes his job as senior counselor easier. The absence listing gives him a monthly listing of the personnel that will not be available during a specified time period. This information is critical for monitoring the workload throughout the department and greatly enhances the Department Chief’s ability to predict periods of high stress due to personnel shortages. The management of CME funds will always remain critical. Doctors need the necessary education to keep them up to date in their medical practice but in periods of increasing resource constraints, the ability to predict and justify these requirements is critical.
4. Scheduling System

a. System Deficiencies

Scheduling is a complex, subjective process requiring a great deal of independent information. In the existing scheduling system, this information is collected in many different ways, at different times, and in different formats. This information is subjectively interpreted and evaluated to produce the three required Family Practice schedules and the CTMC/FP schedules. Specific problem areas within the current scheduling process (as shown in Chapter III, Figures 15 and 16) are listed below:

- Doctor's leave and TDY requests are verbal. The scheduler depends on the individual doctor to inform him of upcoming absences. There is no standard form or time requirements for providing this information.

- The independent sources of information are maintained informally, i.e., some are recorded on yellow legal paper, other information is kept on 3" x 5" cards, and still others are typed on regular white paper.

- There is no formal instruction for the collection or maintenance of the information necessary for scheduling. The Assistant Department Chief (ADC) currently keeps all the scheduling paperwork in a manila folder and the CTMC/FP chief has a green log book in which he records doctor availability information.

b. Proposed System Improvements

The subjective nature of the scheduling process and the diverse sources of the necessary information place restrictions on the improvements which can be made and the resulting benefits of these improvements. We feel attempting to automate the process, in this case, is infeasible. Automated scheduling applications requires integer programming and optimization techniques far beyond the scope of this thesis. Additionally, complex scheduling algorithms often require the computing power of a
mainframe computer for the rapid calculations and reiterations of scheduling models. (Lyons, 1983, p. 438) Therefore, instead of concentrating on the process of actually creating the schedule, we propose improved methods of collecting, maintaining, and assimilating the necessary information. Developing a scheduling optimization model could be the subject of future research.

As described in the previous section on the Personnel System, an automated leave/TDY log could be used to record all requests for leave as soon as they are approved by the Department Chief. A simple report listing each doctor’s requested leave dates could be produced for the ADC just prior to the creation of the following month’s schedule. This would ensure the ADC had all doctor’s leave and TDY dates, without having to rely on verbal information or "Post-it-Notes" stuck on his office door.

In evaluating the other methods for collecting and maintaining doctor information, we found that automation would again be infeasible. In this case, the department schedulers do not have ready access to microcomputers and will probably not have access in the near future. Additionally, automating manual records can sometimes cause more work than it saves. For instance, in keeping the monthly cumulative tally sheet described in Chapter III, the ADC simply puts tick marks beside doctors names to show how many times they were on call for the month. If this tally sheet were automated, what now takes the ADC 2 or 3 minutes to perform might take 10 or 15 minutes by the time he turns the computer on, loads the application program, and selects and updates the doctor’s information.
Improvements can be made, however, if the forms for recording and reporting information are standardized and a more formal method of coordinating the information is developed. Using the monthly cumulative tally sheet to illustrate, preprinted forms with the months of the year listed across the top and the doctors names on the left could be used instead of the handwritten yellow legal paper. Other forms depicted in Chapter III, Figures 15 and 16 could be standardized and preprinted. This would make formalizing instructions easier and would positively influence the scheduler's assimilation of data when producing the schedules.

Keeping these standardized forms in a folder or binder is sufficient, as long as there are some basic instructions on where to get the printed forms (e.g., the department secretary's office) and the doctor's leave report so that a newcomer to the job will not revert to an unorganized system.

c. Impact of Automation

As presented in the last two sections, automating the scheduling process for the DFPCM would be infeasible within the scope of this thesis. Where automation would benefit the scheduling process is in providing consolidated information concerning doctor's leave and TDY requests. This is discussed more fully in the section on personnel. The preprinted forms for standardizing the information collection and maintenance functions could be created and kept on a floppy disk in the department's administrative office. They can then be printed as needed by the ADC.

d. Impact of Proposed System

The improvements suggested for the scheduling system deal mainly with organization and standardization of the information collection, maintenance, and
reporting functions. Although the process will remain virtually the same, the schedulers will find it much easier to gather and assimilate the data concerning the individual doctor’s availability status. Designing a good manual user interface (forms, reports, instructions, etc.), like designing a computer user interface (menus, data entry forms, reports, screens) is important. "You will learn and use a system better if it has a consistent user interface." (Burnett, 1988, p. 29) Organizing and standardizing the various forms and reports will assist the scheduler in recording, finding, and understanding necessary information. It will also be much easier for him to explain the system when he turns the scheduling job over to another person, as often happens in the military. Clear instructions are vital for a good transition file.

The process of scheduling department doctors will, for the time being, remain a subjective decision making process. Formalized methods of collecting and reporting information, however, will ease the process by allowing the department schedulers to more rapidly assess the information presented to them.

5. Patient Satisfaction System

a. System Deficiencies

Patient satisfaction is difficult to define and measure. The concept of satisfaction is viewed differently by each patient and is influenced by different factors. One person may base satisfaction on the courtesy of the doctor, another on the amount of time he had to wait to see the doctor. Some people agree that hospital satisfaction is "the consumer’s overall emotional feelings about a hospital following his or her visit" (Swan, and others, 1987). Because of the differences in opinions on this matter, it is important to identify some basic dimensions which might be indicators of
satisfaction. The evaluation of these dimensions can then be determined by using a questionnaire to measure patient opinion on the various dimensions. It is also important to realize that "many questionnaires are developed not with the intent of determining global patient satisfaction, but instead, to address only those dimensions of satisfaction with which an organization is willing or able to react". (Pelletier, 1985)

Applying these concepts to the DFPCM involved evaluating the effectiveness of the current patient satisfaction questionnaire and the value of the information it provides.

The basic content of the current questionnaire closely matches the Department Chief's desires. Table IV shows the dimensions of satisfaction perceived by the Department Chief as necessary for effective evaluation of patient satisfaction. The current questionnaire covers most of these dimensions except as noted in Table IV. The questionnaire lacks two important features: a brief explanation of the purpose of the questionnaire; and instructions for completing and submitting the questionnaire. The patient currently receives verbal instructions from the doctor distributing the questionnaire. These instructions will vary slightly from doctor to doctor.

The format for obtaining patient response is not as effective as it could be. Instead of "YES/NO" questions, the Department Chief would like the answers to be scaled, e.g., options from poor to excellent using a scale of one to five. "YES/NO" questions are considered too restrictive while a scale indicates a degree of intensity (Duffe, 1985). For our purposes, a scale would show the general level of patient satisfaction with respect to the given dimensions.
Table IV DIMENSIONS OF SATISFACTION

| **ACCESS TO CARE** | How long it takes to get an appointment. |
| **WAITING TIME** | How long it takes to see a doctor. |
| **COURTESY OF STAFF** | Doctors, Nurses, Clerks. |
| **UNDERSTAND TREATMENT** | Explanation of procedures. |
| **CLINICAL ENVIRONMENT** | Cleanliness of clinic. |
| **PHYSICIAN TIME ALLOCATION** | Adequacy of time spent with doctor. |
| **GENERAL SATISFACTION** | General opinion of the care received for a particular visit. |

**Dimensions not included in current questionnaire**

The primary problem with the existing system is in the output generated from the questionnaire results. Each question is treated as a discrete entity, one indicator of an important aspect of care. As such, only one-time, discrete response rates can be obtained for each question. Additionally, the questionnaire results are not being tracked or reported. As discussed throughout this thesis, the Department Chief wants summary information which depicts comparisons and trends. The Monitor and Evaluation reports do not provide this information.

b. **Proposed System Improvements**

There are two basic improvements which need to be made for the patient satisfaction system. First, the questionnaire must be redesigned to include all of the dimensions of satisfaction identified by the Department Chief, listed in Table IV. This redesign must also incorporate the desired scales for applicable questions. In addition, the questionnaire should include a statement of purpose and instructions to the patient on how to complete and submit the questionnaire. Although some literature
suggests that a cover letter be included (Landry, 1987, p. 16), we believe a simple one
page questionnaire will be received better by the patients and will be easier to collect
and review.

Secondly, the results of the questionnaire need to be reported in a more
meaningful, effective method. The Department Chief should be able to view trend
lines and other graphical information to determine the level of satisfaction with respect
to various dimensions. Comparing the dimensions, when appropriate, should also be
made easier. Providing this information using automation would require the
questionnaire data to be entered into a computer program which would manipulate and
compute the desired results and produce the desired output.

c. Impact of Automation

If the responses in the questionnaire are coded, the patient response can
be easily entered into a computer. Once this is done, the application program would
automatically compute the results and print or display the desired output in tabular or
graphical form. Automation will allow rapid trend analysis and graph generation and
provide a means for storing historical results for future analysis if desired. To perform
these functions manually would require an inordinate amount of time and the resulting
benefits would thus be outweighed by the costs. The Department Chief has clearly
stated the shortage of personnel in his department precludes implementing any system
which would require excessive input or evaluation time. The time the QA representative
now spends hand calculating the results of the current questionnaire would be converted
to time spent by a data entry clerk entering the raw data from the returned
questionnaires.
6. **Impact of Proposed System**

The proposals outlined above will improve the patient satisfaction information system in several ways:

- A questionnaire which is easy to understand and complete is more likely to be submitted by the patients.

- Improved questions will meet the Department Chief’s stated dimensions of satisfaction.

- Redesigned answer formats (scales) will provide more meaningful information to the Department Chief on the level of satisfaction of the patients.

- Automated applications will free the QA representative from the time consuming task of hand calculating the response rates for each question.

- Through automation, improvements in data analysis, storage, and reporting can be realized with minimal time requirements.

- Producing more meaningful reports will allow the Department Chief to spend less time analyzing the data and draw more accurate conclusions from the information presented. Trend analysis and historical comparisons will give indications of possible problems and potential improvements in the care provided by the department.

6. **Productivity System**

   **a. System Deficiencies**

   The main problem with the productivity information system is that only the CTMC and CTMC/FP clinics are being monitored for productivity. The Department Chief likes most of the tables and graphs produced by the Clinical Support Division for the CTMC clinics but would like to receive this information for each of his other sections. Unfortunately, all of the sections do not use the same system to record patient visits and doctor workload. CTMC uses AQCESS, Family Practice uses COSTARS, and other sections use a manual system. Thus, to provide the Chief with
the information he desires will require collecting and consolidating the clinic and
doctor workload statistics from each separate clinic.

b. Proposed System Improvements

The Department Chief is interested in obtaining productivity information
for two distinct purposes: monitoring each individual doctor's workload (based on the
number of patients seen), and monitoring the overall workload of each clinic (based on
the total number of visits).

Monitoring each doctor's productivity was determined to be beyond the
scope of this thesis for the following reasons:

- Only clinics using automated appointment systems, i.e., AQCESS and
  COSTARS, maintain individual doctor workload data.

- Productivity information for each doctor would be impractical to obtain
  manually because of the high volume of patients treated by each clinic.

- The appointment systems use different measures of doctor availability and do
  not factor in doctor absences, e.g., leave and TDY, when computing doctor
  workload. These disparities result in inconsistencies between the resulting
  doctor productivity figures.

For these reasons, individual doctor productivity will not be discussed in the remainder
of the thesis but could be the subject of future research.

Overall clinic workload data, in terms of the number of patient visits,
is reported monthly by each section to the Patient Administration Division (PAD). This
information is already mandatory and can be obtained from PAD either manually from
the printed MED 302 report or automatically from the data in the PAD worksheet (see
discussion in Chapter III). The use of an automated data capture routine will preclude
the sections from having to provide another copy of their workload reports to the
department.

The improvements necessary to obtain the clinic productivity
information involve collecting all of the section's visit data for entry into an overall
department system. With a consolidated database of department visit information,
productivity reports can be produced to show monthly clinic workload and yearly
productivity trends. The productivity database can be combined with the budget
database to produce information relating department and clinic monthly expenditures
to monthly workload data.

c. Impact of Automation

Automating clinic workload reporting would result in the following
benefits:

- The Chief can monitor the aggregate workload, by section, to determine trends
  in patient visits and the need to shift resources to meet needs.

- The department will be able to monitor its workload in relation to its budget.

d. Impact of Proposed System

The aggregate number of patient visits is important information. The
number of patients seen by a section can be compared with the dollar amounts of
supplies used to track and estimate budget requirements and justify spending patterns
for the Department Chief. The trends and seasonal changes in patient visits can be
analyzed over time to assist the Department Chief in planning for future requirements.
V. REQUIREMENTS ANALYSIS

A. INTRODUCTION

This chapter presents the requirements analysis for the DFPCM information system. These requirements were determined through prototyping as discussed in Chapter II. The requirements analysis is based on the functional specifications for each system described in Chapter IV and provides a more detailed look at the inputs, outputs, data structures and user interfaces required to meet the functional specifications. We used User Concept Diagrams (UCDs), described in the following section, to depict the requirements for the systems and aid in establishing the prototypes.

Having analyzed the current system (Chapter III) and proposed improvements (Chapter IV), the requirements analysis is the first step toward actually building an improved information system. This thesis takes the requirements analysis phase of the development life cycle through one iteration of the requirements prototype. The number of iterations which will ultimately be required for the prototype is unknown and will vary for different development projects. Once the prototypes are accepted by the users, the system development can continue with design and implementation. The remainder of the chapter presents the identified requirements for the DFPCM information system.
B. USER CONCEPT DIAGRAMS

Chapter III introduced data flow diagrams as a way to depict the current information system. Although DFD's are being used extensively by systems analysts, there are many other methods available for relating information system functions and data flows to the user. One of these methods is the User Concept Diagram (UCD) developed by Charles F. Martin in 1988.

Martin designed UCDs to supplant DFDs for representing the information system to the user. UCDs have several advantages over DFDs. These advantages result from the use of additional symbols to represent entities and interactions not present in DFDs. The major advantages are listed below:

- External entity symbols clearly indicate data flows into and out of the automated system.

- The use of multiple symbols for external entities more closely depicts the objects they are intended to represent.

- The intended user is identified with his type of interface so the interactions of the system can be designed for compatibility with intended users.

- Symbols can be easily drawn with standard flow chart templates or automated graphics packages.

- Different storage and output mediums can be easily portrayed. (Martin, 1988, pp. 65-84)

Figure 21 shows the basic UCD symbols (more can be created to meet a particular analyst's needs). Although UCDs use more symbols, the resulting diagrams are easier to explain to the users because they are "pictorially more suggestive of the objects they represent" (Martin, 1988, p. 65). We found this to be true in our
interactions with the DFPCM users. Thus, in the requirements analyses that follow, we use UCDs to depict the department's information system requirements.

![User Concept Diagrams](image)

**Figure 21. User Concept Diagrams**

C. GENERAL REQUIREMENTS

1. User Interface Design

   The design of the interface is perhaps one of the most critical aspects in the development of a prototype for the DFPCM. "Ease of use", "user friendly", and "ergonomic design" are all industry buzzwords that simply mean one thing: make the interface work for the user in the way they expect it to work in their environment.
Many factors determine who will be the users and when and how they will use the system. The environment at the hospital provides a challenging set of circumstances for the design of the interface. The target DFPCM information system user will most likely be a novice, untrained in both computers and applications programs. He or she will not have the time to learn complicated applications program because of many more urgent duties. The information system will not have dedicated data entry clerks and will, in all probability, rely on the availability of someone who has other pressing matters at hand.

Martin's Human Factors/Computer Knowledge Structure, as depicted in Table V, served as the basis for the interface designs in developing the initial prototype (Martin, 1987, p. 335).

To properly humanize software through the use of ergonomic design principles, Knittle and Gardner suggest the designer follow the principles listed below (Knittle, 1987, pp. 164-171):

- Minimize worker effort. The user should only perform essential, non-automatable tasks, avoiding repetition of work already accomplished (Knittle, 1987, p. 164). All inputs should be in the format that the user is already familiar with, i.e., a commonly used written form or report.

- Minimize worker memorization.

- Minimize worker frustration. Keep the user aware of delays in accomplishment and if necessary give them progress reports (Knittle, 1987, p. 166).

- Maximize use of habit patterns.

- Notify users of problems promptly.

- Maximize worker control of tasks.

- Maximize task support.
Table V  HUMAN FACTORS/COMPUTER KNOWLEDGE STRUCTURE (Martin and Fuerst. 1987, p. 335)

<table>
<thead>
<tr>
<th>Human factor</th>
<th>Human subfactor</th>
<th>User computer knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Novice</td>
</tr>
<tr>
<td>Tone</td>
<td>Explanatory and polite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short and to the point</td>
<td></td>
</tr>
<tr>
<td>Use of humor</td>
<td>Careful</td>
<td>None</td>
</tr>
<tr>
<td>Bypasses</td>
<td>None</td>
<td>Allow</td>
</tr>
<tr>
<td>Warnings</td>
<td>Many</td>
<td>Rarely</td>
</tr>
<tr>
<td>Screen format</td>
<td>Menu</td>
<td>Inquiry</td>
</tr>
<tr>
<td>Input verification</td>
<td>Always</td>
<td>Rarely</td>
</tr>
<tr>
<td>High lighting</td>
<td>Some (judiciously)</td>
<td>Little</td>
</tr>
<tr>
<td>Defaults</td>
<td>With explanation</td>
<td>Without explanation</td>
</tr>
<tr>
<td>Screen discontinuation</td>
<td>Prompt and keyed response</td>
<td>Keyed response without prompt</td>
</tr>
<tr>
<td>Help function</td>
<td>Procedures</td>
<td>Full, unsolicited</td>
</tr>
<tr>
<td></td>
<td>Values</td>
<td>Full, unsolicited</td>
</tr>
<tr>
<td>Response time</td>
<td>Mean</td>
<td>Minimize within variance</td>
</tr>
<tr>
<td></td>
<td>Variance</td>
<td>Minimize</td>
</tr>
<tr>
<td>Path process</td>
<td>Menu structure</td>
<td>Depth</td>
</tr>
<tr>
<td></td>
<td>Overall screen density</td>
<td>Minimize</td>
</tr>
</tbody>
</table>

Screen design is another aspect of humanizing software. Stahl recommends the following guidelines in the design of screens which support user friendliness. (Stahl, 1986, p. 60).

- Do not crowd the screen. "Good screens look good."
- Use highlighting, blinking, and reverse video sparingly. Overuse will lead to operator fatigue.
Use color sparingly. Color is an appealing and proven way to enhance computer input. The following foreground/background screen combinations are listed in order of legibility, from the most legible to the least legible (Ives, 1982, pp. 15-47).

MOST LEGIBLE
- Black on Yellow
- Green on White
- Blue on White
- White on Blue
- Yellow on Black
- White on Red
- White on Orange
- White on Black
- Red on Yellow
- Green on Red
- Red on Green

LEAST LEGIBLE
- Blue on Red

Limit the amount of information on each screen to what is necessary. Do not force the user to remember things from one screen to the next.

- Minimize key strokes.
- Minimize cursor movement.
- Show the maximum permissible length of an input field with underscores, highlighting, or brackets.
- Keep the screen consistent with paper input forms. Although all information from the paper form may not need to be entered on the screen, the screen should follow the general flow of information on the paper form. (Kendall and Kendall, 1988, p. 484).

Messages to the user, an essential element in user friendly screens, should be: (1) consistently positioned, (2) short, meaningful, common and fully spelled out, (3) affirmative, (4) in the active voice, and (5) in the temporal sequence of events. (Galitz, 1983, p. 9).

Another aspect of interface design is the design of menus. The user should be able to identify which transactions are available through a series of logically related
and relevant events common to a menu screen. The menu screens for the DFPCM information systems are depicted in the following sections by the use of Menu Hierarchy Charts.

2. Standard Interface Designs

Understanding the importance of a good user interface, we designed a set of standard interfaces for getting user input and for displaying output on the screen for each of the systems. The following sections describe the standard input and output designs which are applicable to all of the systems. Within the detailed requirements for each system, we present a specific description of the data required for the inputs and outputs related to that system. Appendix A, the Data Dictionary, contains detailed information about the data structure of the system's databases.

a. Input Screens

The majority of the input screens were generated with a commercially available database screen generator. The screen generator displays the available fields from the database in use and allows the analyst to load and position the desired fields onto the screen to create a functional input format. The program which generates this screen is saved and called into use whenever the user selects an input option from one of the menu systems. Appendix B is the program listing of all of the format screens for the DFPCM information system.

The screen generator allows the system designer to easily load and manipulate the necessary input fields to create good user interfaces. The screen formats are easy to change to suit the user's requirements, making the generator an invaluable tool when prototyping the requirements analysis. Examples of each of the
input screens designed are included with the detailed requirements analysis for each system, with a description of the necessary input fields.

Other standard input screens are those used to accept input from the user necessary for identifying further processing requirements, such as the year and month for a desired report or a person’s identification number for updating his or her personal information. These screens are created with programming commands which identify where the prompts and input blocks appear and any other information needed on the screen. An example of these interactive screens is shown in Figure 22. Where possible, we have designed these screens to position prompts, input blocks, and instructions in the same locations and with similar terminology. Whenever the user is asked to input a coded response, e.g., the Section Code shown in the example, he or she should be allowed to view a help screen showing the valid codes for that particular item, e.g., FPC = Family Practice Clinic.

```
Enter the Year for report: 89
Enter the Month for report: 10
```

```
Enter the Clinic section code for report: FPC
```

Figure 22. Sample Interactive Input Screen

\textit{b. Review Screens}

In many of the system menus, there is an option for reviewing database information on the screen. The review screens are easily created with commercially available database software (e.g., DBASE III+) by using a programming command and
specifying the fields desired for display. An example of a typical review screen used in the DFPCM information system is shown below.

<table>
<thead>
<tr>
<th>APC</th>
<th>DESCRIPTION</th>
<th>SECT CODE</th>
<th>POC</th>
<th>TELEPHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>W357</td>
<td>FAM PRAC CLINIC</td>
<td>FPC</td>
<td>TURNER</td>
<td>8888888</td>
</tr>
<tr>
<td>W358</td>
<td>CTMC-FPC</td>
<td>CFP</td>
<td>SHAW</td>
<td>7777777</td>
</tr>
<tr>
<td>W360</td>
<td>EMERGENCY MED</td>
<td>EMS</td>
<td>BLAKE</td>
<td>6666666</td>
</tr>
</tbody>
</table>

The field names are printed across the top of the screen, in the order given in the program command. The specified fields for each applicable record are displayed beneath the corresponding field title. The analyst can program the review screen to allow the user to change certain data or prevent the user from making any changes while reviewing the database information. Review screens used throughout the system are similar in format. The specific fields required for display for each review are described within the detailed requirements for the applicable system. As with generated screen inputs, analysts can easily update review screens to meet user requirements during prototyping.

3. Requirement Analysis Constraints

The detailed analyses which follow describe the data structures, menus, inputs, outputs, and user interactions for each of the systems under consideration. Many of the tables and graphs produced by the systems require extensive data manipulations and in some cases, interaction with more than one software package. The design of the detailed programming for these data manipulations and extractions is beyond the scope of this thesis and is therefore not included in the detailed system requirements. The output examples were generated using sample data similar to that which would be extracted from the database. Where applicable, the program listings
for each system contain comment statements indicating where data manipulations and report generation would have to occur to produce the desired output. Within the system requirements is a detailed description of the data elements necessary to create the outputs. The actual method of output generation will depend on the software packages used. For example, if the database software has graphing capability, the graphs can be generated internally from the existing data. If not, the data will have to be moved to a separate graphics software package to produce the desired graphs. These software specific constraints are not included as part of the requirements analysis but would have to be considered further in the development life cycle, once the design and software selections have taken place.

D. DETAILED REQUIREMENTS

1. Budget Information System (see Program, Appendix C)

Figure 23, a user concept diagram, gives a picture of the components of the new budget information system. The user concept diagram, as discussed in the previous section, allowed us to give the Department Chief a general picture of the new requirements necessary for the budget information system.

a. Data Structures

To successfully meet the needs of the Department Chief, the data structure for the budget system was designed to provide maximum flexibility in data retrieval and analysis. Each database was designed to represent a portion of the budget process, e.g., the receipt of the quarter's budget allocations or the receipt of the section's expenditures as reported in the month end report. Figure 24 represents how each database relates with the other databases in the budget information system.
The structure of the data fields facilitates the combination of databases through the use of relationships among the key fields between the databases. The key field identified throughout the budget databases is the Account Processing Code (APC) which is used within the hospital for financial accounting purposes.

The APC database contains the following data fields:

- Account Processing Code. Hospital-wide funding code.
- Section Description. This is the specific department name associated with a particular APC code.
- Section Code. This field was designed to represent the true organizational structure of the department. It allows the system to interrelate sections along...
organizational lines versus the artificial budgetary lines necessitated by the APC funding codes. This convention allows other subsystems of the DFPCM information system to relate budgetary information along the same command lines, such as is necessary in the Productivity system. The codes used in this field include:

DEP     Department Headquarters
FPC     Family Practice Clinic, Main Hospital
CFP     Family Practice Clinic, Troop Clinic
GOC     General Outpatient Clinic
EMS     Emergency Medical Services
POM     Presidio of Monterey Health Clinic
CTM     Consolidated Troop Medical Clinic
FHL     Fort Hunter Liggett Clinic
AMB     Ambulance Section
FSO     Flight Surgeon Office

- Point of Contact for budget matters within the section.

- Telephone Number. Self Explanatory.

- Status Code. A system code, either "A" for active, or "I" for inactive. This code is needed to allow APCs which are no longer in use (identified by an I) to continue to be linked with budget data to maintain long term historical APC information. The APC code, once entered into the system, is never deleted. Only active APCs (coded A) are displayed when a user requests an APC listing.

The APC Allocation Database contains the following fields:

- APC code. Described above.

- Fiscal Year (FY).

- Quarter. The quarter of the given fiscal year.

- Allocation: The funds allocation for the APC in the first field further delineated by the Fiscal Year and Quarter fields.

The APC Monthly Expenditure Database contains the following fields:

- APC code, as described earlier.

- Fiscal Year of expenditure.
• Month of expenditure.

• Quarter of expenditure, computed from the month field, i.e., if month is 10, quarter is 1.

• Expenditure for the month.

**APC INFORMATION DATABASE**

<table>
<thead>
<tr>
<th>Account Processing Code</th>
<th>Section Description</th>
<th>Section Code</th>
<th>Point of Contact</th>
<th>Telephone Number</th>
<th>APC Status Code</th>
</tr>
</thead>
</table>

**ALLOCATION DATABASE**

<table>
<thead>
<tr>
<th>Account Processing Code</th>
<th>Fiscal Year</th>
<th>Quarter</th>
<th>Funds Allocated (Allocations)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MONTHLY EXPENDITURE DATABASE**

<table>
<thead>
<tr>
<th>Account Processing Code</th>
<th>Fiscal Year</th>
<th>Quarter</th>
<th>Funds Expended (Expenditures)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 24. Budget Information System Data Structures

b. **Data Inputs**

The user will be required to maintain the databases discussed above through three database interfaces. The three interfaces are:

• Enter or delete quarterly allocations.

• Enter or delete monthly expenditures for each section.

• Enter or change the status of a section’s APC information.

The menu hierarchy chart is depicted in Figure 25. As discussed in the previous section of this chapter, the user is required to enter the fiscal year to limit the database search. If necessary, the month or quarter within the selected fiscal year is also entered. These entries are standardized as discussed in Section C, General Requirements. All entries within a particular menu cycle are restricted to the user's
chosen fiscal year. This restriction is desired because most data entries will require the
same fiscal year since the user usually works in one fiscal year at a time. To change
fiscal year while working in the selected menu, the user must return to the main menu
and enter the new fiscal year when prompted. The entries within the selected menu
cycle are limited to the chosen fiscal year so the user does not have to re-enter the
fiscal year for each additional expenditure or similar input.

In the cases where the APC is entered by the user, the system verifies
the code entered against the active APC information database and, if the APC is found,
confirms the user’s choice with the following screen.

Section: Section Code:
Point of Contact: Telephone:

This confirmation prevents the entry of either a wrong or inappropriate APCs that
would destroy the integrity of the allocation and expenditure databases. If the APC is
not found, an appropriate warning is issued to the user and he or she is allowed to
try again.

Figure 26 is a picture of the user input screen used for the entry and
deletion of a quarter’s budget allocation for a given APC. The fiscal year, APC, and
quarter have already been entered by the user and will appear on the input screen.
This screen is modified when used in the deletion process by the addition of a
comment, Delete this Record? (Y/N), at the bottom of the screen.

Figure 27 depicts the user input screen that allows the user to enter the
monthly expenditures for a particular APC. As discussed previously, the user can only
enter the actual allocation for the month. The month and APC have already been
Figure 25. Budget Information System Menu Hierarchy Chart
entered and verified to be correct. This format, modified like the quarterly format, is also used for verification prior to the deletion of a record.

**Figure 26. Quarterly Budget Allocation Input Screen**

<table>
<thead>
<tr>
<th>Quarter</th>
<th>APC Code</th>
<th>Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>W140</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 27. Monthly Expenditure Input Screen**

<table>
<thead>
<tr>
<th>APC Code</th>
<th>Month</th>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>W-156</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Figure 28 depicts the user input screen that allows the user to enter or change an APC. The entry of a new APC is preceded by verification that the APC requested is not in the current database. If the requested APC is found in the existing database, the user is warned and allowed to try again. The user is not allowed to reenter the APC once the screen in Figure 28 is presented. This prevents redundancy in data entry and keeps the user from circumventing the duplicate APC check procedure. The section codes are displayed on the screen to facilitate user entries. Inactivation of the APC is allowed when the user is prompted with "Do you wish to
put this APC into inactive status? (Y/N) ["]. If the user wants to change a particular APC's status code to inactive, the APC record is automatically annotated with the new status code. Activation to an active status is automatic when the user first enters a new APC.

![APC Information Input Screen]

**Figure 28. APC Information Input Screen**

c. **Outputs**

Outputs are divided into two general categories. Review screens (discussed in Section B of this chapter) and pre-formatted reports. The three general review screens presented to the user are depicted in the menu hierarchy chart in Figure 25 as the menu options either to review allocations, expenditures, or all of the APC information. Each review option provides the user with the generic review display as described in Section B of this chapter. The data fields presented in each case are the complete data fields of the respective active database.

(1) Monthly Budget Expenditure Report. Figure 29 is an illustration of the monthly budget expenditure report. This report serves as the Department Chief's indicator of the month to month status of the department's budget. This report is
critical to the monitoring of the section's compliance with the department's budget. This report is also provided to the section chiefs for the same reason.

The user is prompted to enter the fiscal year and month desired prior to the output of this report. The databases and appropriate fields necessary to create the report are listed below.

- APC, extracted from the Monthly expenditure database.
- Section Description. This information is obtained from the combination of the APC database with the Monthly Expenditure database to obtain the title for each APC in the monthly expenditure database.
- Allocation for the quarter. The APC's allocation figure from the allocation database is combined with the monthly expenditure database for the selected fiscal year and quarter.
- Expenditures for the month. This data is derived for each APC from the monthly expenditures database.

The following numbered items, which clarify the calculated fields within the report, correspond with the numbers in Figure 29.

1 This is the fiscal year of the report.
2 This is the month of the report. The numerical month requested is converted to the name of the month, i.e., month 10 becomes October.
3 Quarter of the report.
4 Report date provided by the system.
5 Spent for Quarter. This field is calculated by summing all the monthly expenditures for the specified quarter. For instance, if the monthly report is for November, the system searches the monthly expenditure database and finds all expenditures for the first quarter's months; October, November, and December. (Note: in this example, December's expenditures would be zero.)
Figure 29. Monthly Budget Expenditure Report

6 Flag Field. This field prints a "***" if the amount spent for the quarter or month exceeds the amount allocated for the quarter or month (see Note 8 below). This flag serves as a visual indicator to the reader and highlights probable problem areas.

7 Percent Spent for Quarter. This field is computed by dividing the amount expended so far in the quarter (as determined in Note 5 above) by the allocation for the quarter.

8 Funds per Month. This amount is computed by dividing the quarterly allocations by three to provide monthly allocations for the sections.

9 Percent Spent for Month. This field is computed by dividing the amount expended during the month in question by the Funds per Month (explained in Note 8 above).

(2) Quarterly Report. Figure 30 is an illustration of the quarterly budget expenditure report. This report serves as the Department Chief's indicator of the status of funds for the selected quarter. This report, like the monthly report, is critical in allowing the Department Chief to monitor the sections' compliance with the department's budget. This report is also provided to the section chiefs for the same reason.
The quarterly report is designed to closely resemble the monthly report. This report remains in the same format as the monthly report, but excludes all the fields relating to monthly expenditures.

The user is prompted to enter the fiscal year and the quarter desired prior to the output of this report. The fields required for each record are the same as described in Subsection (1) on the monthly budget expenditure report.

![Department of Family Practice Quarterly Expenditure Report](image)

**Figure 30. Quarterly Budget Report**

The following numbered items, which clarify the calculated fields within the report, correspond to the numbers in Figure 30.

1. This is the Fiscal Year of the report.

2. This is the quarter of the report.

3. Report date provided by the system.

4. Spent for Quarter. This field is calculated by summing all the monthly expenditures for the requested quarter. For instance, the system searches the monthly expenditure database and finds all expenditures for the selected quarter's months, for each APC.

**DEPARTMENT TOTALS**

<table>
<thead>
<tr>
<th>APC INFORMATION</th>
<th>QUARTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>APC</td>
<td>SECTION</td>
</tr>
<tr>
<td>W140</td>
<td>PRIMARY CARE</td>
</tr>
<tr>
<td>W257</td>
<td>FAM PRAC CL</td>
</tr>
<tr>
<td>W360</td>
<td>EMERG MED SERVICE</td>
</tr>
</tbody>
</table>

**DEPARTMENT TOTALS**

| DEPARTMENT TOTALS | 43000.00 | 17500.00 | 41% |

**Indicates an overexpenditure of funds.**
5 Flag Field. This field prints a "**" if the amount spent for the quarter exceeds the amount allocated for the quarter. This flag serves as a visual indicator to the reader and highlights probable problem areas.

6 Percent Spent for Quarter. This field is computed by dividing the amount expended so far in the quarter (as described in Note 4 above) by the allocation for the quarter. This process is repeated for each APC.

(3) Fiscal Year Allocation Report. Figure 31 is a representation of the Fiscal Year Allocation Report. This report shows the allocation for each APC for each quarter in the user selected fiscal year. This report also shows the percent change between the previous fiscal year’s allocation and the selected fiscal year’s allocation. This report provides the Chief with a quick look at the relative allocations for each of his sections compared with fund allocations from the previous fiscal year.

FISCAL YEAR ALLOCATION REPORT
FY 89

DEPARTMENT OF FAMILY PRACTICE 4
COMMUNITY PRACTICE FUND
11 MAR 89

<table>
<thead>
<tr>
<th>APC</th>
<th>SECTION</th>
<th>ALLOCATION QUARTER 1 CHANGE</th>
<th>ALLOCATION QUARTER 2 CHANGE</th>
<th>ALLOCATION QUARTER 3 CHANGE</th>
<th>ALLOCATION QUARTER 4 CHANGE</th>
<th>TOTAL FOR FISCAL YR CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>W149</td>
<td>PRIMARY CARE</td>
<td>1000.00</td>
<td>516.00</td>
<td>516.00</td>
<td>518.00</td>
<td>2550.00</td>
</tr>
<tr>
<td>W145</td>
<td>C. Fam Pract</td>
<td>6000.00</td>
<td>2000.00</td>
<td>2000.00</td>
<td>2000.00</td>
<td>14000.00</td>
</tr>
<tr>
<td>W157</td>
<td>Fam Pract Clinic</td>
<td>14000.00</td>
<td>-0.11</td>
<td>8000.00</td>
<td>-0.50</td>
<td>8000.00</td>
</tr>
<tr>
<td>W516</td>
<td>CMHS-FPC</td>
<td>10000.00</td>
<td>1.37</td>
<td>6000.00</td>
<td>1.06</td>
<td>6000.00</td>
</tr>
</tbody>
</table>

OTHER SECTIONS REPORTED HERE

| TOTALS | 119200.00                  | 70244.00                     | -0.39                       | 70244.00                     | -0.39                       | 70244.00                     | 330000.00                  | -0.29 |

Figure 31. Fiscal Year Allocation Report

The user is prompted to enter the fiscal year prior to the output of this report. The fields required for output of this report include:

- APC.

- Section Description.
• Allocations. For each APC for the current year.
• Allocations. For each APC for the previous year.

The following numbered items, which clarify the calculated fields within the report, correspond with the numbers in Figure 31.

1 This percentage reflects the percent change between the previous fiscal year's allocation and the currently selected fiscal year allocation.

2 Totals for the department. This number reflects the total allocation for the department for each quarter in the selected fiscal year. This figure is calculated from totaling all quarter allocations for all of the APCs within the APC Allocation Database.

3 In the cases where an APC did not exist in a prior year, the percentage change field (as described in Note 1) is left blank.

(4) Fiscal Year Recap. Figure 32 provides an illustration of the Fiscal Year Recap Report. This report serves as the Department Chief's indicator of the year's funds status for the department. This report is critical in allowing the Department Chief to analyze each section's compliance with the imposed funds limitations. Throughout the year, this report can provide a quick look at the current status of funds remaining to fulfill the needs for the rest of the fiscal year.

<table>
<thead>
<tr>
<th>Department of Family Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Year Recap Report 89</td>
</tr>
</tbody>
</table>

**APC INFORMATION**

<table>
<thead>
<tr>
<th>APC</th>
<th>SECTION</th>
<th>ALLOCATED</th>
<th>SPENT</th>
<th>** PERCENT SPENT**</th>
<th>UNDER COMMITTED THIS FY</th>
<th>OVER COMMITTED THIS FY</th>
</tr>
</thead>
<tbody>
<tr>
<td>WM40</td>
<td>PRIMARY CARE</td>
<td>16419.00</td>
<td>1091.43</td>
<td>6%</td>
<td>15532.57</td>
<td>159.02</td>
</tr>
<tr>
<td>WM57</td>
<td>FAM PRAC CL</td>
<td>62600.00</td>
<td>62759.02</td>
<td>101%</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>WM35</td>
<td>CTMC-FPC</td>
<td>15500.00</td>
<td>5630.03</td>
<td>36%</td>
<td>9868.97</td>
<td>16027.42</td>
</tr>
<tr>
<td>WM36</td>
<td>EMERG MED SERV</td>
<td>124000.00</td>
<td>107972.58</td>
<td>87%</td>
<td>**</td>
<td>**</td>
</tr>
</tbody>
</table>

DEPARTMENT TOTALS

| 539719.00 | 459885.82 | 85% | 78833.42 |

** Indicates an overexpenditure of funds.

Figure 32. Fiscal Year Recap Report
The user is prompted to enter the fiscal year desired prior to the output of this report. The fields required for output of this report include:

- APC.
- Section description.
- Allocation for the quarter.
- Expenditure for the month.

The following numbered items, which clarify the calculated fields within the report, correspond with the numbers in Figure 32.

1 Allocated Funds for FY. This number represents the allocation for each APC in the allocation database for the selected fiscal year. This number is computed by totaling all quarter's allocations within the selected fiscal year for each APC.

2 Total Spent this FY. This represents the total amount spent in the selected fiscal year for the APC. This number represents a total of all monthly expenditures for the selected fiscal year in the monthly expenditure database.

3 Uncommitted Funds this FY. This number represents the difference between Allocated Funds for FY (Note 1) and Total Spent FY (Note 2).

4 Over Committed this Fiscal Year. This column is printed when the uncommitted funds are negative in the preceeding column (Note 3). It serves to flag overcommitted sections within the department.

5 Percent Spent FY. This column is calculated by dividing the Total Spent this FY figure (Note 2) by the Allocated Funds for FY figure (Note 1).

6 Department Totals. These numbers, with the exception of Percent Spent (Note 5), are totals of the respective column above the numbers. The Percent Spent figure is the total spent for the fiscal year divided by the total allocated funds.

(5) Percent Spent For Quarter Graph (see Figure 33). This report provides the Department Chief with a graphical portrayal of the funds remaining for each APC for a selected quarter. This graph provides a visual picture of the current status of all of the APC's expenditures.
The user is prompted to enter the fiscal year and quarter desired prior to output of this report. This report requires the following fields to be completed:

- APC.
- Section description.
- Total Expenditures for the quarter for each APC
- Allocation for the quarter for each APC.

The following numbered items correspond to the numbered items in Figure 33:

1. The X-axis represents the APC’s expenditures for the quarter on a scale from 0 to 100 percent of the amount allocated for the section.
2 The actual computation of this percentage comes from dividing the total expenditures for a section by the allocation for that section.

3 APC's active in the selected quarter are reported along the Y-axis.

(6) Trend Analysis Graph (see Figure 34). These two graphical pictures provide the Chief with a look at the current trend in expenditures for the current year and the trends for the two previous years. The expenditures are compared to the allocations for the respective fiscal years. This report will be used to report and track the overall budgetary trends within the department for the current fiscal year. This report can be called up at any time during the current fiscal year.

The user is required to enter the fiscal year prior to output of this report. The data fields necessary to create this report include:

- Total Allocation for all APCs for each quarter within the selected fiscal year.

- Total expenditures for all APCs for each month within the selected fiscal year. This will not be graphed but serves as the building block for the graphing of this data on a cumulative basis.

A calculated cumulative total for each of the above data fields is required to create these two graphs. As depicted in Figure 34, one line is graphed to represent the cumulative total of each quarter's allocation. The second line represents the cumulative total expenditures for each month.

The following numbered items correspond with Figure 34.

1 This line reflects the cumulative total for the total allocations for all APC's reported for the selected fiscal year in the APC Allocation Database.

2 Each tick mark on the line corresponds to the actual total expenditure for all APCs for the given month on the X axis.
Figure 34. Trend Analysis Graph
3 This graph represents a long term trend analysis of department wide expenditures. The system uses the current fiscal year’s expenditures and the two previous year’s expenditures to create this graph.

4 The fiscal year of the information graphed.

5 Quarter allocations are plotted on the FY graph by dividing the quarterly allocation into three equal monthly allocations (done within the department). These monthly allocations are then graphed on a cumulative basis.

6 The percent of allocation is computed by dividing the expenditures for the month by the allocation for the month.

2. Equipment Information System (see Program, Appendix D)

Figure 35 is the UCD describing the proposed Equipment Information System. As shown in the diagram, initial equipment requirements are identified with the department’s Resource Information Report (RIR). The RIR is shown in Figure 36. This report is completed by the sections and submitted to the department NCOIC. In addition to new equipment requirements, the RIR is also the medium for updating previously submitted equipment requirements. The information contained in the RIR is used by the department to update the equipment procurement database. As shown in Figure 36, the RIR is also the medium for collecting section personnel information, i.e., gains, losses, and changes. The personnel portion of the RIR is discussed in Section 3, Personnel System.
Figure 35. Equipment Information System User Concept Diagram
Figure 36, Resource Information Report (RIR)

### 1. Personnel

- Losses (changes additions to previous report)

<table>
<thead>
<tr>
<th>CODE</th>
<th>NAME</th>
<th>RANK</th>
<th>LOSS DATE</th>
<th>PA</th>
<th>COMMENTS</th>
</tr>
</thead>
</table>

- Gains (attach completed personnel information sheet)

<table>
<thead>
<tr>
<th>PARA LINE POS</th>
<th>NAME (last,first)</th>
<th>RANK</th>
<th>STATUS</th>
<th>RCT</th>
<th>COMMENTS</th>
</tr>
</thead>
</table>

- Changes to Current TDA (other than losses or gains)

<table>
<thead>
<tr>
<th>PARA LINE POS</th>
<th>NAME</th>
<th>RANK</th>
<th>PARA LINE POS</th>
<th>REASON</th>
</tr>
</thead>
</table>

### 2. Equipment

- Status Update (Items currently on list)

<table>
<thead>
<tr>
<th>CODE</th>
<th>ITEM</th>
<th>QTY</th>
<th>COST</th>
<th>NEW STAT</th>
<th>COMMENTS</th>
</tr>
</thead>
</table>

### 3. Command Interest

- List 3 things going well.

- List 3 things being worked on.

- List any thing that may require the assistance of the chief.
a. **Data Structures**

The Equipment System consists of two databases. The primary database maintains the active department equipment requirements and contains the following data fields:

- **Equipment Code Number.** This number, assigned by the system, uniquely identifies each equipment item in the database.

- **Section Code.** Explained in Section 1, Budget System.

- **Date of Request.** The date equipment is requested by the section.

- **Item Description.** This is a short description of each equipment item identified in the database.

- **Type of Request.** The equipment requested will be one of four types, MEDCASE, CEEP, CAPR, or other as described in Chapter IV.

- **Priority.** The priority number is a ranking of all of the equipment to indicate the relative priority of each. The Department Chief assigns the priority to all department equipment using the priority worksheet described in the Outputs section below.

- **Urgency Code.** The urgency code indicates how soon the equipment is needed by the section.

- **Quantity.**

- **Unit Price.**

- **Extended Price.** Quantity * Unit Price.

- **Status of Procurement.** The status of the procurement is indicated by one of five codes to show where each equipment request is in the procurement process. The five codes and their meaning are listed below:

  - **PW** Paperwork is being prepared by the section requesting the equipment.
  - **RM** RMD is processing the equipment request.
  - **AP** RMD has approved the equipment procurement.
  - **OO** The section as put the equipment on order.
  - **RC** The equipment has been received by the section.

- **Comments.**
The second database maintains the historical information on equipment previously procured by the department and consists of the following data fields:

- Section Code.
- Item Description.
- Type of Request.
- Quantity.
- Extended Price.
- Date of Request. Taken from primary database described above.
- Transfer Date. The date the item was transferred to the historical database (upon receipt of the equipment).
- Months to Complete Procurement. The difference between the date of request and the transfer date.
- Comments.

b. Data Inputs

The Equipment System menu hierarchy chart is shown in Figure 37. The menu system allows the user to update the equipment database, print reports, and archive completed equipment procurements in the historical database. Users enter new equipment requirements into the primary equipment database using the input screen shown in Figure 38. This screen presents all of the data fields necessary for user input and displays the various codes needed for the specific data fields.

To change or remove equipment from the database, the user selects the appropriate menu item and is then prompted to enter the equipment code number or the section code to identify the equipment to be changed or removed. If the user does not know the equipment code number, he or she can enter the section code. A list
Figure 37. Equipment Menu Tree
of all equipment requirements for that section is presented. The user is then asked to enter the record number (displayed to the left of each equipment item) of the desired equipment record to change. When changing equipment data, the user is presented with the same screen discussed above for new data entry.

```
<table>
<thead>
<tr>
<th>SECT</th>
<th>DATE</th>
<th>ITEM DESCRIPTION</th>
<th>TYPE</th>
<th>URGENCY</th>
<th>QTY</th>
<th>UNIT PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

STATUS CODE

```
• Item Description.
• Urgency Code.
• Priority. The Department Chief’s numerical ranking for the item.
• Quantity.
• Unit Price.

The user is allowed to enter the changes directly to the review screen. When equipment status changes, e.g., an equipment requisition is submitted or equipment is received, the sections are required to indicate this on the RIR and submit it to the department NCOIC. These status changes are then entered into the database using the input screen shown in Figure 39. This screen is similar in format to the Status Update section on the RIR to simplify user data entry.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>FPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQUIP CODE</td>
<td>ITEM DESCRIPTION</td>
</tr>
<tr>
<td>9010.01</td>
<td>BREAST PUMP</td>
</tr>
</tbody>
</table>

Press ESC to abort editing, ENTER to complete changes.

Figure 39. Status Update Screen

c. Outputs

(1) Review Equipment List. The format of the review screen is discussed in Section B above. All of the equipment database fields are listed on the review output screen. The user can scroll left and right, up and down, to view or change all fields for each record.
(2) Department Equipment Report (see Figure 40). The department equipment report is a complete equipment requirements listing for the department. All of the fields in the equipment database are used to produce this report. The user is allowed to choose one of three sort options. The flexibility to select the sort option makes it easier to highlight those aspects of equipment procurement most important to the Department Chief. Each sort option is discussed below:

- Sorting by Cost. The equipment list is sorted by the extended price field, from high values to low.

- Sorting by Urgency. The equipment list is sorted by the urgency code, from zero (0) for immediate equipment requirements to four (4) for non-urgent requirements. Within each urgency code section the equipment is further sorted by section code and extended price (from high to low).

- Sorting by Status. The status sort option groups the equipment information by each of the five status codes. Each group is further sorted by section code and extended price (from high to low).

![Figure 40. Department Equipment Report](image)

The following numbered items correspond to the numbers in Figure 40 and explain certain portions of the report.

1. The system date is printed at the top of the report.

2. The type of sort indicates how the equipment list has been sorted, by COST, URGENCY, or STATUS.

3. The format of the fields listed across the top remains the same regardless of the sort option chosen.
4 The cumulative total is calculated by adding each successive extended price to the previous cumulative total.

(3) Equipment Type Report (see Figure 41). The equipment type report is a listing of the equipment requirements for one of the equipment types, either MEDCASE, CEEP, CAPR, or OTHER. The user selects the type of equipment he or she wants listed from the menu. All of the fields in the equipment database are used to produce this report. The user is allowed to choose one of two sort options. Each sort option is discussed below:

- Sorting by Cost. The equipment list is sorted by the extended price field, from high values to low.
- Sorting by Priority. The equipment list is sorted by the priority code, from one for highest priority to the lowest existing priority in the database. Within each priority section the equipment is further sorted by section code and extended price (from high to low).

<table>
<thead>
<tr>
<th>TYPE EQUIPMENT: CEEP</th>
<th>EQUIPMENT TYPE REPORT</th>
<th>DATE: 7/25/89</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRI</td>
<td>SECT</td>
<td>REQ DATE</td>
</tr>
<tr>
<td>1 FPC 01/10/89 INSUFFLATOR</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2 EMS 01/20/89 MICROTOME</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3 CTM 12/15/88 FLURO-LITE</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4 CFP 04/10/89 PLASMA BATH</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 41. Equipment Type Report

The following numbered items correspond to the numbers in Figure 41 and explain certain portions of the report.

1 The system date is printed at the top of the report.

2 The type of equipment indicates which equipment type is listed in the report, either MEDCASE, CEEP, CAPR, or OTHER.

3 The format of the fields listed across the top remains the same regardless of the sort option chosen.

4 The cumulative total is calculated by adding each successive extended price to the previous cumulative total.
(4) Equipment Priority Worksheet (see Figure 42). The priority worksheet is used by the Department Chief in a meeting with each of his section chiefs. In this meeting, the priority of all of the department’s equipment requirements is determined and annotated on the priority worksheets for each equipment type. These worksheets are then used to update the priorities in the equipment database.

### Figure 42. Equipment Priority Worksheet

The data fields necessary to produce the priority worksheet are listed below:

- Type of Equipment.
- Equipment Code Number.
- Section Code.
- Item Description.
- Priority.
- Urgency Code.
- Quantity.
- Unit Price.
- Extended Price.
- Comments.

The following numbered items correspond to the numbers in Figure 42 and explain certain portions of the report.
1. The system date is printed at the top of the report.

2. The type of equipment indicates which equipment type is listed in the report, either MEDCASE, CEEP, CAPR, or OTHER.

3. A fill in section is provided to allow the Department Chief to enter the updated priorities.

(5) Equipment Historical Report (see Figure 43). Once equipment is received, the data referencing it can be archived from the primary equipment database to the historical database. All of the historical database fields are used to produce the equipment historical report. The report can be sorted either by section or by equipment type. Within each of these sort options the list is further sorted by the extended price field, from high to low.

<table>
<thead>
<tr>
<th>TYPE SORT: SECTION</th>
<th>EQUIPMENT HISTORICAL REPORT</th>
<th>DATE: 7/20/89</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECT</td>
<td>REQ</td>
<td>TYPE</td>
</tr>
<tr>
<td>FPC</td>
<td>MEDC</td>
<td>BEDPAN</td>
</tr>
<tr>
<td>FPC</td>
<td>OTES</td>
<td>SPIT CUP</td>
</tr>
<tr>
<td>Subtotals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTF</td>
<td>CAPR</td>
<td>MICROCOMPUTER</td>
</tr>
<tr>
<td>Subtotals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFP</td>
<td>CEEP</td>
<td>GAMMA CAMERA</td>
</tr>
<tr>
<td>Subtotals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 43. Equipment Historical Report

The following numbered items correspond to the numbers in Figure 43 to explain the report information.

1. The transfer date is automatically entered into the database using the system date when the data is archived.

2. The months to complete the procurement are calculated by subtracting the transfer date from the original request date.

3. Subtotals for each section or equipment type group are shown for the extended price field and is obtained by totaling the extended prices for the respective group.
(6) Historical Summary Report (see Figure 44). The historical summary report displays summary statistical information about the data in the historical database. The Department Chief can use the summary report to determine the department's history of equipment procurement in terms of the number of equipment requests, average costs of the equipment requested, the type of equipment requested, and the average length of time to obtain equipment. The historical database fields necessary to create the summary report are listed below.

- Section Code.
- Type of Request.
- Quantity.
- Extended Price.
- Date of Request.
- Transfer Date.
- Months to Complete Procurement.

The following numbered items correspond to the numbers in Figure 44 and explain the method used to produce the summary report information.

1. The earliest date of request and the latest date of request contained in the database are listed at the top of the report.

2. The total number of requests for each type of equipment are calculated by adding the total quantities of equipment procured for each equipment type.

3. The average cost of each equipment type is calculated by dividing the total extended price for the equipment type group by the total number of requests for that equipment type group.

4. The average time to complete an equipment procurement is calculated by averaging all of the figures for the number of months to complete each procurement for each equipment type.
5. The total number of requests for each type of equipment is summed for each section.

6. The average cost for each type of equipment is calculated for each section by dividing the total cost of the equipment type requests for a section by the total number of requests for that equipment type for the section.

HISTORICAL SUMMARY REPORT

REQUESTS BY TYPE

<table>
<thead>
<tr>
<th>TYPE REQUEST</th>
<th># REQUESTS</th>
<th>AVG COST</th>
<th>AVG MONTHS TO COMPLETE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPR</td>
<td>25</td>
<td>7500.00</td>
<td>3.1</td>
</tr>
<tr>
<td>MEDC</td>
<td>78</td>
<td>3500.00</td>
<td>2.5</td>
</tr>
<tr>
<td>CEEP</td>
<td>52</td>
<td>11000.00</td>
<td>4.7</td>
</tr>
</tbody>
</table>

# REQUESTS BY SECTION

<table>
<thead>
<tr>
<th>SECTION</th>
<th># MEDCASE</th>
<th># CEEP</th>
<th># CAPR</th>
<th># OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPC</td>
<td>25</td>
<td>13</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>CTM</td>
<td>14</td>
<td>11</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>GOC</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>EMS</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

AVERAGE COST BY SECTION

<table>
<thead>
<tr>
<th>SECTION</th>
<th>AVERAGE MEDCASE</th>
<th>AVERAGE CEEP</th>
<th>AVERAGE CAPR</th>
<th>AVERAGE OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPC</td>
<td>4400.00</td>
<td>13000.00</td>
<td>8500.00</td>
<td>2900.00</td>
</tr>
<tr>
<td>CTM</td>
<td>3700.00</td>
<td>9000.00</td>
<td>3400.00</td>
<td>3000.00</td>
</tr>
<tr>
<td>GOC</td>
<td>3400.00</td>
<td>6500.00</td>
<td>0.00</td>
<td>2700.00</td>
</tr>
<tr>
<td>EMS</td>
<td>3000.00</td>
<td>0.00</td>
<td>0.00</td>
<td>2650.00</td>
</tr>
</tbody>
</table>

Figure 44. Historical Summary Report

3. Personnel Information System (see Program, Appendix E)

Figure 45 is the user concept diagram for the personnel information system.

This system interfaces the four major personnel subsystems identified in Chapter IV.

These information subsystems include:

- Department Personnel Information Subsystem (including personal data).
- Table of Distribution and Allowances Subsystem.
- Leave and Absence Recordkeeping Subsystem.
- Continuing Medical Education (CME) Budget Subsystem.
Figure 45. Personnel Information System User Concept Diagram

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The consolidation of all four personnel subsystems under one major system simplifies the transfer and maintenance of the six data files necessary to maintain the data. All personnel inputs, processing, and outputs are captured within a single series of operations without requiring the user to leave the current application environment.

a. Data Structures

Figure 46 depicts the various database files required to support the personnel information system. This figure shows how the file that represents a person within the department serves as the pivotal point for the interrelation of all of the personnel files.

Figure 46. Personnel Data Structures
The key field identified throughout the database is the Personnel Identification Code as described below. This code is already used in the current system. It is recognized as the method by which personnel data should be maintained throughout the department.

The personnel file, which represents an individual assigned to the department, contains the following fields:

- Personnel Identification Code. This code is derived from the first letter of an individual’s last name, combined with the last four numbers of their social security number.
- Last Name.
- First Name and Middle Initial.
- Rank.
- Branch of Service (accepted military abbreviations e.g., Medical Corps (MC), Army Nurse Corps (AN), etc.).
- Military Occupational Specialty Code.
- Arrival Date within the Department.
- Anticipated Date of PCS (if known).
- Currently assigned TDA Paragraph Number.
- Currently assigned TDA Line Number.
- Currently assigned TDA Position Number. If the person is carried as excess, this number will be 99.
- Doctor Status (if appropriate). This code serves to track only the current training status of doctors in the residency program. The codes used are; (1) Third Year Residency, (2) Second Year Residency, (3) First Year Residency (Student).
The personal information database file serves as the repository of sensitive information about an assigned individual. Each record contains:

- Personnel Identification Code. This code serves to relate this file to the personnel file.
- Local Home address.
- City of Home address.
- State.
- Spouse’s first name (if appropriate).
- Children’s names, followed by their ages (if appropriate).
- Home telephone number.
- Date of rank.
- Personal Comments.

The Table of Distributions and Allowances (TDA) database file reflects the current positions available as obtained from the most up to date TDA for the department. Each record contains the following fields:

- TDA Paragraph Number.
- TDA Line Number.
- TDA Position Number.
- TDA Official Job Title.
- The APC that relates to this particular position.
- The authorized branch of service of this position.
- The authorized rank or grade for this position.
- The authorized Military Occupational Specialty for this position.
* Authorized field. This field is used to determine if the position is an authorized position under the current TDA. This position could actually be required under the TDA but not authorized under peacetime conditions. This is a common occurrence in TDAs in the military.

The Continuing Medical Education funds allocation database records the CME allocation for each fiscal year. Each record contains the following fields:

- Fiscal Year.
- Allocation for the fiscal year in dollars.

The Continuing Medical Education request database records the doctors' requests for CME funded education. Each doctor can have several active CME requests within this database. Each record contains the following fields:

- Personnel Identification Code.
- Fiscal Year of the request.
- Type Request. The CME request can be one of the following types of requests: (C) Conference/Meeting Travel, (G) General Mission Travel, (B) Board Certification.
- Start Date of Travel.
- End Date of Travel.
- Duration of travel. This field is computed by determining the number of days between the start date and the end date. This data is used in the statistical summary reports described in Section 3.c, Outputs, below.
- Location or Destination.
- Purpose of travel. The title of the conference or the specific purpose of the request.
- Travel Mode. Travel can either be by (A) aircraft, (P) privately owned vehicle, or (G) government provided ground transportation. This is used in the computation of the costs involved in the travel.
• Travel cost (Actual or estimated cost depending on the Costing Code described below).

• Per Diem Cost (Actual or estimated cost depending on the Costing Code described below).

• Registration Fee for the Conference (Actual or estimated cost depending on Costing Code described below).

• Reimbursable expenses (Actual or estimated cost depending on Costing Code described below).

• Total Cost of travel. This field is calculated by adding the Travel cost, Per Diem cost, Registration Fee, and Reimbursable expenses fields (Actual or estimated total cost depending on the Costing Code of the related fields).

• Costing Code. This code differentiates between an estimated total cost and the actual costs. The actual costs are identified once the travel has been completed and the travel claim voucher is received by the department.

The Absence database maintains the record of all requested leaves or other absences, e.g., permissive TDY, emergency leave. This database does not record the CME requests discussed in the CME request database section. Each record contains the following fields:

• Personnel Identification Code.

• Fiscal Year of request.

• Type of request. (L) Ordinary Leave, (P) Permissive TDY, (E) Emergency Leave, (S) Sick Leave or Convalescence leave, (T) Temporary Duty, or (O) other type of unspecified absences.

• Start Date of Absence.

• End Date of Absence.

• Duration of absence. This field is computed by determining the number of days between the start date and the end date.

• Comments on special circumstances.
b. **Data Inputs**

The Personnel Information System menu hierarchy chart is shown in Figure 47. This menu system allows the user to update the personnel system databases in the following areas:

- Add, change or remove records in the personnel and personal database.
- Add, change or remove records in the Table of Distributions and Allowances database.
- Update the Personnel Files from information provided on the Resource Information Report explained in the equipment information system Section (2).
- Add, change, or remove records in the Continuing Medical Education request and funds allocation databases. The user can also print the two required reports for CME fund monitoring.
- Add, change or remove records from the absence database.

The following sections describe the major data entry requirements for the personnel system. The common data entry requirements are described in the first section. This description is followed by the data input requirements for each of the major input submenus depicted in Figure 47.

1. **Common Input Requirements.** In most of the submenus, the user is required to enter a personnel identification code (PIC). The standardized entry screen discussed in Section C.2.a, Input Screens, is used for this input. The system then verifies the PIC entered against the personnel file. If the PIC is found in the database, the user is presented with the following confirmation screen.
Figure 47. Personnel System Menu Hierarchy Chart

PERSONNEL SYSTEM
Section 1

MAIN MENU

UPDATE PERSONNEL LIST
ADD PERSONNEL
CHANGE INFORMATION
DELETE PERSON
REVIEW INFORMATION

UPDATE TDAS LIST
ADD TDAS POSITION
CHANGE TDAS INFORMATION
REMOVE TDAS POSITION
REVIEW TDAS POSITIONS

QUICK UPDATE FROM RHR REPORT
UPDATE LOSSES
UPDATE TDAS POSITIONS

PERSONNEL SYSTEM
Section 2

MAIN MENU

UPDATE CME LIST/BUDGET
UPDATE ALLOCATIONS FOR FISCAL YEAR
UPDATE CME REQUESTS
ADD NEW CME REQUEST
CHANGE CME REQUEST
DELETE CME REQUEST
REVIEW ALL CME REQUEST

UPDATE CME REQUESTS WITH ACTUAL COSTS
PRINT REPORTS
ESTIMATED CME EXPENSES
ACTUAL CME EXPENSES

PERSONNEL SYSTEM
Section 3

MAIN MENU

UPDATE LEAVE AND ABSENCE
PRINT REPORTS
ENTER NEW REQUESTS
CHANGE REQUESTS
REVIEW REQUESTS

POSITION LISTING
UPDATE WORKSHEET
LOSS REPORT
VACANCY LISTING
SOCIAL ROSTER
ABSENCE REPORT
ABSENCE SUMMARY
This confirmation screen allows the user to determine if the requested PIC is correct. This type of confirmation prevents the user from entering a wrong or inappropriate PIC that would destroy the integrity of the database. If the identification code is not found, a warning, "ID Code not found! Press return to continue...", is displayed. The system then gives the user the option to search for a PIC by entering the last name of the person. All records with the requested last name are displayed as shown below and the user is allowed to pick the identification code of the correct person from the list.

<table>
<thead>
<tr>
<th>LAST NAME</th>
<th>FIRST NAME</th>
<th>ID CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMITH</td>
<td>JOHN E.</td>
<td>S2356</td>
</tr>
<tr>
<td>SMITH</td>
<td>BECKY K.</td>
<td>S9999</td>
</tr>
</tbody>
</table>

ENTER THE ID CODE OF THE PERSON DESIRED: ■■■■

An appropriate modification to this screen, if supported in the application program, would be the ability to select a record by highlighting the record desired and pressing the return key. This process would eliminate the possibility of keying errors being introduced by the user.

If the user is requested to enter information on a TDA position, the screen shown below is presented to the user.
Another feature that would enhance this input would be the addition of the ability to call up all TDA positions that are unoccupied. The user would then be allowed to select a TDA position by highlighting a particular position from among those depicted on the screen. This enhancement will make the following two screens unnecessary.

The system then verifies the requested TDA position with the TDA database and if the position is found to exist in the database, the user is presented with the following standard TDA position screen.

**POSITION CHOSEN:**

Job Title:  
Authorized Branch:  
Authorized Grade:  
Authorized MOS:  
Authorized Position: YES

This screen also converts the authorized position field from its coded value to the correct YES or NO answer depending on the contents of this field.

In the cases where a TDA position is requested and is found to already be occupied by someone else, the warning screen shown below is presented to the user.
THE POSITION IS ALREADY OCCUPIED BY:

Last Name : [Redacted]
First Name : [Redacted]
Rank : [Redacted]

The user is then given the following choices.

YOU NOW HAVE THE FOLLOWING CHOICES:

1. MOVE THE PERSON FOUND IN THE POSITION TO EXCESS (POSITION CODE 99) AND THE PERSON YOU ARE WORKING WITH INTO THE POSITION YOU ORIGINALLY REQUESTED.

2. PLACE THE PERSON YOU ARE WORKING WITH INTO THIS POSITION AS EXCESS (OVERSTRENGTH, POSITION CODE 99).

3. TRY ANOTHER POSITION.

ENTER YOUR CHOICE (1-3) : [Redacted]

(2) Enter, change, or remove personnel from the personnel database.

As discussed earlier, the user is first requested to enter the identification code of the individual to add, change, or remove from the personnel file. In all of these cases, the system first checks the personnel file for the requested identification code. If the code is already in use, and the user is trying to enter this identification code to add a new person to the personnel file, the standard confirmation screen is displayed with the message "ID CODE REQUESTED IS ALREADY USED BY THE PERSON SHOWN ABOVE" and the user is prompted to try a different code. When the user is updating or removing someone already in the personnel file, this PIC check serves to confirm the identification code already exists in the file and warns the user if it is not found.
If the identification code is not found, the system gives the user the same options as described in the general input screens discussed earlier.

**UPDATE PERSONNEL**

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>MI</th>
<th>RANK</th>
<th>BRANCH</th>
<th>MOS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**INDIVIDUAL IS ASSIGNED TO TDA POSITION**

- TDA Paragraph Number is 250
- TDA Line Number is 10
- TDA Position Number is 99

NOTE: If Position Number is 99, the Individual is carried as excess

Figure 48. Personnel Input Screen Format

If the user is adding or changing information in the personnel database, the system requests the new position before displaying a blank data entry screen format. This action allows the system to verify that the TDA position is valid and is not already occupied by someone else. If the position is occupied, the standard choice screen as discussed earlier is displayed and the user must choose an appropriate course of action. Once they have selected a course of action, the system then allows access to the personnel database. The screen depicted in Figure 48 is the standard input screen for personnel information. This screen does not allow the user to either change the identification code or the position information, thus preventing the user from circumventing the integrity checks already accomplished by the system.

Once the user has entered information into the personnel file, he or she is given the choice to enter data into the personal file. This data entry format
is displayed in Figure 49. This screen includes the privacy act statement to remind the user of the sensitive nature of this information.

<table>
<thead>
<tr>
<th>This is the personal information for ID CODE S7395</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIVACY ACT STATEMENT</td>
</tr>
<tr>
<td>PRINCIPLE PURPOSE: To maintain personal information on individuals assigned to this command to facilitate counseling, emergency notification, and social event information.</td>
</tr>
<tr>
<td>WARNING: This information is of a highly sensitive nature and should not be provided to anyone outside of the chain of command without approval.</td>
</tr>
<tr>
<td>Address</td>
</tr>
<tr>
<td>City, State, Zip Code</td>
</tr>
<tr>
<td>Date of Rank</td>
</tr>
<tr>
<td>Wife's Name</td>
</tr>
<tr>
<td>Comments</td>
</tr>
</tbody>
</table>

Figure 49. Personal Information Data Entry Screen

If the user desires to delete someone from the personnel database, the identification code entered by the user is used to find the right record. The screen depicted in Figure 48 is displayed with the message, "IS THIS THE PERSON YOU WANT TO DELETE? (Y/N)\" \(\text{Y}\), included on the screen. This allows the user to confirm the information about the person they desire to delete. If the user deletes the person, the system then purges all the files in the personnel system which have the requested identification code. Several databases are affected: the personnel database; the personal database; the CME request database; and the absence database.

(3) Enter, change, or remove TDA information. The user gains access to the TDA database by initially entering the position they desire to add, change or remove in the position entry format described earlier. In the case where the user is adding a new position, this information allows the system to verify that the TDA position requested does not already exist in the database. If the user is modifying an
already existing TDA record, this information is used to locate the record or warn the user that the position entered does not exist in the database.

**TABLE OF DISTRIBUTION AND ALLOWANCES**

**Figure 50. Table of Distribution and Allowances Input Screen**

The system must determine the authorized status of the position. If the position is new to the database, the user is required to answer the prompt, "IS THIS AN AUTHORIZED POSITION? (Y/N) ". If the user answers yes, the system automatically replaces the authorization code with a one, otherwise the code is replaced with a zero. If the user is modifying an already existing database, the system uses the existing code to ask the user if they desire to change the current authorized status to the opposite status. For instance, if the authorized code is zero (0) (unauthorized), the message, "DO YOU WANT TO CHANGE THIS POSITION TO AN AUTHORIZED STATUS? (Y/N) ", is displayed.

If the user desires to delete a position, the format depicted in Figure 50 is used, but it includes a message to verify if the user desires to delete the displayed record. If the record is deleted, the system also checks the personnel database.
to determine if someone occupies the deleted position. If a matching position is found in the personnel database, the person's TDA position information is blanked in their record, and the following message is displayed.

FOUND CPT SMITH OCCUPYING THE DELETED POSITION!
ID CODE IS S2345. BE SURE YOU UPDATE THIS PERSON'S TDA POSITION WITH A VALID TDA POSITION.

(4) Update from Resource Information Report. This menu choice provides the user with the capability to directly update the personnel database with information provided in the Resource Information Report personnel sections. Figure 51 depicts this input screen. The system also verifies the new position entered to ensure that it is not already occupied, and if it is occupied, responds with the screen of choices discussed earlier.

UPDATE FROM R.I.R. REPORT

B. CHANGES TO CURRENT TDA (OTHER THAN LOSSES OR GAINS)

<table>
<thead>
<tr>
<th>OLD POSITION</th>
<th>NEW POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARA</td>
<td>LINE</td>
</tr>
</tbody>
</table>

PRESS ESCAPE [ESC] TO QUIT

Figure 51. Update from RIR Report screen.

When the user is updating from the personnel losses section on the RIR, the user must first enter the PIC. This code is verified in the manner discussed earlier. The system then prompts the user with, "HAS THIS PERSON ACTUALLY DEPARTED OR IS THIS AN UPDATE TO A PROJECTED LOSS DATE? (ACTUAL=0, PROJECTED=1)". If the change is a modification of the
anticipated loss date, the user enters the new loss date, and the record is updated automatically. If the loss is an actual PCS from the department, the system invokes the same procedures as described for the deletion of personnel in Section (2) earlier.

(5) Enter, change, or remove CME requests. Figure 52 depicts the standard input screen for the CME request. This screen is designed to match the format of the actual printed CME request form used. The bottom of the screen is used to depict whether the costs displayed are actual expended costs or estimated costs. If the user desires to change an already existing record, the user must first enter the fiscal year of the request and the PIC code of the person sought. As discussed earlier, the confirmation screen displays the personnel information about the selected PIC with the message, "IS THIS THE PERSON YOU EXPECTED? (Y/N) ." The system then displays all matching records in the following format:

<table>
<thead>
<tr>
<th>RECORD NO.</th>
<th>ID CODE</th>
<th>TYPE</th>
<th>START DATE</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>S7777</td>
<td>C</td>
<td>06/07/89</td>
<td>07/07/89</td>
</tr>
<tr>
<td>15</td>
<td>S7777</td>
<td>G</td>
<td>07/20/89</td>
<td>07/22/89</td>
</tr>
</tbody>
</table>

ENTER THE RECORD NUMBER DESIRED :     

The user is then prompted with, "WILL COSTS BE ACTUAL COSTS OR ESTIMATED COSTS? (ENTER AN A FOR ACTUAL OR AN E FOR ESTIMATED): ." The system takes the user’s response and enters the correct cost code into the record. The system will also total all travel costs and update the total cost of travel field in the record.

In the case where the user only wants to update a record with the actual costs and selects this option in the menu, the system displays the same screen in Figure 52, except the user can only input the cost portions of the screen format. The
system then changes the cost code and totals the costs for the user prior to updating the record.

**SUBJECT: APPLICATION FOR CONFERENCE/MISSION TRAVEL IN FISCAL YEAR 89**

1. Type of Travel Requested
   - C-Conference/Meeting Travel
   - G-General Mission Travel
   - B-Board Certification

2. ID CODE of person requesting the travel is S7396.

4. Purpose of Travel is

5. Registration Fee $___.

6. Destination Mode of Travel is
   - F-FLY
   - G-GOVT VEH
   - P-POV
   - O-OTHER

8. Leave Dates Starting Date ___/___/___ Ending Date ___/___/___
   - Duration 0 days

13. TRAVEL COST $_____.
   - PER DIEM COST $_____.
   - REIMBURSABLES $_____.

   **TOTAL COST OF TRAVEL $___.**

EXPENSES REFLECT THE ESTIMATED COST OF TRAVEL

Figure 52. Continuing Medical Education Request Data Entry Screen

Figure 53 depicts the input screen used to add, change or remove the records in the CME allocation database. There is only one CME allocation for the department for each fiscal year. Therefore, the user is always required to enter the fiscal year prior to using this screen to enter the CME funds allocation.

**UPDATE CME ALLOCATION**

THE CME ALLOCATION FOR FISCAL YEAR 89 SHOULD BE $_____.

Figure 53. CME Allocation Data Entry Screen.

(6) Enter, change, or remove leave/absence requests. Figure 54 depicts the data entry screen for the absence database. Prior to using this screen, the user must first provide the fiscal year of the request and PIC of the person who will be entered. Once the PIC is entered, it is verified against the personnel database and if it is found,
the standard confirmation screen is displayed with the message, "IS THIS THE PERSON YOU EXPECTED? (Y/N)".

**UPDATE LEAVE OR ABSENCE REQUEST**

This is the Fiscal Year 89 Leave or Absence request for ID CODE S7396

<table>
<thead>
<tr>
<th>Type of Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>L..Regular Leave  E..Emergency Leave</td>
</tr>
<tr>
<td>F..Permissive TDY  C..Convalescent Leave</td>
</tr>
</tbody>
</table>

Starting Date 06/07/89  Ending Date 07/07/89  Duration 0 days

COMMENT

Figure 54. Leave and Absence Data Entry Screen

If the user is changing an already existing record, the system uses the PIC entered to display the following:

<table>
<thead>
<tr>
<th>RECORD NO.</th>
<th>ID CODE</th>
<th>TYPE</th>
<th>START DATE</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>S7777</td>
<td>C</td>
<td>06/07/89</td>
<td>07/07/89</td>
</tr>
<tr>
<td>15</td>
<td>S7777</td>
<td>G</td>
<td>07/20/89</td>
<td>07/22/89</td>
</tr>
</tbody>
</table>

ENTER THE RECORD NUMBER DESIRED: 

Since the PIC has already been verified with the confirmation screen, only the PIC number is displayed. The user can then choose the record desired. As discussed earlier, the ability to "point and shoot" to a particular record would enhance the user's ability to request a particular record. The record is redisplayed in the same entry format depicted in Figure 54.

With each addition or change of a record, the system automatically recomputes the duration field by subtracting the starting date from the ending date. This
constant updating insures that this field will always be updated prior to saving the database.

c. Outputs

(1) Review Screens. The review of the personnel, TDA, absence, and CME request databases are accomplished by the use of the standard review screen. Each review option provides the user with the generic review display described in Section B of this chapter. The data fields presented, with the exception of the CME request database and the absence database, are simply the fields existing in the database. The CME request database and absence database are combined with the personnel database to create a new temporary database that contains the name associated with each PIC in the databases. The additional review fields displayed with the already existing fields in the CME request or absence database are the Rank, First Name, and Last name of the person that matches the PIC field in the CME or absence databases.

(2) Position Listing (see Figure 55). This report provides the Chief with a listing of all TDA positions within his department and the personnel assigned to those positions. This report is generated by combining the TDA database with the personnel database where the TDA position in the personnel database matches the TDA position in the TDA database. If no match is found, the TDA information is printed but with the personnel information left blank. If the person is carried as excess, their information is also printed but with only the TDA paragraph number, TDA line number, and the excess position code of 99. This report is sorted in TDA paragraph number, line number, and position number order whether the position is filled or not.
Figure 55. Position Listing Report

The fields necessary to create this report are:

- Section Description for each TDA Paragraph Number.
- TDA Paragraph Number.
- TDA Line Number.
• TDA Position Number.
• Authorized Grade for above TDA position.
• Authorized MOS for the above TDA position.
• Authorized Branch for the above TDA position.
• TDA Official Job Title.
• Rank.
• Last Name.
• Authorization Code for the position.

• Doctor Status Code. This code reflects the current residency status of a doctor in the residency program.

• Anticipated date of PCS for the person in the position.

The following numbered items correspond with the numbers in Figure 55.

1 This section title correlates to the TDA paragraph number in the TDA.

2 This subtotal is the total authorized positions within the TDA Paragraph number. This is calculated by totaling the authorized position fields for each paragraph number.

3 This is the number of persons assigned to a particular TDA paragraph. This number is calculated by counting the number of TDA positions where the name field is not blank within the same TDA paragraph number.

4 If no name is associated with a TDA position, the phrase "VACANT" is printed in this field.

5 The doctor status codes in the database. They are also explained in a footnote at the bottom of the report.

6 The RANK, FIRST NAME and LAST NAME of the person who occupies a TDA position are concatenated to produce this field.
This total is the total for the department and is a total of all the TDA paragraphs subtotals.

Personnel whose position code is designated as 99 do not have a job title since they are carried in an excess capacity.

This "*" flag indicates that the person listed has an anticipated loss date that is less than 60 days from the current system date.

(3) Section Update Worksheet (see Figure 56). This worksheet allows the department to update its personnel database with new position information, changes or additions to the anticipated loss date field, and changes to the personnel status field. This report is very similar to the position listing with the exception of the following:

- Each paragraph within the TDA is printed separately to facilitate individual delivery to sections.

- There are three fill in the blank fields added to allow the section to directly annotate changes into the worksheet.

This report is created from the same combination of databases necessary for the personnel listing, but only the following fields are needed to print this worksheet:

- Section Description for each TDA Paragraph Number.
- TDA Paragraph Number.
- TDA Line Number.
- TDA Position Number.
- TDA Official Job Title.
- Rank.
- Last Name.
- Doctor Status Code for the person who occupies the TDA position. (Only applies to doctors in the residency program).

- Anticipated date of PCS for the person in the position.

### Figure 56. Section Update Worksheet

The following numbered items correspond with Figure 56.

1. These fields are intentionally left blank to allow the section to input changes to the current TDA position listing.

2. The RANK and LAST NAME of the person who occupies a TDA position are concatenated to produce this field.
(4) Loss Report (see Figure 57). This report provides the department with a listing of all personnel who have an anticipated PCS date between two user specified dates. Prior to printing this report, the user is required to enter these dates to define the parameters for which this report will be printed.

LOSS REPORT
DEPARTMENT OF FAMILY PRACTICE & COMMUNITY MEDICINE
11 MAR 89

START DATE : 06/01/89 ENDING DATE : 09/25/89

The following personnel have expected anticipated loss dates within the above dates:

<table>
<thead>
<tr>
<th>RANK</th>
<th>NAME</th>
<th>SECTION</th>
<th>PCS DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPT</td>
<td>JOHN SMITH</td>
<td>AMB</td>
<td>07/01/89</td>
</tr>
<tr>
<td>CPT</td>
<td>JANE DOE</td>
<td>CTM</td>
<td>09/01/89</td>
</tr>
<tr>
<td>MSG</td>
<td>GERY JONES</td>
<td>CTM</td>
<td>07/09/89</td>
</tr>
<tr>
<td>1LT</td>
<td>WAYNE SHARPE</td>
<td>FPC</td>
<td>07/20/89</td>
</tr>
</tbody>
</table>

Figure 57. Loss Report

The following fields are necessary to print this report:

- Rank.
- Last Name.
- Section Description for the person.
- Anticipated Date of Loss.

The following numbered items correspond with Figure 57:

1 The date parameters for the report entered by the user.

2 The date in this field must lie between the parameter dates established by the user.
Vacancy Listing (see Figure 58). This report provides a listing of all TDA positions within the department that are vacant. This report provides the Chief with a quick look at his personnel shortages and the current vacant positions within the department.

VACANCY REPORT
DEPARTMENT OF FAMILY PRACTICE & COMMUNITY MEDICINE
11 MAR 89

The following TDA Positions are vacant:

<table>
<thead>
<tr>
<th>PARA LINE POSN GR MOS BR</th>
<th>JOB TITLE</th>
<th>AUTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAMILY PRACTICE CLINIC (FPC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>532 03 13 03 61H00 MC</td>
<td>FAM PHYS</td>
<td>NO</td>
</tr>
<tr>
<td>532 03 14 03 61H00 MC</td>
<td>FAM PHYS</td>
<td>NO</td>
</tr>
<tr>
<td>532 12 02 03 00679 GS</td>
<td>MED CLK (T)</td>
<td>YES</td>
</tr>
</tbody>
</table>

PARAGRAPH SUBTOTAL *** VACANCIES : 3

| EMERGENCY MEDICAL SERVICE (EMS) |
| 581 17 01 13 00602 GS | GEN MED OFF | YES |
| 581 17 02 13 00602 GS | GEN MED OFF | YES |

PARAGRAPH SUBTOTAL *** VACANCIES : 2

TOTAL DEPARTMENT VACANCIES : 5

Figure 58. Vacancy Listing

This report file is generated in the same manner as the position listing except that only the TDA positions which do not have a matching person assigned to a position are printed.

The following numbered items correspond with Figure 58.

1 This is a count of all authorized positions that are vacant within a given TDA paragraph number. This total represents the sum of the authorized field for the TDA paragraph.
2 If the position is authorized (code=1), "YES" is displayed, otherwise "NO" is displayed.

3 Total Department Vacancies. This total is the sum of all TDA paragraph subtotals mentioned in Note 1 above.

(6) Social Roster (see Figure 59). This roster provides personnel within the department a roster of personal information of assigned personnel within the department. This roster both serves as a social listing to facilitate social gatherings and as an emergency notification listing for department personnel. The creation of this report requires the combination of the personnel database and personal database. In the case where there is not a match to a personnel record in the personnel database, "NO PERSONAL DATA" is printed in the report.

The fields necessary to create this report are:

- Last Name.
- First Name and Middle Initial.
- Rank.
- Branch of Service.
- Military Occupational Specialty Code.
- Arrival Date within the Department.
- TDA Official Job Title.
- Section Description for each TDA Paragraph Number.
- Local Home address.
- City of Home address.
- State.
- Spouse's first name.
• Children's names, followed by their ages (if appropriate).
• Home telephone number.
• Date of rank.

SOCIAL ROSTER
DEPARTMENT OF FAMILY PRACTICE & COMMUNITY MEDICINE
11 MAR 89

PRIVACY ACT STATEMENT

DEPARTMENT OF FAMILY PRACTICE (DEP)

LTC SMITH, JOHN R. POSN: C, DEPT FP
BR: MC MOS: 61H00 ARR: 07/20/87
1200 BIRDTREE LANE
ANYWHERE STATE 99999-9999
PHONE: (408)999-9999
WIFE: BECKY CHILDREN: JIM/10, MIKE/4, SUE/1

FAMILY PRACTICE CLINIC (FPC)

LTC JONES, SUE R. POSN: FAM PHYS
BR: MC MOS: 61H00 ARR: 07/20/88
1200 SINGASONG ROAD
ANOTHERPLACE STATE 99999-9999
PHONE: (408)888-8888
WIFE: N/A CHILDREN: BECKY JOE/1

MAJ BURB, HERB R. POSN: FAM PHYS
BR: MC MOS: 61H00 ARR: 06/11/85
23 CHIRPING TREE LANE
ANYWHEREELSE STATE 99999-9999
PHONE: (408)444-4444
WIFE: JO CHILDREN:

Figure 59. Social Roster
This report is created in the format shown in Figure 59. Entries are sorted by TDA paragraph number and then by rank within the position paragraph number.

(7) Monthly Absence Report (see Figure 60). This report provides the department with a listing of personnel who have planned absences, either a planned CME course or a regular absences (i.e., leave), within an selected month. This report is used by the department managers and the clinical director (see scheduling information system) to manage personnel assets on a month to month basis. The user is required to enter the month and the fiscal year desired prior to output of this report. This report is generated by combining the absence database and the CME request database and then combining this new database with the personnel database to get the rank and name of the person who plans to be absent in the selected month. The report file is then sorted by section and last name prior to printing.

MONTHLY ABSENCE REPORT
DEPARTMENT OF FAMILY PRACTICE & COMMUNITY MEDICINE
11 MAR 89

MONTH : JULY  FISCAL YEAR : 89
The following personnel have planned absences during the month of July:

<table>
<thead>
<tr>
<th>RANK</th>
<th>NAME</th>
<th>SECTION</th>
<th>START DATE</th>
<th>END DATE</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPT</td>
<td>JOHN SMITH</td>
<td>AMB</td>
<td>07/01/89</td>
<td>07/15/89</td>
<td>CME</td>
</tr>
<tr>
<td>CPT</td>
<td>JANE DOE</td>
<td>CTM</td>
<td>06/01/89</td>
<td>07/02/89</td>
<td>EMER LV</td>
</tr>
<tr>
<td>MSG</td>
<td>GERY JONES</td>
<td>CTM</td>
<td>07/02/89</td>
<td>08/25/89</td>
<td>LEAVE</td>
</tr>
<tr>
<td>1LT</td>
<td>WAYNE SHARPE</td>
<td>FPC</td>
<td>07/20/89</td>
<td>07/22/89</td>
<td>PERM TDY</td>
</tr>
<tr>
<td>SGT</td>
<td>WAYNE ROGERS</td>
<td>POM</td>
<td>07/30/89</td>
<td>08/30/89</td>
<td>ORD TDY</td>
</tr>
</tbody>
</table>

Figure 60. Monthly Absence Report.
The fields required to produce this report are:

- Rank of the person who has an absence planned during the requested month.
- Last Name.
- First Name.
- Section of assignment.
- Start date of planned absence.
- End Date of planned absence.
- Type of Absence.

The following numbered items correspond with Figure 60.

1. The fiscal year and month desired are entered by the user prior to output of report. If the record in the combined database falls within the requested start date or end date, the absence record is included within the report. If the record is inclusive of the requested start and end date, e.g., a request in July falls between a user specified start date in June and an end date August, the record will be included in the report.

2. Section codes are sorted to keep personnel along organizational lines. The secondary sort is on the last name.

3. Type request code is converted to its full text format. Care must be taken not to assign the same type code to both the CME database and the absence database.

4. The RANK, FIRST NAME, and LAST NAME fields are concatenated to give the appearance that the field is one field.

(8) Fiscal Year Summary of Physician Absences (see Figure 61). This summary report provides the Department Chief with the ability to monitor and evaluate the number of and frequency of doctor absences within the department. This report serves as an indicator of doctor availability over the fiscal year and shows the frequency of absences by type of request. This report is generated in the same manner as described in the absence report except this report is not restricted to one month and
extracts only doctor information. The user is only required to enter the fiscal year desired. The fields necessary to generate this report are the same as the absence report but also include the duration field from both of the databases.

**FISCAL YEAR ABSENCE SUMMARY**  
**DEPARTMENT OF FAMILY PRACTICE & COMMUNITY MEDICINE**  
*11 MAR 89*

**FISCAL YEAR : 89**

<table>
<thead>
<tr>
<th>NAME</th>
<th>START DATE</th>
<th>END DATE</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTC JOHN SMUCK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TYPE :</strong> CME REQUEST</td>
<td>01/01/89</td>
<td>01/30/89</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>06/05/89</td>
<td>06/10/89</td>
<td>5</td>
</tr>
<tr>
<td>Subtotal.</td>
<td></td>
<td></td>
<td>34</td>
</tr>
<tr>
<td><strong>TYPE :</strong> ORDINARY LEAVE</td>
<td>03/05/89</td>
<td>03/30/89</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>06/10/89</td>
<td>06/20/89</td>
<td>10</td>
</tr>
<tr>
<td>Subtotal.</td>
<td></td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Total.</td>
<td></td>
<td></td>
<td>69 days</td>
</tr>
<tr>
<td>LTC JANE SMITH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TYPE :</strong> CME REQUEST</td>
<td>03/01/89</td>
<td>03/30/89</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>04/01/89</td>
<td>04/19/89</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>05/05/89</td>
<td>05/15/89</td>
<td>10</td>
</tr>
<tr>
<td>Subtotal.</td>
<td></td>
<td></td>
<td>57</td>
</tr>
<tr>
<td><strong>TYPE :</strong> PERMISSIVE TDY</td>
<td>09/25/89</td>
<td>09/30/89</td>
<td>5</td>
</tr>
<tr>
<td>Subtotal.</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td><strong>TYPE :</strong> ORDINARY LEAVE</td>
<td>02/01/89</td>
<td>02/28/89</td>
<td>27</td>
</tr>
<tr>
<td>Subtotal.</td>
<td></td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Total.</td>
<td></td>
<td></td>
<td>89 days</td>
</tr>
</tbody>
</table>

**Figure 61. Fiscal Year Summary of Physician Absences.**
The following numbered items correspond with Figure 61.

1 Each person identified as having at least one absence during the fiscal year is reported in last name order.

2 Under each person, all absences are sorted by request type in alphabetical order with breaks between different types of absences.

3 Duration is extracted directly from the databases reflecting the End Date minus the Start Date in days.

4 Subtotal of the duration for each type of absence, for each person.

5 Total duration for all absences for the given person.

(9) CME Reports (Actual and Estimated) (see Figures 62 and 63). These reports allow the Department Chief to monitor the CME expenditures and estimate the funds remaining for a given fiscal year. The CME reports are critical in keeping track of the limited funds available to send doctors to the training necessary to keep them certified in critical medical skills.

These two reports are very similar but are used in separate contexts. The Actual CME Budget Expenditure Report is used to report the amount actually spent during a given fiscal year, excluding all estimated costs figures. This report gives the Department Chief an accurate look at the funds remaining for the requested fiscal year. The Estimated CME Budget Expenditure report not only gives the Chief a look at what funds have actually been spent, but also provides a listing of the approved CME funded travel for which travel claims have not yet been settled. This report is also used at the beginning of the fiscal year to report the projected expenditures for a requested fiscal year.
CONTINUING MEDICAL EDUCATION
ACTUAL FUNDS REPORT
DEPARTMENT OF FAMILY PRACTICE &
COMMUNITY MEDICINE (SCA)
11 DEC 89

<table>
<thead>
<tr>
<th>NAME</th>
<th>RANK DATES OF TDY</th>
<th>LOCATION OF TDY</th>
<th>REASON FOR TDY</th>
<th>TRAVEL PER DTY</th>
<th>REG REGIME</th>
<th>TOTAL UNCOMMITTED FUNDS</th>
<th>FUNDS ALLOCATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMITH, JOHN</td>
<td>CPT 09/09/89-09/20/89</td>
<td>LAS VEGAS, NV OBSO</td>
<td>147.00</td>
<td>320.00</td>
<td>395.00</td>
<td>0</td>
<td>862.00</td>
</tr>
<tr>
<td>JONES, JANE</td>
<td>MAJ 10/10/89-11/20/89</td>
<td>RENO, NV ADA</td>
<td>169.25</td>
<td>437.50</td>
<td>210.00</td>
<td>50</td>
<td>866.75</td>
</tr>
</tbody>
</table>

MED TRAVEL APPROVED BUT NOT COMPLETED (ESTIMATED COST)
PROJECTED FUNDS REMAINING
12500.00
1551.17

Figure 62. Actual CME Budget Expenditure Report

CONTINUING MEDICAL EDUCATION
ESTIMATED FUNDS REPORT
DEPARTMENT OF FAMILY PRACTICE &
COMMUNITY MEDICINE (SCA)
11 DEC 89

<table>
<thead>
<tr>
<th>NAME</th>
<th>RANK DATES OF TDY</th>
<th>LOCATION OF TDY</th>
<th>REASON FOR TDY</th>
<th>TRAVEL PER DTY</th>
<th>REG REGIME</th>
<th>TOTAL UNCOMMITTED FUNDS</th>
<th>FUNDS ALLOCATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMITH, JOHN</td>
<td>CPT 01/05/89-01/20/89</td>
<td>LAS VEGAS, NV OBSO</td>
<td>147.00</td>
<td>320.00</td>
<td>395.00</td>
<td>0</td>
<td>862.00</td>
</tr>
<tr>
<td>JONES, JANE</td>
<td>MAJ 05/10/89-05/20/89</td>
<td>RENO, NV ADA</td>
<td>169.25</td>
<td>437.50</td>
<td>210.00</td>
<td>50</td>
<td>866.75</td>
</tr>
<tr>
<td>ANDREAS, KEN</td>
<td>CPT 07/20/89-08/15/89</td>
<td>SAN DIEGO, CA EMERG</td>
<td>100.00</td>
<td>400.00</td>
<td>200.00</td>
<td>50</td>
<td>750.00</td>
</tr>
</tbody>
</table>

ALL ESTIMATED AND ACTUAL TRAVEL COSTS REPORTED HERE

PROJECTED FUNDS REMAINING
14311.17

Figure 63. Estimated CME Budget Expenditures Report

The user is required to enter the fiscal year of the report prior to the creation of either report. The fields required to create these reports are:

- Last Name of requestor.
- First Name.
- Rank of the requestor.
- Start and End dates of travel.
- Destination.
• Purpose of Request, e.g., ORTHO WORKSHOP.

• All Costs of travel, including the Travel Cost, Per diem costs, registration fee, reimbursable expenses, and total cost fields of the request.

• Cost Code, whether it is an actual accrued cost or an estimated cost of the travel.

• Allocated CME budget for the fiscal year from the CME allocation database.

To create this report requires that the CME request database be combined with the personnel database to match the name of a person with the PIC in the CME request database. The CME allocation database is also used to determine the actual allocation for the selected fiscal year.

The following numbered items correspond with the numbers in Figures 62 and 63.

1 This number is the actual allocation for the current fiscal year selected.

2 This is an accumulated total of the actual costs incurred for the current fiscal year.

3 This number reflects the allocation for the current fiscal year minus the actual expenses already incurred.

4 This figure is the previous allocation minus the total cost of travel for the current record.

4. Scheduling Information System

We concluded in Chapter IV that although automating the scheduling system would be impractical, improvements could be made in the system by standardizing the forms used in data collection and reporting.

Figure 64 is the UCD depicting the proposed scheduling system. Although most of the scheduling process will remain the same, the clinical director will now be
able to get pre-printed standard forms for recording doctor availability information. These forms can be created with commercially available software packages (e.g., FORMTOOL) and maintained on diskettes in the administration office.

![Diagram of scheduling user concept](image)

Figure 64. Scheduling User Concept Diagram
After discussions with the clinical director, it was determined that the most valuable forms to standardize are the duty history sheet, the monthly cumulative tally sheet, and the clinic schedule template. Other sources of information such as the 3x5 cards containing staff doctor and resident's special availability instructions were considered to be adequate in their current form. The resulting forms are shown in Figures 65 and 66.

Figure 65 is the Duty History Record which is a combination of the duty history sheet and the monthly cumulative tally sheet. A completed duty history record will provide the scheduler with a comprehensive history of each doctor's on call duty.

Figure 66 is the clinic schedule template. Since this form is a template, the staff doctors permanent schedules are included. The template can be penciled in by the scheduler to show residents' schedules for the month. The resident’s names can then be entered into the form using the fill-in-form option of FORMTOOL and a complete schedule can be printed for distribution. The clinical director liked the idea of the template. The template can be changed easily and each month a clean template can be used without having to first delete the resident's names from the previous month's schedule.

<table>
<thead>
<tr>
<th>Date</th>
<th>Duty History Record</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Doctor Name</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 65. Duty History Record
<table>
<thead>
<tr>
<th>Month</th>
<th>Yr</th>
<th>Schedule Template</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MONDAY</td>
</tr>
<tr>
<td>Gold</td>
<td>A</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lorenzen</td>
<td>M</td>
<td>Foster</td>
</tr>
<tr>
<td>Mork</td>
<td>M</td>
<td>Foster</td>
</tr>
<tr>
<td>Foster</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birdsong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landauer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crisp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinelli</td>
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<td></td>
</tr>
<tr>
<td>Herman</td>
<td></td>
<td>Mork</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrio, H</td>
<td>M</td>
<td>Mork</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>A</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forred</td>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Mork</td>
<td>M</td>
<td>Forred</td>
</tr>
<tr>
<td>Fullner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hutnak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schmidt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walcott</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bradley</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorensen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue</td>
<td>A</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kugler</td>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spaulding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yeash</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runkle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Davis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goodrich</td>
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</tr>
<tr>
<td>Swann</td>
<td></td>
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<td>Terrio, J</td>
<td>P</td>
<td>Yeash</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weaver</td>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 66. Schedule Template
5. Patient Satisfaction Information System (see Program, Appendix F)

   a. Data Structures

   As can be seen in the UCD in Figure 67, the entire patient satisfaction system hinges on completed patient surveys, the results of which are entered into a survey database for use in report generation.

   Figure 67. Patient Satisfaction User Concept Diagram

   The approved opinion survey, designed in cooperation with the Department Chief and the Quality Assurance (QA) representative, is shown in Figure
The questions and answers cover those areas of most concern to the Department Chief. The survey form determines the data structure of the database itself, with data fields corresponding to each question. The following data fields are used in the database to record survey data.

- **Month.** The month the survey was completed by the patient.
- **Year.** Calendar year the survey was taken.
- **Section Code.** Same as systems above.
- **Doctor's Name.** The name of the doctor seen by the patient completing the survey.
- **Appointment Days.** Question 1A.
- **Appointment Acceptability.** Question 1B.
- **Records Ready.** Question 2.
- **Waiting Time.** Question 3A.
- **Waiting Acceptability.** Question 3B.
- **Receptionist Courtesy.** Question 4.
- **Nursing Courtesy.** Question 5.
- **Doctor Courtesy.** Question 6
- **Procedures Explanations.** Question 7.
- **Time Spent With Doctor.** Question 8.
- **Clinic Cleanliness.** Question 9.
- **Overall Satisfaction.** Question 10.

- **Patient Comments to Enter?** The user entering the survey results into the survey database must enter a "Y" in this field to indicate there are comments to be added to the database for this survey. An "N" indicates there are no comments. The following section on Inputs explains this further.
• Comments. A memo field which the user can fill from comments made on the patient surveys.

Department of Family Practice
Patient Opinion Survey

Your opinion is important to us. Please complete this survey and return it to the box located at the reception desk.

Sincerely,

Chief, Department of Family Practice

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Clinic</th>
<th>Doctor</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLEASE CIRCLE THE ANSWER TO THE RIGHT OF EACH QUESTION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.A. How many days did it take to get your appointment?</td>
<td>1) Same 2) Less than 7 3) Less than 14 4) Less than 30 5) More than 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Was this time acceptable?</td>
<td>1) Acceptable 2) Not Acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Were your records ready at the front desk?</td>
<td>1) Yes 2) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.A. How long did you wait to see the doctor?</td>
<td>1) Less than 15 min 2) Less than 30 min 3) Less than 45 min 4) Less than 1 hour 5) More than 1 hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Was the waiting time acceptable?</td>
<td>1) Acceptable 2) Not Acceptable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PLEASE CIRCLE THE NUMBER TO THE RIGHT OF EACH QUESTION WHICH MOST CLOSELY MATCHES YOUR OPINION BASED ON THE FOLLOWING SCALE:

5=Excellent 4=Good 3=OK 2=Needs Improvement 1=Unsatisfactory

4. Courtesy of receptionists ......................................................... 5 4 3 2 1
5. Courtesy of nursing staff ......................................................... 5 4 3 2 1
6. Courtesy of doctor ........................................................................ 5 4 3 2 1
7. Explanation of procedures (lab work, EKG's, etc) ....................... 5 4 3 2 1
8. The amount of time the doctor spent with you .......................... 5 4 3 2 1
9. The general cleanliness of the clinic ......................................... 5 4 3 2 1
10. Overall satisfaction with the care you received ....................... 5 4 3 2 1

COMMENTS:

THANK YOU!!

Figure 68. Opinion Survey Form
b. Data Inputs

The Patient Opinion menu hierarchy chart is depicted in Figure 69. The user can enter new survey data using the input screen shown in Figure 70. This input screen contains all of the data base fields arranged in a format similar to the actual survey for simplified data entry. The answers to the survey’s numbered questions are coded: the user simply enters one number corresponding to the survey answer. Since each question has a predetermined number of responses, error checking is simply a matter of verifying the input number falls in the allowable range. For example, question 1A has five possible answers. If the user entered anything other than one through five, a bell would sound and a message saying the input was out of range would appear at the bottom of the screen. The user is then given the chance to enter the correct answer. At the bottom of the input screen the user is asked if there are comments to be entered. The user enters a "Y" or "N" in the Patient Comments to Enter field. The Patient Comments to Enter field is necessary when printing the patient comments report discussed in Outputs below because a memo field in the database program cannot be used to determine records to print. Therefore, it is necessary to have a second field whose value indicates whether the comment field is filled to allow only those records with comments to be printed.

The use of mark-sense forms would allow automatic entry of the survey data into the database. Unfortunately, neither the department nor the hospital has the computer hardware to read mark-sense forms and there are no plans to acquire such technology. Additionally, we feel the added complexity of mark-sense forms, e.g., special marking requirements and additional instructions, would deter some patients
from completing the surveys. Also, the requirement to purchase specially designed forms may deter the department from obtaining the surveys.

**PATIENT OPINION SYSTEM**

![Diagram of Patient Opinion System](image)

**Figure 69.** Patient Satisfaction Menu Hierarchy Chart

![Patient Satisfaction Input Screen](image)

**Figure 70.** Patient Satisfaction Input Screen

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Once the survey data is entered into the database, the user can print one of several reports. After selecting the report desired from the menu, the user is prompted to enter information which further identifies the report parameters such as year, month, and (if necessary) the clinic's section code. This information is used to gather the data necessary to create the desired output.

c. Outputs

(1) Access to Care Reports (see Figure 71). There are two access to care reports, one for the department as a whole, and one for each clinic. Both consist of two parts and are identical in content and appearance. However, for clinic reports, only the survey data for the selected clinic is used. Part One of the report, Acceptability of Appointment Access indicates to the Department Chief the patients' opinions on the acceptability of the length of time it took them to obtain an appointment. Part Two, Average Days to Get Appointment, allows the Department Chief to examine the trend in the average number of days to get an appointment.

The following fields are necessary for creating the two part access to care reports.

- Month.
- Year.
- Section Code. For clinic report only.
- Appointment Days.
- Appointment Acceptability. Required only for Part 1, Acceptability of Appointment Access.
Acceptability of Appointment Access

Number of Responses

Days to Get Appointment

- Acceptable
- Not Acceptable
- Total Responses

Average Days to Get Appointment

Figure 71. Access to Care Report

169
The following numbered items correspond to the numbers shown in Figure 71 and explain the data manipulations and calculations required to produce the report.

1. The total number of responses for each possible answer to survey question 1A are graphed along the Y-axis based on note 2 below.

2. For each possible answer to question 1A, the number of patients who responded to question 1B as acceptable and unacceptable are counted and each count is graphed as a separate bar. For example, in the figure, for those patients that said it took them less than seven days to get an appointment, 15 said this was acceptable and one said this was unacceptable.

3. The total response line shows the total responses for each possible answer to question 1A, appointment days.

4. This is the month and year of the survey. This data is input by the user when requesting the report and is used by the program to select the appropriate survey database records.

5. In Part Two, the days to get an appointment are graphed on the Y-axis.

6. The responses to question 1A are averaged for each month of the desired year and plotted along the X-axis.

(2) Waiting Time Reports (see Figure 72). As with the access to care reports, there are two waiting time reports, one for the department as a whole, and one for each clinic. The format of the waiting time report is similar to the access to care report for both department and clinic. Part One of the report, Acceptability of Waiting Time indicates to the Department Chief the patients’ opinions of the acceptability of the length of time it took them to be seen by the doctor. Part Two, Average Waiting Time, denotes the trend over the calendar year of the average waiting time to see a doctor.
Figure 72. Waiting Time Reports
The following fields are necessary for creating the two part waiting time reports.

- Month.
- Year.
- Section Code. For clinic report only.
- Waiting Time.
- Waiting Acceptability. Required only for Part One, Acceptability of Waiting Time.

The following numbered items correspond to the numbers shown in Figure 72 and explain the data manipulations and calculations required to produce the report.

1. The total number of responses for each possible answer to survey question 3A are graphed along the Y-axis based on note 2 below.

2. For each possible answer to question 3A, the number of patients who responded to question 3B as acceptable and unacceptable are counted and each count is graphed as a separate bar. For example, in the figure, for those patients that said it took them less than 30 minutes to see a doctor, 17 said this was acceptable and three said this was unacceptable.

3. The total response line shows the total responses for each possible answer to question 3A, waiting time.

4. This is the month and year of the survey. This data is input by the user when requesting the report and is used by the program to select the appropriate survey database records.

5. In Part Two, the waiting time is graphed on the Y-axis.

6. The responses to question 3A are averaged for each month of the desired year and plotted along the X-axis.

(3) Satisfaction Indicators (see Figure 73). Questions four through ten of the survey are statements for which the patient is asked to indicate his level or
degree of satisfaction ranging from five for excellent to one for unsatisfactory. The Satisfaction Indicator report shows the results of the survey in these seven areas, with the total number of responses for each level of satisfaction (one through five) graphed for each of the seven areas.

Satisfaction Indicators
July 1989

Figure 73. Satisfaction Indicators

The following fields are necessary for creating this report:

- Month.
- Year.
- Section Code. For clinic report only.
- Receptionist Courtesy.
- Nursing Courtesy.
- Doctor Courtesy.
- Procedure Explanations.
- Time Spent With Doctor.
- Clinic Cleanliness.
- Overall Satisfaction.

The following numbered items correspond to the numbers in Figure 73 and explain the data manipulations required to produce the graph.

1. The Month and Year for the report.

2. The total number of responses in each level of satisfaction are graphed along the Y-axis.

3. For each satisfaction indicator (e.g., doctor courtesy, overall satisfaction) the number of responses in each level of satisfaction (note 4 in the figure) are counted and the total for each level is graphed as a separate bar for all of the indicators along the X-axis.

(4) Average Satisfaction Levels (see Figure 74). This two part report shows the average level of satisfaction for each satisfaction indicator for the calendar year. It is presented in two reports to simplify viewing. The Department Chief prefers line graphs to enhance trend identification so the seven indicators are divided into two groups. Part One shows the indicators which are primarily personnel oriented (e.g., courtesy) plus overall satisfaction. Part Two shows the remaining indicator's averages.

The following fields are necessary to create the two part report:

- Month.
- Year.
- Section Code. For clinic report only.
• Receptionist Courtesy. For Part One only.

• Nursing Courtesy. For Part One only.

• DoctorCourtesy. For Part One only.

• Overall Satisfaction. For Part One only.

• Procedure Explanations. For Part Two only.

• Time Spent With Doctor. For Part Two only.

• Clinic Cleanliness. For Part Two only.

The following numbered items correspond to the numbers in Figure 74 and explain the data manipulations required to produce this report.

1. This is the requested year of the survey data for the report.

2. The average of all of the values (ranging from one to five) for each indicator is calculated for each month of the specified year. The satisfaction indicators are plotted along the X-axis using different line styles for each indicator's average values.

3. The average response for each indicator is correlated to its equivalent narrative description, i.e., 1 = unsatisfactory, and these are shown along the Y-axis.

(5) Doctor Satisfaction Report (see Figure 75). This report is a table showing the average responses for a given month for four of the satisfaction indicators which most directly relate to the patient's interactions with the doctors. This report is produced for all of the doctors in the department and allows the Department Chief to track individual doctor's survey results.
Figure 74. Average Satisfaction Levels Report
### DOCTOR SATISFACTION REPORT

July 1989

<table>
<thead>
<tr>
<th>DOCTOR</th>
<th>COURTESY</th>
<th>EXPLANATIONS</th>
<th>TIME SPENT</th>
<th>GENERAL SATISFACTION AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker</td>
<td>3.5</td>
<td>3.0</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Foster</td>
<td>4.0</td>
<td>4.2</td>
<td>3.6</td>
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</tr>
<tr>
<td>Kugler</td>
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<td>2.8</td>
<td>3.4</td>
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</tr>
<tr>
<td>Lorenzen</td>
<td>4.5</td>
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<td>4.7</td>
<td>4.5</td>
</tr>
<tr>
<td>Mork</td>
<td>4.0</td>
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<td>3.7</td>
<td>4.0</td>
</tr>
<tr>
<td>Yeash</td>
<td>3.0</td>
<td>4.3</td>
<td>2.8</td>
<td>4.0</td>
</tr>
</tbody>
</table>

#### Figure 75. Doctor Satisfaction Report

The following fields are necessary for creating this report:

- Year.
- Month.
- Doctor Name.
- Doctor Courtesy.
- Procedure Explanations.
- Time Spent With Doctor.
- Overall Satisfaction.

The numbered items below correspond to Figure 75 and explain how the data for the report is obtained.

1. This is the month and year for the report.
2. Each doctor's name is printed in the first column in alphabetical order.
3. For each doctor, the average response for the four indicators is calculated and placed in the corresponding column adjacent to the doctors name.
4. The value of all four indicators is averaged to produce an overall doctor satisfaction average.
5. An additional indicator of a physician's consistency could be computer here, e.g., standard deviation or some similar measure of dispersion.
(6) Patient Comments (see Figure 76). This report is a print out of all of the patient comments entered into the survey database for the desired month and year. It allows the Department Chief to review any constructive criticisms or noteworthy suggestions made by the patients and pinpoint other trouble areas (or outstanding areas) which cannot be identified from the quantitative portion of the survey.

The fields necessary to produce this report are listed below:

- Month.
- Year.
- Patient Comments to Enter?
- Comments.

The numbered items below, corresponding to Figure 76, explain the comment report.

1 The month and year of the report is listed at the top.

2 The records in the database which have the Comments field filled (indicated by a "Y" in the Patient Comments to Enter field) are printed in record number order for the month and year.

I THINK THE LAB AND PHARMACY TAKE TOO LONG, I WAITED FOR MORE THAN AN HOUR TO GET MY PRESCRIPTION FILLED.

THE FAMILY PRACTICE CLINIC IS GREAT HERE. I WOULD LIKE TO BE ABLE TO SEE MY ASSIGNED DOCTOR MORE OFTEN, DR. YEASH, BUT WHOEVER SEES ME IS ALWAYS VERY COURTEOUS AND HELPFUL.

I NEVER GET TO SEE THE DOCTOR WHICH MY FAMILY IS ASSIGNED TO, WHY BOTHER GOING THROUGH THE HASSLE OF SIGNING UP FOR A SPECIFIC DOCTOR?

ITS TOO COLD IN THE EXAMINING ROOMS.

Figure 76. Patient Comments Report
6. Productivity Information System (see Program, Appendix G)

a. Data Structures

The productivity system UCD is shown in Figure 77. The functions of the productivity system depend on visit information obtained from the Patient Administration Division for each section of the department. The method of obtaining the visit information is described in the next section, Inputs.

![Productivity System User Concept Diagram](image)

Figure 77. Productivity System User Concept Diagram
The visit information is entered into the visit database which consists of the following fields:

- Fiscal Year. The fiscal year is used so the number of visits in each section can be directly compared to the section’s expenditures for each month. Expenditure data is maintained in the budget database by fiscal year.
- Month.
- Section Code.
- Number of Visits. The number of patient visits for each section within the department as reported by the Patient Administration Division.

b. Data Inputs

The productivity system menu hierarchy chart is shown in Figure 78. Visit data for the entire hospital is collected monthly by the Patient Administration Division (PAD) for RMD. PAD enters each section’s visit information into a spreadsheet program which they use to create the MED 302 report, discussed in Chapters III and IV. For the department productivity system, the visit information can be extracted from the PAD MED 302 file for entry into the visit database. Table VI shows the locations of visit data in the MED 302 spreadsheet file corresponding to each section in the DFPCM. As can be seen in the Table VI, some calculations on the data in the file are necessary to accurately correlate the visit data to the DFPCM sections. For example, the CTMC section visit count is a combination of multiple lines and columns from the MED 302 file. The disparity occurs because PAD divides section visits into subdivisions for their hospital reporting requirements. For the Department Chief’s purposes, only the total visit information for each section is necessary.
The visit information in the MED 302 file can be extracted for entry into the visit database in one of two general ways, either automatically or manually.
To extract the visit data automatically, an extraction program can be written to take data from the MED 302 spreadsheet file and load it on a floppy disk. Another program is necessary to transfer the data from the disk into the department productivity system's visit database in the correct format.

Manual extraction would require PAD to print the department's sections and visit data, monthly, to a paper report. The user of the department productivity system would select the "Add Visit Data" option from the "Update Visit Data" menu and enter the visit data contained in the printed report provided by PAD. The input screen for adding, changing, or removing visit data is shown in Figure 79.

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Month</th>
<th>Section Code</th>
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<tbody>
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</tbody>
</table>

**Section Codes**

- Family Practice Clinic: FPC
- General Outpatient Clinic: GOC
- CTMC Family Practice: CFP
- Emergency Medical Service: EMS
- Presidio of Monterey: POM
- Consolidated Troop Clinic: CTM
- Fort Hunter Liggett: FHL
- Ambulance Section: AMB
- Flight Surgeon Office: FSO

Figure 79. Visit Data Input Screen

Either of the above input methods is technically feasible. However, there are tradeoffs in choosing one method over the other. The automated method eliminates the need for manual entry of each section's visit data every month. On the other hand, the amount of data entry is relatively small. There are eight sections with visit data requiring approximately 11 keystrokes for each section (see Figure 79). Thus, in any given month, it would require approximately 90 keystrokes to enter the new visit information into the database. The main drawback to automating the
information extraction lies in the MED 302 file itself. PAD created the spreadsheet file for their own use in creating the hospital's MED 302 report. The DFPCM has no control over PAD's use of the spreadsheet file. Therefore, any changes PAD might make to the file would cause any extraction program referencing specific lines and columns to fail. Other changes in the method of visit data collection or reporting would likely require changes in the extraction programs. Both extraction methods require cooperation and coordination between the DFPCM and the PAD, with the automated method requiring considerably greater effort.

The method of extraction aside, once the data is contained in the database, the user can view the data by selecting one of the outputs described in the following section.

c. Outputs

(1) Review Visit Data. The review is an option under the "Update Visit Data" menu and allows the user to view the entire visit database. All of the database fields are displayed in the standard review format described in Section C.2.b., Review Screens.

(2) Department Monthly Visit Report (see Figure 80). The monthly visit report is a bar graph showing each sections' total visits for the desired fiscal year and month. This report provides the Department Chief with a quick indication of the level of work done by each of the eight sections reporting visit information. All of the visit database fields are necessary to create the monthly visit report.
The following numbered items correspond to the numbers in Figure 80 and explain the monthly visit report:

1. The month and year for the report.

2. The total number of visits (in thousands) for each clinic is plotted on the Y-axis.

3. The eight department sections are plotted along the X-axis.

**Figure 80. Department Monthly Visit Report**

(3) Visit Trend Report (see Figure 81). The visit trend report is a multiple graph report showing fiscal year trends in patient visits for each section. To simplify viewing, only two sections are shown on each graph resulting in four graphs.
Figure 81. Visit Trend Report

VISIT TRENDS
FISCAL YEAR 1989

Number of Visits (thousands)

VISIT TRENDS
FISCAL YEAR 1989

Number of Visits

VISIT TRENDS
FISCAL YEAR 1989

Number of Visits

VISIT TRENDS
FISCAL YEAR 1989

Number of Visits

Sections:

- CTM
- FPC

- EMS
- FHL

- GOC
- FSO

- CFP
- PDM
for the entire report. All of the visit database fields are required for the visit trend report.

The following numbered items correspond to the numbers in Figure 81 and explain the visit trend report.

1 The fiscal year of the report.

2 The number of visits for each clinic is plotted in the appropriate graph on the Y-axis.

3 Each month of the reported fiscal year is graphed along the X-axis. There are two sections plotted on each graph, each with a different trend line style.

(4) Expenditure/Visit Comparison Report (see Figure 82). The expenditure/visit comparison report shows the dollar amount spent per patient visit. To obtain the data necessary to produce this report, the information in the visit database must be combined with information from two of the databases maintained by the budget system: the APC monthly expenditure database; and the APC database. Because of the relationship between the APC and the Section Code, the visit database must first be combined with the APC database to relate the visit database section code with the APCs used in the budget system. The resulting combination must further be combined with the APC monthly expenditure database. This combination is necessary to relate the number of visits for a particular section code to that section's expenditures for the same month and fiscal year desired for the report. The three databases and their field relationships are shown in Figure 83.
Expenditure/Visit Comparison
July 1989

The combined data fields necessary to create the report are listed below:

- Fiscal Year.
- Month.
- Section Code.
- APC.
- Expenditure.
- Number of Visits.

Figure 82. Expenditure/Visit Comparison
The following numbered items correspond to the numbers in Figure 82 explaining the comparison report.

1. The month and fiscal year of the report.

2. The dollar expenditure per patient visit is plotted along the Y-axis. For each section, divide the monthly expenditure by the monthly number of visits to arrive at the expenditure per visit amount.

3. Each section is plotted along the X-axis with a vertical bar showing the dollar expenditure per visit.

Figure 83. Productivity and Budget Database Relationships

(5) Department Expenditure and Visit Trend Report (see Figure 84). The expenditure and visit trend report allows the Department Chief to rapidly assess the general direction department spending is taking in comparison to the department’s workload. The process for obtaining the information for the report is similar to that used in the Expenditure/Visit Comparison report discussed previously. The same combined database fields are used in both reports, however, the calculations for each report are different.
The following numbered items correspond to the numbers in Figure 84 and explain the data calculations required to produce the expenditure and visit trend report.

1. The fiscal year of the report.

2. The dollar amount of department expenditures for each month of the fiscal year. Sum the eight section’s expenditure data for each month to obtain the total monthly department expenditures.

3. The number of department visits for each month of the fiscal year. Sum the eight sections’ visit data for each month to obtain the total monthly department visits.

4. The dollar amount of expenditures and the number of visits are both plotted on the Y-axis. The numbers along the Y-axis represent both thousands of dollars and thousands of visits.
Figure 84. Department Expenditure and Visit Trend Report
VI. CONCLUSIONS AND RECOMMENDATIONS

A. PROJECT SYNOPSIS

We began our information systems development project for Silas B. Hays by studying the current literature on information systems development and hospital information systems. The findings of this literature research were presented in Chapter II. In summary, there were a multitude of systems development methodologies from which to choose. We determined that a combination of two commonly used methodologies, a traditional systems development life cycle and a prototyping methodology, would best fit our needs. The life cycle methodology provided us with the structured techniques to develop the proposed information system, while prototyping allowed us to quickly develop the user interfaces necessary to rapidly identify user requirements. Through research, we determined that the critical nature of the health care environment influences the information systems used by hospitals. There exists a dichotomy between the goals and objectives of hospital administrators and health care providers. This dichotomy influences the way in which information systems are used to meet these differing objectives. Additionally, the resource constraints within the hospital create pressures when considering the use of information systems by both administrators and health care providers. This was particularly true in the case of the DFPCM, whose Chief is both a health care provider, and by necessity, an administrator.

We conducted interviews with senior hospital managers to obtain a clear problem definition and to focus our research. The feedback from these discussions directed us
to the Department of Family Practice and Community Medicine (DFPCM). This large, multi-service department greatly affects overall hospital operations. Chapter III provided a detailed look at the DFPCM: its structure and its current information systems. The Chief of the DFPCM commands more than 150 people and manages an annual budget of nearly half a million dollars. In initial discussions with the Chief, he identified and prioritized his most critical management concerns: budget, equipment, personnel, scheduling, patient satisfaction, and productivity. The information systems relating to these six management areas became the subject of our research.

Discussions with the Department Chief and his senior department personnel helped us identify their requirements for information in each of the six areas. In analyzing their needs, and comparing the needs with the current information systems, we were able to propose improvements to the systems in Chapter IV. Those improvements included: the use of databases; simpler data collection; automated data manipulations (in some cases); concise, summary reports; graphical reports; trend analysis capabilities; and improved automated user interfaces (where applicable).

The improvements proposed in Chapter IV were prototyped in Chapter V to produce a detailed requirements analysis for the six information systems in the DFPCM. The databases, user interface screens, and outputs of the systems were designed to help us pinpoint the user’s requirements. The Department Chief and other department managers provided feedback, allowing us to tailor the prototyped models to their specifications. Time constraints allowed only one iteration of the prototyping process. Further iterations would further enhance the requirements analysis presented in Chapter V.
The general conclusions resulting from our research are presented in the following section. The recommendations for follow on thesis study are discussed in the last section of this chapter.

B. CONCLUSIONS

The requirements analysis presented in this thesis is the first step in the development life cycle for the DFPCM information system. With the existing information system defined and the requirements identified and analyzed, the system can be fully designed, constructed, and implemented to meet the needs of the targeted department users.

The process of requirements analysis is a complex task which if done poorly will likely result in a substandard system development. The complexity of this task leads to many difficulties which the analysts must face during the development process.

Identifying the system's target audience and obtaining a clear problem definition are essential first steps in the process. Without a clear understanding of the intended users and their related problems, the analyst's energies and resources are wasted on unimportant or non-existent requirements. Starting on the right track early in the process requires the involvement of senior management to obtain the input from those personnel who are in a position to identify problem areas. Once involved in the thesis study, the senior managers at Silas B. Hays were quick to identify the DFPCM as potential benefitors of an improved information system. Frequent and early interactions with the users were critical in identifying the detailed requirements of each of the subsystems presented.
Selecting the "best" development methodology is the next hurdle in the development process. Given the large number of methodologies in existence, it is doubtful there is one "best" method. Rather, the analyst must choose the methodology most suited to the task at hand, with which he has the most experience, or simply, one which he feels most comfortable using. Decisions such as whether to use data flow diagrams or user concept diagrams depends on a number of factors, the bottom line being whether or not the analyst can use the method effectively to build a high quality system acceptable to the intended users.

The use of prototyping in the early stages of system's development was shown to be beneficial in identifying the inputs, interfaces, and output requirements desired by the intended users. Using separate software packages to design the various prototypes was time consuming and did not allow direct integration of the input and output prototype programs. The use of a dedicated, integrated prototype tool which does all of these processes could have greatly enhanced our productivity in prototype development.

The project management of the system development is critical for an efficient and effective process. The division of labor, coordination of effort, and teamwork were important issues throughout the project. When these factors are missing or inadequate in project development, schedules slip and resources are wasted.

An important influence in the development project at Silas B. Hays is the complexity of the computer systems in place at the hospital. The lack of integration of these systems frustrates the development of an information system and ultimately causes more work for the users in duplicating the data collection and reporting efforts.
The integrated Composite Health Care System planned for implementation in the early 1990s does not answer the needs of the department managers today. The new Director of Information Management at Silas B. Hays has begun planning for solving the integration problems using networking technology.

A valuable lesson learned during the writing of this thesis was that the use of automation is not always appropriate in every part of an information system. In some cases, automation would actually create more work in relation to any benefits gained. With the intense workload of the department’s personnel, every effort must be made to reduce the amount of work required while providing the best possible information to the department chief.

C. RECOMMENDATIONS AND FOLLOW-ON THESIS WORK

The requirements analysis presented in this thesis should be used to further design and implement a complete information system for the DFPCM. The hospital’s Information Management Division can use the prototype program listings, and input and output examples to develop a working system using the software packages currently available in the hospital, or they can use the requirements to justify purchasing or developing other software as required to implement the systems. Possible follow on thesis work in this area includes designing, constructing, and/or implementing an information system from a previously developed requirements analysis. Evaluating and selecting software and hardware alternatives, including thorough economic analyses, provide additional possibilities for future research.

The information which could be provided to hospital managers by a completed system may be useful to other hospital departments. Follow on thesis work could
involve expanding the initial requirements analysis of this thesis to other departments or the hospital as a whole.

Additional follow-on thesis work include: research into the design of an optimization model for the doctor scheduling process and further research into the doctor productivity issues discussed in Chapter IV.

At a minimum, the analysis contained in this thesis can be used by senior hospital managers to identify the shortcomings of the existing information systems in providing department managers with the high quality information they require to successfully manage the many resources needed to accomplish their missions.
### APPENDIX A. DATA DICTIONARY

#### BUDGET DATABASE FILES

**APC FILE**

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## PERSONNEL DATABASE FILES

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<td>CHARACTER</td>
<td>1 0</td>
<td>TYPE OF ABSENCE (CODED)</td>
</tr>
<tr>
<td>START</td>
<td>DATE</td>
<td>8 0</td>
<td>START DATE OF ABSENCE</td>
</tr>
<tr>
<td>END</td>
<td>DATE</td>
<td>8 0</td>
<td>END DATE OF ABSENCE</td>
</tr>
<tr>
<td>DURATION</td>
<td>NUMERIC</td>
<td>3 0</td>
<td>CALCULATE (START DATE - END DATE)</td>
</tr>
<tr>
<td>COMMENTS</td>
<td>CHARACTER</td>
<td>30 0</td>
<td>COMMENTS ABOUT ABSENCE REQUEST</td>
</tr>
</tbody>
</table>

## CMEAlloc File

<table>
<thead>
<tr>
<th>FIELD NAME</th>
<th>FIELD TYPE</th>
<th>FIELD LENGTH/DECIMALS</th>
<th>DESCRIPTION OF FIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY</td>
<td>NUMERIC</td>
<td>2 0</td>
<td>FISCAL YEAR OF CME FUNDS ALLOCATION</td>
</tr>
<tr>
<td>ALLOCATION</td>
<td>MONEY</td>
<td>11 2</td>
<td>CME FUNDS ALLOCATION FOR THE FY</td>
</tr>
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### CMEREQ FILE

<table>
<thead>
<tr>
<th>FIELD NAME</th>
<th>FIELD TYPE</th>
<th>FIELD LENGTH/DECIMALS</th>
<th>DESCRIPTION OF FIELD</th>
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<tr>
<td>IDCODE</td>
<td>CHARACTER</td>
<td>5 0</td>
<td>PERSONNEL IDENTIFICATION CODE</td>
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<tr>
<td>FY</td>
<td>NUMERIC</td>
<td>2 0</td>
<td>FISCAL YEAR OF REQUEST</td>
</tr>
<tr>
<td>TYPE</td>
<td>CHARACTER</td>
<td>1 0</td>
<td>TYPE OF CME REQUEST (ONE DIGIT CODE)</td>
</tr>
<tr>
<td>START DATE</td>
<td>DATE</td>
<td>8 0</td>
<td>START DATE OF CME TRAVEL</td>
</tr>
<tr>
<td>END DATE</td>
<td>DATE</td>
<td>8 0</td>
<td>ENDING DATE OF CME REQUEST</td>
</tr>
<tr>
<td>DURATION</td>
<td>NUMERIC</td>
<td>3 0</td>
<td>CALCULATED (END DATE - START DATE)</td>
</tr>
<tr>
<td>LOCATION</td>
<td>CHARACTER</td>
<td>20 0</td>
<td>LOCATION OF REQUESTED CONFERENCE</td>
</tr>
<tr>
<td>PURPOSE</td>
<td>CHARACTER</td>
<td>20 0</td>
<td>PURPOSE OF CME TRAVEL</td>
</tr>
<tr>
<td>TVLMODE</td>
<td>CHARACTER</td>
<td>1 0</td>
<td>MODE OF TRAVEL (CODED)</td>
</tr>
<tr>
<td>TRAVELCOST</td>
<td>MONEY</td>
<td>7 2</td>
<td>COST OF TRAVEL</td>
</tr>
<tr>
<td>PERDIEM</td>
<td>MONEY</td>
<td>7 2</td>
<td>PER DIEM COSTS OF TRAVEL</td>
</tr>
<tr>
<td>REGFEE</td>
<td>MONEY</td>
<td>7 2</td>
<td>REGISTRATION FEES</td>
</tr>
<tr>
<td>REIMB</td>
<td>MONEY</td>
<td>6 2</td>
<td>REIMBURSABLE EXPENSES</td>
</tr>
<tr>
<td>TOTALCOST</td>
<td>MONEY</td>
<td>8 2</td>
<td>TRAVELCOST+PERDIEM+REGFEE+REIMB</td>
</tr>
<tr>
<td>C_CODE</td>
<td>CHARACTER</td>
<td>1 0</td>
<td>COST CODE (A=ACTUAL OR E=ESTIMATED)</td>
</tr>
</tbody>
</table>

### ABSENCE FILE

<table>
<thead>
<tr>
<th>FIELD NAME</th>
<th>FIELD TYPE</th>
<th>FIELD LENGTH/DECIMALS</th>
<th>DESCRIPTION OF FIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDCODE</td>
<td>CHARACTER</td>
<td>5 0</td>
<td>PERSONNEL IDENTIFICATION CODE</td>
</tr>
<tr>
<td>FY</td>
<td>NUMERIC</td>
<td>2 0</td>
<td>FISCAL YEAR OF ABSENCE REQUEST</td>
</tr>
<tr>
<td>TYPE</td>
<td>CHARACTER</td>
<td>1 0</td>
<td>TYPE OF ABSENCE (CODED)</td>
</tr>
<tr>
<td>START DATE</td>
<td>DATE</td>
<td>8 0</td>
<td>START DATE OF ABSENCE</td>
</tr>
<tr>
<td>END DATE</td>
<td>DATE</td>
<td>8 0</td>
<td>END DATE OF ABSENCE</td>
</tr>
<tr>
<td>DURATION</td>
<td>NUMERIC</td>
<td>3 0</td>
<td>CALCULATE (START DATE - END DATE)</td>
</tr>
<tr>
<td>COMMENTS</td>
<td>CHARACTER</td>
<td>30 0</td>
<td>COMMENTS ABOUT ABSENCE REQUEST</td>
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201
SATISFACTION DATABASE FILE

<table>
<thead>
<tr>
<th>FIELD NAME</th>
<th>FIELD TYPE</th>
<th>FIELD DESCRIPTION</th>
<th>LENGTH/DECIMALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MONTH</td>
<td>NUMERIC</td>
<td>MONTH SURVEY TAKEN</td>
<td>2 0</td>
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<tr>
<td>YEAR</td>
<td>NUMERIC</td>
<td>YEAR SURVEY TAKEN</td>
<td>2 0</td>
</tr>
<tr>
<td>SECTCODE</td>
<td>CHARACTER</td>
<td>SECTION CODE (FROM SURVEY)</td>
<td>3 0</td>
</tr>
<tr>
<td>DOCTORNAME</td>
<td>CHARACTER</td>
<td>DOCTOR'S LAST NAME, FIRST NAME, MI</td>
<td>20 0</td>
</tr>
<tr>
<td>APPTDAYS</td>
<td>NUMERIC</td>
<td>NUMBER OF DAYS TO GET APPOINTMENT</td>
<td>1 0</td>
</tr>
<tr>
<td>ACCAPPT</td>
<td>NUMERIC</td>
<td>ACCEPTABILITY OF DAYS TO GET APPOINTMENT</td>
<td>1 0</td>
</tr>
<tr>
<td>RECORDS</td>
<td>NUMERIC</td>
<td>WERE MEDICAL RECORDS READY?</td>
<td>1 0</td>
</tr>
<tr>
<td>WAITTIME</td>
<td>NUMERIC</td>
<td>WAITING TIME SCORE</td>
<td>1 0</td>
</tr>
<tr>
<td>ACCWAIT</td>
<td>NUMERIC</td>
<td>ACCEPTABILITY OF WAITING TIME SCORE</td>
<td>1 0</td>
</tr>
<tr>
<td>RECEPTE</td>
<td>NUMERIC</td>
<td>COURTESY OF RECEPTIONIST SCORE</td>
<td>1 0</td>
</tr>
<tr>
<td>NURSE</td>
<td>NUMERIC</td>
<td>COURTESY OF NURSES SCORE</td>
<td>1 0</td>
</tr>
<tr>
<td>DOCTORS</td>
<td>NUMERIC</td>
<td>COURTESY OF DOCTORS SCORE</td>
<td>1 0</td>
</tr>
<tr>
<td>EXPLAIN</td>
<td>NUMERIC</td>
<td>EXPLANATIONS OF PROCEDURES SCORE</td>
<td>1 0</td>
</tr>
<tr>
<td>TIMESPENT</td>
<td>NUMERIC</td>
<td>ADEQUACY OF TIME SPENT WITH DOCTOR SCORE</td>
<td>1 0</td>
</tr>
<tr>
<td>CLEAN</td>
<td>NUMERIC</td>
<td>CLEANLINESS OF CLINIC SCORE</td>
<td>1 0</td>
</tr>
<tr>
<td>SATIS</td>
<td>NUMERIC</td>
<td>GENERAL SATISFACTION SCORE</td>
<td>1 0</td>
</tr>
<tr>
<td>PATCOMMENT</td>
<td>CHARACTER</td>
<td>ARE THERE PATIENT COMMENTS TO ENTER?</td>
<td>1 0</td>
</tr>
<tr>
<td>COMMENTS</td>
<td>MEMO</td>
<td>COMMENTS MEMO FIELD</td>
<td>10 0</td>
</tr>
</tbody>
</table>

SCORE : NUMBER MARKED ON PATIENT'S SURVEY QUESTIONNAIRE
PRODUCTIVITY DATABASE FILE

<table>
<thead>
<tr>
<th>FIELD NAME</th>
<th>FIELD TYPE</th>
<th>FIELD LENGTH/DECIMALS</th>
<th>DESCRIPTION OF FIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY</td>
<td>NUMERIC</td>
<td>2 0</td>
<td>FISCAL YEAR OF VISIT INFORMATION</td>
</tr>
<tr>
<td>MO</td>
<td>NUMERIC</td>
<td>2 0</td>
<td>MONTH OF VISIT INFORMATION</td>
</tr>
<tr>
<td>SECTCODE</td>
<td>CHARACTER</td>
<td>3 0</td>
<td>SECTION CODE</td>
</tr>
<tr>
<td>VISITS</td>
<td>NUMERIC</td>
<td>4 0</td>
<td>NUMBER OF VISITS FOR SECTION CODE</td>
</tr>
</tbody>
</table>
APPENDIX B. DISPLAY SCREENS

LIST OF SCREENS
ABSENCE SCREEN FILE
APC SCREEN FILE
CHOICE SCREEN FILE
CMEMAILC SCREEN FILE
CMEREQ SCREEN FILE
CONFIRM SCREEN FILE
DELCMERE SCREEN FILE
DELLEAVE SCREEN FILE
DELMOE XP SCREEN FILE
DELQALLO SCREEN FILE
EQUIPMENT SCREEN FILE
EQUIPMENT UPDATE FROM RIR SCREEN FILE
MOEXP SCREEN FILE
OCCUPIED SCREEN FILE
PERRIR B SCREEN FILE
PERSON SCREEN FILE
POSITION SCREEN FILE
QTRALLOC SCREEN FILE
SOCIAL SCREEN FILE
SURVEY SCREEN FILE
TDA SCREEN FILE
TDAINPUT SCREEN FILE
UPCMEREQ SCREEN FILE

ABSENCE SCREEN FILE
Update and change the absence information in the Personnel Database.
@ 0, 21 SAY "UPDATE LEAVE OR ABSENCE REQUEST"
@ 3, 4 SAY "This is the Fiscal Year"
@ 3, 28 SAY ABSENCE->FY PICTURE "99"
@ 3, 31 SAY "Leave or Absence request for ID CODE"
@ 3, 68 SAY ABSENCE->IDCODE PICTURE "!9999"
@ 6, 23 SAY "Type of Request"
@ 6, 46 GET ABSENCE->TYPE PICTURE "!"
@ 8, 4 SAY "L..Regular Leave   E..Emergency Leave   T..Other TDY, not CME"
@ 9, 4 SAY "P..Permissive TDY  C..Convalescent Leave  O..Other"  
@ 13, 11 SAY "Starting Date"
@ 13, 26 GET ABSENCE->START
@ 13, 38 SAY "Ending Date"
@ 13, 51 GET ABSENCE->END
@ 15, 26 SAY "Duration"
@ 15, 35 SAY ABSENCE->DURATION PICTURE "999"
@ 15, 39 SAY "days"
@ 18, 13 SAY "COMMENT"
@ 18, 25 GET ABSENCE->COMMENT FUNCTION "!"  
@ 2, 1 TO 4, 75
@ 7, 2 TO 10, 72

APC SCREEN FILE
Update and change the Account Processing Code information in the Budget Database.
@ 2, 23 SAY "APC Code Entered ->"
@ 2, 44 SAY APC->APC FUNCTION "R" PICTURE "A-999"
@ 5, 8 SAY "SECTION"
@ 5, 20 GET APC->SECTION
@ 5, 48 SAY "Section Code"
@ 5, 63 GET APC->S_CODE
@ 8, 20 SAY "Point of Contact"
@ 8, 38 GET APC->POC
@ 11, 20 SAY "Telephone Number"
@ 11, 38 GET APC->TELEPHONE PICTURE "(999)-999-9999"
@ 14, 31 SAY "See"
@ 15, 30 SAY "SECTION CODES"

204
@ 16, 4 SAY "Family Practice Clinic" FPC Consolidated Troop Clinic CTM
@ 17, 4 SAY "General OutPatient Clinic" GOC Fort Hunter Liggett Clinic FHL
@ 19, 4 SAY "Emergency Medical Service" EMS Ambulance Station AMB
@ 20, 4 SAY "Presidio of Monterey" POM Department DEP
@ 1, 1 TO 13, 78 DOUBLE
@ 3, 2 TO 3, 77 DOUBLE
@ 14, 1 TO 21, 78

**CHOICE SCREEN FILE**

Generic user selection format for the Personnel Database.

@ 6, 0 TO 11, 79 DOUBLE
@ 7, 10 SAY "ENTER YOUR CHOICE"
@ 8, 10 SAY "1. MOVE THE OLD PERSON TO EXCESS AND THE NEW PERSON INTO THE SLOT"
@ 9, 10 SAY "2. PLACE THE PERSON YOU ARE WORKING WITH INTO THIS POSITION AS EXCESS (OVERSTRENGTH, POSITION CODE = 99)"
@ 10, 10 SAY "3. TRY ANOTHER POSITION"
@ 7, 28 GET ANSWER PICTURE "9" RANGE 1, 3

**CMEALLOC SCREEN FILE**

Update and change the Continuing Medical Information funds allocation in Personnel Database.

@ 1, 28 SAY "UPDATE CME ALLOCATION"
@ 5, 9 SAY "THE CME ALLOCATION FOR FISCAL YEAR"
@ 5, 44 SAY CMEALLOC->FY
@ 5, 47 SAY "SHOULD BE $"
@ 3, 5 TO 7, 73 DOUBLE

**CMEREQ SCREEN FILE**

Update and change the CME request information in the Personnel Database.

@ 1, 2 SAY "SUBJECT: APPLICATION FOR CONFERENCE/MISSION TRAVEL IN FISCAL YEAR"
@ 1, 68 SAY M FY PICTURE "99"
@ 3, 0 SAY "1. Type of Travel Requested......."
@ 3, 34 GET CMEREQ->TYPE PICTURE "$"
@ 4, 3 SAY "C-Conference/Meeting Travel G-General Mission Travel B-Board Certification"
@ 6, 0 SAY "2. ID CODE of person requesting the travel is"
@ 6, 46 SAY M_IDCODE PICTURE "9999"
@ 5, 52 SAY "$"
@ 8, 0 SAY "4. Purpose of Travel is"
@ 8, 24 GET CMEREQ->PURPOSE
@ 8, 45 SAY ". 5. Registration Fee $"
@ 8, 71 GET CMEREQ->REGFEE
@ 10, 0 SAY "6. Destination"
@ 10, 16 GET CMEREQ->LOCATION
@ 10, 42 SAY "Mode of Travel is"
@ 10, 60 GET CMEREQ->TVLMODE
@ 11, 42 SAY "F-FLY, G-GOVT VEH, P-POV, O-OTHER"
@ 13, 0 SAY "8. Leave Dates Starting Date"
@ 13, 31 GET CMEREQ->START
@ 13, 41 SAY "Ending Date"
@ 13, 53 GET CMEREQ->END
@ 14, 3 SAY "Duration"
@ 14, 14 SAY CMEREQ->DURATION
@ 14, 19 SAY "days"
@ 16, 0 SAY "13. TRAVEL COST $"
@ 16, 18 GET CMEREQ->TRAVELCOST
@ 16, 29 SAY "PER DIEM COST $"
@ 16, 44 GET CMEREQ->PERDIEM
@ 16, 56 SAY "REIMBURSABLES $"
@ 16, 71 GET CMEREQ->REIMB
@ 18, 17 SAY "TOTAL COST OF TRAVEL $"
@ 18, 40 SAY CMEREQ->TOTALCOST
@ 20, 12 SAY "EXPENSES REFLECT THE"
IF C CODE = "A" THEN
@ 20, 33 SAY "ACTUAL COST OF TRAVEL"
ELSE
@ 20, 33 SAY "ESTIMATED COST OF TRAVEL"

205
CONFIRM SCREEN FILE

Generic confirmation screen for the Personnel Database.

@ 4, 0 SAY MESSAGE
@ 6, 0 TO 9, 79 DOUBLE
@ 7, 5 SAY "Last Name: " + LNAME
@ 7, 35 SAY "First Name: " + FNAME
@ 8, 5 SAY "Rank: " + RANK
@ 8, 35 SAY "Branch: " + BRANCH
?? CHR(7)
@ 15, 0 WAIT "PRESS RETURN TO CONTINUE..."

DELCMERE SCREEN FILE

Special delete CHE request information screen in Personnel Database.

@ 1, 2 SAY "SUBJECT: DELETE APPLICATION FOR CONFERENCE/MISSION TRAVEL IN FISCAL YEAR"
@ 1, 68 SAY M_FY PICTURE "99"
@ 3, 0 SAY "1. Type of Travel Requested......."
@ 3, 34 SAY CMEREQ->TYPE PICTURE "!"
@ 4, 63 SAY ABSENCE->IDCODE/Meeting Travel G-General Mission Travel B-Board Certification"
@ 6, 0 SAY "2. ID CODE of person requesting the travel is"
@ 6, 46 SAY CMEREQ->IDCODE PICTURE "!9999"
@ 6, 52 SAY "."
@ 8, 0 SAY "4. Purpose of Travel is"
@ 8, 24 SAY CMEREQ->PURPOSE
@ 8, 45 SAY ".5. Registration Fee $"
@ 8, 71 SAY CMEREQ->REGFEE
@ 10, 0 SAY "6. Destination"
@ 10, 16 SAY CMEREQ->LOCATION
@ 10, 42 SAY "Mode of Travel is"
@ 10, 60 SAY CMEREQ->TVLMODE
@ 11, 42 SAY "F-FLY, G-GOVT VEH, P-POV, O-OTHER"
@ 13, 0 SAY "8. Leave Dates Starting Date"
@ 13, 31 SAY CMEREQ->START
@ 13, 41 SAY "Ending Date"
@ 13, 53 SAY CMEREQ->END
@ 14, 3 SAY "Duration"
@ 14, 14 SAY CMEREQ->DURATION
@ 14, 19 SAY "days"
@ 16, 0 SAY "13. TRAVEL COST $"
@ 16, 18 SAY CMEREQ->TRAVELCOST
@ 16, 29 SAY "PER DIEM COST $"
@ 16, 44 SAY CMEREQ->PERDIEM
@ 16, 56 SAY "REIMBURSABLES $"
@ 16, 71 SAY CMEREQ->REIMB
@ 18, 17 SAY "TOTAL COST OF TRAVEL $"
@ 18, 40 SAY TOTALCOST
@ 20, 17 SAY "DO YOU WANT TO DELETE THIS RECORD?"
GET MAYBE PICTURE ";"
@ 0, 0 TO 2, 79
@ 19, 10 TO 21, 58

DELCMERE SCREEN FILE

Special delete Absence information screen for the Personnel Database.

@ 0, 21 SAY "UPDATE LEAVE OR ABSENCE REQUEST"
@ 3, 4 SAY "This is the Fiscal Year"
@ 3, 28 SAY ABSENCE->FY PICTURE "99"
@ 3, 31 SAY "Leave or Absence request for ID CODE"
@ 4, 63 SAY ABSENCE->IDCODE PICTURE "!9999"
@ 6, 23 SAY "Type of Request"
@ 6, 46 SAY ABSENCE->TYPE PICTURE "!"
@ 8, 4 SAY "L...Regular Leave  E...Emergency Leave  T...Other TOY, not CME"
@ 9, 4 SAY "P...Permissive TOY  C...Cun~alescent Leave  O...Other"
@ 13, 1 SAY "Starting Date"
@ 13, 26 SAY ABSENCE->START
@ 13, 38 SAY "Ending Date"
@ 13, 51 SAY ABSENCE->END
@ 15, 26 SAY "Duration"
@ 15, 35 SAY ABSENCE->DURATION PICTURE "999"
@ 15, 39 SAY "days"
@ 18, 13 SAY "COMMENT"
@ 18, 25 SAY ABSENCE->COMMENT
@ 21, 10 TO 23, 58 DELQALLO SCREEN FILE
Special delete quarterly allocation format for the Budget Database.
@ 2, 20 SAY "Delete the Quarterly Allocation"
@ 4, 34 SAY "for"
@ 5, 28 SAY "Fiscal Year"
@ 5, 41 SAY QTPALLOC->FY
@ 5, 47 SAY "Quarter"
@ 5, 39 SAY QTPALLOC->QUARTER
@ 7, 26 SAY "APC Code"
@ 7, 38 SAY QTPALLOC->APC
@ 7, 42 SAY QTPALLOC->ALLOCATION
@ 1, 14 TO 16, 59 DOUBLE
@ 7, 15 TO 7, 58
@ 19, 19 SAY "Delete this Record? (Y/N) ";
GET Maybe PICTURE "!"

EQUIPMENT SCREEN FILE
Update and change the Equipment information in the Equipment Database.
[EMENU1 SCREEN FILE]
@ 2, 17 SAY "ENTER NEW EQUIPMENT DATA"
@ 4, 4 SAY "EQUIPMENT CODE "
@ 4, 44 GET EQUIP->EQCODE
@ 6, 32 SAY "SECT DATE  ITEM DESCRIPTION  TYPE  URGENCY  QTY  UNIT PRICE"
@ 7, 7 GET EQUIP->SECTCODE
@ 7, 17 GET EQUIP->REQDATE
@ 7, 42 GET EQUIP->REQTYPE
@ 9, 21 SAY "STATUS CODE  COMMENTS"
@ 10, 26 GET EQUIP->STATUS

DELMOEXP SCREEN FILE
Special delete Monthly Expenditure format for the Budget Database.
@ 2, 20 SAY "Delete this Monthly Expenditure"
@ 5, 26 SAY "APC Code"
@ 5, 38 SAY MOEXP->APC FUNCTION "!" PICTURE "A###"
@ 7, 26 SAY MOEXP->MONTH
@ 9, 26 SAY "Expenses"
@ 12, 14 TO 20, 59 DOUBLE
@ 18, 14 TO 20, 59
@ 19, 19 SAY "Delete this Record? (Y/N) ";
GET Maybe PICTURE "!"
EQUIPMENT UPDATE FROM RIR SCREEN FILE

Special update screen for Equipment when the Resource Information Report is used.

MOEXP SCREEN FILE

Update and change the monthly expenditures in the Budget Database.

OCCUPIED SCREEN FILE

Special output screen when a TDA position is occupied in the Personnel Database.

PERRIR B SCREEN FILE

Special input screen for personnel information when the Resource Information Report is Used.
PERSON SCREEN FILE

Update and change personnel information in the Personnel Database.

POSITION SCREEN FILE

TDA position verification output screen for the Personnel Database.
QTRALLOC SCREEN FILE
Update and change quarterly allocation in the Budget Database.
@ 3, 19 SAY "Enter the New Quarterly Allocation"
@ 4, 34 SAY "for"
@ 5, 28 SAY "Fiscal Year"
@ 5, 41 SAY QTRALLOC->FY
@ 9, 27 SAY "Quarter"
@ 9, 39 SAY QTRALLOC->QUARTER
@ 11, 27 SAY "APC Code"
@ 11, 39 SAY QTRALLOC->APC
@ 13, 27 SAY "Allocation"
@ 13, 39 GET QTRALLOC->ALLOCATION
@ 1, 14 TO 16, 59 DOUBLE
SOCIAL SCREEN FILE
Update and change personal information in the Personnel Database.
@ 1, 12 SAY "This is the personal information for ID CODE"
@ 1, 57 SAY PRIVATE->IDCODE PICTURE "19999"
@ 2, 0 SAY "PRIVACY ACT STATEMENT"
@ 2, 0 SAY "PRINCIPLE PURPOSE: To maintain personal information on individuals assigned to"
@ 3, 3 SAY "this command to facilitate counseling, emergency notification, and social"
@ 4, 0 SAY "event information."
@ 5, 0 SAY "WARNING: This information is of a highly sensitive nature and should not be"
@ 6, 0 SAY "provided to anyone outside of the chain of command without approval."
@ 8, 2 SAY "Address"
@ 8, 13 GET PRIVATE->ADDRESS FUNCTION "!
@ 8, 38 SAY "Telephone"
@ 9, 50 GET PRIVATE->TELEPHONE FUNCTION "R" PICTURE "(999)999-9999"
@ 10, 18 SAY "City, State, Zip Code"
@ 10, 45 SAY ","
@ 10, 51 GET PRIVATE->LOCAL FUNCTION "R" PICTURE "99999-9999"
@ 12, 18 SAY "Date of Rank"
@ 12, 35 GET PRIVATE->DOR
@ 14, 20 SAY "Wife's Name"
@ 14, 52 GET PRIVATE->CHILDREN FUNCTION "S24" 
@ 16, 27 SAY "Comments"
@ 17, 0 TO 2, 77
SURVEY SCREEN FILE
Input screen for the Patient Satisfaction Survey in the Satisfaction Database.
@ 1, 7 SAY "MONTH"
@ 1, 13 GET SURVEY->MONTH RANGE 1, 12
@ 1, 18 SAY "YEAR"
@ 1, 23 GET SURVEY->YEAR
@ 1, 29 SAY "CLINIC"
@ 1, 36 GET SURVEY->SE-TCODE
@ 1, 43 SAY "DOCTOR"
@ 1, 51 GET SURVEY->DOCTORNAME
@ 3, 18 SAY "1.A. Days to get appointment. 1.A."
@ 3, 58 GET SURVEY->APPTDAYS RANGE 1, 6
@ 4, 20 SAY "B. Acceptability. B."
@ 4, 58 GET SURVEY->ACCPRT RANGE 1, 2
@ 6, 18 SAY "2. Records ready on time. 2."
@ 6, 58 GET SURVEY->RECORDS RANGE 1, 2
@ 8, 18 SAY "3.A. Waiting time. 3.A."
@ 8, 58 GET SURVEY->WAITTIME RANGE 1, 4
@ 9, 20 SAY "B. Acceptability. B."
@ 9, 58 GET SURVEY->ACCWAIT RANGE 1, 2
@ 11, 18 SAY "4. Courtesy, receptionists. 4."
@ 11, 58 GET SURVEY->RECEPT RANGE 1, 5
@ 12, 18 SAY "5. Courtesy, nurses. 5."
@ 12, 58 GET SURVEY->NURSE RANGE 1, 5
@ 13, 18 SAY "6. Courtesy, doctors. 6."
@ 13, 58 GET SURVEY->DOCTORS RANGE 1, 5
@ 14, 18 SAY "7. Explanation of procedures. 7."
@ 14, 58 GET SURVEY->EXPLAIN RANGE 1, 5
@ 15, 18 SAY "8. Time spent with doctor. 8."
@ 15, 58 GET SURVEY->TIMESPENT RANGE 1, 5
@ 16, 18 SAY "9. Cleanliness. 9."
@ 16, 58 GET SURVEY->CLEAN RANGE 1, 5
@ 17, 17 SAY "10. General satisfaction. 10."
@ 17, 58 GET SURVEY->SATIS RANGE 1, 5
@ 20, 58 GET SURVEY->PATCOMMENT
@ 21, 19 SAY "(Ctrl PgDn to Enter Comments)"
@ 21, 55 GET SURVEY->COMMENTS
@ 22, 73 DOUBLE
@ 3, 7 TO 11, 79 DOUBLE
@ 7, 5 SAY "WHAT POSITION WILL THIS PERSON OCCUPY?
OR ENTER A ZERO (0) TO QUIT:"
@ 8, 5 SAY "TDA Paragraph Number:";
@ 18, 5 GET M_TDA PARA PICTURE "999"
READ
*- SEE IF THEY WANT TO QUIT
IF M_TDA PARA = 0
TRY=.F.
LOOP
ENDIF
@ 9, 5 SAY "TDA Line Number:";
@ 10, 5 SAY "TDA Position Number:";
GET M_TDA PARA PICTURE "999"
GET M_TDA LINE PICTURE "99"
GET M_TDA POSN PICTURE "99"
GET M_TDA AUTH BR PICTURE "99"
GET M_TDA AUTH GR PICTURE "99"
GET M_TDA AUTH MOS PICTURE "99"
GET M_TDA AUTH YES NO PICTURE "99"
GET M_TDA PARA PICTURE "999"
GET M_TDA LINE PICTURE "99"
GET M_TDA POSN PICTURE "99"

TDA SCREEN FILE
Update and change the TDA information in the Personnel Database.

TDAINPUT SCREEN FILE
Input screen for entering a requested TDA position in the Personnel Database.
UPCMEREQ SCREEN FILE

Special update screen for CME requests when only actual costs are entered in Personnel Database.

@ 1, 2 SAY "SUBJECT: APPLICATION FOR CONFERENCE/MISSION TRAVEL IN FISCAL YEAR"
@ 1, 68 SAY M_FY PICTURE "99"
@ 3, 0 SAY "1. Type of Travel Requested........"
@ 3, 34 SAY CMEREQ->TYPE PICTURE "!"
@ 4, 3 SAY "C-Conference/Meeting Travel  G-General Mission Travel  B-Board Certification"
@ 6, 0 SAY "2. ID CODE of person requesting the travel is"
@ 6, 46 SAY M_IDCODE PICTURE "9999"
@ 6, 52 SAY "."
@ 8, 0 SAY "4. Purpose of Travel is"
@ 8, 24 SAY CMEREQ->PURPOSE
@ 8, 45 SAY ". 5. Registration Fee $"
@ 8, 71 GET CMEREQ->REGFEE
@ 10, 0 SAY "6. Destination"
@ 10, 16 SAY CMEREQ->LOCATION
@ 10, 42 SAY "Mode of Travel is"
@ 10, 60 SAY CMEREQ->TVLMODE
@ 11, 42 SAY "F-FLY,  G-GOVT VEH,  P-POV,  O-OTHER"
@ 13, 0 SAY "8. Leave Dates Starting Date"
@ 13, 31 SAY CMEREQ->START
@ 13, 41 SAY "Ending Date"
@ 13, 53 SAY CMEREQ->END
@ 14, 3 SAY "Duration"
@ 14, 14 SAY CMEREQ->DURATION
@ 14, 19 SAY "days"
@ 16, 0 SAY "13. TRAVEL COST $"
@ 16, 16 GET CMEREQ->TRAVELCOST
@ 16, 29 SAY "PER DIEM COST $"
@ 16, 44 GET CMEREQ->PERDIEM
@ 16, 56 SAY "REIMBURSABLES $"
@ 16, 71 GET CMEREQ->REIMB
@ 18, 17 SAY "TOTAL COST OF TRAVEL $"
@ 18, 40 SAY CMEREQ->TOTALCOST
@ 20, 12 SAY "EXPENSES REFLECT THE "
IF C_CODE = "A"
@ 20, 33 SAY "ACTUAL COST OF TRAVEL"
ELSE
@ 20, 33 SAY "ESTIMATED COST OF TRAVEL"
ENDIF
@ 0, 0 TO 2, 79
@ 19, 10 TO 21, 58
APPENDIX C. BUDGET PROGRAMS

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DISCLAIMER

The purpose of this programming code is to facilitate the understanding of the requirements presented in Chapter 5 of this thesis. The nature of this project precludes it actual implementation in DBASE III+. To fully implement the requirements the system designer will need a full range of capabilities that does not currently exist in DBASE III+. DBASE III+ served as the modeling tool by which the screens were generated and where necessary, specific code was written to illustrate a point. The actual working code merely acts as a shell in which to run the menus. A close analysis of the program code can facilitate implementation in a more suitable language, i.e., PARADOX, which can support the graphics and high level relationships involved in the various databases. Where the actual requirements process may appear to be unclear, comments were added within the code to explain these areas to the designer.

* Program...

MENU.PKG

* Author: ELBERT T. SEAN & JOAN ZIMMERMAN
* Date: 02/14/89
* Notice:: Copyright (c) 1989, ELBERT T. SEAN & JOAN ZIMMERMAN, All Rights Reserved
* Notes:: The main menu for the Budget System

DO WHILE .T.

* --Display menu options, centered on the screen.
  * draw menu border and print heading
  CLEAR
  $ 2.0 TO 14.79 DOUBLES
  $ 3.10 SAY "DEPARTMENT OF FAMILY PRACTICE BUDGET SYSTEM"
  $ 4.1 TO 4.79 DOUBLES
  * --display detail lines
  $ 7.29 SAY [1. UPDATE FISCAL YEAR ALLOCATIONS]
  $ 8.29 SAY [2. UPDATE MONTHLY EXECUTIVES]
  $ 9.29 SAY [3. UPDATE ACP INFORMATION FIELDS]
  $ 12,29 SAY "0. EXIT"
  STORE 0 TO selectnum
  $ 14,33 SAY "select "
  $ 14,42 GET selectnum PICTURE "9" RANGE 0.4
  READ

DO CASE
  CASE selectnum = 0
  CLEAR ALL
  RETURN
  CASE selectnum = 1
  DO CASE
    CASE selectnum = 0
    SET BELL OFF
    SET TALK OFF
  END CASE

  CASE selectnum = 2
  DO UPDATE FY ALLOCATIONS
  SET CONFIRM OFF
  WAIT
  SET CONFIRM ON
  END CASE

  CASE selectnum = 3
  DO AFC INFORMATION FIELDS
  SET CONFIRM OFF
  WAIT
  SET CONFIRM ON
  END CASE

  CASE selectnum = 4
  DO PRINT REPORTS
  SET CONFIRM OFF
  WAIT
  SET CONFIRM ON
  END CASE

ENDCASE

RETURN

* Program...

MENU1.PKG

* Author: ELBERT T. SEAN & JOAN ZIMMERMAN
* Date: 02/14/89
* Notice: Copyright (c) 1989, ELBERT T. SEAN & JOAN ZIMMERMAN, All Rights Reserved
* Notes:: Updates the Quarterly Allocation File

SET TALK OFF
SET BELL OFF
SET ESCAPE OFF
USE OUTALLOC
M_FT = 0

* Clear Screen for FY input an allow for the user to select the Fiscal Year
* Typically, the user will only be operating in one FY

CLEAR
$6.0 TO 8.79 DOUBLES
$7.15 SAY "Enter the Fiscal Year for the Allocations:" ;
GET M_FT PICTURE "99"
READ

DO WHILE .T.

* --Display menu options, centered on the screen.
  * draw menu border and print heading
  CLEAR
  $ 2.0 TO 14.79 DOUBLES
  $ 3.6 SAY "UPDATE FISCAL YEAR ALLOCATIONS"
  $ 4.1 TO 4.79 DOUBLES
  * --display detail lines
  $ 7.29 SAY [1. ADD ALLOCATIONS FOR FY ]+STR(M_FT,2)
  $ 8.29 SAY [2. CHANGE ALLOCATIONS FOR FY ]+STR(M_FT,2)
  $ 9.29 SAY [3. REMOVE ALLOCATIONS FROM FY ]+STR(M_FT,2)
  $ 10.29 SAY [4. REVIEW ALLOCATIONS FOR FY ]+STR(M_FT,2)
  $ 12.29 SAY "0. EXIT"
  STORE 0 TO selectnum
  $ 14,33 SAY "select "
  $ 14,42 GET selectnum PICTURE "9" RANGE 0.4
  READ

DO CASE
  CASE selectnum = 0
  CLEAR ALL
  RETURN
  CASE selectnum = 1
  DO CASE
    CASE selectnum = 0
    SET BELL OFF
    SET TALK ON

213
More = "T."
DO WHILE More
CLEAR
M_APC = SPACE(4)
$ 6,0 TO 10,79 DOUBLE
7,10 SAY "Enter the APC Number of the Section to delete its allocation" GET M_APC PICTURE "*999"$ 8,10 SAY "or Press Return to QUIT" READ
IF M_APC = " " More = "F."
ENDIF
 USE APC INDEX APC
SEARCH = UPPER(M_APC)
LOCATE FOR APC = SEARCH
IF FOUND()
CLEAR
$ 6,0 TO 9,79 DOUBLE
7,35 SAY "Section: " + ":SECTION"
7,35 SAY "Section Code: " + ":S_CODE"
8,55 SAY "Point of Contact: " + "POC"
8,55 SAY ": FILTER
"Telephone:" "TRANSFORM(Telephone," "(999) 999-9999")"
ELSE CLEAR
$ 6,0 TO 8,79 DOUBLE
7,55 SAY "APC requested is not in the Master File, ;
   Please Try again." ?? CER(?)
$ 15,0 WAIT "Press Return to try again..."
END
ENDIF
M_QTR = 0
$ 14,0 TO 14,45
15,5 SAY "Enter the Quarter You Wish to Delete:
 GT M_QTR PICTURE "9"
READ
USE UTRALLOC INDEX UTRALLOC
SET FILTER TO FYM_FT .AND. QUARTER=M_QTR
GO TOP
LOCATE FOR APC=M_APC
IF FOUND()
CLEAR
Maybe = "Y"
SET FORMAT TO DELALLOC
READ
CLOSE FORMAT
IF UPPER(Maybe) = "Y"
DELETE
ENDIF
ELSE
$ 20,0 CLEAR
7 "Can't find the requested record"
?? CER(?) WAIT "Press any key to try again..."
END
ENDIF
ENDDO
"Give the user a chance to change their mind about deleting data
Yorn = "F"
CLEAR
$ 9,1 SAY "Permanently remove records marked for deletion now?" $ (Y/N) " GET Yorn PICTURE "F"
$ 7,1 SAY "(Process may take a few minutes to complete...)"
READ
IF Yorn = "Y"
SET FILTER TO Models = 0
"-Count the number of records to be deleted
7 "Counting... Please wait." COUNT FOR (DELETE) TO Models
Perm = "Y"
DO WHILE Perm = "Y" .AND. Models > 0
CLEAR
"Display all deleted records
 DO DISPLAY AFC, FY, QUARTER, ALLOCATION FOR
DELETEN()?
Perm = "F"
*Give user all or some choice
$ 25,5 SAY "OK to delete all these? (Y/N)
GET Perm PICTURE "F"
READ
*IF not OK to delete all, find out which
IF Perm = "Y"
Models = 0
$ 20,0 CLEAR
"*Find out which Records to recall
$ 23,5 SAY "Recall which one (Record Number)?"
READ
IF Models > 0 AND. Models <= RECOUNT()$ 23,5 SAY "PACKING DATABASE TO REMOVE RECORDS MARKED FOR
DELETION"
PACK
ENDIF
SET TALK OFF
SET CONFIRM OFF
WAIT
SET CONFIRM ON
CASE selectnum = 4
* DO REVIEW INFORMATION
CLEAR
M_QTR = 0
$ 6,0 TO 8,79 DOUBLE
7,15 SAY "Enter the Quarter to Review":$ GET M_QTR PICTURE "9" PICTURE 1,4
READ
SET FILTER TO QUARTER=M_QTR .AND. FY=M_FT
*Display only those records user desires
GO TOP
BROWSE NOAPPEND NOMENO
SET FILTER TO
SET CONFIRM OFF
WAIT
SET CONFIRM ON
ENDCASE
ENDDO T
RETURN
* EOF; BMENU1.PRG

* Program...
BMENU1.PRG
* Author:... ELBERT T. SHEW & JOAN ZIMMERMANN
* Date.....: 02 14.89
* Notice:... Copyright (c) 1989, ELBERT T. SHEW & JOAN ZIMMERMANN, All
* Notes:...
SET TALK OFF
SET BELL OFF
SET ESCAPE OFF
SET CONFIRM OFF
USE MORE
CLEAR
M_FY = 0
$ 6,0 TO 8,79 DOUBLE
$7,15 SAY "Enter the Fiscal Year for the Allocations":$ GET M_FY PICTURE "99"
READ

215
DO WHILE .T.
* ---Display menu options, centered on the screen.
* draw menu border and print heading
CLEAR
$ 2, 0 TO 14,79 DOUBLE
$ 3,8 SAY "UPDATE MONTHLY EXPENDITURE"
$ 8,8 @ 4,1 TO 4,78 DOUBLE
* ---Display detail line
$ 7,25 SAY [L. ADD EXPENDITURES FOR FY] +STR(M_FY,2)
$ 8,25 SAY [L. CHANGE EXPENDITURES FOR FY] +STR(M_FY,2)
$ 8,25 SAY [L. REMOVE EXPENDITURES FROM FY] +STR(M_FY,2)
$ 10,25 SAY [L. REVIEW EXPENDITURES FOR FY] +STR(M_FY,2)
$ 12, 30 SAY "O. EXIT"
STORE 0 TO selectnum
$ 14,42 GET selectnum PICTURE "$" RANGE 0,6
READ
DO CASE
CASE selectnum = 0
CLEAR ALL
CLOSE ALL
RETURN
CASE selectnum = 1
* DO ADD INFORMATION
Adding = .T.
DO WHILE Adding
CLEAR
M_APC = SPACE(4)
$ 6,0 TO 10,79 DOUBLE
$ 7,10 SAY "Enter the APC of the Section to update expenditures" GET M_APC PICTURE
"1999"
$ 8,10 SAY "or Press Return to QUIT"
READ
IF M_APC = " "
Adding = .F.
ENDIF
USE APC INDEX APC
SEARCH= UPPER(M_APC)
LOCATE FOR APC=SEARCH
IF FOUND()
CLEAR
$ 6,0 TO 9,79 DOUBLE
$ 7,5 SAY "Section: " +STR(1,2)
$ 7,35 SAY "Section Code: " +STR(2,2)
$ 8,5 SAY "Point of Contact: " +STR(4,2)
$ 8,35 SAY;
"Telephone:" +TRANSFORM("Telephone," "(999) 999-9999")
ENDIF
File, Please
Try again.
?77 CHR(7)
$ 15,0
WAIT "Press Return to try again..."
LOOP
ENDIF
M_MONTH = 0
$ 14,0 TO 14,45
$ 15,5 SAY "Enter the Month You Wish to Add:": GET M_MONTH PICTURE "99" RANGE 1,12
READ
USE MEXP INDEX MEXP
SET FILTER TO FY=M_FY AND. MONTH=M_MONTH
GO TOP
LOCATE FOR APC=M_APC
IF FOUND()
CLEAR
WAIT "RECORD ALREADY EXISTS, Press Return to Change it" SET FORMAT TO MEXP
READ
CLOSE FORMAT
ELSE
SET FORMAT TO MEXP
CLEAR
WAIT "ADDING NEW RECORD, Press Return to Continue"
APPEND BLANK
REPLACE M_FY WITH M_FY
REPLACE APC WITH M_APC
REPLACE MONTH WITH M_MONTH
*Replace Quarter Based on Month entered
DO CASE
CASE M_MONTH > 6
REPLACE QUARTER WITH 6
CASE M_MONTH = 3
REPLACE QUARTER WITH 3
CASE M_MONTH = 1
REPLACE QUARTER WITH 1
ENDCASE
READ
CLOSE FORMAT
ENDIF
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ENDIF
CASE M_MONTE > 5
REPLACE QUARTER WITH 4
CASE M_MONTE > 3
REPLACE QUARTER WITH 3
CASE M_MONTE > 1
REPLACE QUARTER WITH 2
ENDCASE
READ
CLOSE FORMAT
ENDIF

ENDDO
SET FILTER TO
$ 5,0 SAY "Please stand by while I reindex the file..."
SET TALE ON
REINDEX
SET TALE OFF
CLOSE ALL
SET CONFIRM OFF
WAIT
SET CONFIRM ON

CASE selection = 3
* DO REMOVE INFORMATION
More = .T.
DO WHILE More
CLEAR
M_AFC = SPACE(4)
$ 6,0 TO 10,79 DOUBLES
$ 7,15 SAY "Enter the AFC Number of the Section
to remove its expenditures" GET M_AFC PICTURE
"1994"
$ 9,10 SAY "or Press Return to QUIT"
READ
IF M_AFC = " "
More = .F.
LOOP
ENDIF

SEAR APC INDEX APC
SEARCH= lFC(M_AFC)
LOCATE FOR APC=SEARCH
IF FOUND():
CLEAR
$ 6,0 TO 8,79 DOUBLES
$ 7,5 SAY "Section: "+SECTION
$ 7,39 SAY "Section Code: " + CODE
$ 8,5 SAY "Point of Contact:" + POC
$ 8,35 SAY ";
FILE: "+TRANSMIT(FILENAME, "(999) 999-9999")
ELSE
CLEAR
$ 6,0 TO 8,79 DOUBLES
$ 7,5 SAY "APC requested is not in the Master
File; Please Try again."
?? CBR(7)
$ 15,0
WAIT "Press Return to try again..."
LOOP
ENDIF

M_MONTE = 0
$ 14,5 TO 16,65
$ 15,5 SAY "Enter the Month You wish to delete: ";
GET M_MONTE PICTURE "99" RANGE 1,12
READ
USE MEXP INDEX MEXP
SET FILTER TO FT=M_FT . AND. MONTH=M_MONTH
GO TOP
LOCATE FOR APC=M_AFC
IF FOUND():
CLEAR
Maybe = " "
SET FORMAT TO DLMEXP
READ
CLOSE FORMAT
IF UPFGR(Maybe) = "Y"
DELETE
$ ELSE
$ 20,0 CLEAR
"Can't find the requested record"
?? CBR(7)
WAIT "Press any key to try again..."
LOOP
ENDIF
ENDDO

York = " "
CLEAR
$ 5,1 SAY "Permanently remove records marked for deletion now? 
(Y/N)"
$ 7,1 SAY "Process may take a few minutes to complete..."
READ
IF YORK = "Y"
SET FILTER TO
$ 5,0 SAY "Please stand by while I reindex the file..."
SET TALE ON
REINDEX
SET TALE OFF
ELSE
SET FILTER TO
Model = 0
"-Count the number of records to be deleted 
? "Counting... Please wait."
COUNT FOR DELETED() TO Models
Permises = "Y"
DO WHILE Permises = "Y" . AND. Models > 0
CLEAR
DISPLAY APC, FT, MONTH, EXPENSES FOR DELETED()
? Permises = " "
? 20,5 SAY "OK to delete all these? (Y/N) :
GET Permises PICTURE "9"
READ
"--If not OK to delete all, find out which
If Permises = "Y"
Recno = 0
$ 20,0 CLEAR
$ 23,5 SAY "Recall which one (Record Number): ":
GET Recno PICTURE "999999"
READ
IF Recno > 0 . AND. Recno <= RECOUNT():
GET APC
IF DELETED()
RECALL
Models = Models - 1
ENDIF
ELSE
$ 20,0 CLEAR
$ 23,5 SAY "No such record:
"+STR(Recno,4)
? CBR(7)
WAIT
ENDIF
ENDIF
ENDDO
ENDDO (Files and No-dels)
SET TALE ON
CLEAR
$ 3,0 SAY ": 
1. RECOUNT DATABASE TO REMOVE RECORDS MARKED FOR 
DELETION"
PACK
SET TALE OFF
SET CONFIRM OFF
WAIT
SET CONFIRM ON

CASE selection = 4
* DO REVIEW INFORMATION
USE MEXP INDEX MEXP
CLEAR
M_MONTE = 0
$ 6,0 TO 8,79 DOUBLES
$ 7,15 SAY "Enter the Month to Review: ";
GET M_MONTE PICTURE "99" RANGE 1,12
READ
"-Filter out extraneous information
SET FILTER TO FT=M_FT . AND. MONTH=M_MONTH
GO TOP
BROWS RECOUNT MEXP
SET "--000111111" IF
WAIT
SET CONFIRM ON
ENDCASE

ENDDO T
RETURN
* EOF: BMENU3.PRO
**
Program: BMENU3.PRO

217
CASE selectnum = 2
* DO CHANGE INFORMATION
CLEAN
Adding = -T.
DO WHILE Adding
*--Ask for new APC to add
CLEAN
CLOSE FORMAT
M_APC = SPACE(4)
$ 6,0 TO 8,79 DOUBLE
$ 7,15 SAY "Enter the APC Code you wish to change:");
GET M_APC PICTURE '999'
$ 8,15 SAY "Press Enter ['*Ret*'] to return to Menu"
READ
"--Create lookup variable
Search = UPPER(M_APC)
**--If nothing entered, Leave Program
IF Search = ""
ADDING = -F.
LOOP
ENDIF
**--See if APC is already Stored
SEEK SEARCH
SET FORMAT TO APC
**--If name Found Edit
IF FOUND(
M_APCSTATUS = ""
CLEAN
$ 6,0 TO 8,79 DOUBLE
$ 7,15 SAY "Do You wish to add this APC Code into inactive status (Y/N)?"; GET M_APCSTATUS
PICTURE "1"
READ
"-- IF WANT TO INACTIVE APC, JUST PUT A
INACTIVE CODE INTO FILE
ELSE EDIT THE FILE AS USUAL.
IF M_APCSTATUS = "Y"
REPLACE STATUS WITH 1
ELSE
SET FORMAT TO APC
CLOSE FORMAT
ENDIF
ELSE
"--If not found, warn user
$ 6,0 TO 8,79 DOUBLE
$ 7,15
"Can't Find the APC You requested:
", Search
?? CHR(7)
WAIT
ENDIF (found)
ENDDO
CLEAR
$ 5,0 SAY "Please stand by while I reindex the
file...
SET TALE ON KEINDEX
SET TALE OFF
SET CONFIRM OFF
WAIT
SET CONFIRM ON
CASE selectnum = 3
* DO REVIEW INFORMATION
SET HELP OFF
GO TOP
BROWSE NOAPPEND MORENU
SET CONFIRM OFF
WAIT
SET CONFIRM ON
ENDCASE
LOOP
ENDDO
RETURN
* EOF: MENU03.PRG
2

* Program:

MENU4.PRG
* Author:... ELBERT T. SHAW & JOAN ZIMMERMAN
* Date:....: 02/14/89
* Notice:... Copyright (c) 1989, ELBERT T. SHAW & JOAN
ZIMMERMAN, All Rights Reserved
* Notes:....
* Reserved:... selectnum

SET TALK OFF
SET BELL OFF
SET ESCAPE OFF
SET CONFIRM ON

DO WHILE .T.
  * ---Display menu options, centered on the screen.
  * draw menu border and print heading
  CLEAR
  $ 5, 0 TO 14, 79 DOUBLE
  $ 3, 25 SAY "PRINT REPORTS"
  $ 4, 1 TO 4, 79 DOUBLE
  * ---Display detail lines
  $ 7, 33 SAY [1. MONTHLY REPORT]
  $ 8, 33 SAY [2. QUARTERLY REPORT]
  $ 9, 33 SAY [3. FISCAL YEAR REPORT (RECAP)]
  $ 10, 33 SAY [6. PRINT GRAPHS]
  $ 12, 33 SAY 'O. EXIT'
  STORE 0 TO selectnum
  $ 14, 33 SAY 'select '
  $ 14, 42 GET selectnum PICTURE "9" RANGE 0, 4
READ
DO CASE
  CASE selectnum = 0
    CLEAR ALL
    RETURN
  CASE selectnum = 1
    * DO MONTHLY REPORT
    DO MENU4_1
    SET CONFIRM OFF
    WAIT
    SET CONFIRM ON
  CASE selectnum = 2
    * DO QUARTERLY REPORT
    DO MENU4_2
    SET CONFIRM OFF
    WAIT
    SET CONFIRM ON
  CASE selectnum = 3
    * DO FY REPORT
    DO MENU4_3
    SET CONFIRM OFF
    WAIT
    SET CONFIRM ON
  CASE selectnum = 4
    * DO PRINT GRAPHS
    DO MENU4_4
    SET CONFIRM OFF
    WAIT
    SET CONFIRM ON
ENDCASE

ENDDO T
RETURN
* EOF: MENU4_1.PRG
* 2

* Program:...
* Author:... ELBERT T. SHAW & JOAN ZIMMERMAN
* Date:....: 02/14/89
* Notice:... Copyright (c) 1989, ELBERT T. SHAW & JOAN
ZIMMERMAN, All Rights Reserved
* Notes:....
* Reserved:... selectnum

READ
$ 0, 15 SAY "Enter the Month for the report"
GET M_FY PICTURE "99" RANGE 1, 12
READ
*** Monthly Report printed here ***
* EOF: MENU4_1.PRG
* 2

* Program:...
* Author:... ELBERT T. SHAW & JOAN ZIMMERMAN
* Date:....: 02/14/89
* Notice:... Copyright (c) 1989, ELBERT T. SHAW & JOAN
ZIMMERMAN, All Rights Reserved
* Notes:....
* Reserved:... selectnum

READ
$ 0, 15 SAY "Enter the Fiscal Year for the report"
GET M_FY PICTURE "99"
READ
$ 0, 15 SAY "Enter the Quarter for the report"
GET M_QTR PICTURE "9" RANGE 1, 4
READ
*** Quarterly Report printed here ***
* EOF: MENU4_1.PRG
* 2

* Program:...
* Author:... ELBERT T. SHAW & JOAN ZIMMERMAN
* Date:....: 02/14/89
* Notice:... Copyright (c) 1989, ELBERT T. SHAW & JOAN
ZIMMERMAN, All Rights Reserved
* Notes:....
* Reserved:... selectnum

READ
$ 0, 15 SAY "Enter the Fiscal Year for the report"
GET M_FY PICTURE "99"
READ
*** Monthly Report printed here ***
* EOF: MENU4_1.PRG
* 2

* Program:...
* Author:... ELBERT T. SHAW & JOAN ZIMMERMAN
* Date:....: 02/14/89
* Notice:... Copyright (c) 1989, ELBERT T. SHAW & JOAN
ZIMMERMAN, All Rights Reserved
* Notes:....
* Reserved:... selectnum

READ
$ 0, 15 SAY "Enter the Fiscal Year for the report"
GET M_FY PICTURE "99"
READ
*** FY Allocation report printed here ***
* EOF: MENU4_1.PRG
* 2
**Program:**  RMORES_6.PRG

* Author:... T. 915 T. ELERT T. SHAH
  JOAN ZIMMERMAN
  Date...... 02/16/99
  Notice..... Copyright (c) 1989, ELERT T. SHAH

* Notes..... DRAW MENU BORDERS AND PRINT HEADING.

SET CONFIRM ON
CASE selectnum = 0
  SET BELL OFF
  CLEAR ALL
  RETURN
CASE selectnum = 1
  * DO PERCENT SPENT FOR QTR (BAR GRAPH)
  GET M_FY PICTURE "99"
  READ
  *** DETERMINE EXPENDITURE BY SECTION FOR EACH
  SECTION OF THE QUARTER SELECTED, HIS FIGURE
  COULD BE A PARTIAL OUTLOOK FOR THE CURRENT
  QUARTER COMPARE TO CURRENT SECTION'S ALLOCATION
  AND DETERMINE PERCENTAGE SPENT
  *** PERCENT SPENT FOR QUARTER GRAPH HERE
  SET CONFIRM ON
  WAIT
  READ
CASE selectnum = 2
  * DO TREND (LINE GRAPH)
  M_FY = 0
  *** TOTAL ALL SECTION EXPENDITURE BY M/FY TO
  DETERMINE TOTAL ALLOCATION FOR EACH QUARTER.
  *** DEPARTMENT FOR EACH QUARTER.
  *** PRINT YEARLY TREND LINE GRAPH HERE
  *** DO LONG TERM TREND (TREND GRAPH)
  *** LOCATE ALL DATA FOR CURRENT FISCAL YEAR, AND
  PREVIOUS FISCAL YEARS UP TO THE TWO YEARS
  *** TREND ON MONTH EXPENDITURES, DISPLAY
  *** ALLOCATIONS FOR THOSE YEARS
  *** INDIVIDUAL APC EXPENDITURES ARE TOTALED TO GET
  A DEPARTMENT WIDE PICTURE
  *** PRINT LONG TERM TREND GRAPH HERE
  SET CONFIRM OFF
  WAIT
  SET CONFIRM ON
ENDCASE

ERDO T
RETURN
* BOF: RMORES_3.PRG
"2

***************

** Program:**  RMORES_4.PRG

* Author:... T. 915 T. ELERT T. SHAH
  JOAN ZIMMERMAN
  Date...... 02/16/99
  Notice..... Copyright (c) 1989, ELERT T. SHAH

* Notes..... DRAW MENU BORDERS AND PRINT HEADING.

SET CONFIRM ON
CASE selectnum = 2
  SET BELL OFF
  SET TALK OFF
  CLEAR
  RETURN
CASE selectnum = 3
  DO PERCENT
  PRINT "PERCENT SPENT FOR QTR (MAR GRAPH)"
  WAIT
CASE selectnum = 4
  DO TREND
  PRINT "TREND ON TEXT EXPENDITURES, DISPLAY"
  PRINT "ALLOCATIONS FOR THOSE YEARS"
  PRINT "INDIVIDUAL APC EXPENDITURES ARE TOTALED TO GET"
  PRINT "A DEPARTMENT WIDE PICTURE"
  PRINT "PRINT LONG TERM TREND GRAPH HERE"
  SET CONFIRM OFF
  WAIT
  SET CONFIRM ON
ENDCASE

ERDO T
RETURN
* BOF: RMORES_5.PRG
"2
APPENDIX D. EQUIPMENT PROGRAMS

$14.42 GET selectnum PICTURE "9" RANGE 0, 6
READ
DO CASE
CASE selectnum = 0
SET BELL ON
SET TALK OFF
CLEAR ALL
RETURN
CASE selectnum = 1
* DO UPDATE EQUIPMENT LISTING
DO EMENU1
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23.0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
CASE selectnum = 2
* DO UPDATE PRIORITIES
DO EMENU2
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23.0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
CASE selectnum = 3
* DO PRINT REPORTS
DO EMENU3
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23.0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
CASE selectnum = 4
* DO ARCHIVE HISTORICAL DATA
DO EMENU4
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23.0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
ENDCASE
ENDDO T
RETURN
* EOF: EEMENU.FRG
*C

* Program...
EEMNU1.FRG

* Author...: ELBERT T. SMAN & JOAN ZIMMERMAN
* Date....: 02/16/89
* Notice...: Copyright (c) 1989, All Rights Reserved
* Notes....;
SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON
DO WHILE .T.
  * ---Display menu options, centered on the screen.
  * draw menu border and print heading
  CLEAR
$ 2.0 TO 14.79 DOUBLE
$ 3.13 SAY [DEPARTMENT OF FAMILY PRACTICE PLANNED EQUIPMENT SYSTEM]
$ 4.1 TO 6.68 DOUBLE
  * ---display detail lines
$ 7.27 SAY [1. UPDATE EQUIPMENT LISTING]
$ 8.27 SAY [2. UPDATE PRIORITIES]
$ 9.27 SAY [3. PRINT REPORTS]
$ 10.27 SAY [4. ARCHIVE HISTORICAL DATA]
$ 11.27 SAY 'O. EXIT'
STORE 0 TO selectnum
$ 14.33 SAY ' select '
"---Display menu options, centered on the screen.
  * draw menu border and print heading
CLEAR
2,0 TO 14.79 DOBLE
3,21 SAY [F DATE PROCUREMENT LIST]
$4.1 TO 4.78 DOUBLE
"---display detail lines
$7.30 SAY [1. ADD EQUIPMENT INFORMATION]
$6.30 SAY [2. CHANGE EQUIPMENT DATA]
$9.30 SAY [3. REMOVE EQUIPMENT ENTRY]
$10.30 SAY [4. REVIEW EQUIPMENT LIST]
$12.30 SAY 'O. EXIT'
STORE 0 TO selectnum
$14.33 SAY 'select
$14.42 GET selectnum PICTURE "9" RANGE 0.4
READ
DO CASE
CASE selectnum = 0 RETURN
CASE selectnum = 1
* DO ADD INFORMATION
SET CONFIRM OFF
SET FORMAT TO ENMU1_1
APPEND BLANK
REPLACE EXTENDED PRICE WITH O" UNITPRICE
CLOSE FORMAT
DO IF IT IS NOT A DUPLICATE
* * NUMBER WITHOUT REPEATING THE COMPLETE INFORMATION
"* THEN REPLACE THE OLD CODE NUMBER WITH THE NEW
STORE ' ' TO wait_subst
$23.0 SAY 'Press any key to continue...' GET
wait_subst.
READ
SET CONFIRM ON
CASE selectnum = 2
* DO CHANGE INFORMATION
DO ENMU1_2
SET CONFIRM OFF
STORE ' ' TO wait_subst
$23.0 SAY 'Press any key to continue...' GET
wait_subst.
READ
SET CONFIRM ON
CASE selectnum = 3
* DO REMOVE INFORMATION
DO ENMU1_3
SET TALK OFF
SET CONFIRM OFF
STORE ' ' TO wait_subst
$23.0 SAY 'Press any key to continue...' GET
wait_subst.
READ
SET CONFIRM ON
CASE selectnum = 4
* DO REVIEW INFORMATION
M_SECT = ""
CLEAR
$6.0 TO 8.79 DOUBLE
$7.15 SAY 'Enter the section code of the section to review';
GET M_SECT PICTURE "XXX"
READ
SET HELP OFF
SET FILTER TO SECTCODE=M_SECT
GO TOP
BROWSE MOAPPEND MOMEM
SET FILTER TO CLEAR MEMORY
SET CONFIRM OFF
STORE ' ' TO wait_subst
$23.0 SAY 'Press any key to continue...' GET
wait_subst.
READ
SET CONFIRM ON
ENDCASE
ENMUO T
RETURN
* EOF: ENMU1.FRS
1
* Program:
ENMU1.FRS
* Author..: JOAN ZIMMERMAN & ELBERT SHAW
* Date.....: 02/16/89
* Notice...: Copyright (C) 1989, JOAN ZIMMERMAN & ELBERT
SHAW, All Rights Reserved
SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON
USE EQUIP
DO WHILE .T.
"---Display menu options, centered on the screen.
  * draw menu border and print heading
CLEAR
$2.0 TO 12.79 DOUBLE
$3.23 SAY [CHANGE PROCUREMENT DATA]
$4.1 TO 4.78 DOUBLE
"---display detail lines
$7.27 SAY [1. BY EQUIPMENT CODE NUMBER]
$6.27 SAY [2. BY SECTION CODE]
$10.27 SAY '0. EXIT'
STORE 0 TO selectnum
$12.33 SAY 'select
$12.42 GET selectnum PICTURE "9" RANGE 0.7
READ
DO CASE
CASE selectnum = 0 RETURN
CASE selectnum = 1
* DO BY EQUIPMENT CODE NUMBER
CLEAR
M_EQ = 0.0
$6.0 TO 8.79 DOUBLE
$7.15 SAY 'Enter the Equipment Code Number';
GET M_EQ PICTURE "$9999.99"
READ
IF M_EQ = 0.0 LOOP
ENDIF
GO TOP
LOCATE FOR EqCode=M_EQ
SET FORMAT TO ENMU1_1
READ
CLOSE FORMAT
SET CONFIRM OFF
STORE ' ' TO wait_subst
$23.0 SAY 'Press any key to continue...' GET
wait_subst.
READ
SET CONFIRM ON
CASE selectnum = 2
* DO BY SECTION CODE
CLEAR
M_SECT = ""
$6.0 TO 8.79 DOUBLE
$7.15 SAY 'Enter the Section Code for section
needing changes';
GET M_SECT PICTURE "AAA"
READ
IF M_SECT = "" LOOP
ENDIF
RECORD = ""
GO TOP
CLEAR
LIST ALL EqCode, Section, RepDate, Description, PType;
FOR SectCode=M_SECT
$21.10 SAY 'Enter the Record Number of the record:
to change'; GET RECORD
READ
GO TO RECORD
SET FORMAT TO ENMU1_1
READ
CLOSE FORMAT
SET CONFIRM OFF
STORE ' ' TO wait_subst
$23.0 SAY 'Press any key to continue...' GET
wait_subst.
* Program 3: EMENU2.PRG

* Author. .: JOAN ZIMMERMAN & ELBERT SAN
* Date.....: 02/16/89
* Notice....: Copyright (c) 1989, JOAN ZIMMERMAN & ELBERT SAN. All Rights Reserved.

READ RECORD = " "
READ GOTO TOP
GOTO RECORD
CLEAR
DISPLAY EQCODE, SECTCODE, REQDATE, DESCRIPT, REQTYPE
 Returns "REMOVE THIS RECORD? (Y/N)" TO ANSWER
IF UPPERCASE(ANSWER) = "Y"
DELETE RECORD RECONI()
ENDIF
SET TALK ON
$ 7,15
RECALL ALL
WAIT "This is where the pack would go"
SET TALK OFF
READ
CLOSE FORMAT
SET CONFIRM OFF
STORE . " To wait_sub
$ 23.0 SAY "Press any key to continue..." GET
wait_sub

READ
SET CONFIRM ON
ENDCASE

* Program 1: EMENU1_2.PRG

* Author. .: JOAN ZIMMERMAN & ELBERT SAN
* Date.....: 02/17/89
* Notice....: Copyright (c) 1989, JOAN ZIMMERMAN & ELBERT SAN. All Rights Reserved.

READ
SET CONFIRM ON
ENDCASE

ENDDO T
RETURN
* EOF: EMENU1_2.PRG

"I
SET CONFIRM OFF
STORE '' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
ENDCASE

ENDDO T
RETURN
* EOF: EMENUZ.PRG
* Z

* Program...:

EMENUZ.PRG

* Author....: JOAN ZIMMERMAN & ELBERT SAW
* Date.......: 02/16/89
* Notice.....: Copyright (c) 1989, JOAN ZIMMERMAN & ELBERT SAW, All Rights Reserved
SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON
USE EQUIP
DO WHILE .T.
  * ---Display menu options, centered on the screen.
  * draw menu border and print heading
  CLEAR
  $ 2, 0 TO 14,79 DOUBLE
  $ 3,24 SAY [UPD A T E P R I O R I T I E S]
  $ 4,1 TO 4,78 DOUBLE
  * ---display detail lines
  $ 7,31 SAY [1. MEDCASE EQUIPMENT]
  $ 8,31 SAY [2. CEEP EQUIPMENT]
  $ 9,31 SAY [3. CAPF EQUIPMENT]
  $ 10,31 SAY [4. OTHER EQUIPMENT]
  $ 12, 31 SAY 'C. EXIT'
  STORE 0 TO selectnum
  $ 14,33 SAY * select *
  $ 14,42 GET selectnum PICTURE "9" RANGE 0,4
  READ
  DO CASE
    CASE selectnum = 0
      RETURN
    CASE selectnum = 1
      * DO MEDCASE EQUIPMENT
      CLEAR
      SET FILTER TO RECTYPE="MEDC"
      GO TOP
      BROWSE FIELDS
      CODE, RECTYPE, SECTCODE, DESCRIPT, URGCODE, PRIORITY,
      QTY, UNITPRICE
      SET FILTER TO
      SET CONFIRM OFF
      STORE '' TO wait_subst
      $ 23,0 SAY 'Press any key to continue...' GET
      wait_subst
      READ
      SET CONFIRM ON
      CASE selectnum = 2
      * DO CEEP EQUIPMENT
      CLEAR
      SET FILTER TO RECTYPE="CEEP"
      GO TOP
      BROWSE FIELDS
      CODE, RECTYPE, SECTCODE, DESCRIPT, URGCODE, PRIORITY, QTY, UNITPRICE
      SET FILTER TO
      SET CONFIRM OFF
      STORE '' TO wait_subst
      $ 23,0 SAY 'Press any key to continue...' GET
      wait_subst
      READ
      SET CONFIRM ON
      CASE selectnum = 3
      * DO CAPF EQUIPMENT
      CLEAR
      SET FILTER TO RECTYPE="CAPF"
      GO TOP
      BROWSE FIELDS
      CODE, RECTYPE, SECTCODE, DESCRIPT, URGCODE, PRIORITY, QTY, UNITPRICE
      SET FILTER TO
      SET CONFIRM OFF
      STORE '' TO wait_subst
      $ 23,0 SAY 'Press any key to continue...' GET
      wait_subst
      READ

PROGRAM:

EMENUZ_2.PRG

* Author....: JOAN ZIMMERMAN & ELBERT SAW
* Date.......: 02/17/89
* Notice.....: Copyright (c) 1989, JOAN ZIMMERMAN & ELBERT SAW, All Rights Reserved
SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON
USE EQUIP
DO WHILE .T.
  * ---Display menu options, centered on the screen.
  * draw menu border and print heading
  CLEAR
  $ 2, 0 TO 12,79 DOUBLE
  $ 3,24 SAY [UPD A T E S TA T U S]
  $ 4,1 TO 4,78 DOUBLE
  * ---display detail lines
  $ 7,31 SAY [1. MEDCASE CODE]
  $ 8,31 SAY [2. BY SECTION CODE]
  $ 9,31 SAY [3. BY EQUIPMENT CODE]
  $ 10,31 SAY 'C. EXIT'
  STORE 0 TO selectnum
  $ 12, 33 SAY * select *
  $ 12, 42 GET selectnum PICTURE "9" RANGE 0,2
  READ
  DO CASE
    CASE selectnum = 0
      RETURN
    CASE selectnum = 1
      * DO BY EQUIPMENT CODE
      CLEAR
      H_EQ = 0.0
      $ 5, 0 TO 8,79 DOUBLE
      $ 7,15 SAY "Enter the Equipment Code Number:";
      GET H_EQ PICTURE "9999.99"
      READ
      IF H_EQ = 0.0
        LOOP
      ENDIF
      GO TOP
      LOCATE FOR CODE=H_EQ
      SET FORMAT TO EMENUZ_2
      READ
      CLOSE FORMAT
      SET CONFIRM OFF
      STORE '' TO wait_subst
      $ 23,0 SAY 'Press any key to continue...' GET
      wait_subst
      READ

224
SET CONFIRM ON
CASE selectnum = 2
' DO CATEGORY/STATUS REPORTS
DO EMENU3_2
SET CONFIRM OFF
STORE " ' TO wait_subst
$23,0 SAY 'Press any key to continue...' GET
wait_subst.
READ
SET CONFIRM ON
CASE selectnum = 3
' DO PRIORITY WORKSHEET REPORT
DO EMENU3_3
SET CONFIRM OFF
STORE " ' TO wait_subst
$23,0 SAY 'Press any key to continue...' GET
wait_subst.
READ
SET CONFIRM ON
CASE selectnum = 4
' DO HISTORICAL FILE REPORTS
DO EMENU3_4
SET CONFIRM OFF
STORE " ' TO wait_subst
$23,0 SAY 'Press any key to continue...' GET
wait_subst.
READ
SET CONFIRM ON
CASE selectnum = 5
' DO EXPORT TO FILE
DO EMENU3_5
SET CONFIRM OFF
STORE " ' TO wait_subst
$23,0 SAY 'Press any key to continue...' GET
wait_subst.
READ
SET CONFIRM ON
ENDCASE
EMEND T
RETURN
* EOF: EMENU3_2.PRG
"5"

* Program...
EMENU3.PRG

* Author... JOAN ZIMMERMAN & ELBERT SEAM
* Date..... 02/16/89
* Notice.... Copyright (c) 1989, JOAN ZIMMERMAN & ELBERT SEAM, All Rights Reserved

SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON
DO WHILE .T.
  * ---Display menu options, centered on the screen.
  * draw menu border and print heading
  CLEAR
  $ 2, 0 TO 15,78 DOUBLE
  $ 3,28 SAY [PRINT REPORTS]
  $ 4,1 TO 4,78 DOUBLE
  * ---display detail lines
  $ 5,27 SAY [1. DEPARTMENT REPORTS]
  $ 6,27 SAY [2. EQUIPMENT TYPE REPORTS]
  $ 7,27 SAY [3. PRIORITY WORKSHEETS]
  $ 8,27 SAY [4. HISTORICAL FILES REPORTS]
  $ 9,27 SAY [5. EXPORT FILE TO SPREADSHEET]
  $ 10,27 SAY [6. TO SELECT]
  $ 11,27 SAY [7. EXIT]
  STORE 0 TO selectnum
  $ 15,32 SAY "select"
  $ 15,42 GET selectnum PICTURE "9" RANGE 0,5
READ
DO CASE
  CASE selectnum = 0
    RETURN
  CASE selectnum = 1
    DO DEPARTMENT REPORTS
    DO EMENU3_1
    SET CONFIRM OFF
    STORE " ' TO wait_subst
    $23,0 SAY 'Press any key to continue...' GET
    wait_subst.
    READ
    SET CONFIRM ON

* EOF: EMENU3_1.PRG
"5"

* Program...
EMENU3_1.PRG

* Author... JOAN ZIMMERMAN & ELBERT SEAM
* Date..... 02/17/89
* Notice.... Copyright (c) 1989, JOAN ZIMMERMAN & ELBERT SEAM, All Rights Reserved

SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON
USE EQUIP
DO WHILE .T.
  * ---Display menu options, centered on the screen.
  * draw menu border and print heading
  CLEAR
  $ 2, 0 TO 13,79 DOUBLE
  $ 3,23 SAY [DEPARTMENT REPORTS]
  $ 4,1 TO 4,78 DOUBLE
  * ---display detail lines
  $ 5,32 SAY [1. BY DEPARTMENT]
  $ 6,32 SAY [2. EQ TYPE]
  $ 7,32 SAY [3. BY PRIORITY]
  $ 8,32 SAY [4. HISTORICAL FILES]
  $ 9,32 SAY [5. EXPORT FILE]
  $ 10,32 SAY [6. TO SELECT]
  $ 11,32 SAY [7. EXIT]
  STORE 0 TO selectnum
  $ 15,32 SAY "select"
  $ 15,42 GET selectnum PICTURE "9" RANGE 0,3
READ
DO CASE
  CASE selectnum = 0
    RETURN
  CASE selectnum = 1
    DO BY COST

***** Set index to cost sort and Print report here
DO CASE
CASE selectnum = 0
RETURN
CASE selectnum = 1
* DO PRIORITY FORM
       _______ Set Indexes here to sort by priority _______
SET CONFIRM OFF
STORE ' ' TO wait_subst
 SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
RETURN
CASE selectnum = 2
* DO PRIORITY FORM
       _______ Set Indexes here to sort by cost _______
SET CONFIRM OFF
STORE ' ' TO wait_subst
 SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
RETURN
ENDCASE
ENDDO T
RETURN
* EOF: EMIU2_1.PRG

* Program...: EMIU3_3.PRG
* Author...: JOAN SIMMONS & ELBERT SHAW
* Date.....: 02/17/89
* Notice...: Copyright (c) 1989, JOAN SIMMONS & ELBERT SHAW, All Rights Reserved
SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON
USE EQUIP
       _______ set cost sort, highest to lowest _______
DO WHILE .T.
     * ---Display menu options, centered on the screen.
     * draw menu border and print heading
CLEAR
$ 3, 0 TO 14, 79 DOUBLE
$ 3,17 SAY [PRIORITY WORKSHEET FORM]
$ 4,1 TO 4, 79 DOUBLE
     * ---display detail lines
$ 7,19 SAY [1. MEDICARE PRIORITY FORM]
$ 6,29 SAY [2. CESE PRIORITY FORM]
$ 5,29 SAY [3. CAPS PRIORITY FORM]
$ 10,39 SAY [4. OTHER PRIORITY FORM]
$ 12, 29 SAY '0. EXIT'
STOR 0 TO selectnum
$ 14,33 SAY " select "
$ 14,42 SET selectnum PICTURE "S" RANGE 0,4
READ
DO CASE
CASE selectnum = 0
RETURN
CASE selectnum = 1
* DO MEDICARE PRIORITY FORM
     * REPORT FORM MED_3 ALL FOR MEDICARE TO PRINT
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
CASE selectnum = 2
* DO CESE PRIORITY FORM
     * REPORT FORM MED_3 ALL FOR CESE TO PRINT
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
CASE selectnum = 3
* DO CAPS PRIORITY FORM
     * REPORT FORM MED_3 ALL FOR CAPS TO PRINT
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
CASE selectnum = 4
* DO OTHER PRIORITY FORM
     * REPORT FORM MED_3 ALL FOR OTHER TO PRINT
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
CASE selectnum = 5
* DO HISTORICAL FORM
     * REPORT FORM MED_3 ALL FOR HISTORICAL TO PRINT
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
CASE selectnum = 6
* DO ALL FORM
     * REPORT FORM MED_3 ALL TO PRINT
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
CASE selectnum = 7
* EOF: EMIU3_3.PRG

* Program...: EMIU3_4.PRG
* Author...: JOAN SIMMONS & ELBERT SHAW
* Date.....: 02/17/89
* Notice...: Copyright (c) 1989, JOAN SIMMONS & ELBERT SHAW, All Rights Reserved
SET TALK OFF
SET BELL OFF
SET ESCAPE OFF
SET CONFIRM ON
USE EQUIP
DO WHILE .T.
     * ---Display menu options, centered on the screen.
     * draw menu border and print heading
CLEAR
$ 2, 0 TO 12, 79 DOUBLE
$ 2,23 SAY [ALL HISTORICAL REPORTS]
$ 4,1 TO 4, 79 DOUBLE
     * ---display detail lines
$ 7,27 SAY [1. PRINT HISTORICAL DATA REPORTS]
$ 6,27 SAY [2. PRINT HISTORICAL SUMMARY]
$ 10, 27 SAY '0. EXIT'
STOR 0 TO selectnum
$ 12,33 SAY " select "
$ 12,42 SET selectnum PICTURE "S" RANGE 0,2
READ
DO CASE
CASE selectnum = 0
RETURN
CASE selectnum = 1
* DO PRINT ALL HISTORICAL DATA
DO EMIU4_1
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
CASE selectnum = 2
* DO PRINT HISTORICAL SUMMARY
* THE HISTORICAL SUMMARY ROUTINE TAKES THE HISTORICAL
* FILE
* AND COMPUTES THE FOLLOWING INFORMATION
* THE TOTAL NUMBER OF REQUESTS BY SECTION
* THE AVERAGE COST PER TYPE
* THE AVERAGE TIME TO COMPLETE THE ACTION BASED
* ON THE
* DURATION INFORMATION COMPUTED UPON RECEIVING
* THE NUMBER OF REQUESTS BY SECTION, THEN TYPE
* THE AVERAGE COST BY SECTION, THEN TYPE
* PRINT HISTORICAL SUMMARY REPORT HERE
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
ENDCASE
ENDDO T
RETURN
* EOF: EMU04_4.PRG
"Z

* Program...
EMU04_4.PRG

* Author...: JOAN ZIMMERMAN & ELBERT SHAN
* Date....: 02/17/89
* Notice...: Copyright (c) 1989, JOAN ZIMMERMAN & ELBERT
SHAN, All Rights
* Reserved
SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON

" Get desired earliest month of report
***
M_DATE = " 
$6,0 TO 8,79 DOUBLE
$7,10 SAY 'Enter the earliest Month and Year for historical
report:';
SET M_DATE PICTURE "XX/XX"
READ
IF M_DATE = " " LOOP
ENDIF

DO WHILE .T.
" " ---Display menu options, centered on the screen.
" draw menu border and print heading
CLEAR
$2,0 TO 13,79 DOUBLE
$3,23 SAY [HISTORICAL REPORTS]
$4,1 TO 4,79 DOUBLE
" " ---display detail lines
$7,33 SAY [1. BY SECTION]
$8,33 SAY [2. BY EQUIPMENT TYPE]
$11,33 SAY '0. EXIT'
STORE 0 TO selectnum
$13,33 SAY ' select '
$13,42 GET selectnum PICTURE "$" RANGE 0,2
READ

DO CASE
CASE selectnum = 0
RETURN
CASE selectnum = 1
* DO BY SECTION
**** Set indexes here for sections ****

**** Print Historical report by Section here ****
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
CASE selectnum = 2
* DO BY CATEGORY

**** Set indexes here for Equipment type ****

**** Print Historical report by Equipment Type here
SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
ENDCASE
ENDDO T
RETURN

* EOF: EMU04_4.PRG

* Program...
EMU04_5.PRG

* Author...: JOAN ZIMMERMAN & ELBERT SHAN
* Date....: 02/17/89
* Notice...: Copyright (c) 1989, JOAN ZIMMERMAN & ELBERT
SHAN, All Rights Reserved
SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON

DO WHILE .T.
" " ---Display menu options, centered on the screen.
" draw menu border and print heading
CLEAR
$2,0 TO 12,79 DOUBLE
$3,14 SAY [EXPORT FILES TO SPREADS]
$4,7 TO $6,7
$4,1 TO 4,79 DOUBLE
" " ---display detail lines
$7,26 SAY [1. EXPORT CURRENT DATABASE]
$8,26 SAY [2. EXPORT HISTORICAL DATABASE]
$10,26 SAY '0. EXIT'
STORE 0 TO selectnum
$12,33 SAY ' select '
$12,42 GET selectnum PICTURE "$" RANGE 0,2
READ

DO CASE
CASE selectnum = 0
RETURN
CASE selectnum = 1
* DO EXPORT CURRENT DATABASE
USE EQUIP
**** Write CURRENT DATABASE export program here
CLOSE ALL
SET CONFIRM OFF
STORE ' ' TO wait_subst
$23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
CASE selectnum = 2
* DO EXPORT HISTORICAL DATABASE
USE EORIST
**** Write HISTORICAL DATABASE export program
here ****
CLOSE ALL
SET CONFIRM OFF
STORE ' ' TO wait_subst
$23,0 SAY 'Press any key to continue...' GET
wait_subst
READ
SET CONFIRM ON
ENDCASE
ENDDO T
RETURN

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*ROP: EMEN03.5.PRG

```
* Program...

EME004.PRG

* Author....: JOAN ZIMMERMAN & ELBERT SHAW
* Date......: 02/16/89
* Notice....: Copyright (c) 1989, JOAN ZIMMERMAN & ELBERT SHAW, All Rights Reserved
* Notes.....:

SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON

---Display menu options, centered on the screen.

  CLEAR
  ANSWER = " "
  $ 5.0 TO 14.79 DOUBLE
  $ 5.15 SAY [ARCHIVE TO HISTORICAL FILE]
  $ 6.1 TO 6.78 DOUBLE
  $ 6.15 SAY "CAUTION: All files with a received status, RC, will be"
  $ 9.25 SAY "removed from the equipment listing"
  $ 10.25 SAY "to the historical file."
  $ 14.25 SAY "Do you wish to continue the archive? (Y/N);"
  GET ANSWER PICTURE "JA"

READ IF ANSWER $ "Y"
  RETURN
ELSE
  $ 16.15 SAY "**** Program to Archive File ****"
  * THE PROGRAM SEARCHES THE ACTIVE FILE FOR STATUS CODES
  - RC
    * IF FOUND IT TRANSFERS THE NECESSARY FIELDS TO THE
      HISTORICAL FILE AND COMPUTES THE DURATION IN DAYS BETWEEN
      THE REQUEST
      * DATE AND CURRENT SYSTEM DATE. THE SYSTEM DATE IS
      ALSO INSERTED
      * INTO THE HISTORICAL DATABASE RECORD ALONG WITH THE
        COMPUTED
        * DURATION.
      ENDF
      WAIT "Press any key to continue ..."
    SET STATUS ON
    SET TALK ON
    CLEAR ALL
    RETURN

RETURN

*ROP: EME004.PRG
```
APPENDIX E. PERSONNEL PROGRAMS

TABLE OF PROGRAMS

- PMENU.PRG
- PMENU1.PRG
- PMENU2.PRG
- PMENU3.PRG
- PMENU4.PRG
- PMENU4.1.PRG
- PMENU4.2.PRG
- PMENU4.3.PRG
- PMENU4.4.PRG
- PMENU5.PRG
- PMENU6.PRG

DISCLAIMER

The purpose of this programming code is to facilitate the understanding of the requirements presented in Chapter 5 of this thesis. The nature of this project precludes its actual implementation in DBASE III+. To fully implement the requirements the system designer will need a full range of capabilities that do not currently exist in DBASE III+. DBASE III served as the modeling tool by which the screens were generated and where necessary, specific code was written to illustrate a point. The actual working code merely acts as a shell in which to run the menus. A close analysis of the program code can facilitate implementation in a more suitable language, i.e., PARADOX, which can support the graphics and high level relationships involved in the various databases. Where the actual requirements process may appear to be unclear, comments were added within the code to explain these areas to the designer.

* Program: PMENU.PRG
* Author: ELBERT T. SHAW & JOAN HEDMANN
* Date: 02/02/90
* Notice: Copyright (c)1990, E. T. SHAW & JOAN HEDMANN. All Rights Reserved * Notes....Main Menu for the Personnel System

SET TALK OFF
SET BELL OFF
SET ESCAPE OFF
SET CONFIRM OFF
DO WHILE .T.
  * ---Display menu options, centered on the screen.
  * draw menu border and print heading
  CLEAR
  $ 2, 0 TO 14,79 DOUBLE
  $ 2,15 SAY [DEPARTMENT OF FAMILY PRACTICE PERSONNEL SYSTEM]
  $ 4,1 TO 4,79 DOUBLE
  * ---display detail lines
  $ 7,22 SAY [1. Update Personnel Listing]  
  $ 8,22 SAY [2. Update TDA Listing]  
  $ 9,22 SAY [3. Quick Update from RIR Report]  
  $ 10,22 SAY [4. Update GME Listing/Budget]  
  $ 11,22 SAY [5. Update Leave and Absence Listings]  
  $ 12,22 SAY [6. Print Reports]  
  $ 14, 22 SAY [0. EXIT]  
  selectnum = 0
  $ 16,39 SAY "select "  
  $ 16,42 GET selectnum PICTURE "9" RANGE 0,6
  READ  
  DO CASE
  CASE selectnum = 0
    CLEAR ALL
    RETURN
  CASE selectnum = 1
    * DO Update Personnel Listing
    DO PMENU1
    SET CONFIRM OFF
    STORE ' ' TO wait_subst
    $ 23,0 SAY 'Press any key to continue...' GET
    wait_subst
    READ
    SET CONFIRM ON
  CASE selectnum = 2
    * DO Update TDA Listing
    DO PMENU2
    SET CONFIRM OFF
    STORE ' ' TO wait_subst
    $ 23,0 SAY 'Press any key to continue...' GET
    wait_subst
    READ
    SET CONFIRM ON
  CASE selectnum = 3
    * DO Quick Update from RIR Report
    DO PMENU3
    SET CONFIRM OFF
    STORE ' ' TO wait_subst
    $ 23,0 SAY 'Press any key to continue...' GET
    wait_subst
    READ
    SET CONFIRM ON
  CASE selectnum = 4
    * DO Update GME Listing/Budget
    DO PMENU4
    SET CONFIRM OFF
    STORE ' ' TO wait_subst
    $ 23,0 SAY 'Press any key to continue...' GET
    wait_subst
    READ
    SET CONFIRM ON
  CASE selectnum = 5
    * DO Update Leave and Absence Listings
    DO PMENU5
    SET CONFIRM OFF
    STORE ' ' TO wait_subst
    $ 23,0 SAY 'Press any key to continue...' GET
    wait_subst
    READ
    SET CONFIRM ON
  CASE selectnum = 6
    * DO Print Reports
    DO PMENU6
    SET CONFIRM OFF
    STORE ' ' TO wait_subst
    $ 23,0 SAY 'Press any key to continue...' GET
    wait_subst
    READ
    SET CONFIRM ON
ENDCASE
END
RETURN
* EOF: PMENU.PRG
*
**Program:**

**PREMRT.FRD**

**Author:** ELBERT T. SAW & JOAN ZIMMERMAN

**Date:** 02/02/85

**NOTES:** C041039 1989, E.T. SAW & JOAN ZIMMERMAN, ALL RIGHTS RESERVED

**Notes:**

- **UPDATE PERSONNEL LISTING**
- **SELECT A**
- **USE TDA INDEX TDA**
- **SELECT R**
- **USE PERSON INDEX P.TDA**

**JOIN** WITH **B TO TEMP FOR TDA PARA-B TO TDA PARA .AND. ;**

**TDA_LINE-M TO TDA_LINE .AND. TDA_FORM-M TO TDA_FORM**

CLOSE ALL

**DO WHILE .T.**

"---Display menu options, centered on the screen."
- **draw menu border and print heading**

**CLEAR**

$ 3, 0 TO 14, 79 DOUBBLE

$ 3, 17 SAY [UPDATE PERSONNEL LISTIN G]

$ 6, 1 TO 4, 79 DOUBBLE

"---Display detail lines

$ 7, 30 SAY [1. ADD DEPARTMENT PERSONNEL]

$ 8, 30 SAY [2. CHANGE INFORMATION ON A PERSON]

$ 9, 30 SAY [3. DELETE PERSON FROM LISTING]

$ 10, 30 SAY [4. REVIEW ALL DEPARTMENT PERSONNEL INFORMATION]

$ 12, 30 SAY 'O. EXIT'

STORE 0 TO selectnum

$ 14, 42 GET selectnum PICTURE "9" RANGE 0, 4

READ

DO CASE

CASE selectnum = 0

CLEAR ALL

RETURN

CASE selectnum = 1

DO ADD INFORMATION

Adding = .T.

DO WHILE Adding

CLEAR

M.TDA_PARA = 0

M.TDA_LINE = 0

M.TDA_FORM = 0

M.code = SPACE(5)

$ 6, 0 TO 10, 79 DOUBBLE

$ 7, 10 SAY 'ENTER THE ID CODE OF THE PERSON YOU WISH TO ADD:'

GET M_CODE PICTURE '9'.999"

$ 8, 10 SAY 'OR Press Return to Quit'

READ

IF M_Code = "*"

Adding = .F.

ENDIF

USE PERSON

READ

IF (PERSON OCCUPIED)

MESSAGE = "ID CODE REQUESTED IS ALREADY USED"

CLEAR

BY THE

SET FORMAT TO CONFIRM

CLOSE FORMAT

LOOP

ELSE

TRY = .T.

DO WHILE TRY

M.TDA_PARA = 0

CLEAR

SET FORMAT TO TDA INPUT

READ

CLOSE FORMAT

USE TDA

READ

GO TOP

LOCATE FOR IDCODE-M code

IF FOUND()

CLEAR

MESSAGE = "ID CODE REQUESTED IS ALREADY USED"

SET FORMAT TO CONFIRM

CLOSE FORMAT

LOOP

ELSE

TRY = .T.

DO WHILE TRY

M.TDA_PARA = 0

CLEAR

SET FORMAT TO TDA INPUT

READ

CLOSE FORMAT

USE TDA

READ

GO TOP

LOCATE FOR IDCODE-M code

IF FOUND()

SET FORMAT TO TDA POSITION

READ

CLOSE FORMAT

ELSE

RETURN TO TRY AGAIN...

WAIT - ""

END IF

USE PERSON

READ

LOCATE FOR IDCODE-M code

TDA_LINE=M TO TDA_LINE .AND. TDA_FORM=M TO TDA_FORM

IF FOUND()

CLEAR

SET FORMAT TO OCCUPIED

READ

CLOSE FORMAT

$ 15, 0

SET FORMAT TO CHOICE

READ

DO CASE

CASE ANSWER=1

REPLACE IDCODE WITH M_CODE;

TDA_PARA WITH M.TDA_PARA;

TDA_LINE WITH M.TDA_LINE;

TDA_FORM WITH M.TDA_FORM

READ

CLOSE FORMAT

TRY = .F.

LOOP

CASE ANSWER=2

SET FORMAT TO PERSON

APPEND BLANK

REPLACE IDCODE WITH M_CODE;

TDA_PARA WITH M.TDA_PARA;

TDA_LINE WITH M.TDA_LINE;

TDA_FORM WITH M.TDA_FORM

READ

CLOSE FORMAT

TRY = .F.

LOOP

CASE ANSWER=3

END DO CASE

ELSE

SET FORMAT TO PERSON

APPEND BLANK

REPLACE IDCODE WITH M_CODE;

TDA_PARA WITH M.TDA_PARA;

TDA_LINE WITH M.TDA_LINE;

TDA_FORM WITH M.TDA_FORM

READ

CLOSE FORMAT

TRY = .F.

END LOOP

END DO

ENDIF

YESNO = "*

$ 6, 0 TO 8, 79 DOUBBLE

$ 7, 15 SAY 'DO YOU WISH TO ENTER SOCIAL ROSTER INFORMATION?'

CLEAR

GET YESNO PICTURE "1"

READ

IF YESNO = "Y"

* SET FORMAT TO PRIVATE

* APPEND BLANK

* REPLACE IDCODE WITH M_IDCODE

* CLOSE FORMAT

END IF

* END DD (ADDDING)

SET CONTINUE ON

STORE ' ' TO wait_sub

$ 23, 0 SAY 'Press any key to continue...' GET

wait_sub

READ

SET CONTINUE ON

CASE selectnum = 2

* DO CHANGE INFORMATION

* SEEK M_CODE

* IF BLANK, EXIT

* IF FOUND()

* SET FORMAT TO PERSON

* CHECK TO INSURE POSITION IS NOT OCCUPIED BY SOMEONE

* IF OCCUPIED

231
* SET FORMAT TO CHOICE
  * GET CHOICE AND EXECUTE PER ADDING

INSTRUCTIONS
* ENDIF
  * ELSE (i.e., NOT FOUND)
  * NOTIFY USER ID NOT FOUND, GIVE OPTIONS TO SEARCH
  * LAST NAME
  * SEEK LAST NAME
  * DISPLAY ALL WITH THIS LAST NAME, FIRST NAME AND ID CODE
  * GIVE USER OPTION TO CROSE WHICH RECORD NUMBER
  * USER PICKS RECORD NUMBER
  * GOTO RECORD SELECTED
  * SET FORMAT TO PERSON
  * CHECK TO ENSURE POSITION IS NOT OCCUPIED BY
  * SOMEONE
    * IF OCCUPIED
      * SET FORMAT TO CHOICE
      * SET CHOICE AND EXECUTE PER ADDING

INSTRUCTIONS
* ENDIF
  * CLEAR
  * 6.0 TO 9.79 DOUBL
  * 7.15 SAY "DO YOU WANT TO CHANGE SOCIAL ROSTER INFORMATION" GET YESNO PICTURE "1"
  * READ IF YESNO = "Y"
    * USE PRIVATE INDEX IDC
    * LOCATE FOR IDCODE = M_IDCODE
    * IF FOUND DO FOLLOWING
    * SET FORMAT TO PRIVATE
    * AFFECT BLANK
    * REPLACE IDCODE WITH M_IDCODE
    * CLOSE FORMAT
  * ENDIF
  * IF NOT FOUND IDCODE NOT IN PRIVATE FILE
  * WAIT "ADDING A NEW RECORD, IDCODE NOT FOUND...""PLEASE"
  * RETURN TO CONTINUE...
  * SET FORMAT TO PRIVATE
  * AFFECT BLANK
  * REPLACE IDCODE WITH M_IDCODE
  * CLOSE FORMAT
  * ENDIF
  * ENDIF
  * ENDIF
  * SET CONFIRM ON

CASE selectnum = 3
* DO REMOVE INFORMATION

  * 6.0 TO 10.79 DOUBL
  * 7.15 SAY "ENTER THE ID CODE OF THE PERSON YOU WANT TO REMOVE: " GET M_IDCODE PICTURE "89999"
  * 8.14 SAY "or Press Return to QUIT"
  * READ M_IDCODE
  * IF BLANK, EXIT
  * IF M_IDCODE = "Y"
    * MESSAGE = "IS THIS THE PERSON YOU WANT TO DELETE? (Y/N)"
  * SET FORMAT TO CONFIRM
  * READ ANSWER
  * IF ANSWER IS NO "N"
    * LOOP TO TRY ANOTHER PERSON CODE
  * ENDIF
  * IF ANSWER IS YES "Y"
    * ARE YOU SURE (Y/N)?"
    * IF SURE IS YES "Y"
      * LOCATE AND DELETE (IN PERSON)
      * USE ABSENCE
      * LOCATE AND DELETE
      * IF NOT FOUND() CONTINUE
      * USE CHEQUE
      * LOCATE AND DELETE
      * IF NOT FOUND() CONTINUE
      * USE PRIVATE
      * LOCATE AND DELETE
      * IF NOT FOUND() CONTINUE
    * ELSE (ANSWER IS NO "N")
      * CLEAR
      * 8.0
      * WAIT
      * ENDIF
  * ELSE (i.e., NOT FOUND)
    * NOTIFY USER ID NOT FOUND, GIVE OPTIONS TO SEARCH
    * LAST NAME
    * IF CHOICE IS TO SEEK BY LAST NAME
      * SEEK LAST NAME
      * DISPLAY ALL WITH THIS LAST NAME
      * GIVE USER OPTION TO CROSE WHICH RECORD
      * USER PICKS RECORD NUMBER
      * GOTO RECORD SELECTED
      * DISPLAY LAST NAME, FIRST NAME, M_ID and PAME
      * ARE "THIS THE PERSON YOU WANT TO DELETE? (Y/N)"
SET ESCAPE OFF
SET CONFIRM ON
USE TDA
DO WHILE .T.
  CLEAR
  $ 2, 0 TO 14, 79 DOUBLE
  $ 3, 23 SAY [UPDATE TDA LISTING]
  $ 6, 1 TO 4, 79 DOUBLE
  * Display menu options, centered on the screen.
  draw menu border and print heading
  $ 7, 30 SAY [ADD A TDA POSITION]
  $ 9, 30 SAY [REMOVE A TDA POSITION]
  $ 10, 30 SAY [REVIEW ALL TDA POSITIONS]
  $ 12, 30 SAY "0. EXIT"
  STORE 0 TO selectnum
  $ 14, 42 GET selectnum PICTURE "9" RANGE 0, 4
  READ DO CASE
  CASE selectnum = 0 CLEAR ALL RETURN
  CASE selectnum = 1 * ADD A NEW TDA POSITION
  * TO THE MASTER LIST
  * DO WHILE TRYING
  * TO ADD A NEW TDA POSITION TO THE MASTER LIST
  TRYING = .T. DO WHILE TRYING
  SET FORMAT TO TDA
  READ
  DRAW FORMAT
  USE TDA
  GO TOP
  LOCATE FOR TDA_PARA-M.TDAPARA .AND. TDA_LINE-M.TDLINE .AND. TDA_FORM-M.TDAPUSH
  IF FOUND
    CLEAR
    SET FORMAT TO OCCUPIED
    READ
    DRAW FORMAT
  ELSE
    $ 12, 0 TO 14, 79 DOUBLE
    $ 13, 5 SAY "TDA POSITION NOT IN CURRENT FILE.
    PRESS : RETURN TO TRY AGAIN..."
    WAIT " " LOOP
  ENDIF
  ENDDO
  SET CONFIRM ON
  STORE 2 TO wait_sub1
  $ 13, 5 SAY "Why aren't you pressing any key to continue..." GET
  wait_sub1 READ
  SET CONFIRM ON
  CASE selectnum = 2 * DELETE A TDA POSITION
  FROM THE MASTER LIST
  * TO THE MASTER LIST
  * DO WHILE TRYING
  * TO REMOVE A TDA POSITION
  TRYING = .T. DO WHILE TRYING
  SET FORMAT TO TDA
  READ
  DRAW FORMAT
  USE TDA
  GO TOP
  LOCATE FOR TDA_PARA-M.TDAPARA .AND. TDA_LINE-M.TDLINE .AND. TDA_FORM-M.TDAPUSH
  IF FOUND
    DELETE TDA_PARA WITH M.TDAPARA .
    TDA_LINE WITH M.TDLINE .
    TDA_FORM WITH M.TDAPUSH
    IF FOUND
      REPLACE TDA_PARA WITH M.TDAPARA .
      TDA_LINE WITH M.TDLINE .
      TDA_FORM WITH M.TDAPUSH
    ENDIF
    CLOSE FORMAT
    "TDA""  "RETURN TO TRY AGAIN..."
    WAIT " " LOOP
  ENDIF
  ENDDO
  SET CONFIRM OFF
  STORE 2 TO wait_sub2
  $ 13, 5 SAY "Why aren't you pressing any key to continue..." GET
  wait_sub2 READ
  SET CONFIRM ON
  CASE selectnum = 3 * Replace A TDA Position
  WITH ANOTHER TDA POSITION
  TRYING = .T. DO WHILE TRYING
  SET FORMAT TO TDA
  READ
  DRAW FORMAT
  USE TDA
  GO TOP
  LOCATE FOR TDA_PARA-M.TDAPARA .AND. TDA_LINE-M.TDLINE .AND. TDA_FORM-M.TDAPUSH
  IF FOUND
    REPLACE TDA_PARA WITH M.TDAPARA .
    TDA_LINE WITH M.TDLINE .
    TDA_FORM WITH M.TDAPUSH
  ENDIF
  IF M.AUTO = "Y"
    REPLACE AUTO WITH 1
  ELSE
    REPLACE AUTO WITH 0
  ENDIF
  REPLACE TDA_PARA WITH M.TDAPARA .
  TDA_LINE WITH M.TDLINE .
  TDA_FORM WITH M.TDAPUSH
  IF FOUND
    REPLACE TDA_PARA WITH M.TDAPARA .
    TDA_LINE WITH M.TDLINE .
    TDA_FORM WITH M.TDAPUSH
  ENDIF
  CLEAR
  $ 6, 0 TO 9, 79 DOUBLE
  $ 7, 5 SAY "FOUND " + "+" + "+NAME+" WHO
  IS OCCUPYING THE DELETED POSITION. IDCODE
  $ 8, 5 SAY "BE SURE YOU UPDATE THIS
  PERSON'S TDA LOCATION WITH A VALID TDA LOCATION!"
  $ 12, 0 WAIT
  ENDIF
  ELSE 44 SAY "H"
  LOOP
  ENDIF
  ELSE 44 Position Was Not Found
  $ 12, 0 TO 14, 79 DOUBLE
  $ 13, 5 SAY "TDA POSITION NOT IN CURRENT FILE.
  PRESS : RETURN TO TRY AGAIN..."
  WAIT " " LOOP
  ENDIF
  ENDDO
set index to
erase temp.ndx
set talk on
clear
$2,0 say ' ' 
' BACKING DATABASE TO REMOVE RECORDS MARKED FOR DELETION'
pack
set talk off
set confirm off
store ' ' to wait_sub
$23,0 say 'Press any key to continue...' get
wait_sub
read
set confirm on
case selectnum = 4
* do review information
* allows you to review the
complete file
index on tda_para .and. tda_line.and. tda_posn to
temp
set index to temp
browse working w/ menu
erase temp.ndx
set confirm off
store ' ' to wait_sub
$23,0 say 'Press any key to continue...' get
wait_sub
read
set confirm on
endo
return
* sof: phemu1.prg
* e

* program: phemu1.prg

* author... elbert t. shaw & joan zimmerman
* date... 12/02/83
* notes: copyright(c) 1983, elbert t. shaw & joan zimmerman,
all rights reserved.
* notes: quick update from rir report
set talk off
set wait off
set escape off
set confirm on
use person
do while .t.
* ___display menu options, centered on the screen.
* draw menu border and print heading
  clear
  $0,0 to 12,79 double
  $4,11 to 4,79 double
  * ___display detail lines
  $7,23 say [1. update losses]
  $8,23 say [2. update changes to tda positions]
  $10,23 say '0. exit'
  store 0 to selectnum
  $12,33 say 'select ''
  $12,42 get selectnum picture '9' range 0,2
  read
  do case
case selectnum = 0
  clear all
  return
  case selectnum = 1
  * do update losses
  'do while trying 4 master loop for multiple
  entries
    m_update type = 1
    $4,0 to 9,79 double
    $7,10 say 'has this person actually departed or is
    this an update to a projected loss date? (actual = 0,
    update = 1) ' get m_update type picture '9' range 0,1
    read
    $15,0 to 19,79 double
    $16,10 say 'enter the id code of the person
    who is (or m_update type = 1), 'loss date needs changing',
    $17,10 say (get m_update type)
    $18,10 say 'return'
    $19,10 say 'return'
    $20,10 say 'return'
  enddo
  else
    $21,10 say 'return'
    $22,10 say 'return'
    $23,10 say 'return'
    $24,10 say 'return'
    $25,10 say 'return'
    $26,10 say 'return'
    $27,10 say 'return'
    $28,10 say 'return'
    $29,10 say 'return'
    $30,10 say 'return'
    $31,10 say 'return'
    $32,10 say 'return'
    $33,10 say 'return'
    $34,10 say 'return'
    $35,10 say 'return'
    $36,10 say 'return'
    $37,10 say 'return'
    $38,10 say 'return'
    $39,10 say 'return'
    $40,10 say 'return'
    $41,10 say 'return'
    $42,10 say 'return'
    $43,10 say 'return'
    $44,10 say 'return'
    $45,10 say 'return'
    $46,10 say 'return'
    $47,10 say 'return'
    $48,10 say 'return'
    $49,10 say 'return'
    $50,10 say 'return'
  enddo
endwhile
DO PM04_2
  SET CONFIRM OFF
  STORE ' ' TO wait_subst
  $ 23,0 SAY 'Press any key to continue...' GET wait_subst
  READ
  SET CONFIRM ON
CASE selectnum = 3
  * Do Update CHE Requests with Actual Costs
  DO PM04_3
  SET CONFIRM OFF
  STORE ' ' TO wait_subst
  $ 23,0 SAY 'Press any key to continue...' GET wait_subst
  READ
  SET CONFIRM ON
CASE selectnum = 4
  * Do Print Reports
  DO PM04_4
  SET CONFIRM OFF
  STORE ' ' TO wait_subst
  $ 23,0 SAY 'Press any key to continue...' GET wait_subst
  READ
  SET CONFIRM ON
ENDCASE
ENDDO T
RETURN
* EOF: PM041. PRO
"I"
IF ANSWER = "Y" &the right person
USE CHEQ
SET FILTER TO FY44_FY
"Y" &"Y"
SET FORMAT TO CHEQ
APPEND BLANK
REPLACE ICODC WITH M_ICODC
REPLACE FY WITH M_FY
READ
REPLACE TOTALCOST WITH TRAVELCOST+PERDIA+RESERVE+REIMS
CLOSE FORMAT
SET FILTER TO LOOP
ELSE
LOOP
ENDIF
ELSE
$ 6.0 TO $7.99 DOUBLE
$ 7.15 SAY "THERE IS NOT A PERSON WITH THAT ICODC,
WAIT "=" OR "PRESS RETURN TO TRY AGAIN..."
ENDIF
ENDDO
SET CONFIRM OFF
STORE ":" TO wait_subst
$ 23.0 SAY "Press any key to continue..." GET wait_subst
READ
SET CONFIRM ON
CASE selection = 2
* DO CHANGE INFORMATION
DO WHILE .T.
$ 6.0 TO $9.79 DOUBLE
$ 7.15 SAY "ENTER THE ID CODE OF THE PERSON YOU WANT TO CHANGE. " GET M_ICODC "799"
$ 8.15 SAY "OR PRESS RETURN TO QUIT"
IF M_ICODC = ""
EXIT
ENDIF
USE PERSON
LOCATE FOR ICODC=M_ICODC
IF FOUND(): IF PERSON DOES EXIST IN MASTER FILE
MESSAGE "IS THIS THE PERSON YOU EXPECTED? (Y/N)"
SET FORMAT TO CONFIRM
READ
IF ANSWER = "Y" &the right person
USE CHEQ
SET FILTER TO ICODC=M_ICODC .AND. FY44_FY CLEAR
$ 6.0 DISPLAY FIELDS ICODC,TYPE,START,END WHILE ICODC=M_ICODC
$ 20.0 CLEAR
$ 22.0 SAY "ENTER THE RECORD NUMBER OF THE ONE RECORD YOU DESIRE TO CHANGE. (1-"
"+STR(RECCOUNT(),4)+")"
GET RECORD PICTURE "9999"
READ
IF RECORD > 0 .AND. RECORD < RECCOUNT() CLEAR
DO WHILE .T.
$ 6.0 TO $7.99 DOUBLE
$ 7.15 SAY "BILL COSTS BE ACTUAL COSTS OR ESTIMATED:
(ENTER AN -A- FOR ACTUAL OR AN -E- FOR ESTIMATED)" GET M_CODE PICTURE "1"
IF M_CODE $"A" OR M_CODE $"E"
CLEAR
$ 6.0 TO $7.99 DOUBLE
$ 7.15 SAY "YOU HAVE ENTERED A WRONG PRESS RETURN TO TRY AGAIN..."
WAIT "=" OR "PRESS RETURN TO TRY AGAIN..."
ENDIF
GOTO RECORD
SET FORMAT TO CHEQ
REPLACE C_CODE WITH M_CODE
READ
REPLACE TOTALCOST WITH TRAVELCOST+PERDIA+RESERVE+REIMS
CLOSE FORMAT
EXIT
ENDIF
ELSE
$ 20.0 CLEAR
$ 23.5 SAY "NO SUCH RECORD:
"+STR(RECORD(),4)+" "
? CRC()?
WAIT
ENDIF
ENDDO
SET FILTER TO LOOP
ELSE
$ 6.0 TO $7.99 DOUBLE
$ 7.15 SAY "THERE IS NOT A PERSON WITH THAT ICODC,
WAIT "=" OR "PRESS RETURN TO TRY AGAIN..."
ENDIF
ENDDO
SET FILTER TO LOOP
ELSE
SET CONFIRM OFF
STORE ":" TO wait_subst
$ 23.0 SAY "Press any key to continue..." GET wait_subst
READ
SET CONFIRM ON
CASE selection = 3
* DO REMOVE INFORMATION
DO WHILE .T.
$ 6.0 TO $9.79 DOUBLE
$ 7.15 SAY "ENTER THE ID CODE OF THE PERSON TO DELETE"
IF ANSWER = "Y" &the right person
USE CHEQ
SET FILTER TO ICODC=M_ICODC .AND. FY44_FY CLEAR
$ 6.0 DISPLAY FIELDS ICODC,TYPE,START,END WHILE ICODC=M_ICODC
$ 20.0 CLEAR
$ 22.0 SAY "ENTER THE RECORD NUMBER OF THE ONE RECORD YOU DESIRE TO DELETE. (1-"
"+STR(RECCOUNT(),4)+")"
GET RECORD PICTURE "9999"
READ
IF RECORD > 0 .AND. RECORD < RECCOUNT() CLEAR
GOTO RECORD
SET FORMAT TO DELCHEREO
READ
IF UPPPER(MIDCODE) = "Y"
DELETE
ENDIF
CLOSE FORMAT
ELSE
$ 20.0 CLEAR
$ 23.5 SAY "NO SUCH RECORD:
"+STR(RECORD(),4)+" "
? CRC()?
WAIT
ENDIF
ENDDO
ELSE
$ 6.0 TO $7.99 DOUBLE
$ 7.15 SAY "THERE IS NOT A PERSON WITH THAT ICODC,
WAIT "=" OR "PRESS RETURN TO TRY AGAIN..."
ENDIF
ENDDO
SET FILTER TO LOOP
ELSE
SET CONFIRM OFF
STORE ":" TO wait_subst
$ 23.0 SAY "Press any key to continue..." GET wait_subst
READ
SET CONFIRM ON
CASE selection = 4
* DO PACK DATABASE
SET FILTER TO LOOP
ELSE
$ 6.0 TO $7.99 DOUBLE
$ 7.15 SAY "THERE IS NOT A PERSON WITH THAT ICODC,
**SET CONFIRM ON**

CASE selectnum = 4
  **DO IF YM INIFICATION**
  SELECT A
  USE CHREQ
  **INDEX ON IDCODE TO TEMP**
  SELECT B
  USE PERSON
  **INDEX ON IDCODE TO TEMP1**
  JOIN WITH A TO TEMP JOIN FOR IDCODE=A TO IDCODE FIELDS
  A-IDCODE, B-START, B-END, ...
  **UNIQUE**, A-PURPOSE, ...
  **TOTALCOST, A-PERIOD, A-RESDUE, A-REIMB**
  **A>B-START, B=A-END, A>LLOCATION, A-**
  **SET ESCAPE OFF**
  **SET **
  **TALK**
  **CASE 1**
  **L**
  **SET CONFIRM OFF**
  **RETURN**

* EOF: PHEN4_3.PRG  "Z

---

**Program..**

PHEN4_3.PRG

**Author..** ELBERT T. SHAW & JOAN ZIMMERNAN
**Date...** 02/02/89
**Notes...** Copyright © 1989, ELBERT T. SHAW & JOAN ZIMMERNAN, All Rights Reserved
**Notes...** PRINT CHE REPORTS

SET TALK OFF
SET ERR OFF
SET ESCAPE OFF
SET CONFIRM ON
M_FT = 0

Clear screen for FY input an allow for the user to select the Fiscal Year
Typically, the user will only be operating in one FY
CLEAR
$0,15 to 8,79 DOUBLE
$1,15 SAY "Enter the Fiscal Year for the CHE Allocations:" ;
GET M_FT PICTURE "99"
READ
DO WHILE .T.

**---Display menu options, centered on the screen.**
**draw menu border and print heading**
CLEAR
M_IDCODE = SPACE(5)
RECORD = 0
$ 6,0 to 8,79 DOUBLE
$ 7,15 SAY "Enter the ID CODE of the person you want to update with actual cost of travel:";
GET M_IDCODE PICTURE "F999"
READ
USE CHREQ
SET FILTER TO IDCODE=M_IDCODE .AND. FY=M_FT CLEAR
$ 6,0
DISPLAY FIELDS IDCODE, TYPE, START, END WHILE
IDCODE=M_IDCODE
$ 20, 0 CLEAR
$ 22,0 SAY "Enter the record number of the CHE request you desire to change. (!="STR(RECOUNT,1,6.Parse")");
GET RECORD PICTURE "9999"
READ
IF RECORD < 0 AND. RECORD < RECOUNCT1)
GOTO RECORD
SET FORMAT TO UPHCMM6
REPLACE C_CODE WITH A
READ
REPLACE TOTALCOST WITH TRAVELCOST+PERDIEM+REGEE+REIMB
CLOSE FORMAT
ELSE
$ 20,0 CLEAR
$ 1.15 SAY "NO SUCH RECORD: ""STR(RECORD,4)
7 CER(7)
WAIT
ENDIF
ENDDO T
RETURN

* Program..* PHEN4_4.PRG

* Author..* ELBERT T. SHAW & JOAN ZIMMERNAN
* Date..:* 02/02/89
* Notes...* Copyright © 1989, ELBERT T. SHAW & JOAN ZIMMERNAN, All Rights Reserved
* Notes...* PRINT CHE REPORTS

SET TALK OFF
SET ERR OFF
SET ESCAPE OFF
SET CONFIRM ON
M_FT = 0

Clear screen for FY input an allow for the user to select the Fiscal Year
Typically, the user will only be operating in one FY
CLEAR
$0,15 to 8,79 DOUBLE
$1,15 SAY "Enter the Fiscal Year for the CHE Allocations:" ;
GET M_FT PICTURE "99"
READ
DO WHILE .T.

** ---Display menu options, centered on the screen.**
**draw menu border and print heading**
CLEAR
$ 2, 0 to 11,79 DOUBLE
$ 3,23 SAY ["ESTIMATED CHE EXPENSES REPORT FOR FY"]
$ 4,1 to 4,78 DOUBLE
**---Display detail lines**
$ 7,30 SAY [1. ESTIMATED CHE EXPENSES REPORT FOR FY]
$ 7,30 SAY [2. CHE EXPENSES REPORT FOR FY]
$ 7,30 SAY [3. CHE EXPENSES REPORT FOR FY]
$ 10,34 SAY "0. EXIT"
$ 11,35 SAY "select:"
$ 11,42 GET selection PICTURE "9" RANGE 0,0
READ
DO CASE
CASE selection = 0
  CLEAR ALL
RETURN
CASE SELECTION = 1
  JOIN CHEREQ WITH PERSON TO JOINFILE FOR IDCODE
  USE CHEMAIL AND GET ALLOCATION FOR SELECTED FY
  **STORE ALLOCATION TO FY ALLOCATION**
  USE JOINFILE INDEXED ON START DATE
  **SET FILTER TO FY+6, FY**
  **SUM TOTAL FOR C_CODE="A" TO A_TOTAL**
  **SUM TOTAL FOR C_CODE="E" TO E_TOTAL**
  **REPORT WILL DISPLAY FY ALLOCATION LESS A TOTAL AND**
  **TOTAL ESTIMATED COSTS REMAINING, E_TOTAL**
  **ESTIMATED CHE REPORT PRINTED HERE**

CASE SELECTION = 2
  JOIN CHEREQ WITH PERSON TO JOINFILE FOR IDCODE
  USE CHEMAIL AND GET ALLOCATION FOR SELECTED FY
  **STORE ALLOCATION TO FY ALLOCATION**
  USE JOINFILE INDEXED ON START DATE
  **SET FILTER TO FY+6, FY**
  **SUM TOTAL FOR C_CODE="A" TO A_TOTAL**
  **SUM TOTAL FOR C_CODE="E" TO E_TOTAL**
  **SET FILTER TO**
  **SET FILTER TO C_CODE="A" .AND. FY+6, FY**
  **REPORT WILL DISPLAY FY ALLOCATION LESS A_TOTAL**
  **NOT WILL NOT DISPLAY ESTIMATED ENTRIES**
  **TOTAL ESTIMATED COSTS, E_TOTAL, REMAINING WILL BE A
* Program name: PHOM4_PAG

* Author: ELMER T. SHAW & JOAN EIDEMANN

* Date: 07/02/89

* Notice: Copyright (c) 1989, ELMER T. SHAW & JOAN EIDEMANN. All rights reserved.

* Notes: UPDATE LEAVE/ABSENCE REQUESTS

SET TALK OFF
SET BELL OFF
SET ESCAPE OFF
SET CONFLICT ON
USE ABSENCE

M_FT = 0

CLEAR Screen for FY input an allow for the user to select the Fiscal Year.

Typically, the user will only be operating in one FY at a time.

$6.0 TO 8.79 DOUBLE
$7.15 SAY "Enter the Fiscal Year for the CHE allocations."

GET M_FT PICTURE "99"

READ DO WHILE .T.

"---Display menu options, centered on the screen.

Draw menu border and print heading.

CLEAR $ 1.0 TO 14.79 DOUBLE
$ 3.12 SAY "UPDATE LEAVE/ABSENCE" PICTURE "$H H H $ S I M O N $ S"

$ 4.7 TO 4.79 DOUBLE

"---Display detail lines.

$ 1.70 SAY [1. ENTER A NEW LEAVE REQUEST FOR FY]

IF STR(M_FT,2) = $ 8.30 SAY [2. CHANGE CURRENT LEAVE INFORMATION FOR FY]

IF STR(M_FT,2) = $ 9.30 SAY [3. REMOVE A LEAVE REQUEST FROM FY]

IF STR(M_FT,2) = $ 10.30 SAY [4. REVIEW LEAVES FOR FY]

IF STR(M_FT,2) = $ 12.30 SAY "0. EXIT"

STORE 0 TO selection

$ 14.25 SAY "Select:

$ 14.42 GET selection PICTURE "9" RANGE 0,4

READ DO CASE

CASE selection = 0 CLEAR ALL RETURN

CASE selection = 1

* DO ADD INFORMATION

USE ABSENCE

DO WHILE .T.

$ 6.0 TO 9.79 DOUBLE

$ 7.15 SAY "Enter the ID code of the person to add the Leave Request."

GET M_IDCODE TYPE,START,END-START PICTURE "9999"

$ 8.15 SAY "Or press return to quit"

IF M_IDCODE = ""

EXIT

ENDIF

USE PERSON

LOCATE FOR IDCODE=M_IDCODE

IF FOUND() ADPERSON DOES EXIST IN MASTER FILE

MESSAGE "Is this the person you expected? (Y/N)"

SET FORMAT TO CONFIRM

READ IF ANSWER = "Y" the right person

USE ABSENCE

SET FILTER FROM FY TO FY

GO TOP

SET FORMAT TO ABSENCE

APPEND BLANK

REPLACE IDCODE WITH M_IDCODE

ELSE

ENDIF

ELSE

REPLACE FY WITH M_FT

END-START WITH END-START

CLOSE $9999

SET FILTER TO LOOP

ELSE

LOOP

ENDIF

ELSE

$ 6.0 TO 8.79 DOUBLE

$ 7.15 SAY "There is not a person with that ID code."

MESSAGE "Press return to try again..."

WAIT = ""

END-START

ENDIF

APPEND

SET CONFLICT OFF

STORE '. ' TO wait_subst

$ 23.0 SAY 'Press any key to continue...' GET

READ SET CONFLICT ON

CASE selection = 2

* DO CHANGE INFORMATION

DO WHILE .T.

$ 6.0 TO 9.79 DOUBLE

$ 7.15 SAY "Enter the ID Code of the person you WANT TO CHANGE."

GET M_IDCODE OF PICTURE "9999"

$ 8.15 SAY "Or press return to quit"

IF M_IDCODE = ""

EXIT

ENDIF

USE PERSON

LOCATE FOR IDCODE=M_IDCODE

IF FOUND() 44PERSON DOES EXIST IN MASTER FILE

MESSAGE "Is this the person you expected? (Y/N)"

SET FORMAT TO CONFIRM

READ IF ANSWER = "Y" the right person

USE ABSENCE

SET FILTER FROM FY TO FY

GO TOP

SET FORMAT TO ABSENCE

APPEND BLANK

REPLACE IDCODE WITH M_IDCODE

ELSE

ENDIF

ELSE

REPLACE FY WITH M_FT

END-START WITH END-START

CLOSE $9999

SET FILTER TO LOOP

ELSE

LOOP

ENDIF

END-START

ENDIF

APPEND

SET CONFLICT OFF

STORE '. ' TO wait_subst

$ 23.0 SAY 'Press any key to continue...' GET

READ
READ  
SET CONFIRM ON
CASE selection = 3
* REMOVE INFORMATION
DO WHILE .T.
$I, 6, 0 TO 9, 79 DOUBLES
$ 7, 15 SAY "ENTER THE ID CODE OF THE PERSON TO DELETE"
* GET M_IDCODE PICTURE "9999"
$ 6, 15 SAY "OR PRESS RETURN TO QUIT"
IF M_IDCODE = "" EXIT ENDIF
USE PERSON
LOCATE FOR IDCODE=M_IDCODE
IF FOUND() APPEARANCE DOES EXIST IN MASTER FILE
MESSAGE = "" ""IS THIS THE PERSON YOU EXPECTED? (Y/N)"
* SET FORMAT TO CONFIRM
READ
IF MESSAGE = "Y" APPEARANCE IS THE RIGHT PERSON
SET FILTER TO IDCODE=M_IDCODE AND. FY=M_FY CLEAR
$ 6, 0 DISPLAY FIELDS IDCODE, TYPE, START, END WHILE IDCODE=M_IDCODE
$ 20, 0 CLEAR
$ 12, 0 SAY "ENTER THE NUMBER OF THE REQUEST YOU DESIRE TO DELETE. (1-"
$ 9, 24 SAY "*COUNT NUMBER OF RECORDS MARKED FOR DELETION"
$)"
READ
IF RECORD > 0 AND. RECORD < RECORD() DEDUCE
SET FILTER TO DELDELETE
READ
IF UPPER(M_IDCODE) = "Y" DELETE ENDIF
CLOSE FORMAT ELSE
$ 20, 0 CLEAR
$ 12, 5 SAY "NO SUCH RECORD:
"$ 9, 24 SAY "*COUNT NUMBER OF RECORDS MARKED FOR DELETION"
$)
READ
SET CONFIRM ON
CASE selection = 4
* DO REVIEW INFORMATION
SET A
USE ABSENCE INDEX ON IDCODE TO TEMP
SELECT B
USE PERSON INDEX ON IDCODE TO TEMP
JOIN A WITH TEMPJOIN FOR IDCODE=A->IDCODE FIELDS
USE TEMPJOIN SET FILTER TO FY=M_FY
DELETE RECORD MARKED FOR DELETION
ERASE TEMPJOIN
ERASE TEMPJOIN

ENDCASE

SET CONFIRM ON

ENDDO T
RETURN
* EOF: PERSONS.PRG
* 1

* Program: PERSONS.PRG
* Author: ELBERT T. SAW & JOAN SIMMERMAN
* Date: 02/02/89
* NOTICE: Copyright (c) 1989, ELBERT T. SAW & JOAN SIMMERMAN. All Rights Reserved
* Notes: PRINT PERSONNEL REPORTS
SET TALK OFF
SET ESCAPE OFF
DO WHILE .T.
IF FY = 0
"Clear Screen for FY input an allow for the user to select the Fiscal Year"
"Typically, the user will only be operating in one FY"
$ 6, 0 TO 0, 79 DOUBLES
$ 7, 15 SAY "Enter the Fiscal Year for the CBE Allocations:"
$ GET M_FY PICTURE "9999"
READ
"--Display menu options, centered on the screen.
"draw menu border and print heading
CLEAR
$ 2, 0 TO 17, 79 DOUBLES
$ 3, 21 SAY "PRINT REPORTS FOR]
$ 1ST(M_FY,2)
$ 4, 1 TO 5, 78 DOUBLES
* "--Display detail lines
$ 7, 24 SAY [1. Position Listing]
$ 8, 24 SAY [2. Section Update Worksheet]
$ 9, 24 SAY [3. Loss Report]
$ 10, 24 SAY [4. Vacancy Listing]
$ 11, 24 SAY [5. Social Roster]
$ 13, 24 SAY [7. Doctor Fiscal Year Absence Summary]
$ 15, 24 SAY "0. EXIT"
STORE 0 TO selection
$ 17, 33 SAY "select"
$ 17, 42 GET selection PICTURE "0" RANGE 0, 6
READ
DO CASE
CASE selection = 0  
PRINT ALL RETURN
CASE selection = 1
* DO Position Listing
"JOIN ABC WITH TDA TO TEMPJOIN
"JOIN TEMPJOIN WITH PERSON FOR LIKE TDA INFORMATION
"SORT BY TDA POSITION INFORMATION
"SUBTOTAL AUTO ON CHANGE OF TDA PARA
"COUNT NUMBER OF RECORDS IN EACH PARAGRAPHS TO GET ANSWERED
"POSITION LISTING REPORT PRINTED HERE
"ERASE ALL TEMP FILE"
SET CONFIRM ON
STORE "1": wait_sub$ 23, 0 SAY "Press any key to continue..." GET wait_sub
SET CONFIRM ON
CASE selection = 2
* DO Section Update Listings
"JOIN ABC WITH TDA TO TEMPJOIN
"JOIN TEMPJOIN WITH PERSON FOR LIKE TDA INFORMATION
"SORT BY TDA POSITION INFORMATION
"SUBTOTAL AUTO ON CHANGE OF TDA PARA
"COUNT NUMBER OF RECORDS IN EACH PARAGRAPHS TO GET
wait_sub
READ
SET CONFIRM ON
CASE selectnum = 4
  "DO Monthly Absence Report"
  "MONTH = 0"
  "$ 6.15 SAY "Enter month (i.e. 1-12) for the report:""
  "GET MONTH PICTURE "99" " RANGE 1,12"
  "READ"
  "USE ABSENCE"
  "COPY TO TEMPFILE FIELDS"
  "ICODE, START, END, DURATION, FY, TYPE"
  "USE CHKREQ"
  "COPY TO APPENDFILE FIELDS"
  "ICODE, START, END, DURATION, FY, TYPE"
  "USE TEMPFILE"
  "APPEND FROM APPENDFILE & JOIN CH1 AND LEAVE FILES"
  "SORT BY "START" DATE, "END" DATE"
  "JOIN PERSON WITH TEMPFILE TO WHIREFILE & APPEND JOIN"
  "WITH ICODE"
  "USE WHIREFILE"
  "REMOVE FILTER TO FY=FY"
  "DISPLAY WHILE [MONTH OF START_DATE] = MONTH"
  "MONTHLY ABSENCE REPORT PRINTED HERE"
  "ERASE ALL TEMP FILES"
  "SET CONFIRM OFF"
  "STORE ' ' TO wait_sub"
  "$ 23.0 SAY 'Press any key to continue... ' GET wait_sub"
READ
SET CONFIRM ON
CASE selectnum = 5
  "DO Social Roster"
  "JOIN PRIVATE WITH PERSON TO SOCIAL FOR ICODE"
  "SOCIAL ROSTER PRINTED HERE"
  "ERASE ALL TEMP FILES"
  "SET CONFIRM OFF"
  "STORE ' ' TO wait_sub"
  "$ 23.0 SAY 'Press any key to continue... ' GET wait_sub"
READ
SET CONFIRM ON
CASE selectnum = 6
  "DO Monthly Vacancy Report"
  "ENDDATE = 0"
  "$ 6.15 SAY "Enter months (i.e. 1-12) for the report:""
  "GET MONTH PICTURE "99" " RANGE 1,12"
  "READ"
  "USE ABSENCE"
  "COPY TO TEMPFILE FIELDS"
  "ICODE, START, END, DURATION, FY, TYPE"
  "USE CHKREQ"
  "COPY TO APPENDFILE FIELDS"
  "ICODE, START, END, DURATION, FY, TYPE"
  "USE TEMPFILE"
  "APPEND FROM APPENDFILE & JOIN CH1 AND LEAVE FILES"
  "SORT BY "START" DATE, "END" DATE"
  "JOIN PERSON WITH TEMPFILE TO WHIREFILE & APPEND JOIN"
  "WITH ICODE"
  "USE WHIREFILE"
  "REMOVE FILTER TO FY=FY"
  "DISPLAY WHILE [MONTH OF START_DATE] = MONTH"
  "MONTHLY ABSENCE REPORT PRINTED HERE"
  "ERASE ALL TEMP FILES"
  "SET CONFIRM OFF"
  "STORE ' ' TO wait_sub"
  "$ 23.0 SAY 'Press any key to continue... ' GET wait_sub"
READ
SET CONFIRM ON
CASE selectnum = 7
  "DO Doctor Absence Report"
  "MONTH = 0"
  "CLEAR"
  "$ 6.0 TO 9.79 DOUBLE"
  "$ 7.15 SAY "Enter the fiscal year for the absence report:""
  "GET M, FY PICTURE "99"
  "READ"
  "USE ABSENCE"
  "COPY TO TEMPFILE FIELDS"
  "ICODE, START, END, DURATION, FY, TYPE"
  "USE CHKREQ"
  "COPY TO APPENDFILE FIELDS"
  "ICODE, START, END, DURATION, FY, TYPE"
  "USE TEMPFILE"
  "APPEND FROM APPENDFILE & JOIN CH1 AND LEAVE FILES"
  "SORT BY "START" DATE, "END" DATE"
  "JOIN PERSON WITH TEMPFILE TO WHIREFILE & APPEND JOIN"
  "WITH ICODE"
  "USE WHIREFILE"
  "REMOVE FILTER TO FY=FY"
  "INDEX ON ICODE"
  "AVERAGE DURATION TO AVOID Rounding"
  "TOTAL ON ICODE TO TOTALSUM FIELDS DURATION & GET TOTAL OF ALL ABSENCEs"
  "ABSENCE SUMMARY REPORT PRINTED HERE, PROCEDURE TRED BELOW"
  "DO WHILE NOT EOF() & SEE ABSENCE SUMMARY REPORT"
  "IF ICODE HAS CHANGED FROM PREVIOUS ICODE"
  "USE TOTALSUM"
  "LOCATE CURRENTICODE"
  "PRINT "TOTAL DURATION ABSENCE" & ICODE & ENDIF"
  "DISPLAY CURRENT RECORD"
  "SKIP TO NEXT RECORD"
  "ENDDO"
  "ERASE ALL TEMP FILES"
  "SET CONFIRM OFF"
  "STORE ' ' TO wait_sub"
  "$ 23.0 SAY 'Press any key to continue... ' GET wait_sub"
READ
SET CONFIRM ON
ENDCASE
ENDDO
RETURN
* EOF: PHOMON.PRG
APPENDIX F. SATISFACTION PROGRAMS

TABLE OF PROGRAMS

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DISCLAIMER

The purpose of this programming code is to facilitate the understanding of the requirements presented in Chapter 5 of this thesis. The nature of this project precludes its actual implementation in DBASE III+. To fully implement the requirements, the system designer will need a full range of capabilities that does not currently exist in DBASE III+

DBASE III+ served as the modeling tool by which the screens were generated and where necessary, specific code was written to illustrate a point. The actual working code merely acts as a shell in which to run the menus. A close analysis of the program code can facilitate implementation in a more suitable language, i.e., PARADOX, which can support the graphics and high level relationships involved in the various databases. Where the actual requirements process may appear to be unclear, comments were added within the code to explain these areas to the designer.

* Program: SMNU2.PRO
* Author: JOAN ZIMMERMAN & ELBERT SHAM
* Date: 02/19/89
* Notice: Copyright (c) 1989, All Rights Reserved
* Notes: Survey Main Menu Program

SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM OFF
USE Survey
DO WHILE .T.
   * ---Display menu options, centered on the screen.
   * drew menu border and print heading
   CLEAR
   $ 2.0 TO 15.79 DOUBLE
   $ 3.10 SAY [DEPARTMENT OF FAMILY PRACTICE PATIENT OPINION SYSTEM]
   $ 4.1 TO 4.78 DOUBLE
   * ---Display detail lines
   $ 7.29 SAY [1. ENTER NEW SURVEY DATA] $ 8.29 SAY [2. PRINT OPINION RESULTS]
   $ 10.78 SAY "0. EXIT"
   STORE 0 TO selectnum
   $ 12.33 SAY "select"
   $ 13.42 GET selectnum PICTURE "9" RANGE 0,2
   READ
   DO CASE
      CASE selectnum = 0
         * DO EXIT TO new survey data
      CASE selectnum = 1
         * DO ACCESS TO CARE REPORTS
      CASE selectnum = 2
         * DO PRINT OPINION RESULTS
   ENDCASE

SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM OFF
USE Survey

DO WHILE .T.
   * ---Display menu options, centered on the screen.
   * drew menu border and print heading
   CLEAR
   $ 2.0 TO 15.79 DOUBLE
   $ 3.21 SAY [PRINT OPINION RESULTS]
   $ 4.1 TO 4.78 DOUBLE
   * ---Display detail lines
   $ 7.29 SAY [1. ENTER NEW SURVEY DATA]
   $ 8.29 SAY [2. PRINT OPINION RESULTS]
   $ 9.29 SAY [3. SATISFACTION REPORTS]
   $ 10.78 SAY [4. DOCTOR REPORTS]
   $ 11.78 SAY [5. PATIENT COMMENTS]
   $ 12.78 SAY "0. EXIT"
   STORE 0 TO selectnum
   $ 15.33 SAY "select"
   $ 15.42 GET selectnum PICTURE "9" RANGE 0,5
   READ
   DO CASE
      CASE selectnum = 0
         * DO EXIT TO new survey data
      CASE selectnum = 1
         * DO ACCESS TO CARE REPORTS
      CASE selectnum = 2
         * DO PRINT OPINION RESULTS
   ENDCASE

SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM OFF
USE Survey

SET CONFIRM ON
CASE selectnum = 2
* DO衛生報告

DO $_HEMU2_2

SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET wait_subst
READ
SET CONFIRM ON

CASE selectnum = 3
* DO衛生報告

DO $_HEMU2_3

SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET wait_subst
READ
SET CONFIRM ON

CASE selectnum = 4
* DO DOCTOR REPORTS

CLEAR
M_YR=0
M_MO=0
$6,0 TO 9,79 DOUBLE
$7,15 SAY "Enter the Year for report:";
GET M_YR PICTURE "99"
READ
$8,15 SAY "Enter the Month for report:";
GET M_MO PICTURE "99" RANGE 1,12
READ

**** Print Doctor Satisfaction Indicator Report here ****

SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET wait_subst
READ
SET CONFIRM ON

CASE selectnum = 5
* DO PATIENT COMMENTS

CLEAR
M_MO = 0
M_YR = 0
$6,0 TO 9,79 DOUBLE
$7,15 SAY "Enter the Year:";
GET M_YR PICTURE "99"
READ
$8,15 SAY "Enter the Month for the desired comments:";
GET M_MO PICTURE "99" RANGE 1,12
READ
CLEAR
REPORT FORM PATCOM FOR YEAR=M_YR.AND. MONTH=M_MO .AND. PATCOMMENTS = 'y'
$22,0

ENDCASE
ENDDO T
RETURN
* EOF: $_HEMU2_3.PRG
"2"

---Display menu options, centered on the screen.---
draw menu border and print heading
CLEAR
$ 2, 0 TO 12,76 DOUBLE
$3,19 SAY "1. TO 9. TO CASE REPORT turbulent"
$ 4,1 TO 4,76 DOUBLE
* ---display detail lines
$ 7,32 SAY [1. DEPARTMENT REPORT]
$ 6,32 SAY [2. CLINIC REPORT]
$10, 32 SAY '0. EXIT'
STORE 0 TO selectnum
$12,32 SAY ' select

$12,42 GET selectnum PICTURE "9" RANGE 0,2
READ
DO CASE
CASE selectnum = 0
RETURN
CASE selectnum = 1
* DO DEPARTMENT REPORTS

CLEAR
M_YR=0
M_MO=0
$6,0 TO 9,79 DOUBLE
$7,15 SAY "Enter the Year for report:";
GET M_YR PICTURE "99"
READ
$8,15 SAY "Enter the Month for report:";
GET M_MO PICTURE "99" RANGE 1,12
READ
**** Print Dept. Access to Care Report here ****

SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET wait_subst
READ
SET CONFIRM ON

CASE selectnum = 2
* DO CLINIC REPORTS

CLEAR
M_YR=0
M_MO=0
$6,0 TO 9,79 DOUBLE
$7,15 SAY "Enter the Year for report:";
GET M_YR PICTURE "99"
READ
$8,15 SAY "Enter the Month for report:";
GET M_MO PICTURE "99" RANGE 1,12
READ
CLEAR
M_CLINIC = " "
$6,0 TO 9,79 DOUBLE
$7,15 SAY "Enter the Clinic section code for report:";
GET M_CLINIC PICTURE "$\text{AAA}"
READ
**** Print Clinic Access to care report here ****

SET CONFIRM OFF
STORE ' ' TO wait_subst
$ 23,0 SAY 'Press any key to continue...' GET wait_subst
READ
SET CONFIRM ON

ENDCASE
ENDDO T
RETURN
* EOF: $_HEMU2_3.PRG
"2"

---Display menu options, centered on the screen.---
draw menu border and print heading
SET BELL OFF
SET STATUS OFF
SET BELL OFF
SET CONFIRM ON
DO WHILE .T.
  " --- DISPLAY menu options, centered on the screen.
  " draw menu border and print heading
  CLEAR
  $ 2, 0 TO 12,79 DOUBLE
  $ 3,21 SAY [WAITING TIME REPORTS]
  $ 4,1 TO 4,79 DOUBLE
  " --- display detail lines
  $ 3,32 SAY [1. DEPARTMENT REPORT]
  $ 4,32 SAY [2. CLINIC REPORT]
  $ 5,32 SAY [3. OTHER REPORTS]
  $ 6,32 AG SELECTNUM PICTURE "9" RANGE 0,2
READ
DO CASE
CASE selectnum = 0
    " DO DEPARTMENT REPORTS
    CLEAR
    M_YR=0
    M_MO=0
    $6,0 TO 9,79 DOUBLE
    $7,15 SAY "Enter the Year for report:";
    GET M_YR PICTURE "99"
READ
    $8,15 SAY "Enter the Month for report:";
    GET M_MO PICTURE "99" RANGE 1,12
READ
    ***** Print Dept. Waiting Time Report here *****
    SET CONFIRM OFF
    STORE .T. TO wait_subst
    $23,0 SAY 'Press any key to continue...’ GET
wait_subst
    READ
    SET CONFIRM ON
    CASE selectnum = 1
    " DO CLINIC REPORTS
    CLEAR
    M_YR=0
    M_MO=0
    $6,0 TO 9,79 DOUBLE
    $7,15 SAY "Enter the Year for report:";
    GET M_YR PICTURE "99"
READ
    $8,15 SAY "Enter the Month for report:";
    GET M_MO PICTURE "99" RANGE 1,12
READ
    CLEAR
    M_CLINIC = ""
    $6,0 TO 8,79 DOUBLE
    $7,15 SAY "Enter the Clinic section code for report:";
    GET M_CLINIC PICTURE "$99"
READ
    ***** Print Clinic Waiting Time Report here *****
    SET CONFIRM OFF
    STORE .T. TO wait_subst
    $23,0 SAY 'Press any key to continue...’ GET
wait_subst
    READ
    SET CONFIRM ON
ENDCASE
ENDDO T
RETURN
* EOF: SMENU2_3.PRG
"I"
APPENDIX G. PRODUCTIVITY PROGRAMS

* Program:...
  V8ZNU1.PRG
* Author:... JOAN ZIMMERMAN/ELBERT SEAN
* Date....: 02/23/89
* Notice:... Copyright (c) 1989, All Rights Reserved

DO WHILE .T.
  * ---Display menu options, centered on the screen.
  * draw menu border and print headings
  CLEAR
  $ 2, 0 TO 13, 78 DOUBLE
  $ 3, 13 SAY "[DEPARTMENT OF FAMILY PRACTICE PRODUCTIVITY SYSTEM]"
  $ 4, 1 TO 4, 78 DOUBLE
  $ 7, 25 SAY [1. UPDATE VISIT FILE]
  $ 8, 25 SAY [2. DEPT & CLINIC PRODUCTIVITY]" $ 9, 25 SAY [3. EXPENDITURE/VISIT COMPARISON]"
  $ 11, 25 SAY '0. EXIT'
STORE 0 TO selectnum
STORE ' ' TO wait subst
$ 13, 33 SAY ' select "
$ 13, 42 GET selectnum PICTURE "S" RANGE 0,3
READ

DO CASE
  CASE selectnum = 0
    SET TALK OFF
    CLEAR ALL
    RETURN
  CASE selectnum = 1
    * DO UPDATE VISIT FILE

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**wait_subt**

READ
SET CONFIRM ON
CASE selection = 1
* DO EXTRACT VISIT DATA FROM MED302 FILE

***** Program to extract visit data from med302 to file *****
SET CONFIRM OFF
$ 23.0 SAY 'Press any key to continue...' GET
wait_subt
READ
SET CONFIRM ON
ENDCASE
ENDO T
RETURN
* EOF: VAEH111.PRG
* 1

* Program...
VAEH111.PRG
* Author... JOAN ZIMMERMAN/ELBERT SHAN
* Date...... 02/23/89
* Notice... Copyright (c) 1989 All Rights Reserved
SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON
USE VISIT
DO WHILE .T.
* ---Display menu options, centered on the screen.
* draw menu border and print heading
CLEAR
$ 2.0 TO 14.79 DOUBLE
$ 3.24 SAY [UPDATE VISIT DATA]
$ 4.1 TO 4.78 DOUBLE
* ---Display detail lines
$ 3.30 SAY [1. ADD VISIT DATA]
$ 9.30 SAY [2. CHANGE VISIT DATA]
$ 10.30 SAY [3. REMOVE VISIT DATA]
$ 12.30 SAY [4. REVIEW VISIT DATA]
$ 14.33 SAY "select"
$ 14.42 GET selection PICTURE "9" RANGE 0,6
READ
DO CASE
CASE selection = 0
RETURN
CASE selection = 1
* DO ADD INFORMATION
SET FORMAT TO VISIT
APPEND
SET FORMAT TO
SET CONFIRM OFF
STORE ' ' TO wait_subt
$ 23.0 SAY 'Press any key to continue...' GET
wait_subt
READ
SET CONFIRM ON
CASE selection = 2
* DO CHANGE INFORMATION
SET FORMAT TO VISIT
APPEND
SET FORMAT TO
SET CONFIRM OFF
STORE ' ' TO wait_subt
$ 23.0 SAY 'Press any key to continue...' GET
wait_subt
READ
SET CONFIRM ON
CASE selection = 3
* DO REMOVE INFORMATION
SET TALK OFF
CLEAR $ 2.0 SAY ' ' $ 'REMOVING DATABASE TO REMOVE RECORDS MARKED FOR DELETION:'
BACK
SET TALK OFF
SET CONFIRM OFF
STORE ' ' TO wait_subt
$ 23.0 SAY 'Press any key to continue...' GET
wait_subt
READ
SET CONFIRM ON
CASE selection = 4
* DO REVIEW INFORMATION
BROWSE MOMENT MAPPEND
SET CONFIRM OFF
STORE ' ' TO wait_subt
$ 23.0 SAY 'Press any key to continue...' GET
wait_subt
READ
SET CONFIRM ON
ENDCASE
ENDO T
RETURN
* EOF: VAEH111.PRG
* 2
**Program:**

**VMECUT3.FRG**

* Author: Joan Zimmerman/Elbert Shaw
* Date: 02/23/89
* Notice: Copyright (c) 1989, All Rights Reserved

SET TALK OFF
SET BELL OFF
SET STATUS OFF
SET ESCAPE OFF
SET CONFIRM ON

DO WHILE .T.
  
  **---Display menu options, centered on the screen.**
  * Draw menu border and print heading
  CLEAR
  $2, 0 TO 12,79 DOUBLE
  $4,10 SAY "CLINIC & DEPT VISIT TREND GRAPH HERE *****"

  **---Display detail lines**
  $6,1 TO 4,78 DOUBLE
  $10, 28 SAY "0. EXIT"
  STORE 0 TO selectnum

  **---Display menu options, centered on the screen.**
  * Draw menu border and print heading
  CLEAR
  $2, 0 TO 12,79 DOUBLE
  $4,10 SAY "CLINIC EXPEND. PER VISIT"

  **---Display detail lines**
  $6,1 TO 4,78 DOUBLE
  $10, 28 SAY "0. EXIT"
  STORE 0 TO selectnum

  DO CASE
  CASE selectnum = 0
    RETURN
  CASE selectnum = 1
    DO CLINIC EXPEND. PER VISIT
    CLEAR
    M_MNO=0
    M_MWR=0
    $6,0 TO 9,79 DOUBLE
    $7,15 SAY "Enter the year for report:"
    GET M_YR PICTURE "99"
    READ
    $8,15 SAY "Enter the month for report:"
    GET M_MO PICTURE "99"
    READ
    **** Print Clinic months exp/visit report here
    *** SET CONFIRM OFF
    STORE '. ' TO wait_subst
    $23,0 SAY 'Press any key to continue...' GET
    wait_subst
    READ
    **** Print Clinic months exp/visit report here
    *** SET CONFIRM OFF
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c/o Dr. Greely Moore  
356 Gaines Avenue  
Mobile, AL 36608

11. CAPT Joan P. Zimmerman  
Marine Corps Finance Center  
1500 E 95th Street  
Kansas City, MO 64197-0001

12. Mr. William Pugh  
Department Head, Code 20  
Naval Health Research Center  
P.O. Box 8512  
San Diego, CA 92138-9174

13. Dr. Eric Gunderson  
Chief Scientist  
Naval Health Research Center  
San Diego, CA 92138-9174

14. Assistant Professor Barry Frew  
Department of Administrative Sciences, Code 54Fw  
Naval Postgraduate School  
Monterey, CA 93943-5008

15. LCDR Robert R. Taylor  
U.S. Navy  
Patrol Squadron 17  
FPO San Francisco 96601-5910