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Application developer's Decision Support System under a Common Front-End System Architecture.

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Application Developer's Decision Support System
Under A Common Front-End System Architecture

by

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Application Developer's Decision Support System Under A Common Front-End System Architecture

by

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ABSTRACT

Applications development personnel have been confronted with the task of creating efficient applications to meet the needs of the end-user. Developers have tried to meet these needs by building their own individual routine libraries, but the wide range of skill levels and the large backlog of application requests have kept developers and end-users largely unsatisfied. Under the Common Front-End System Architecture being installed at the Marine Corps Central Design And Programming Activity Kansas City, Mo. developers will have access to a tool box of common functions that will help reduce development time for all levels of applications.

A Decision Support System (DSS) designed to aid development personnel in gaining access to the data and functions necessary for their development efforts is desired by the Marine Corps to support Manpower and Pay systems. The creation of such a DSS will entail gathering data concerning access patterns to tool box functions and database elements, definition of specific tool box functions to be utilized by the DSS, and definition of the decision logic and rule processing for use in determining all the related elements of a transaction.

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I. INTRODUCTION

The U. S. Marine Corps' large scale data processing efforts are centered on three large databases operating on an IBM mainframe computer using the wide area network known as the Marine Corps Data Network (MCDN). These databases are separated into three main functional areas: Manpower, Pay, Fiscal; Logistical Support; and Budget and Finance. Each of these functional areas is under the control of a system sponsor, and the development effort within each is handled at a separate Marine Corps Central Design and Programming Activity (MCCDPA). These MCCDPA's are subject to a high rate of personnel turnover. Personnel are constantly moving between MCCDPA's and other data processing activities. This guarantees an influx of new people with changing ideas for each unit. However it also means a consistent loss of expertise at each sight as personnel who are familiar with a system receive orders and move on to other installations. In many cases, the only expertise or useful experience that a new individual brings with him/her when he/she transfers is that of the operating system, database management system, other software languages, and functions of the MCDN. The skills and knowledge from one functional area are rarely applicable to another.

The database management system and fourth generation language utilized by the Marine Corps in the development and maintenance of these systems are Software AG's ADABAS and NATURAL. Additionally, support of other procedural languages such as COBOL is still required due to the large base of existing applications. The development efforts for the new database systems and the maintenance requirements for the existing applications have put a strain on the Marine Corps' data processing personnel and assets. In an effort to alleviate some of this burden, development personnel in the manpower and pay arena are interested in a project by the Department of Energy's Idaho National Engineering Laboratory (DOE INEL).

The DOE INEL has developed a System Architecture (SA) for IBM mainframe computers environment that gives users at all levels a common view or feel of the system regardless of the specific machine type, operating system or communication processor they are working on. This SA provides the user with a series of menus that contain unique access choices based on each user's security profile allowing access to data and functions. Access to other data elements through SA is prevented by restricting each user's visibility within the system to those transactions and items necessary for him/her to accomplish his/her daily work.

Additionally, personnel are provided access to a tool box of common functions that can significantly reduce program development and maintenance time. The tool box is centered on a logical transaction concept which is defined as the minimum amount of work required to perform some aspect of an automated process. Each transaction or process within a system is analyzed to determine what actions are associated with it. Once identified, they are used to define the logical transaction that is contained in the tool box. After the logical transaction has been defined, the developer does not need to rely on his/her memory or spend time tracking through system manuals to ensure that a transaction he requires for an application is complete. He/she simply accesses the tool box for the transaction and is insured of the completeness of the transaction based on its presence in the tool box.

The SA provides a user with several tools to enhance his/her performance and productivity. Metrics at the DOE INEL have documented 38% productivity gains with the SA. (Bell R.S. et al, 1988)

The U. S. Marine Corps' Real Time Finance and Manpower Management Information System (Real FAMMIS) design team is working with the DOE INEL on the transfer of the SA technology. The technology transfer will be accomplished in three phases. Phase I is limited to the manpower and pay arena at the Marine Corps Central Design and Programming Activity (MCCDPA) Kansas City, Missouri and was scheduled for 30 May 1989. Phase II will incorporate the SA technology Marine Corps wide using the Marine Corps Data Network (MCDN) under the title of Common Front-End System Architecture (CFESA). Testing of Phase II is scheduled for 1 October 1989. Phase III is scheduled for the 1st quarter of CY1990 and is planned to include a Decision Support System (DSS) capability or tool box item to support development personnel in the manpower and pay arena. Development of DSS's for the other functional areas are anticipated to take place at a later date. If desired, the functional manager or responsible MCCDPA, using the framework established for the Application Developers DSS for the manpower and pay arena, will develop their respective capability.

The DSS for the manpower and pay arena will be a support tool designed to provide developers with rapid and timely access to the data and functions necessary to complete their development projects. It will function as an expert system to meet developers' needs by asking the developers to specify the general functions needed for their development project, such as ADD or UPDATE, and the primary data requirements, such as PAY or PERSONAL data. The DSS will use this initial specification to access the tool box to retrieve all the related logical transactions for the particular area of concern. Once all of the logical transactions have been retrieved, the developer will be able to review, evaluate and order them for use within the particular application he/she is developing. At this time, the developer may choose to reject entire logical transactions or portions thereof if they are not necessary for a particular project. He/she may also create transactions of his/her own which meet the specific requirements of a project.

Project development without the use of a tool box of common functions is a lengthy and painful process. It becomes almost unmanageable when it involves data that spans multiple related functional areas like manpower and pay. Each developer is required to identify all of the aspects of each transaction on his/her own. This is a difficult process at best and it usually requires several iterations before it is done correctly.

Currently, application developers must rely on their own memory, search through system manuals, or query a fellow programmer (the duty expert) when developing applications to insure that all related aspects of a transaction are addressed in their application. This can take an inordinate amount of time in the case of searching through system manuals, and typically ties up two programmers when consulting the duty expert. When this happens, nothing is done to reduce the programming burden being faced throughout the data processing community. An expert system with access to a tool box of logical transactions can eliminate much of this duplication of effort in identifying and coding all of the related aspects of a transaction. Another benefit of using an expert system to access a tool box of logical transactions is that the testing of the code that makes up the transactions has already been accomplished. Using code that has already been debugged will reduce the amount of time it takes to test a program containing these logical transactions.

Expert systems technology will also help to address the problem of loosing personnel through Permanent Change of Station Orders. With an expert system in place, much of the expert's knowledge will remain behind when he/she is transferred. This will aid in the training of new personnel on the system and speed up the development of applications as well.

The CFESA provides an excellent environment in which to implement an expert based system. It provides a single system image for the user to work in that will be familiar to him/her no matter where he/she is operating from. The access to a tool box of common functions is already in place within CFESA, with the only addition required being the decision logic and rule processing, and the inference mechanism to drive the system. Adding an expert system that will drive the initial transaction identification process for a system should allow for additional increases in productivity over and above the 38% increases achieved by the DOE INEL.

The addition of a DSS to the manpower and pay arena will provide a developer with a series of transactions that are applicable to the project he/she is working on based on the specifications provided. A developer will then refine and combine the initial logical transactions to produce a prototype system for a user to evaluate and comment on. This will provide a developer with an immediate time savings at the beginning of a project by giving him/her a starting base for the application. Through the use of the Application Developers DSS and prototyping for developing new systems end users should be able to reap the benefits of a new application earlier than under current development methods, and application developers should finally be able to reduce the backlog of development requests he/she is currently facing.

In many cases, it is difficult to evaluate the effectiveness of a DSS, but when dealing with a DSS of the expert system variety it is often much easier. Evaluation of the Application Developers DSS should be easy to accomplish by comparing the current backlog of application development requests with the backlog of requests after the system is in place. A reduction of the turnaround time for application development should be evident after the system is in place. Additionally, the CFESA provides the capability to monitor the actions taken by any user or system operating within its environment. This serves two purposes; it provides an audit trail to track actions within the system, and the ability to generate system wide statistics for the computer centers operation staff to use to refine the systems operation. It can also provide the basic statistics for system budgeting and cost accounting. The use of the system monitor to record access information for the Application Developers DSS to the tool box would give an indication of the number of accesses the Application Developers DSS makes to the tool box and the average number of transactions each access to the tool box generates. These statistics can easily be compared to current development metrics such as lines of code to determine the efficiency of the Application Developers DSS in developing applications.

The creation of a DSS to aid application development personnel will entail definition of specific tool box functions and the decision logic and rule processing to be used by the DSS. Its purpose is to aid development personnel in gaining access to the data and functions they need in their programs to meet the needs of the end-users. Once the initial prototyping of the system is complete, it is anticipated that system development will follow two paths concurrently:

- Further development within the Manpower and Pay functional area

- Expanded functional area support by being used as a basic framework for personnel to use in developing expert systems to support efforts in the fiscal and logistical support functional areas

Within the manpower and pay arena, interest already exists in developing expert systems to support end-users in individual applications. The Application Developers DSS will provide the basic mechanisms and specific tool box functions that will be necessary to drive these specific applications.

Subsequent chapters detail specific aspects for a DSS to aid application developers in the manpower and pay arena.

- Chapter 2 describes the basic background concerning application development within the Marine Corps and the basic characteristics of a DSS as well

- Chapter 3 addresses the current environment at the MCCDPA Kansas City, Missouri and the addition of the Common Front End System Architecture

- Chapter 4 addresses the decision logic and rule processing that will drive the functioning of the DSS

- Chapter 5 outlines the components in the model/knowledge base of the DSS

- Chapter 6 covers the functional requirements definition of the proposed DSS

- Chapter 7 addresses the integration of the data, dialog, and modeling capabilities within the Common Front-End System Architecture

- Chapter 8 addresses the Conclusions and Recommendations concerning the development of the Application Developers Decision Support System

II. BACKGROUND

A. DSS ROLE AND ENVIRONMENT

Identifying all the aspects of what appears to be a simple transaction can become an elaborate and incredibly complicated task in a large scale information systems development project. Many sources must be checked to discover all the elements that might be effected by a single transaction, such as a promotion, and most organizations have strict guidelines that must be followed during the software development project. It often takes a junior programmer many hours of exhaustive research coupled with several iterations of coding and testing before it is correct.

Information systems development projects within the Marine Corps are currently governed by Marine Corps Order P5231.1A: Life Cycle Management For Information Systems Projects, and IRM-5231-01: Information Resources Management System Development Methodology - Overview. The primary area of concern addressed by these documents is the large scale mainframe database developments using the MCDN. During project development, analysts and programmers are required to follow the specification contained in these, and subsequent documents, in addition to trying to meet the needs of the end-user for whom the program is being developed.

Care must be taken during development to ensure that all aspects of a transaction are dealt with properly and completely. In the manpower and pay arena, a single transaction may effect elements contained in two separate ADABAS physical files. Identifying all the aspects contained within one transaction can take an enormous amount of time and effort on the part of a junior programmer. Numerous sources exist for identifying the data affected by a transaction, including other Marine Corps Orders, previously developed programs, and any duty experts that may be available for the programmer to consult. When the frequent movement of personnel is taken into account, it is often a miracle that anything is accomplished at all. Any expertise that an analyst or programmer may develop during his tour at an installation is often lost when he/she moves on to another site, and there is no guarantee that his/her replacement will come in with anywhere near his/her level of knowledge. This means that each new programmer must often re-learn the knowledge that an outgoing expert has developed with minimal turnover involved. All the factors that must be considered during the development process add to the complexity of the task, and tend to increase the amount of time required in the development process.

The CFESA environment provides a good basis for developing a DSS. The single system image and the consistent access format are well equipped to be adapted for use as the dialog manager within a DSS. Once the development system is invoked, a query/response type of dialogue can be initiated within the CFESA to provide the DSS with the information it needs to access the tool box. The tool box of common functions within the CFESA will provide the model base of logical transactions. Once the system has received the input from the developer, it will access the tool box and provide the developer with a list of the transactions necessary to complete some aspect of an automated process. The CFESA also provides a facility for performing maintenance on the tool box that will allow for modification of and additions to the logical transactions throughout the life of the system. The database portion of an expert system is different than what is considered the database portion of a DSS. Within an expert system, all the database portion is used for is a temporary work space to use while collecting and collating the users input and the system responses. This can be provided quite easily by utilizing some temporary working storage for the user during the operation of the system. The CFESA also provides a suitable environment within which to build the decision logic and rule processing that is necessary to power the inference engine within an expert system.

A DSS to support application developers will fill the role of a duty expert within a functional area such as manpower and pay. When provided with the specifics of an application, it will be able to access the tool box and provide the user with a list of potential transactions much faster than the user could develop on his own. In this way, it will serve to lessen the impact of experienced programmers being transferred to other installations. Using a query/response format to obtain the required input from the user will allow the system to function much like a duty expert. The decision logic and rule processing within the inference mechanism could utilize data driven forward chaining in order to identify all the applicable data elements, functions and procedures to meet the needs of the transaction. A secondary benefit that will be realized by the use of an expert system is the faster development and training of junior programmers. The system will help less experienced programmers to obtain a grasp of the functions and related attributes within a given functional area. It will accomplish this without removing a second programmer from his/her development efforts as is normally the case when a real duty expert is consulted for information.

Moreover, such a DSS is expected to have a major impact on the amount of time required for project development. It will reduce the amount of time required to identify all the aspects of an automated process and provide an increase in programmer efficiency by allowing them to efficiently utilize a pre-programmed library of common functions. Performance/impact of the system should be readily assessed by an increase in programmer productivity and a reduction in the amount of time a users request for an application spends in the development process. Use of the expert system can be measured within the CFESA by utilizing a transaction log type of facility available within CFESA to record the number of accesses made to the system and the amount of time required for the system to process a request. This information can be compared with the increase in programmer productivity to determine how effective the system is at fulfilling the role of a duty expert within a given functional area.

B. DSS DESIGN AND IMPLEMENTATION PLAN

The design of the Application Developers Decision Support System differs somewhat from methods used for designing MIS. Traditional design methodologies (i.e. flowcharts, HIPO) have proven deficient for developing a DSS (Sprague and Carlson, 1982). Structured design methodologies often result in a mismatch between the capabilities of the DSS and the requirements of decision makers or decision making. They do not have balanced strength in dialog, data, and modeling capabilities because users cannot specifically define the decision support requirements in advance. An approach to systems analysis which is intended to identify requirements in the dialog, data and modeling capability areas of a DSS is based on a set of four user-oriented entities: Representations, Operations, Memory Aids and Control Mechanisms (ROMC). Representations help conceptualize and communicate the problem or decision situation; operations analyze and manipulate those representations; memory aids assist the user in linking the representations and operations; and control mechanisms allow the user to handle and use the system. This approach to system analysis is known as the ROMC approach. It is a process-independent method that helps to reduce the gap between decision support requirements and DSS capabilities (Sprague and Carlson, 1982; Turban, 1988).

Since the system is based on expert systems technology, a hybrid of DSS, the components that make up the system differ from other DSS. To the extent possible, a complete Representations, Operations, Memory Aids, and Control Mechanisms description of the system follows:

1. **Representations**

   - Data Dictionaries
   - Marine Corps Orders
   - System Manuals
   - Existing Programs
   - Other Programmers

2. **Operations**

   - Spider Diagram of Related Functions (Barrett and Beerel, 1988)
   - Event Screen Maps (Planning Analysis Corporation, 1988)

3. **Memory Aids**

   - Tool Box of Common Functions

4. **Control Mechanisms**

   - Common Front-End System Architecture
   - Decision Logic and Rule Processing

The Representations comprise all the sources that a programmer/analyst has at his/her disposal to consult during application development. An in depth review of these sources is necessary to identify all the elements that are related to a specific transaction so that the relations can be included in the tool box of common functions.

The Operations required in the system are shown in the Spider Diagrams contained in Appendix A and the Event Screen Maps contained in Appendix B. Appendix A details the sequence of events for one leg of the entire system and Appendix B contains diagrams detailing all the events in the system. Implementing these operations will allow the user to provide the specifications necessary to access the tool box and determine the data elements, functions and procedures that may be applicable to the type of application he/she is developing.

The Memory Aids contained in the tool box of common functions represent all the related aspects of a transaction as identified by the objects listed in the Representations. By referring to the tool box an application developer can quickly identify all the related data elements and save the time that would have initially been spent on searching through the manuals to find them.

The Control Mechanisms for the proposed system are contained within the Common Front-End System Architecture and the rule processing and decision logic utilized in the inference mechanisms processing. The CFESA provides the environment within which the entire system functions, and the update and access mechanisms for the tool box of common functions. Additionally, the CFESA provides for the smooth integration of all the aspects of the expert system. The rule processing and decision logic control the processing of the inference mechanism for the system. The decision logic will be used to drive a query/response dialogue with the system user to provide the initial input to the inference mechanism. The inference mechanism will then utilize that input to search through the model base to identify the related data elements, functions and procedures within the tool box for an application developers use.

Functionally, the Application Developers DSS will include dialogue, data and modeling components as follows:

- Dialog Component

  The DSS dialog will be handled in a Query/Response format where the system queries the user to gather input concerning the area of application to use to drive the inference engine. A typical session between the system (DSS) and an application developer (AD) might begin as follows:

DSS: What is the primary functional area of the application?

1.) MANPOWER.

2.) PAY.

3.) BOTH.

AD: 1.

DSS: What is the type of transaction to be performed?

1.) Add a record.

2.) Delete a record.

3.) Output a record.

4.) Update a record.

AD: 4.

DSS: What is the primary element of concern?

1.) Grade change.

2.) Duty status.

3.) Dependents status.

4.) Local commanders information.

AD: 1.

DSS: What type of grade change?

1.) Promotion.

2.) Demotion.

Using this style of dialog will allow the system to obtain the information it requires to function, and will do so in a manner that is easy for even novice users to understand and respond to. It also allows the system to respond to queries from the users asking for explanations why a specific question is being asked or how the system reached a particular conclusion.

- Data Component

Normally, the data component of a DSS is represented by a database of one type or another. Within the Application Developers DSS, the database serves as a temporary working storage space where it acts upon the inputs from the user and combines them with the tool box components in order to respond to the users request.

- Model Component

The model component represents the knowledge store within the system. Within the Application Developers DSS the knowledge is represented by the rule processing and decision logic working in conjunction with the components contained in the tool box of common functions. The CFESA provides the facility to make changes to the model base allowing the system to grow and adapt to the needs of the users.

Figure 2-1 contains a diagram showing how the resources available within the DSS environment are mapped onto the functional components described above. The CFESA provides the framework within which the DSS functions as a whole, and it also provides key components for use by the individual Dialogue and Model components. Additionally, the model component contains the heart of the DSS, the tool box of common functions and the inference mechanism. These two items are the parts of the system that actually simulate the reasoning of a duty expert to provide a response to a users request. While the user may view the dialogue component he/she deals with as the system, the majority of the design effort is centered here to provide accurate and meaningful results. The data component shown on the map actually holds a minimal amount of data in the form of the decision logic and rule processing. There is some interface between the functional area's data dictionary and the tool box of common functions. This is accomplished within the temporary work space that is designated within the expert system in order to handle the users input and formulate the systems replies to the users queries.

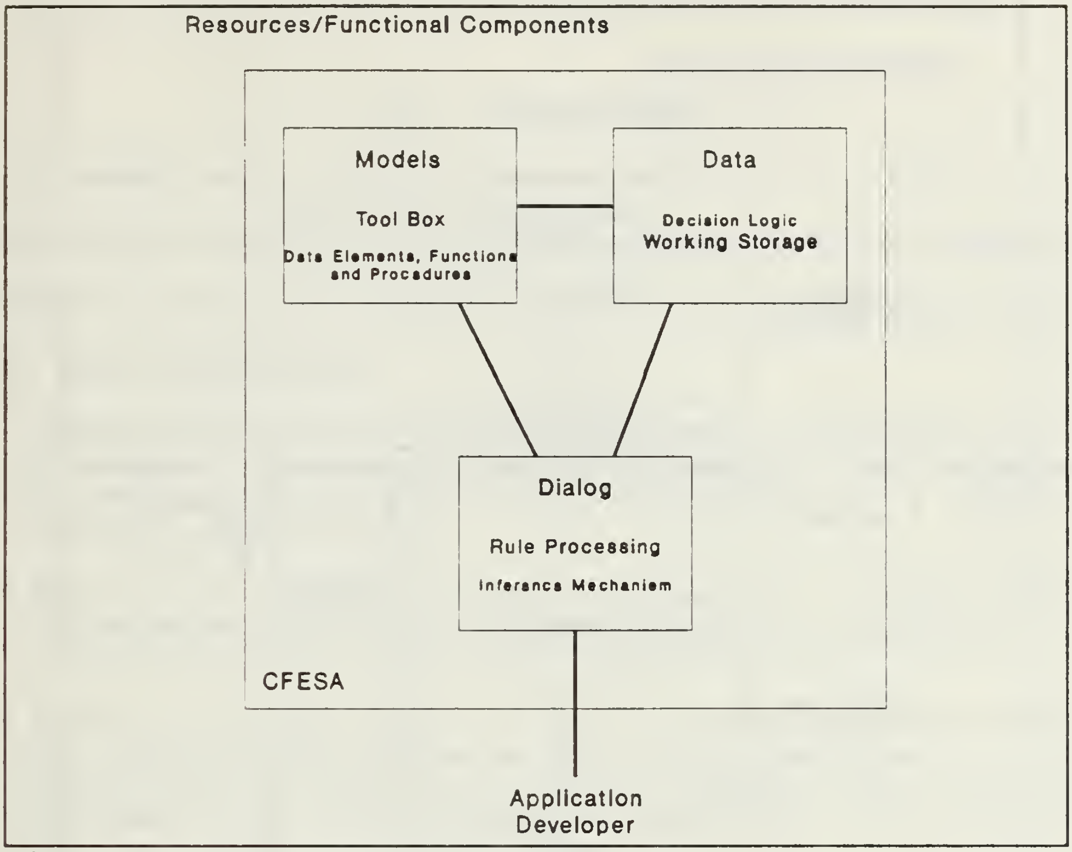

Figure 2-1 CFESA Components

Figure 2-2 contains a diagram showing how the implementation process for an expert system should be handled. The most important activities within the process are acquiring and structuring the knowledge. This is the time when you are working closely with the duty expert and potential users trying to adapt the system to meet their needs. Care must be taken during this phase to insure cooperation between all parties. Again it is important to remember that this is an iterative process, as depicted in the diagram, and change is expected to occur.

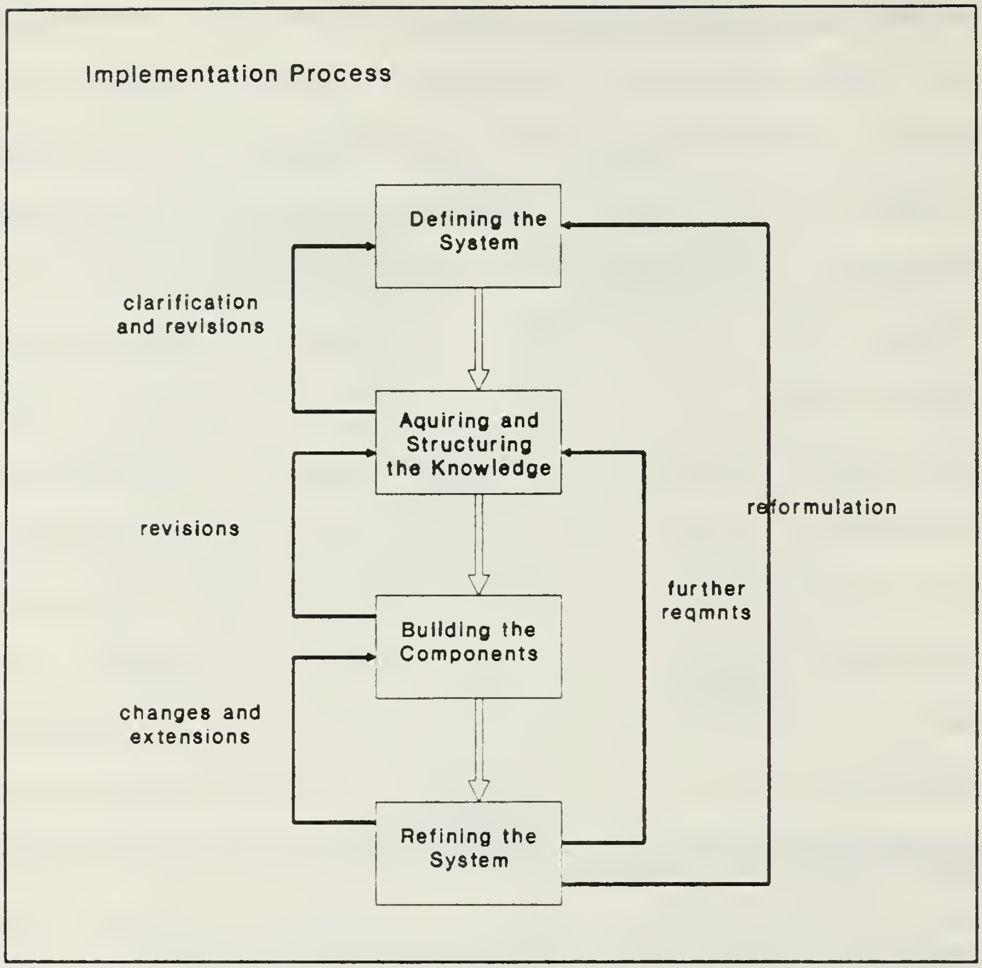

Figure 2-2 Implementation Process

(Barrett & Beerel, 1988)

III. ENVIRONMENT

A recent study (Peat, Marwick, Main & Co., 1987) analyzed the benefits of a user interface that was found to be easy to use. The benefits identified by the study fell into four broad areas.

- Productivity gains were realized by an improvement in throughput, increased quality of product, and improved planning, communications, and control due to a system that was easy to use

- Ease of use was found to be an asset in a system since it promoted use of the system rather than acted as a roadblock to the users

- Ease of training made the system easier for the users to get started with and once they had learned one application it was easy to add on others since they had the same feel due to a common interface

- Executive use of the system was found to be enhanced as a result of the ease of use and ease of training features. The ability to quickly master the operation of a system allowed key executives to plan, communicate, and control their projects and resources which provides competitive and strategic value to an organization

The benefits identified in the study are summarized in Table 3.1.

Good User Interface Benefits
Productivity Gains - Throughput gains. - Quality gains. - Planning, Communications, and Control gains.
Ease of use promotes use.
Ease of training.
Executive use.

Table 3.1 Interface Benefits

The ability of an easy to use interface to increase productivity and promote use of a system is the reason behind the inception of the Common Front End System Architecture (CFESA).

The CFESA is scheduled for implementation at the MCCDPA Kansas City, Mo. during the fall of 1989. The environment that it will be operating on is contained in Table 3.2.

HARDWARE:	SOFTWARE:
IBM 3084 Quad Processor	MVS/XA
IBM 3380 DASD	Top Secret
NCR Comten Front end Processor	UCC - 7
Line Printers	UCC - 11
Tape Drives	VTAM
	TSO/E
Other associated peripherals	CICS
	ROSCOE
	COMPLETE
	Natural 2.1
	Adabas 5.0
	Other miscellaneous compilers utilities and application packages

Table 3.2 MCCDPA Environment

The CFESA is designed to standardize the computer interface and provide a single system image within a computing environment. The primary goal of the single system image is to provide a friendlier, easier to use interface that promotes system use rather than acts as an obstacle to it.

The CFESA is centered around a menu system that provides a user with a unique choice of functions based on what he/she is authorized to access. The menu system is flexible in the sense that it allows novice users the ability to step down through each level of menus to get to the function or data he/she needs to access, yet will allow an experienced user to do a direct transfer to the function or data without utilizing each of the intermediate steps. The security facility within the CFESA is provided by a centralized security file that is accessed each time a user logs onto the system. The specific access level for the user is contained in the file and determines what functions he/she is provided within his/her menu structure. This further enhances system security by preventing a user from seeing functions that he/she is not authorized to access.(Linsenman, 1987)

Additionally, personnel are provided access to development aids in the form of a tool box of common functions that can significantly reduce program development and maintenance time. One such aid is the standard navigational capabilities given to the user through the use of Program Function (PF) Keys. Actions such as the immediate log-off from the system, transfer to any other authorized transaction in the system, and return to the previous menu are effected with a single keystroke. (Linsenman, 1987) The ability to utilize these aids saves time on the users part and provides a quick and standard method of execution which further enhances the single system image. Table 3.3 contains a summary of the functionality provided by the CFESA.

SYSTEM ARCHITECTURE CONCEPT

- SINGLE SYSTEM IMAGE
  - ONE LOGON PROVIDES ALL ACCESS
  - CONSISTENT USER INTERFACE
    - # STANDARD MENU SCREENS
    - # COMMON AUDIT FUNCTIONS
    - # COMMON HELP AND ERROR HANDLING
    - # STANDARD USE OF KEYBOARD
  - MACHINE INDEPENDENT
  - SOFTWARE INDEPENDENCE
  - INTRA-APPLICATION COMMUNICATIONS

- SECURITY CONCEPT
  - STANDARD SECURITY IAW TOP SECRET

- INTEGRATED DATA RESOURCE
  - REAL FAMMIS DATA BASE
  - CURRENT DATA BASES

Table 3.3 CFESA Concept

The tool box is centered on a logical transaction concept which is defined as the minimum amount of work required to perform some aspect of an automated process. Each transaction or process within a system is analyzed to determine what actions are associated with it. Once identified, they are used to define the logical transaction that is contained in the tool box. Once the logical transaction is defined, the developer does not need to rely on his/her memory or spend time tracking through system manuals to ensure that a transaction he/she requires for an application is complete. He/she simply accesses the tool box for the transaction and is insured of the atomicity of the transaction based on its presence in the tool box. If five records need to be created to add an item to a database, then the creation of the five records is a logical transaction. Any less data indicates an incomplete transaction, and any more indicates a repeat of the transaction. (Linsenman, 1987) By storing the composition of the logical transaction in the tool box, the user is insured that all aspects of the transaction are dealt with whenever it is accessed.

Other standard functions provided to the user by the CFESA are: help, data verification, transaction reporting (audit trail), transaction activation, common transaction linkage between applications and functions, and standardized PF keys.

A DSS based within the CFESA would provide added functionality to application developers in identifying the necessary components from the tool box for their application. The addition of a manpower and pay DSS to the

CFESA is expected to significantly reduce the time and effort that currently is required to develop end-user applications by reducing the time an application developer spends in identifying the components required for his/her application. It will provide a developer with a series of transactions that are applicable to the project he/she is working on based on the project specifications that the developer provides. The developer will then refine and combine the initial logical transactions to produce a prototype system for the user to evaluate and comment on. This will provide the developer with an immediate time savings at the beginning of a project by giving him/her a starting base for the application. Through the use of the Application Developers DSS and prototyping for developing new systems the user will be able to reap the benefits of his/her new application more quickly than under current development methods, and developers should finally be able to begin making headway against the backlog of development requests he/she is currently facing.

The primary components of a DSS within the CFESA would be the dialog component and a knowledge base to store the necessary information to drive the system outputs. These components can be easily incorporated into the structure of the CFESA. The menu structure of the CFESA environment provides an excellent mechanism for implementing a dialogue with the user and the tool box of common functions provides a storage area for the knowledge base.

The dialog component implemented within the CFESA menu structure would contain the essence of the system. The decision logic and rule processing would be contained within the user interface to determine the initial data requirements from the tool box. The user would be presented with a series of questions that he/she would have to respond to. Once all of his/her responses are entered, the system would utilize forward chaining to work through the statements contained within the inference engine of the DSS to determine the tool box access requirements.

The knowledge base would be stored within the tool box of common functions in the form of data element relationships, standardized function modules and pre-programmed procedures that would be accessed based upon the results of the user/system dialog. These data element relationships, standardized function modules and pre-programmed procedures would provide the application developer with a knowledge base to build upon for the development of his/her application much faster than he/she could develop that knowledge base by sifting through reference manuals and other information sources.

IV. DECISION LOGIC & RULE PROCESSING

The decision logic and rule processing used to drive the inference mechanism of a DSS comprises the data and dialog components of the Application Developers DSS. The inference mechanism is the bridge between the user and the model/knowledge base that leads the user to the information or knowledge that he/she needs to get from the model/knowledge base. Figure 4.1 shows the relationship between the user, inference mechanism, knowledge base and database.

The inference mechanism drives all interaction within the system. Its function is to use the decision logic and rule processing to search through the knowledge base to provide information to a user. The inference mechanism is basically a set of routines that carry out deductive reasoning. It has no understanding what it is doing, or what it achieves. The process is simply a mechanical one. (Barrett and Beerel, 1988)

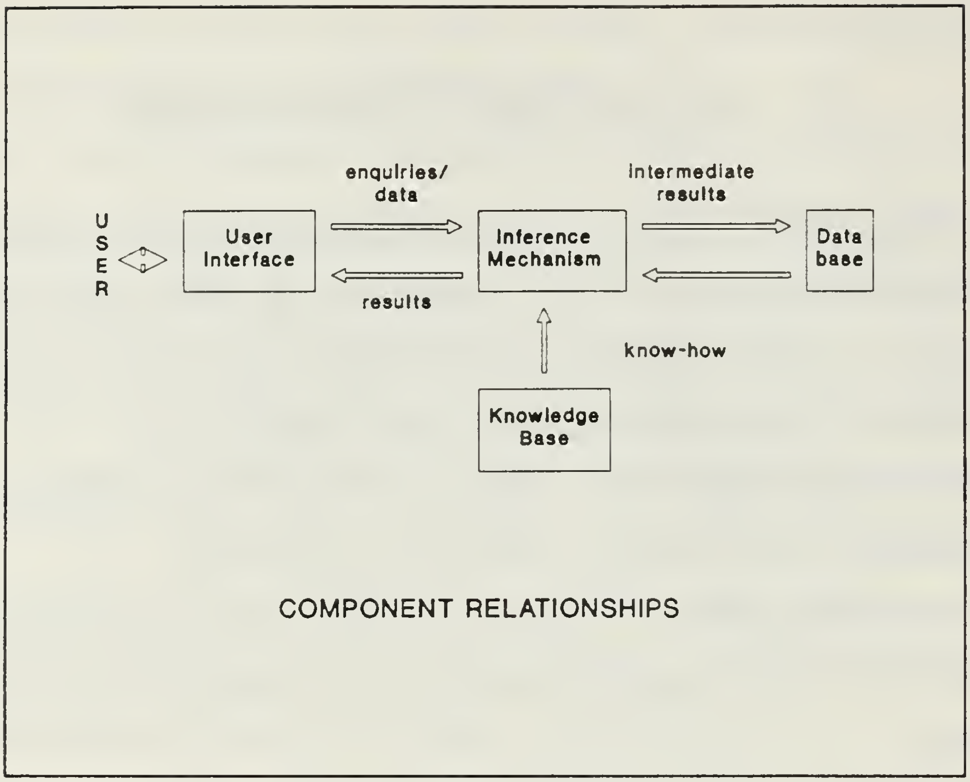

Figure 4.1 Component Relationship

An inference mechanism is typically composed of a series of IF-THEN-ELSE statements that step the user through the decision making process to obtain the relevant information contained within the systems knowledge base. Information can be obtained from the knowledge base by using one of two methods of working through the decision logic and rule processing. The inference mechanism can use goal directed reasoning which is known as backward chaining or it can use data driven reasoning which is known as forward chaining to thread through the rules. With backward chaining, the goals are possible solutions to a specific problem and the system works backward through the rules associated with each goal to determine if it is a viable alternative. Forward chaining uses the strategy of gathering data from a user until a pattern is recognized that will allow the system to present a user with a solution set. Forward chaining leads to a wider variety of solutions than does backward chaining since the possible solutions are not specified before hand. The chaining method used by a DSS depends upon the purpose of the DSS. Backward chaining is most useful in selecting between a set of known solutions, and forward chaining is used for building up solutions and leaps in reasoning. Each of these methods leaves a different impression on a user. Figure 4.2 shows a comparison between the two types of chaining. (Barrett and Beerel, 1988)

Forward chaining is the logical choice when a system has to build up a solution from many components, or inputs. The Application Developers DSS would be such a system. The idea behind the system is to provide a developer with a set of data elements, procedures or functions that may be applicable to the application he/she is working on. Once the developer has a solution set to start with, he/she can begin to work on narrowing or expanding that base to provide all of the information or functionality that the application he/she is working on requires.

	BACKWARD CHAINING	FORWARD CHAINING
Also called	goal directed	data driven
Starts from	possible solutions	new data
Works toward	necessary data	any conclusions
Progression thru rules	conclusion to condition	condition to conclusion
Style	conservative	opportunistic
Processing	efficient	possibly wasteful
User's impression	plodding but predictable	responsive but quirky
Obvious usage	selection between alternative solutions	building up solutions and "leaps" in reasoning

FORWARD VS. BACKWARD CHAINING

Figure 4.2 Chaining Comparison

The inference mechanism also provides a degree of self documentation to the system. This ability comes with the systems ability to track the rules that it uses to reach a conclusion or conclusions and to provide that list to the developer so that he/she can verify that the rules the system used are all applicable to the application he/she is developing. The inference mechanism also provides the ability to respond to basic type of questions the user asks such as why a particular rule was used. In this instance the system would respond with the link that caused that particular rule to be used. This self documenting aspect of the system will enable an application developer to verify the outputs of the system more rapidly than he/she would be able to verify them if he/she didn't have them.

One aspect of a forward chaining expert system type of DSS that is often looked upon as a drawback to them is the unpredictable nature of them. There is no guarantee with this type of system that a reasonable solution set will be arrived at. The solution set that the system provides may have no conclusions in it at all, or it may have an excessive number of conclusions, or an excessively large solution set. (Barrett and Beerel, 1988) While these may seem to be drawbacks in the beginning, a closer examination of the purpose of the Application Developers DSS shows that these results are actually an added benefit. A solution set that contains no recommendations for data elements, procedures or functions or one that is excessively large may actually be an indication that the application that the developer is working on has been poorly specified or poorly designed. Receiving an indication like this early in a projects life cycle should help to shorten the development time and improve the quality of the application as a whole.

V. MODEL/KNOWLEDGE BASE

The model/knowledge base is the heart of an expert system type of DSS. It contains the know-how or expert information of the system that the inference mechanism must act with to reach a feasible solution based on the users input. The information contained in the model/knowledge base can come in any form, but it is usually expressed in the form of rules of thumb or relationships. The programming language used within the system most often determines the form the model/knowledge base will take. (Barrett & Beerel, 1988)

The model/knowledge base within the Application Developers DSS will serve as the store house of the systems knowledge. It will hold the data relationships, procedures and functions that will comprise the outputs of the system.

Access to the model/knowledge base will be controlled by the decision logic and rule processing utilized by the dialog component of the DSS. As stated earlier, the rules of the system are stored in the form of IF-THEN-ELSE type statements. This form is a familiar form to almost everyone literate in computers and makes the logic of the system relatively easy to understand. In an expert system type of DSS each rule is a nugget of know-how which is valid in itself. When the system is running the inference mechanism will select which rules to apply, and when, to solve the current problem. The system builder only has to state what the rules are and not how the rules will be used. The statement of what rather than how is a declarative statement of know-how and is one of the strengths of an expert system DSS. Other strengths include:

- ability to add, modify, or delete rules independently of one another
- ability to input rules in any order
- program is easy to understand

While these are generic strengths of an expert system DSS, there are some exceptions to them in reality. In many cases the order the rules are input often affects the processing, and the ease of understanding is often dependent on the software tools used and the skills of the person developing the system.

When compared to traditional systems, an expert system type of DSS is usually quicker to build and easier to modify. It lends itself well to incremental development which gets a beginning product into the users hands faster and can be modified faster to provide what the user really wants because of the independent rules. (Barrett & Beerel, 1988)

Another primary aspect of the model/knowledge base is the information it contains in the form of data relationships, canned procedures and standardized functions. In order for the Application Developers DSS to assist a developer in identifying all the aspects of a transaction or application it must contain intimate knowledge about what the relationships are among the data elements and how a change in one can effect other elements. Information like this can be expressed in the form of a complete, interactive data dictionary or an Entity And Attribute Report and Association Report (Information Engineering Systems Corporation, 1989).

Additionally, canned routines, procedures and functions should be available as an output from the system. These should come in the form of pre-coded and debugged modules that have proven to be effective in solving a rigidly specified task. These could include modules to change a service members marital status, promotion or stop/start an entitlement. The use of pre-coded modules like these in applications development will promote structured programming techniques, improve development speed and ease the documentation burden because each of the modules should be complete entities unto themselves, complete with test results and documentation to be included in the final package for the user. The only effort required by the developer would be the function/procedure call and variable passing to get the data into and out of the module.

In many cases, the sources for the standardized functions and procedures already exist in many organizations. Most programmers maintain their own private libraries of pre-coded modules that execute what they have found to be repetitive or commonly used tasks. By tapping these libraries significant time in loading the model/knowledge base can be saved and many programmers would feel that they have a vested interest in the system since they would have made a contribution to it. This aspect will go a long way toward tapping the pool of expert knowledge throughout an organization.

VI. FUNCTIONAL REQUIREMENTS DEFINITION

This chapter contains the Functional Requirements Definition of the Application Developers DSS and is formatted in accordance with Marine Corps Order P5231.1A and IRM 5231.04.

SECTION 1 GENERAL

The Marine Corps Central Design and Programming Activity, Kansas City, Mo. is currently installing a new architecture for their mainframe environment to operate under that is known as the Common Front-End System Architecture. This architecture gives an application developer working within the manpower and pay arena a single system image environment to operate within and provides him/her with access to a tool box of common functions to use in developing applications.

This specification describes a DSS for use on the CFESA that will aid an application developer in identifying applicable data elements, functions, and procedures for use in a program being developed.

1.1 OBJECTIVES

The Application Developers DSS design objectives are:

a. Provide application developers working within the CFESA with an automated aid for identifying data elements, functions and procedures that could be applicable to a program under development.

b. Save time during the development phase of a programming project.

c. Guard against the loss of knowledge in the event the "duty expert" leaves the installation.

1.1.1 Current System Deficiencies

The current method of identifying applicable data elements, functions, and procedures to use within a programming project leads to several deficiencies. Among them are:

a. Excessive time spent searching through unrelated literature.

b. Distracting knowledgeable programmers from their assigned tasks.

c. Missing related data elements, functions, or procedures due to lack of recognizing their applicability.

d. Loss of corporate information when experienced programmers leave the installation.

1.1.2 Proposed System Objectives

The primary objective of the Application Developers DSS is to provide application developers working within the CFESA architecture an automated tool to speed up the identification of data elements, functions, and procedures that need to be considered for use within a programming project. The system will use the components of the CFESA architecture to query an application developer about the focus of a programming project and use the results to search through the tool box of common functions to obtain a beginning set of data elements, functions, and procedures that should be considered as applicable to the project. At that point the application developer must determine which of the items is actually applicable to the project and use them accordingly.

1.2 SCOPE

The Application Developers DSS will be limited to the manpower and pay functional areas that are within the domain of the MCCDPA Kansas City, Mo.

1.2.1 Applications Under Study

The Application Developers DSS will be limited to application development in the manpower and pay functional areas. All of the deficiencies identified in Section 1.1.1 are directly related to the amount of time spent gathering information and the accuracy, completeness, and relevance of the information.

1.2.2 Organizational Environment

The organizational environment the system will function within is the environment within the Marine Corps Central Design And Programming Activity, Kansas City, Mo.

1.2.3 Site Specific Information

The system will run within the hardware and software environment delineated previously in Table 3.2.

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1.4 FUNCTIONAL REQUIREMENTS DEFINITION ACTION PLAN

The Application Developers DSS represents a new type of development activity for the MCCDPA Kansas City, Mo. It will replace a manual search of system reference manuals, data dictionary entries, previously developed programs, and corporate knowledge held by other members of the organization with an automated tool that will focus on the primary area of a development project.

1.4.1 New Logical Model Findings

The CFESA provides an excellent environment for a DSS to operate within. It provides:

a. A well defined method of user interface to handle the dialog component of a DSS.

b. A tool box for the storage of data element relationships, functions, and procedures to fill the needs of the model component of a DSS.

c. A temporary work area for the system to use as the data component to compile the results of the user/system dialog and search the model component to identify the applicable information.

1.4.2 Recommended Course of Action

The ability of the CFESA to meet the needs of a DSS indicates that development of a DSS for application developers working within the CFESA should be undertaken. DSS development requires a different approach than traditional system development utilizes in order to be successful. Past experiences in DSS development indicate that an incremental approach to development through the use of prototypes works best. (Sprague and Carlson, 1982; Turban, 1988)

Based on the findings, incremental development of the Application Developers DSS should continue through the use of prototypes.

SECTION 2. STRUCTURED SPECIFICATION

2.1 DATA FLOW DIAGRAMS (DFD)

The DFD's for the Application Developers DSS are depicted in the following sections.

2.1.1 Context Diagram

FIGURE 7-01 Application Developers DSS Context Diagram

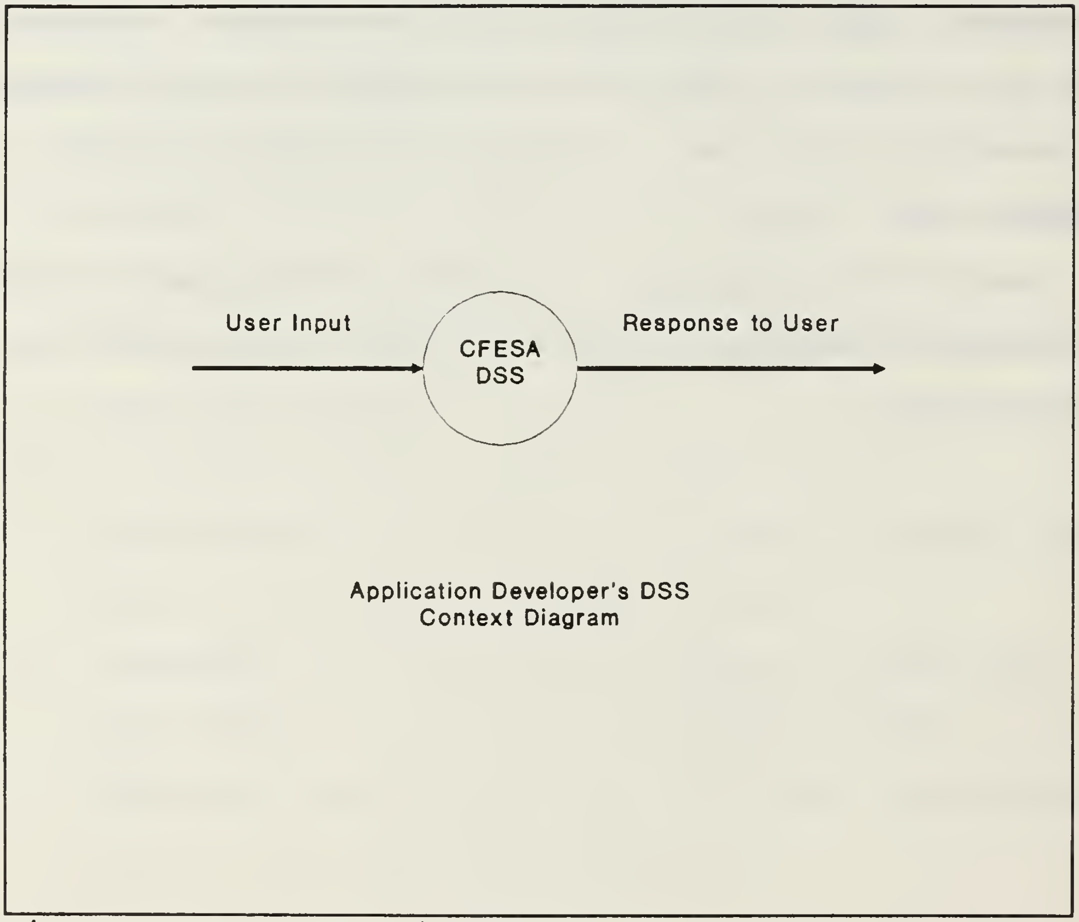
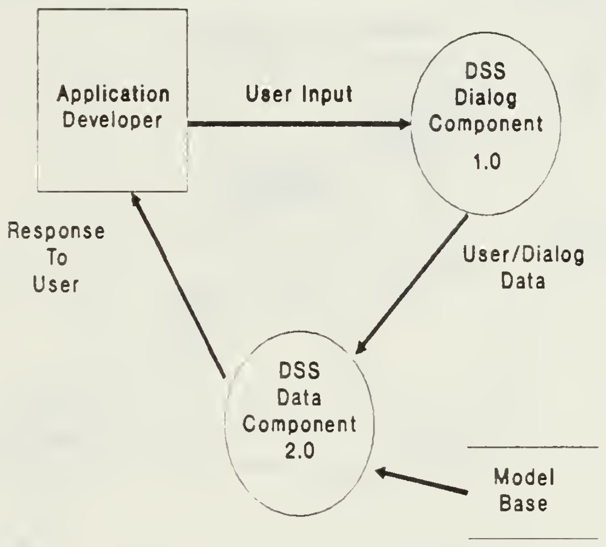


Figure 7-01 Context Diagram

2.1.2 Leveled Set of Diagrams

2.1.2.1 Level-One Diagram

FIGURE 7-02 Application Developers DSS Logical Model



Application Developer's DSS Logical Model

Figure 7-02 Logical Model

2.1.2.2 Level-Two Diagrams

FIGURE 7-03 Application Developers DSS Dialog Component

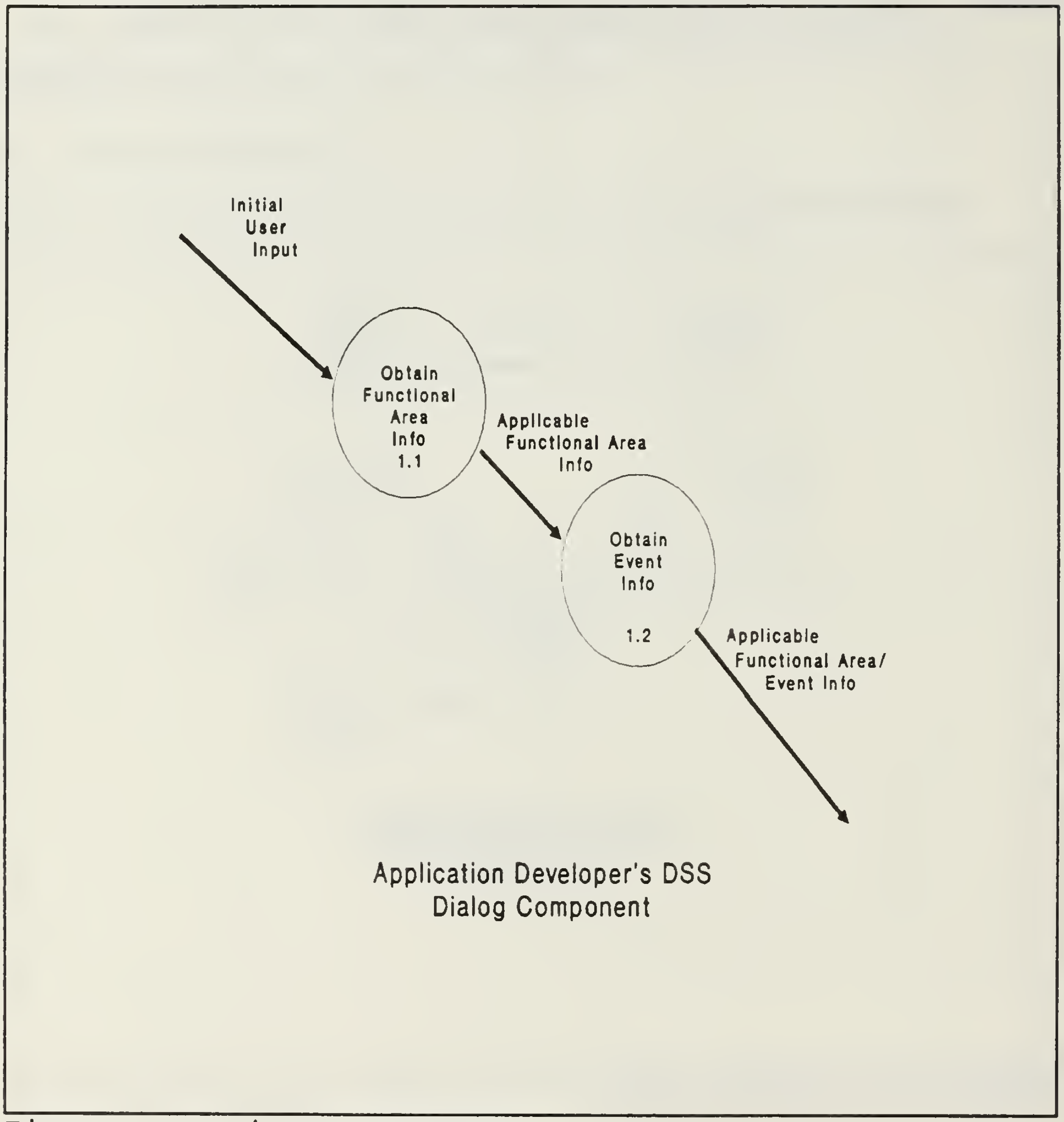


Figure 7-03 Dialog Component

FIGURE 7-04 Application Developers DSS Data Component

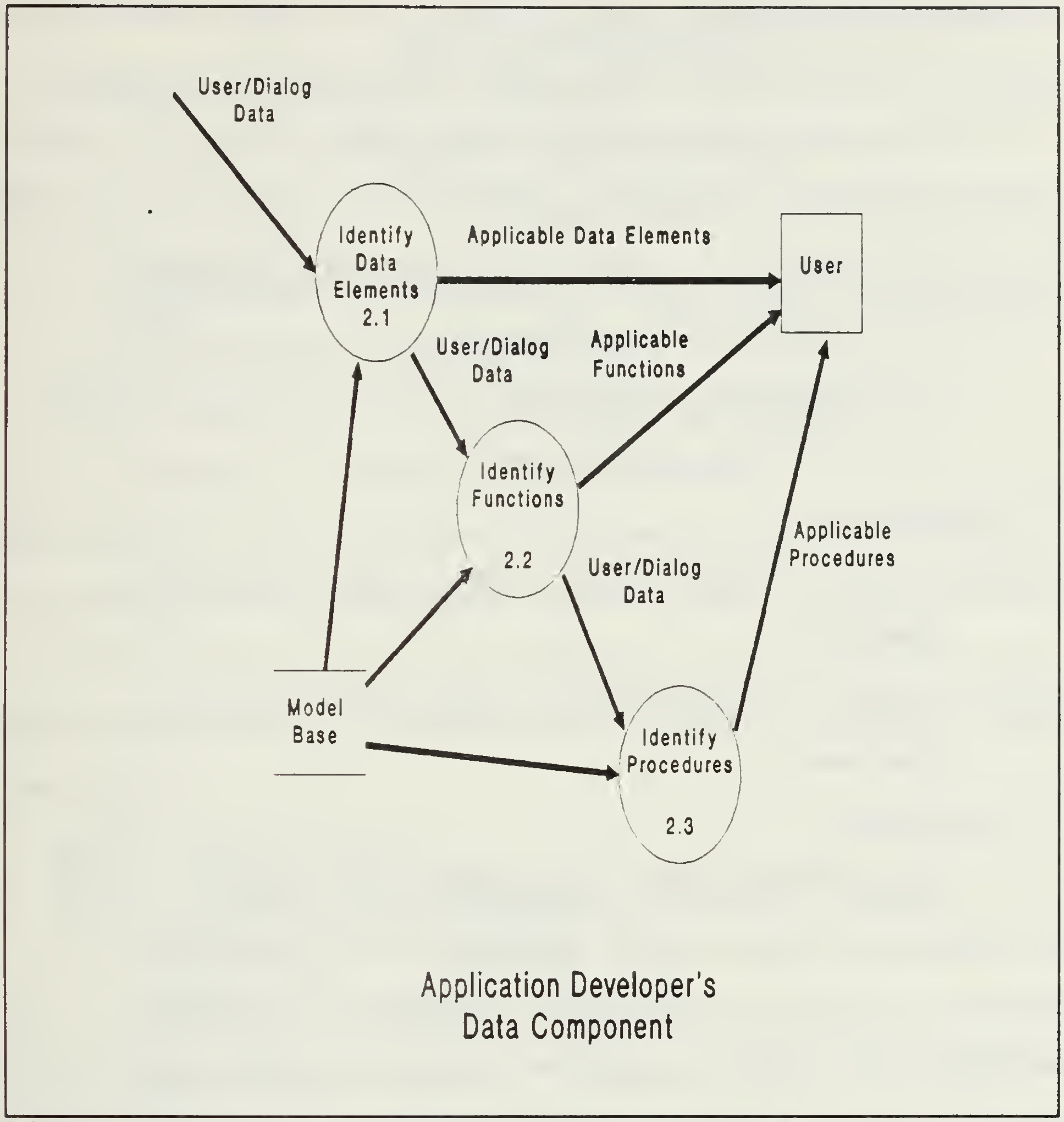


Figure 7-04 Data Component

2.2 MINI-SPECIFICATIONS

2.2.1 Mini-Specification Descriptions

2.2.1.1 1.0 Application Developers DSS Dialog Component

1.1 Obtain Functional Area Info

1.2 Obtain Event Info

2.2.1.2 2.0 Application Developers DSS Data Component

2.1 Identify Data Elements

2.2 Identify Functions

2.3 Identify Procedures

2.2.2 Level-One

2.2.2.1 Process 1.0 Application Developers DSS Dialog Component

2.2.2.2 Process 2.0 Application Developers DSS Data Component

2.2.3 Level-Two

2.2.3.1 Process 1.1 Obtain Functional Area Info

This process is the initial component of the dialog component for the DSS designed to obtain the desired functional area from the user. Information obtained in this process is used to determine the queries available in the next process.

Query user for applicable Functional Area
Accept user input for Functional Area
Pass Functional Area to Process 1.2

2.2.3.2 Process 1.2 Obtain Event Information

This process uses the Functional Area information obtained in Process 1.1 to determine the relevant event information to query the user about that will eventually be used to select applicable data elements, functions, and procedures.

```
Do while not done
    Query user for applicable events based on Functional
    Area
    Accept event input from user
End-do
Output Functional Area/Event info to Process 2.0
```

2.2.3.3 Process 2.1 Identify Data Elements

This process takes the data assembled in the data component of the Application Developers DSS and uses the information to search the tool box of the CFESA for data elements that may be applicable to a developers application that is under development.

```
Accept FA/Event data
Search tool box for applicable data elements
Store applicable data elements for output to user
Pass FA/Event data to Process 2.2
```

2.2.3.4 Process 2.2 Identify Functions

This process takes the data assembled in the data component of the Application Developers DSS and uses the information to search the tool box of the CFESA for functions that may be applicable to a developers application that is under development.

```
Accept FA/Event data
Search tool box for applicable functions
Store applicable functions for output to user
Pass FA/Event data to Process 2.3
```

2.2.3.5 Process 2.3 Identify Procedures

This process takes the data assembled in the data component of the Application Developers DSS and uses the information to search the tool box of the CFESA for procedures that may be applicable to a developers application that is under development.

Accept FA/Event data
Search tool box for applicable procedures
Store applicable procedures for output to user
Discard FA/Event data

2.3 <u>DATA DICTIONARY</u>

The data dictionary developed and defined by the REAL FAMMIS project is applicable and requires no changes.

<u>SECTION 3 SUPPORTING DOCUMENTATION</u>

3.1 <u>SUMMARY OF NEW REQUIREMENTS</u>

The new requirements of the Application Developers DSS lie in the area of the data, dialog, and model base components of a DSS. These components make up the heart of a DSS and specific information concerning each component as it relates to the Application Developers DSS is contained in Chapter 7.

VII. CFESA SYSTEM INTEGRATION

The CFESA is the key ingredient in the development of the Application Developers DSS. It provides an excellent environment to support the data and dialog components of the DSS as well as a ready made store house for the model base in the form of the tool box. All of the interfaces between these components have already been designed within the CFESA, as well as additional features that make the user's, application developer's, and system administrator's jobs easier to master.

Tieing a DSS into the CFESA will require care and attention to be applied to each individual component. Each of the DSS components, Data, Dialog and Model Base, has its own particular areas of concern that need to be addressed directly.

A. DATA COMPONENT

The Data Component of the DSS is where all of the decision making of the DSS will occur. For the Application Developers DSS it contains the rule base the system functions on and temporary working storage for use while the users input is being accumulated and then to store and format the results of searching the tool box (Model Base) for data elements, functions and procedures that might be applicable to a developers project. In an environment where virtual memory is used, such as that found at the MCCDPA, concern over each users available work area is minimized thanks to the dynamic way in which memory is allocated to each user. In installations where virtual memory is not utilized, or there are other restrictions imposed upon user's memory use, care should be taken to allocate sufficient memory to allow for the efficient processing of the system. If there isn't enough memory allocated to allow for smooth, efficient operation the system will appear slow and awkward to a user and will result in a lack of confidence in the responses the system provides and eventually use of the system will cease. (Barrett and Beerel, 1988)

The rule base, in the form of IF-THEN-ELSE statements, contains the reasoning ability of the DSS. They are an attempt to isolate the reasoning that an experienced programmer might utilize to break down a programming project to identify the data elements, functions and procedures that should be utilized for the project. The rule base for the Application Developers DSS is based on the structure and information available within the manpower and pay database. The initial determination that a user will have to make is whether the primary area of concern is within the manpower or pay area, or both. The possibility that a transaction will effect both areas must be considered since there is a large area of overlap between the two functional areas. Once this determination has been made, the specifics of the application are addressed. During the development of the Real FAMMIS Reporting and Retrieval System (R3S), sixteen basic categories were identified as valid transaction categories. These sixteen categories are:

- Join
- Drop
- To
- From
- Training
- Dependents Information
- Pay (Debits/Credits)
- Discipline
- Performance
- Service Information
- Contract Information
- Personal Information
- Basic Individual Record Audit
- Unit Information (Events)
- Checklist for Personnel Reportable Items
- Checklist for Pay Related Reportable Items (Planning Analysis Corporation, 1988)

Each of these sixteen categories leads to more detailed information that eventually identify disbursing Type Transaction Codes (TTC) that can be associated with individual data elements, functions, and procedures.

B. DIALOG COMPONENT

The Dialog Component of the DSS will represent the whole DSS to the user. It will be the only part of the Application Developers DSS that the user actually sees, therefore it is crucial that the User/System dialog operate smoothly and efficiently.

The primary purpose of the Dialog Component is to gather information from the user that the system can use to search through the Model Base. The information will be gathered through an interactive User/System dialog that presents a user with a series of questions to respond to. The questions that the system poses to the user come from the rule base that is designed into the system. Since the goal of the Application Developers DSS is to provide a developer with a set of possible data elements, functions and procedures for use in a program, the system must use forward chaining to progress through the rule base.

A forward chaining inference mechanism is often difficult to initiate and, as noted earlier, often appears quirky to the user. Despite this, it is the only method to achieve the desired results. Since the decisions that the system must handle are straight forward questions with clear cut answers some of the awkwardness will be removed from the system. The ability to limit the system to clear cut questions and answers removes the necessity of identifying confidence factors for the rules. This makes the system much easier to program. Rather than looking for the most relevant of many possible rules to utilize, the system can be lead directly to the next rule. Since the Application Developers DSS has many different branches that can be traversed, the sequence of events is best handled by a case structure. At each level of decision the system should present a list of relevant events for a user to choose from. Each choice will lead to another subset until the ability to divide the event is exhausted and the system arrives at a recommended list of TTC's.

The Dialog Component will also have the ability to draw upon the capabilities of the CFESA to further enhance its interaction with a user. The event choices available to any developer can be further refined based upon that users level of access contained within the CFESA's security authorization mechanism. This will prevent a user with Read Only authority from developing an application that would allow him/her to make changes to the database by denying him/her access to the functions and procedures that allow those changes to be made.

C. MODEL BASE

The Model Base for the Application Developers DSS is composed of the data elements, functions and procedures that relate to the manpower and pay functional areas. Most of the work necessary to accumulate this model base has already been done, in one form or another.

1. Data Elements

The Manpower and Pay Functional Managers modeling teams have expended much time and effort in designing the Real FAMMIS database. Through the use of Computer Aided Systems Engineering (CASE) technology a database containing 857 entities and 1124 associations has been identified. The data dictionary for this database should comprise the data element portion of the Application Developers DSS model base.

2. Functions and Procedures

Much of the work compiling functions and procedures that are applicable to certain events has already been accomplished by programmers throughout the MCCDPA Kansas City. Most programmers are in the habit of developing and maintaining libraries of these types of routines. Use of these libraries saves programmers time and machine time since they are already coded and debugged. The only difficulty in obtaining these routines is getting the organizations programmers to submit them for inclusion in the model base.

The biggest concern within the model base is developing a method to identify which functions and procedures are applicable to which events/data elements. One method of identification would be through the use of the TTC's that are already linked to the data elements. Utilizing this method would provide the easiest method of association and would only require limited expansion or creation of TTC's to identify higher level events. Adding these codes to the headers of each function and procedure would allow easy identification of applicable items based on the results of the user/system dialog.

Another important ability that the model base must possess is the ability to grow and adapt to changes. If the model base is to stay relevant, this ability must exist. A key consideration to an organization is where the authority to make changes to the model base should lie. In order to effectively address this problem, the position of Model Base Administrator (MBA) should be created. The MBA's duties and responsibilities would parallel the duties and responsibilities of a Data Base Administrator as found in many organizations. The MBA should be in a position to work closely with the organization's DBA and possess an intimate knowledge of the functional areas requirements and purposes so that he/she can insure that the model base stays current.

VIII. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

1. General

The development of the Application Developers DSS provides the MCCDPA Kansas City, Mo. with the opportunity to increase programmer productivity and to gain additional benefits from work that has previously been accomplished by the Real FAMMIS program office. It will build on work that went into the Event Reporting for the R3S system and utilize the basic design work of the Real FAMMIS project as well as utilize the capabilities of the CFESA. Since the Application Developers DSS will be make use of a new architecture at the MCCDPA it is difficult to assess the viability and benefits such a system could provide. Based on the results obtained at the DOE INEL and the potential to realize a significant time savings in the early stages of program development, the Application Developers DSS gives every indication of being a system that could provide enormous benefits through increased programmer productivity to the MCCDPA.

Without the CFESA, development of the Application Developers DSS would be much more difficult. Extensive work would be required on the interfaces between the data, dialog and model base components. Working within the CFESA though relieves the interface burden from the DSS developer and allows him/her to concentrate upon the task of defining the rules and establishing the model base.

2. Inference Mechanism

The inference mechanism driving the Application Developers DSS will appear as a menu system displayed by the system that allows a user to select the next level choice from a list provided to him/her. Beginning the inference mechanism in this manner will allow development to take place incrementally on the system and for more time to be spent on the tool box contents than on the access method. Once the tool box contents have been finalized and initial feedback has been achieved, a more elaborate processing scheme for the inference mechanism can be developed and installed for the Application Developers DSS.

3. Model Base Components

The real effectiveness of the system lies in the contents of the CFESA tool box. In order for the system to be utilized the developers who are going to be accessing it must believe in the integrity of the data elements, functions and procedures it contains. Initial loading of the tool box contents should receive a high priority during the system development. Utilizing the information developed during the Real FAMMIS information engineering effort and further incorporating the results obtained from Information Engineering Systems Corporation's User: Expert System software package, should provide the initial confidence in the data element components within the tool box. The same level of confidence in the functions and procedures can be obtained by carefully reviewing each one submitted for inclusion and thoroughly testing and documenting each one before it is added to the tool box.

Continued confidence in the integrity and value of the items in the tool box can only come from a demonstrated commitment to keeping the items up to date and accurate. This can be accomplished by establishing a Model Base Administrators (MBA) position at a level of authority equal in degree to that of the Data Base Administrator (DBA). The duties of the MBA would be similar to those of the DBA in that he/she would be responsible for insuring the integrity of the items in the tool box and be the central point for changes that would be included in them.

B. RECOMMENDATIONS

The Application Developers DSS represents an opportunity for the MCCDPA Kansas City, Mo. to realize additional benefits from previously accomplished work and advance into new areas of program development. As such, the following recommendations are provided:

- Determine to begin incremental development of the Application Developers DSS after the installation of the CFESA is complete at the MCCDPA Kansas City, Mo

- Begin collection, identification and documentation of standardized functions and procedures for inclusion in the tool box

- Create the position of Model Base Administrator and staff it at the appropriate level

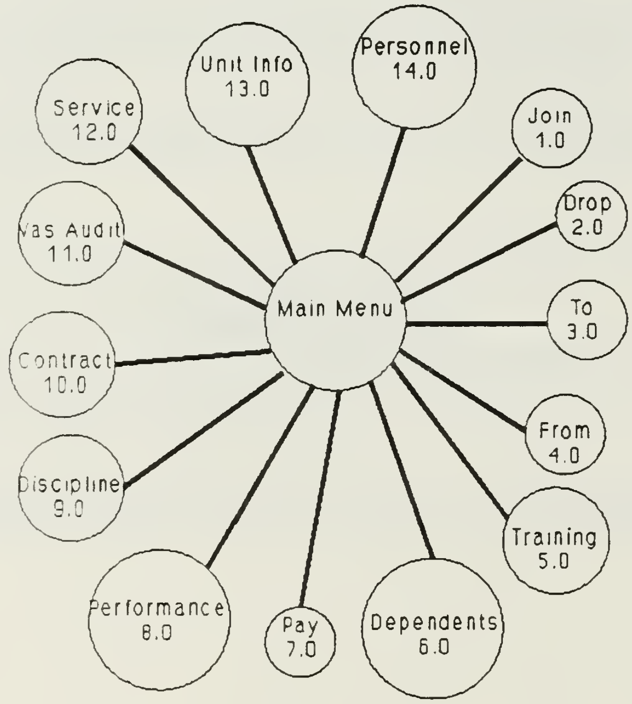
- Expand upon the TTC identification scheme and utilize it to identify the data elements, functions and procedures contained in the tool box

- General and Detail Design efforts for the Application Developers DSS should begin as soon as possible

Appendix A

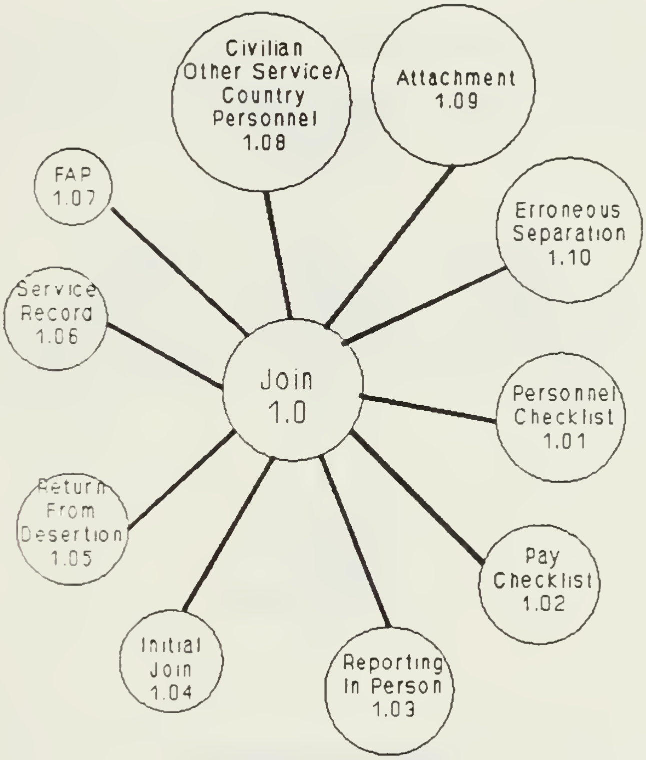
Spider Diagrams

The diagrams contained on the following pages contain the event sequences for the JOIN event leg of the menu's. These diagrams correspond with the diagrams contained in Appendix B as noted below each diagram.



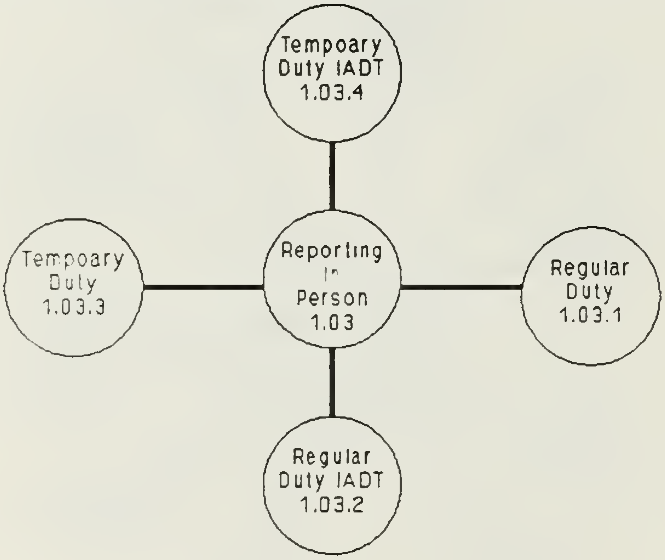
Level 0 Select Event

See Appendix B, Page B-3.



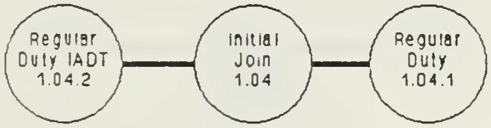
Level 1 JOIN Event

See Appendix B, Page B-4 to B-7.



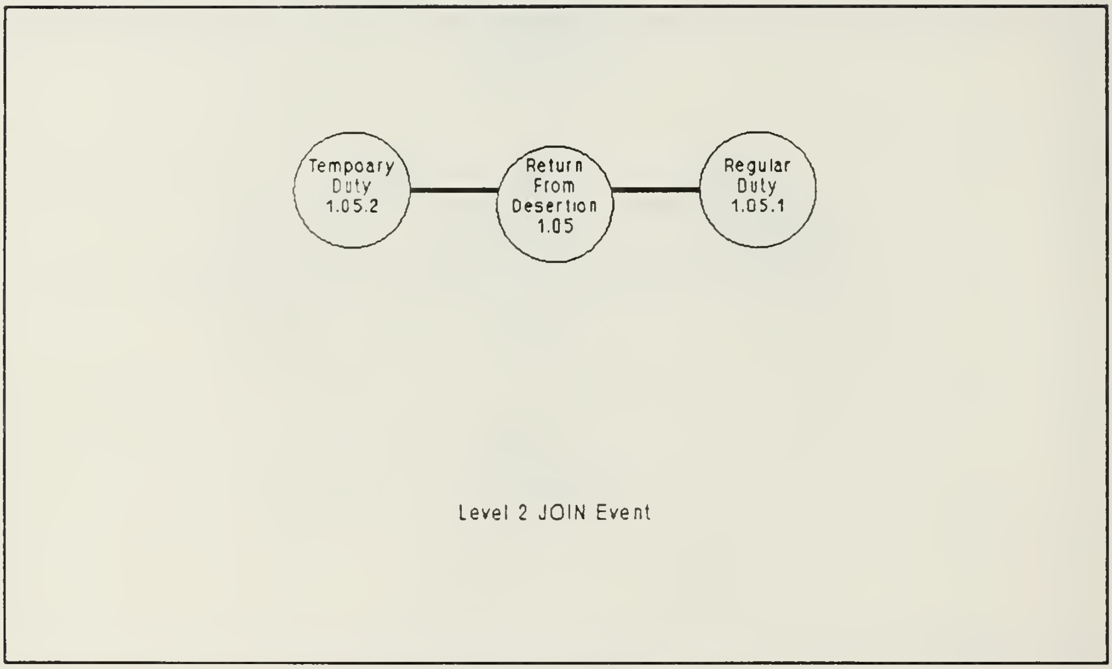
Level 2 JOIN Event

See Appendix B, Page B-6.

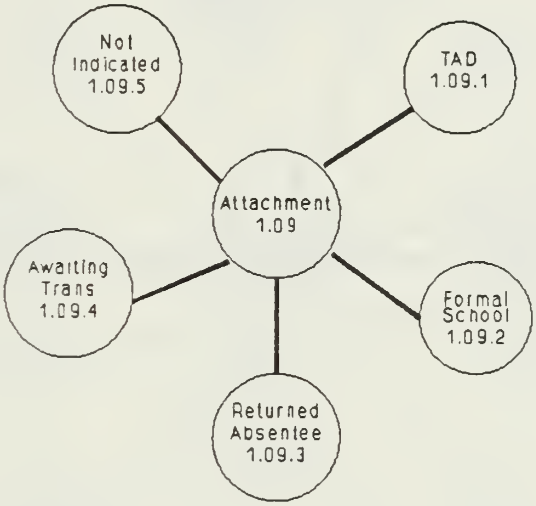


Level 2 JOIN Event

See Appendix B, Page B-6.

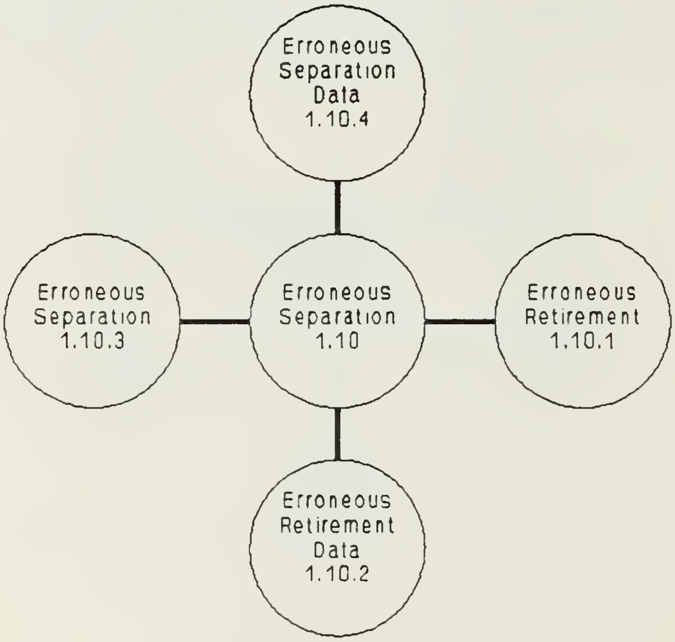


See Appendix B, Page B-6.



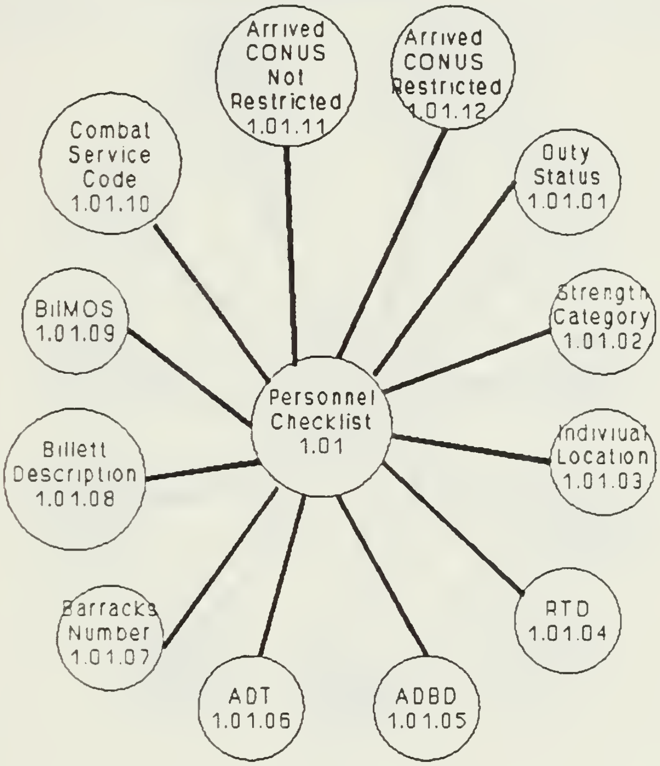
Level 2 JOIN Event

See Appendix B, Page B-6.



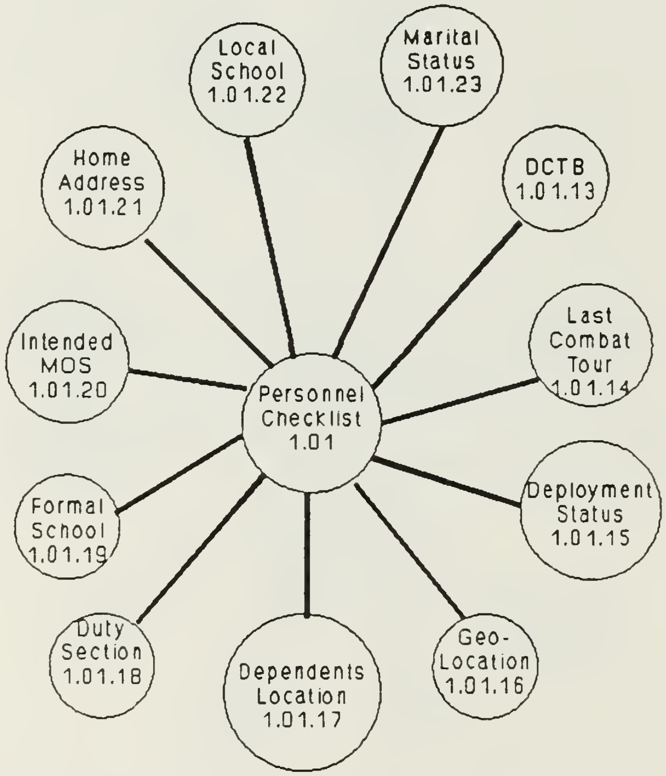
Level 2 JOIN Event

See Appendix B, Page B-6.



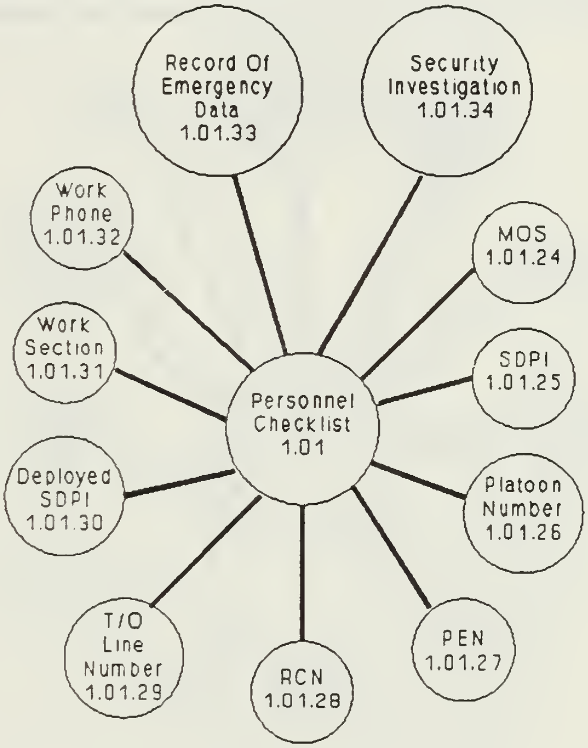
Level 2 JOIN Event (Part 1 of 3)

See Appendix B, Page B-4.



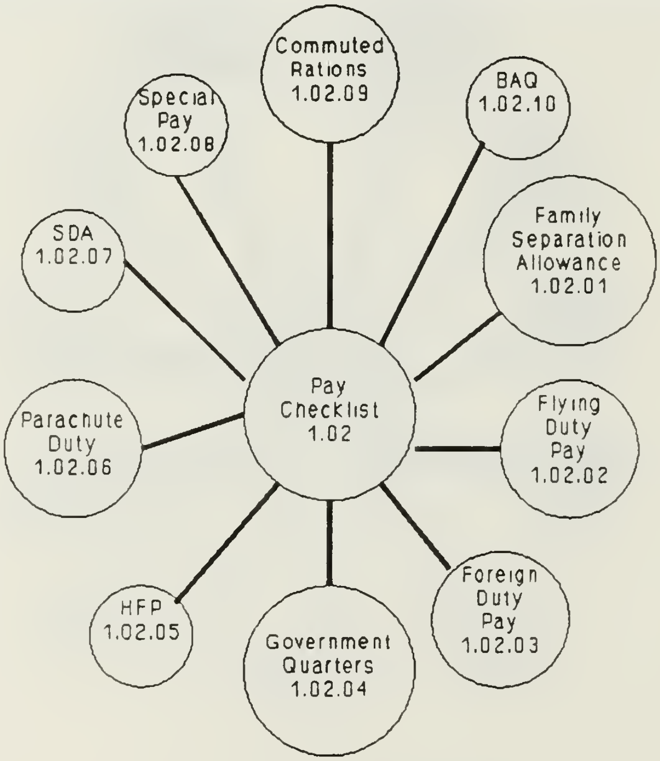
Level 2 JOIN Event (Part 2 of 3)

See Appendix B, Page B-4.



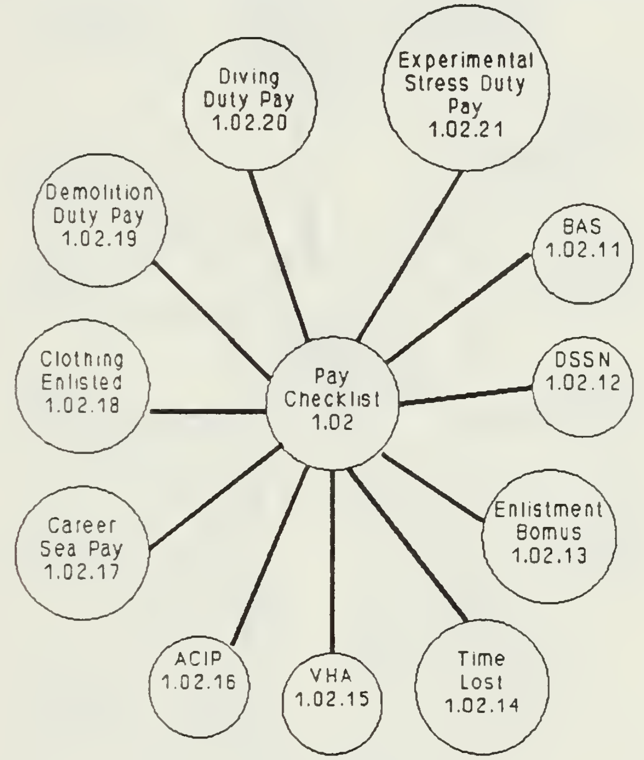
Level 2 JOIN Event (Part 3 of 3)

See Appendix B, Page B-4.



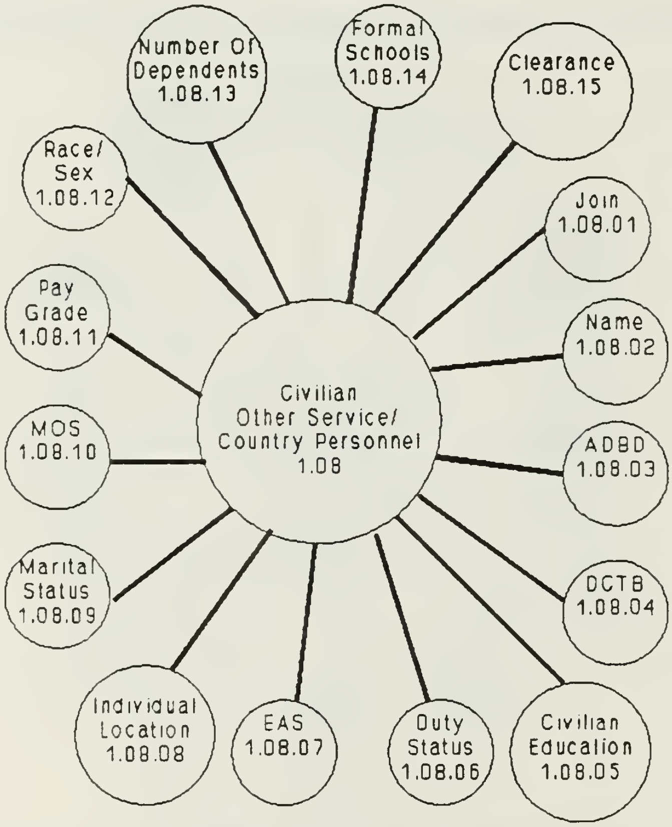
Level 2 JOIN Event (Part 1 of 2)

See Appendix B, Page B-5 and B-7.



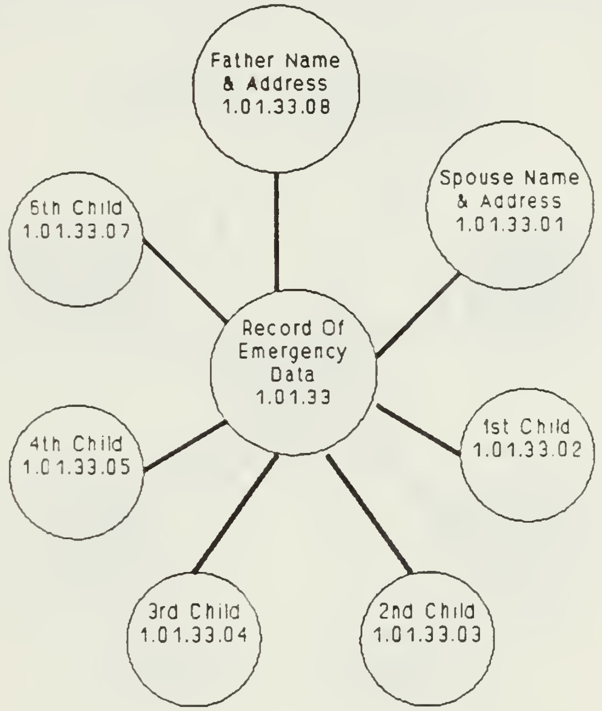
Level 2 JOIN Event (Part 2 of 2)

See Appendix B, Page B-5.



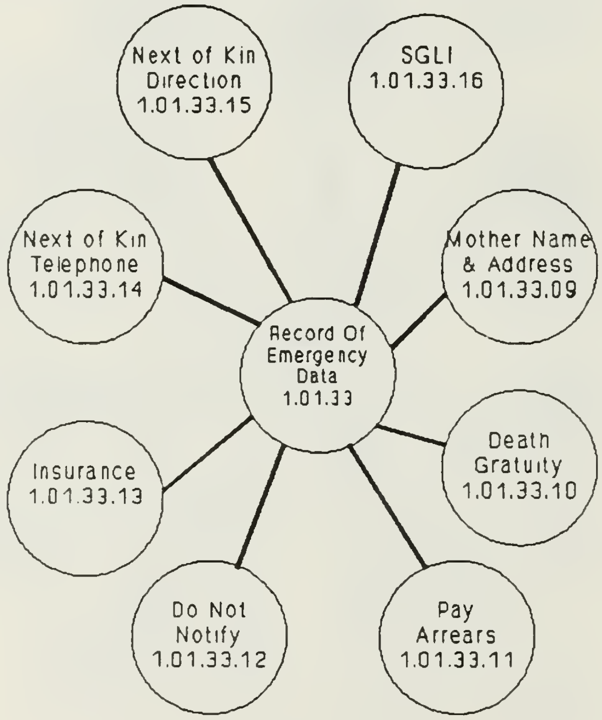
Level 2 JOIN Event

See Appendix B, Page B-6.



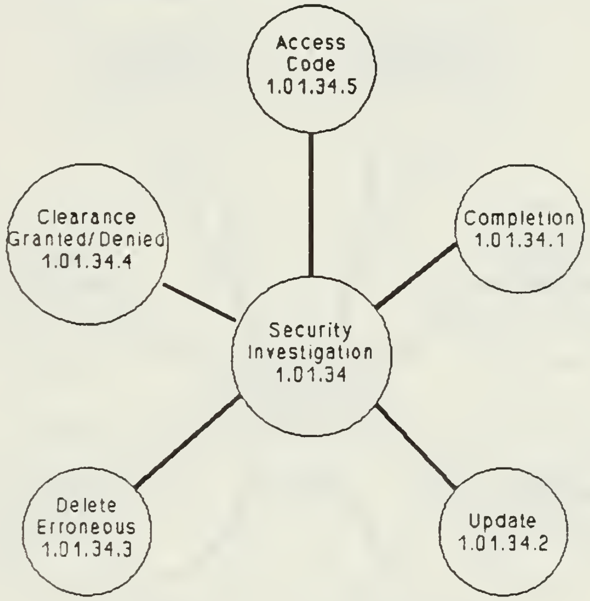
Level 3 JOIN Event (Part 1 of 2)

See Appendix B, Page B-4.



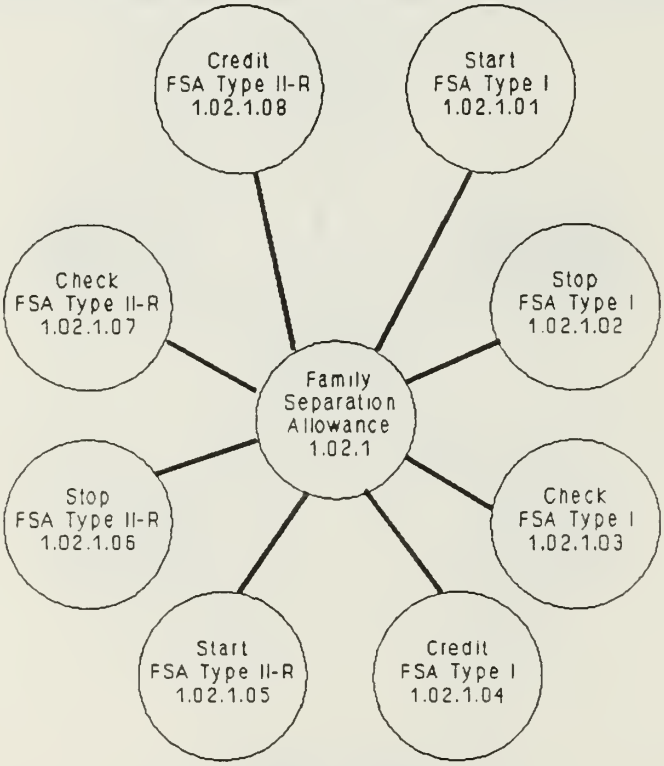
Level 3 JOIN Event (Part 2 of 2)

See Appendix B, Page B-4.



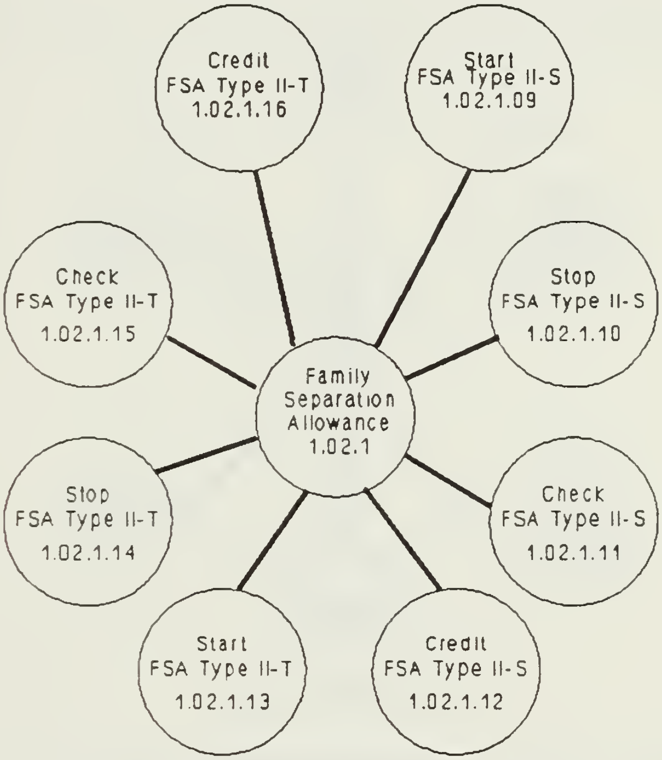
Level 3 JOIN Event

See Appendix B, Page B-4.



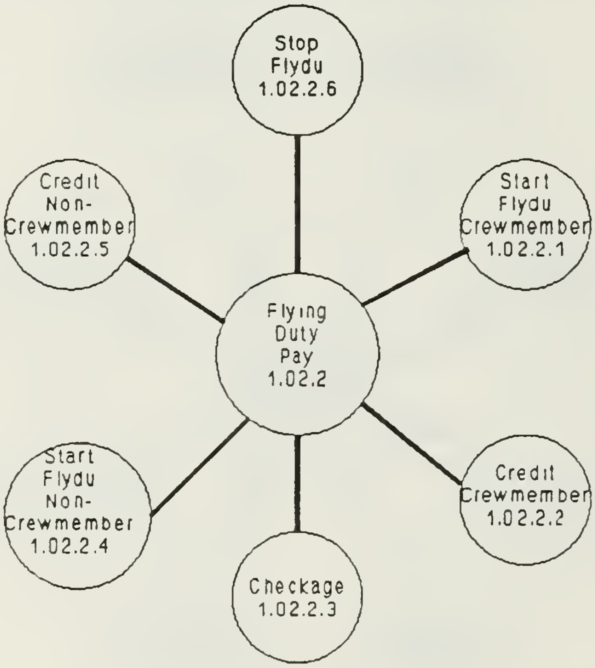
Level 3 JOIN Event (Part 1 of 2)

See Appendix B, Page B-7.



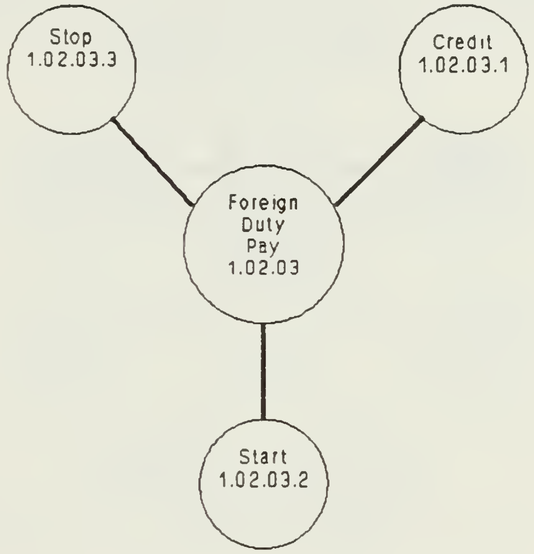
Level 3 JOIN Event (Part 2 of 2)

See Appendix B, Page B-7.



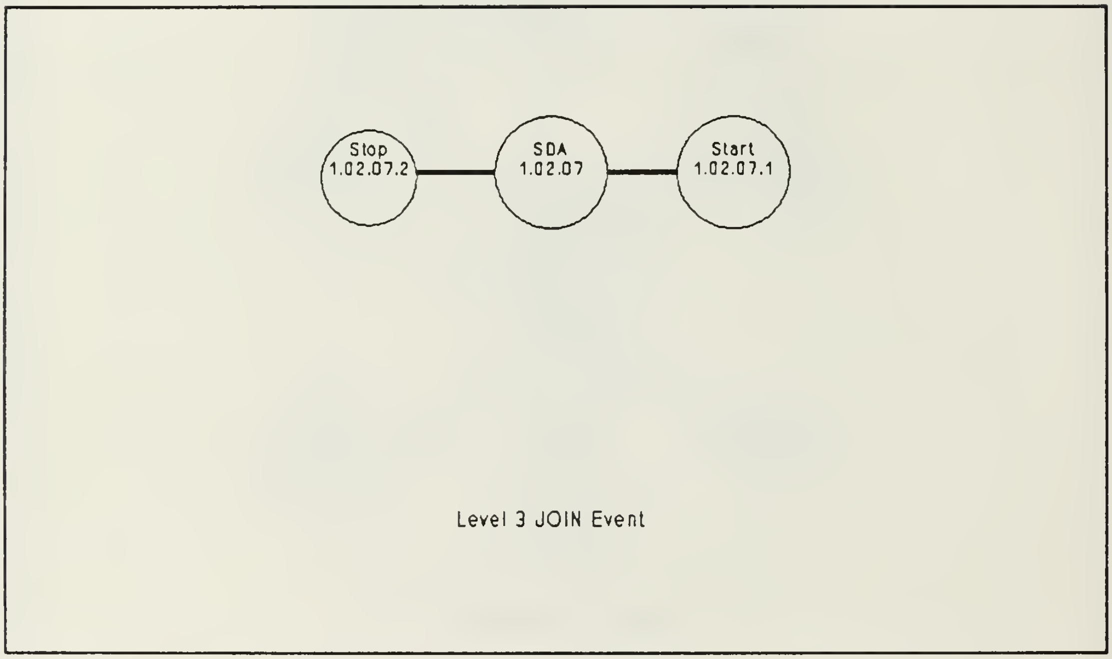
Level 3 JOIN Event

See Appendix B, Page B-7.

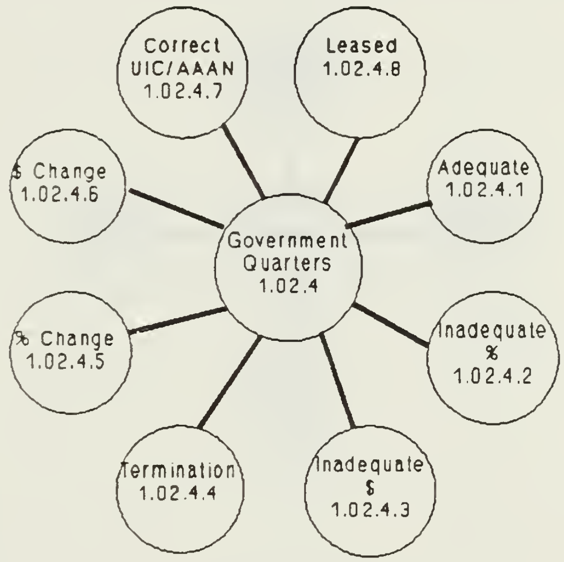


Level 3 JOIN Event

See Appendix B, Page B-7.

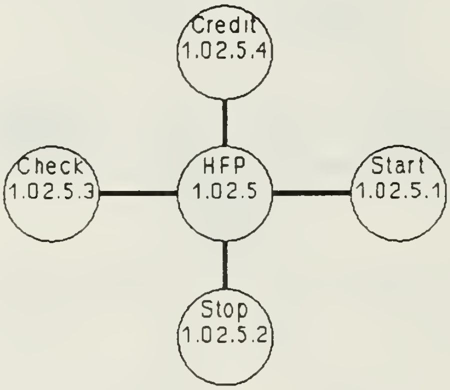


See Appendix B, Page B-7.



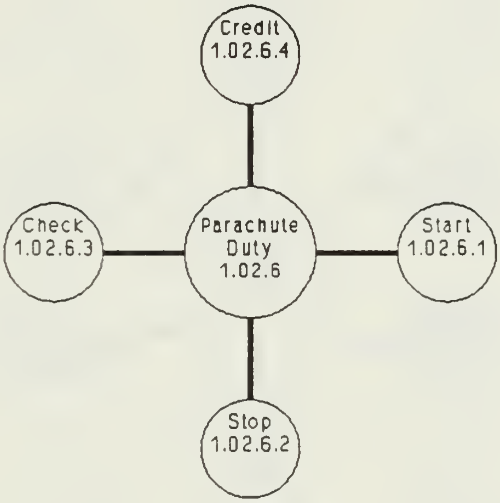
Level 3 JOIN Event

See Appendix B, Page B-7.



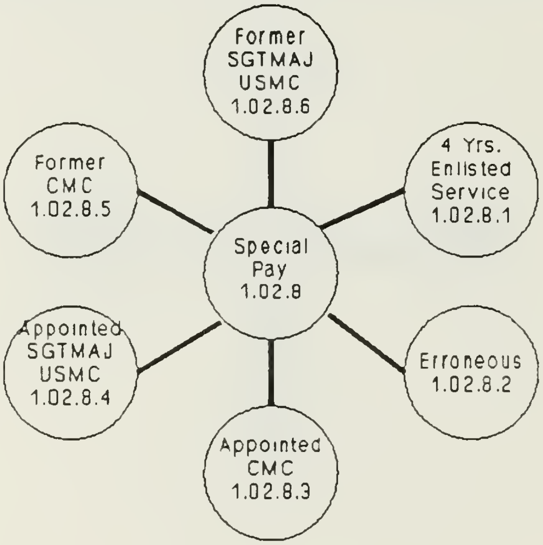
Level 3 Join Event

See Appendix B, Page B-7.



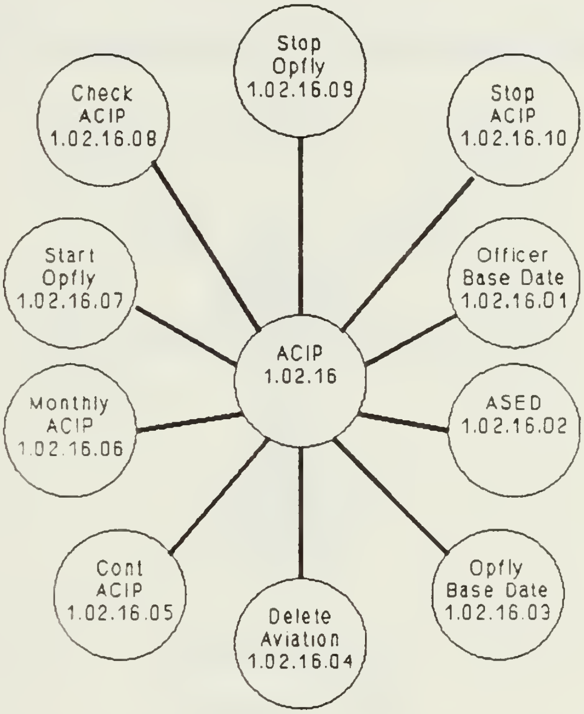
Level 3 Join Event

See Appendix B, Page B-7.



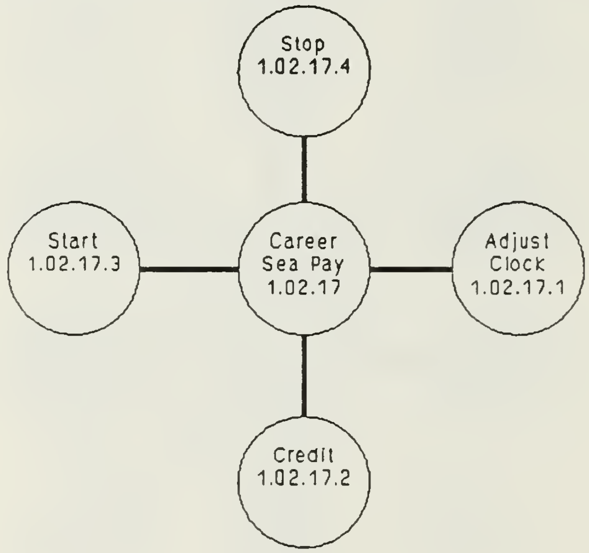
Level 3 JOIN Event

See Appendix B, Page B-7.



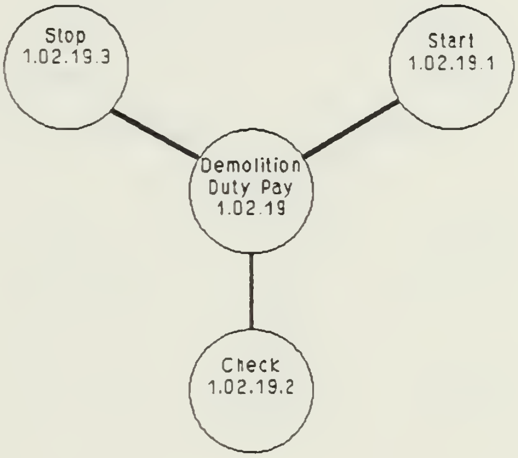
Level 3 JOIN Event

See Appendix B, Page B-5.



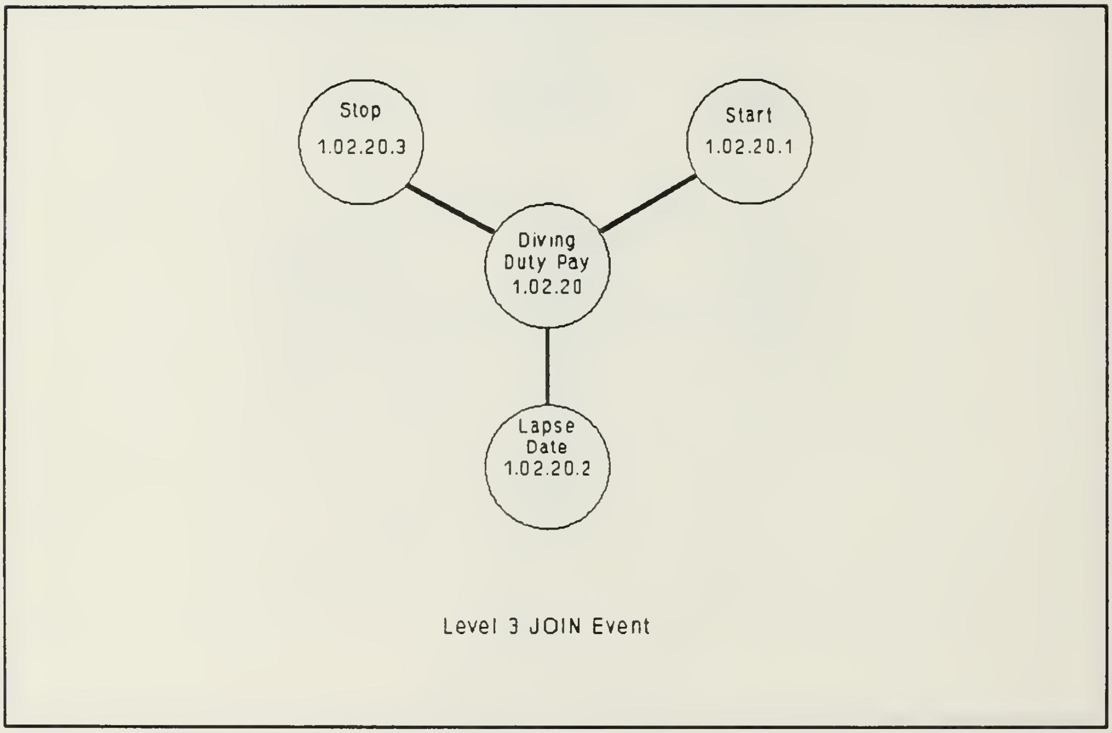
Level 3 JOIN Event

See Appendix B, Page B-5.

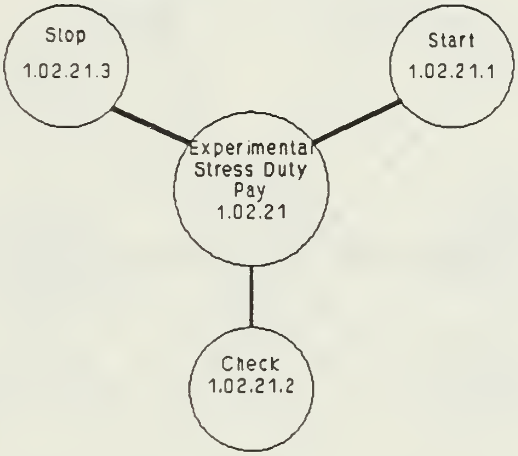


Level 3 JOIN Event

See Appendix B, Page B-5.

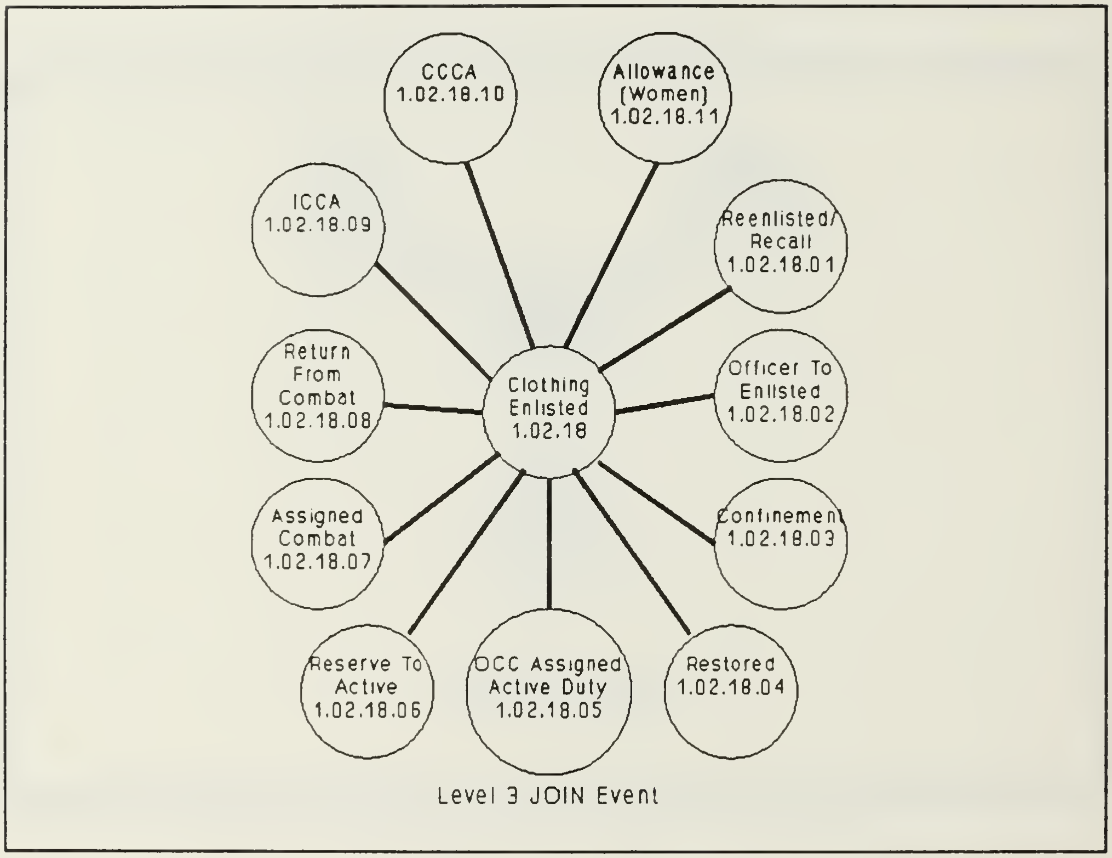


See Appendix B, Page B-5.



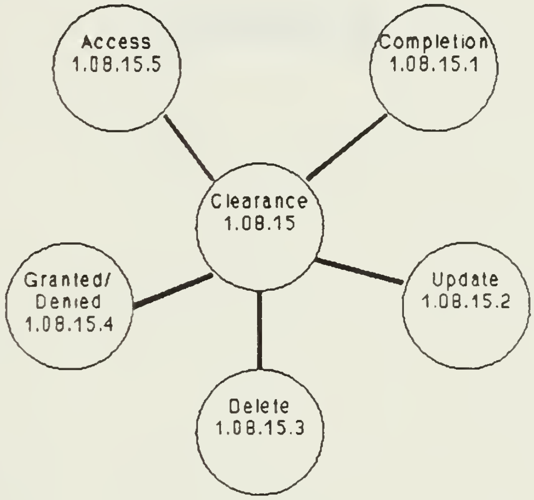
Level 3 JOIN Event

See Appendix B, Page B-5.



Level 3 JOIN Event

See Appendix B, Page B-5.



Level 3 JOIN Event

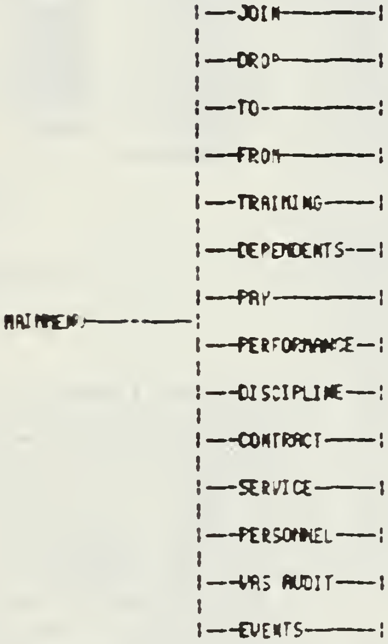
See Appendix B, Page B-4.

Appendix B

Screen Maps

The diagrams contained in this appendix are taken from the REAL FAMMIS Event Reporting document prepared by Planning Analysis Corporation. They are included here for ready reference and correlation with Appendix A.

MANPOWER SCREEN MAPPING



Screen Mapping (Page 1 of 27)

```
                              JOIN

                            |----DUTY STATUS-----------------------|
                            |----STRENGTH CATEGORY-----------------|
                            |----INDIVIDUAL LOCATION---------------|
                            |----RTD-------------------------------|
                            |----ADBD------------------------------|
                            |----ADT-------------------------------|
                            |----BARRACKS NUMBER-------------------|
                            |----BILLET DESCRIPTION----------------|
                            |----BILMOS----------------------------|    |--(460000)      (091000)
                            |----COMBAT SERVICE CODE---------------|    |--(112000)      (097000)
                            |----ARRIVED CONUS NOT RESTRICTED------|    |--(135000)      (097002)
                            |----ARRIVED CONUS RESTRICTED----------|    |--(198000)      (171000)
                            |----DCTB------------------------------|    |--(085000)      (499014)
                            |----LAST COMBAT TOUR------------------|    |--(033000)      (493019)
                            |----DEPLOYMENT STATUS-----------------|    |--(499003)      (272000)
                            |----GEO-LOCATION----------------------|----|--(177000)      (176000)
                            |----DEPENDENTS LOCATION---------------|    |--(152001)      (477000)
                            |----DUTY SECTION----------------------|    |--(072000)      (470000)
                            |----FORMAL SCHOOL---------------------|    |--(071000)      (265000)
                            |----INTENDED MOS----------------------|    |--(074000)      (263000)
                            |----HOME ADDRESS----------------------|    |--(120001)      (493004)
                            |----LOCAL SCHOOL----------------------|    |--(422000)      (478000)
                            |----MARITAL STATUS--------------------|    |--(417000)      (499002)
                            |----MOS-------------------------------|    |--(499021-028)
                            |----SDPI------------------------------|
MAIN MENU--|--JOIN----|PER-----|----PLATOON NUMBER--------------------|
                  CHECKLIST|----PEM-------------------------------|
                            |----RCM-------------------------------|
                            |----T/O LINE NUMBER-------------------|
                            |----DEPLOYED SDPI---------------------|
                            |----WORK SECTION----------------------|
                            |----WORK PHONE------------------------|
                            |
                            |                                      |-- SPOUSE NAME & ADDRESS-----|
                            |                                      |-- 1ST CHILD-----------------|
                            |                                      |-- 2ND CHILD-----------------|
                            |                                      |-- 3RD CHILD-----------------|
                            |                                      |-- 4TH CHILD-----------------|
                            |                                      |-- 5TH CHILD-----------------|
                            |                                      |-- 6TH CHILD-----------------|    |--(043000-014)
                            |                                      |-- FATHER NAME & ADDRESS-----|    |--(044000-030)
                            |----RECORD OF EMERGENCY DATA----------|-- MOTHER NAME & ADDRESS-----|----|--(045000-004)
                            |                                      |-- DEATH GRATUITY------------|    |--(046000)
                            |                                      |-- PAY ARREARS---------------|    |--(047000)
                            |                                      |-- DO NOT NOTIFY-------------|
                            |                                      |-- INSURANCE-----------------|
                            |                                      |-- NEXT OF KIN TELEPHONE-----|
                            |                                      |-- NEXT OF KIN DIRECTION-----|
                            |                                      |-- SGLI----------------------|
                            |
                            |                                      |-- COMPLETION----------------|    |--(168000-003)
                            |                                      |-- UPDATE--------------------|    |--(172000-003)
                            |----SECURITY INVESTIGATION------------|-- DELETE ERRONEOUS----------|----|--(185000-003)
                                                                   |-- CLEARANCE GRANTED/DENIED--|    |--(169000-007)
                                                                   |-- ACCESS CODE---------------|    |--(499017)
```

Screen Mapping (Page 2 of 27)

```
                                              JOIN

                   |----COMMUTED RATIONS--------------|
                   |----BAQ---------------------------|   |--(322000-001)
                   |----BAS---------------------------|   |--(187000-001)
                   |----DSSM--------------------------|---|--(187007)
                   |----ENLISTMENT BONUS--------------|   |--(187010-015)
                   |----TIME LOST---------------------|
                   |----VHA---------------------------|
                   |
                   |
                   |                                  |-- OFFICER BASE DATE--------|
                   |                                  |-- ASED---------------------|
                   |                                  |-- OPFLY BASE DATE----------|
                   |                                  |-- DELETE AVIATION----------|   |--(130009)  (464000)
                   |                                  |-- CONT ACIP----------------|   |--(295001)  (129001)
                   |----ACIP--------------------------|-- MONTHLY ACIP-------------|---|--(456000)  (465000)
                   |                                  |-- START OPFLY--------------|   |--(467000)  (131001)
                   |                                  |-- CHECK ACIP---------------|   |--(130001)
                   |                                  |-- STOP OPFLY---------------|
                   |                                  |-- STOP ACIP----------------|
                   |
                   |                                  |-- ADJUST CLOCK-------------|   |--(188000)
                   |                                  |-- CREDIT-------------------|   |--(147000)
                   |----CAREER SEA PAY----------------|-- START--------------------|---|--(139001)
EN)--|--JOIN--|PAY-----|                              |-- STOP---------------------|   |--(173000)
          CHECKLIST|
                   |                                  |-- REENLISTED/RECALL--------|
                   |                                  |-- OFFICER TO ENLISTED------|
                   |                                  |-- CONFINEMENT--------------|
                   |                                  |-- RESTORED-----------------|
                   |                                  |-- OCC ASSIGNED ACTIVE DUTY--|
                   |----CLOTHING ENLISTED-------------|-- RESERVE TO ACTIVE--------|---|--(305001-005) (301001-002)
                   |                                  |-- ASSIGNED COMBAT----------|
                   |                                  |-- RETURN FROM COMBAT-------|
                   |                                  |-- ICCA---------------------|
                   |                                  |-- CCCA---------------------|
                   |                                  |-- ALLOWANCE (WOMEN)--------|
                   |
                   |                                  |-- START--------------------|   |--(130000)
                   |----DEMOLITION DUTY PAY-----------|-- CHECK--------------------|---|--(129000)
                   |                                  |-- STOP---------------------|   |--(131000)
                   |
                   |                                  |-- START--------------------|   |--(144002)
                   |----DIVING DUTY PAY---------------|-- LAPSE DATE---------------|---|--(148000)
                   |                                  |-- STOP---------------------|   |--(145001)
                   |
                   |                                  |-- START--------------------|   |--(129003-007)
                   |----EXPERIMENTAL STRESS DUTY PAY--|-- CHECK--------------------|---|--(130004-007)
                                                      |-- STOP---------------------|   |--(130011)
                                                                                       |--(131004-008)
```

Screen Mapping (Page 3 of 27)

```
        JOIN

                  |------REGULAR DUTY--------|   |-(020000-016)     (021000-003)      (021085-091)
        |---REPORTING--|------REGULAR DUTY IADT----|---|-(020018-041)     (021005)          (021094)
        |   IN PERSON  |------TEMPORARY DUTY-------|   |-(020043-044)     (021007-016)      (021096-097)
        |              |------TEMPORARY DUTY IADT--|   |-(020046-047)     (021072-081)
        |
        |              |------REGULAR DUTY--------|   |(022000-012)      (022039)
        |---INITIAL----|                          |---|(022015)          (022041)
        |   JOIN       |------REGULAR DUTY IADT---|   |(022030-031)      (022047-049)
        |
        |   RETURN     |------REGULAR DUTY--------|   |(021037-042)      (021066)          (021104)
        |---FROM-------|                          |---|(021045-056)      (021069-071)
        |   DESERTION  |------TEMPORARY DUTY------|   |(021056-063)      (021098-099)
        |
        |---SERVICE----|-(021000-001) (021018-024) (021026-036) (021098) (021101-104) (020045)
        |   RECORD
        |
        |---FAP--------|-(032000)
        |
        |              |------JOIN----------------|   |-------(020007)   (083000)
        |              |------NAME----------------|   |-------(236000)   (423000-001)
MAIN MENU--|--JOIN-----|              |------ACBD----------------|   |-------(079000)
        |              |------DCTB----------------|   |-------(074000)
        |   CIVILIAN   |------CIV EDUCATION-------|   |-------(151000)
        |   OTHER      |------DUTY STATUS---------|---|-------(460000)
        |---SERVICE/---|------EAS-----------------|   |-------(077000)
        |   COUNTRY    |------IND LOCATION--------|   |-------(135000)
        |   PERSONNEL  |------MARITAL STATUS------|   |-------(272000)
        |              |------MCS-----------------|   |-------(178000)
        |              |------PAY GRADE-----------|   |-------(067000)
        |              |------RACE/SEX------------|   |-------(163000)
        |              |
        |              |                              |---------COMPLETION--------|   |-(168000-003)
        |              |                              |---------UPDATE------------|   |-(172000-003)
        |              |------CLEARANCE-----------|---|---------DELETE------------|---|-(185000-003)
        |              |                              |---------GRANTED/DENIED----|   |-(169000-007)
        |              |                              |---------ACCESS------------|   |-(499017)
        |              |
        |              |------# OF DEPENDENTS-----|---|-------(423000)
        |              |------FORMAL SCHOOL-------|---|-------(083000)
        |
        |              |------TAD-----------------|---|-------(031006)
        |              |------FORMAL SCHOOL-------|---|-------(031007)
        |---ATTACHMENT-|------RETURNED ABSENTEE---|---|-------(031000)
        |              |------AWAITING TRANS------|---|-------(031002)
        |              |------NOT INDICATED-------|---|-------(031004)
        |
        |              |------ERRON RETIREMENT----|
        |---ERRONEOUS--|------ERRON RET DATE------|---|-------(069000-001)
            SEPARATION |------ERRON SEPARATION----|   |-------(076000)
                       |------ERRON SEP DATE------|
```

Screen Mapping (Page 4 of 27)

```
JOIN

                                                       |-- START FSA TYPE I ------------|
                                                       |-- START FSA TYPE II-R ---------|
                                                       |-- START FSA TYPE II-S ---------|
                                                       |-- START FSA TYPE II-T ---------|
                                                       |-- STOP FSA TYPE I -------------|
                                                       |-- STOP FSA TYPE II-R ----------|
                                                       |-- STOP FSA TYPE II-S ----------|      |--(189000-003)
                                                       |-- STOP FSA TYPE II-T ----------|      |--(190000-003)
                          |----FAMILY SEPARATION ALLOWANCE----|-- CHECK FSA TYPE I ------------|------|--(098000-003)
                          |                            |-- CHECK FSA TYPE II-R ---------|      |--(097000-003)
                          |                            |-- CHECK FSA TYPE II-S ---------|
                          |                            |-- CHECK FSA TYPE II-T ---------|
                          |                            |-- CREDIT FSA TYPE I -----------|
                          |                            |-- CREDIT FSA TYPE II-R --------|
                          |                            |-- CREDIT FSA TYPE II-S --------|
                          |                            |-- CREDIT FSA TYPE II-T --------|
                          |
MAIN MENU--|--JOIN---|PAY-----|                        |-- START FLYDU CREWMEMBER ----|--------(130009)
             CHECKLIST|                                |-- CREDIT CREWMEMBER ---------|--------(127001)
                          |----FLYING DUTY PAY---------|-- CHECKAGE ------------------|--------(129001)
                          |                            |-- START FLYDU NON CREWMEMBER|--------(130010)
                          |                            |-- CREDIT NONCREWMEMBER ------|--------(131001)
                          |                            |-- STOP FLYDU ----------------|--------(127002)
                          |
                          |                            |-- START ---------------------|--------(136000)
                          |----FOREIGN DUTY PAY--------|-- STOP ----------------------|--------(175000)
                          |                            |-- CREDIT --------------------|--------(125004)
                          |
                          |                            |--ADEQUATE -------------------|
                          |                            |--INADEQUATE % ---------------|
                          |                            |--INADEQUATE $ ---------------|      |--(187037-038)
                          |----GOVERNMENT QTRS---------|--TERMINATION ----------------|------|--(187016-017)
                          |                            |--% CHANGE -------------------|      |--(186002-003)
                          |                            |--$ CHANGE -------------------|      |--(184000)
                          |                            |--CORRECT UIC/AARN -----------|
                          |                            |--LEASED ---------------------|
                          |
                          |                            |--START ----------------------|      |--(293001)
                          |----HFP---------------------|--STOP -----------------------|------|--(294001)
                          |                            |--CHECK ----------------------|      |--(236001)
                          |                            |--CREDIT ---------------------|      |--(297001)
                          |
                          |                            |--START ----------------------|      |--(130003)
                          |----PARACHUTE DUTY----------|--CHECK ----------------------|------|--(129002)
                          |                            |--CREDIT ---------------------|      |--(127003)
                          |                            |--STOP -----------------------|      |--(131003)
                          |
                          |                            |--START ----------------------|      |--(233000-004)
                          |----SDA---------------------|                              |------|--(233008-012)
                          |                            |--STOP -----------------------|      |--(235000)
                          |
                          |                            |--4 YRS ENLISTED SERVICE -----|
                          |                            |--ERRONEOUS ------------------|
                          |----SPECIAL PAY-------------|--APPOINTED CMC --------------|------|--(128000-005)
                                                       |--APPOINTED SGTMAJ USMC ------|
                                                       |--FORMER CMC -----------------|
                                                       |--FORMER SGTMAJ USMC ---------|
```

Screen Mapping (Page 5 of 27)

DROP

```
                                                   |-TRANSFER WITHIN THE SAME MONITORED-|
                                                   |    COMMAND                         |
                                                   |-TRANSFER BETWEEN MONITORED COMMANDS|   |---(064000-009)
                                                   |    NO TEMPORARY DUTY EN-ROUTE      |   |---(066000-002)
                                                   |-TRANSFER BETWEEN MONITORED COMMANDS|   |---(062000-012)
                                                   |    WITH TEMPORARY DUTY EN-ROUTE    |   |---(067000-014)  (068000-008)
                  |-TRANSFERS OF OFFICERS AND ENLISTED---|-REASSIGNMENT BETWEEN MONITORED------|---|---(096000-003)  (096005-026)
                  |                                |    COMMANDS INVOLVING PCS          |   |---(063000-002)  (065000-005)
                  |                                |-TRANSFER BY SERVICE RECORD WITHIN--|   |---(060000)      (065006-013)
                  |                                |    SAME MONITORED COMMAND          |   |---(060000)      (061000-005)
                  |                                |-TRANSFER BY SERVICE RECORD OUTSIDE-|   |---(059000-016)  (061002)
                  |                                |    PRESENT MONITORED COMMAND       |   |---(063000-002)  (061007-009)
                  |                                |-TRANSFER OF CIVILIAN OR PERSON OF--|
                  |                                |    ANOTHER MILITARY SERVICE/COUNTRY|
                  |                                |
                  |-RELEASE FROM ACTIVE DUTY ------------|-(078000)
                  |
                  |
                  |                                |-DESERTION--------------------------|
                  |                                |-DISCHARGE OF ENLISTED--------------|
MAINMENU-|-DROP--|                                 |-TRANSFER FMCF OFFICER OR ENLISTED--|   |---(091000)
                  |-SEPARATION OF OFFICER AND ENLISTED---|-TRANSFER FMCF OFFICER OR ENLISTED--|   |---(035000)
                  |                                |    REMAINING ON ACTIVE DUTY--------|---|---(078000-001)
                  |                                |-RESIGNATION/DISCHARGE OFFFICER-----|   |---(077000)
                  |                                |-DEATH OF OFFICER OR ENLISTED-------|   |---(158000)
                  |                                |-RETIREMENT OF OFFICER OR ENISTED---|
                  |
                  |
                  |-RECRUITER ENLISTED AIDES AUTHORIZED--|-(058000)
                  | FURTHER ACTIVE DUTY
                  |
                  |
                  |-ATTACHMENT TERMINATED----------------|-(461000)
                  |
                  |
                  |-TERMINATE FLEET ASSISTANCE PROGRAM---| (462000)
                  | (FAP) STATUS
                  |
                  |                                |-ERRONEOUS RETIREMENT---------------|
                  |-ERRONEOUS SEPARATION-----------------|-ERRONEOUS RETIREMENT DATA----------|---|---(069000-001)
                                                   |-ERRONEOUS SEPARATION---------------|   |---(078000)
                                                   |-ERRONEOUS SEPARATION DATA----------|
```

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TO

```
                                  |----COMPUTED RATIONS-----|
                                  |----BAQ------------------|
                                  |----VHA------------------|   |--(166000)  (142000)
                                  |----BAS------------------|   |--(187007)  (338000)
                                  |----CLOTHING COMBAT------|---|--(187000-001)
                                  |----CLOTHING FR COMBAT---|   |--(187010-015)
                                  |----CLOTHING CONFINEMENT-|   |--(301001-002)
                                  |----TIME LOST------------|   |--(305005)
                                  |----252 BASIC PAY--------|
                                  |
                                  |                             |----START FSA TYPE I-----|
                                  |                             |----START FSA TYPE II-R--|
                                  |                             |----START FSA TYPE II-S--|
                                  |                             |----START FSA TYPE II-T--|
                                  |                             |----STOP FSA TYPE I------|
                                  |                             |----STOP FSA TYPE II--R--|
                                  |                             |----STOP FSA TYPE II--S--|
                                  |                             |----STOP FSA TYPE II--T--|   |(190000-003)
                                  |----FSA------------------|---|----CHECK FSA TYPE I-----|---|(189000-003)
                                  |                             |----CHECK FSA TYPE II-R--|   |(398000-003)
                                  |                             |----CHECK FSA TYPE II-S--|   |(397000-003)
                                  |                             |----CHECK FSA TYPE II-T--|
                                  |                             |----CREDIT FSA TYPE I----|
                                  |                             |----CREDIT FSA TYPE II-R-|
                                  |                             |----CREDIT FSA TYPE II-S-|
                                  |                             |----CREDIT FSA TYPE II-T-|
                                  |
                                  |                             |----CORRECT/ADJUST-------|   |(188000)
                                  |----CAREER SEA PAY-------|---|----CREDIT---------------|---|(147000)
                                  |                             |----START----------------|   |(139001)
EMU---|-TO----|--PAY CHECKLIST--|-|                             |----STOP-----------------|   |(173000)
                                  |
                                  |                             |----START----------------|   |(130000)
                                  |----DEMOLITION DUTY PAY--|---|----CHECK----------------|---|(129000)
                                  |                             |----STOP-----------------|   |(131000)
                                  |
                                  |                             |----START----------------|   |(144002)
                                  |----DIVING DUTY PAY------|---|----CHECK----------------|---|(148000)
                                  |                             |----STOP-----------------|   |(145001)
                                  |
                                  |                             |----START----------------|   |(129003-007)
                                  |----STRESS DUTY PAY------|---|----LAPSE DATE-----------|---|(130004-007)
                                  |                             |----STOP-----------------|   |(130011)      (131004-008)
                                  |
                                  |
                                  |                             |----START CREWMEMBER-----|
                                  |                             |----CREDIT CREWMEMBER----|   |(127001-002)
                                  |----FLYING DUTY PAY------|---|----CHECK----------------|---|(130009-010)
                                  |                             |----START NONCREWMEMBER--|   |(129001)
                                  |                             |----CREDIT NONCREWMEMBER-|   |(130010)      (131001)
                                  |                             |----STOP-----------------|
                                  |
                                  |                             |----START----------------|   |(136000)
                                  |----FOREIGN DUTY PAY-----|---|----STOP-----------------|---|(175000)
                                  |                             |----CHECK----------------|   |(125004)
                                  |
                                  |                             |----START----------------|   |(293001)
                                  |----HOSTILE FIRE PAY-----|---|----STOP-----------------|---|(294001)
                                                                |----CHECK----------------|   |(236001)
                                                                |----CREDIT---------------|   |(297001)
```

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```
            TO
                                   |--START----------------|   |(130003)
                  |---PARACHUTE DUTY PAY--|--|--CHECK----------------|---|(129002)
                  |                        |--CREDIT---------------|   |(127003)
                  |                        |--STOP-----------------|   |(131013)
     |--PAY CHECKLIST---|-----|
     |            |                        |--START----------------|   |(235000)
     |            |---SPECIAL DUTY PAY-----|--|--STOP-----------------|---|(233000-004)   (233008-012)
     |            |
     |            |                        |--ADEQUATE-------------|
     |            |                        |--INADEQUATE 2---------|
     |            |                        |--INADEQUATE $---------|   |(187016-017)
     |            |---GOVERNMENT QTRS------|--|--TERMINATION----------|---|(187037-039)
     |            |                        |--PERCENTAGE CHANGE----|   |(186002-003)
     |            |                        |--DOLLAR CHANGE--------|   |(184000)
     |            |                        |--CORRECT UIC/AAAN-----|
     |            |                        |--GOVT LEASED----------|
     |
     |            |---DUTY STATUS------------|   |--(460000)
     |            |---STRENGTH CATEGORY------|   |--(112000)
     |            |---INDIVIDUAL LOCATI------|   |--(135000)
     |            |---RTD--------------------|   |--(198000)
     |            |---ADT--------------------|   |--(033000)
     |            |---BILLET DESCRIPTION-----|   |--(177000)
     |            |---BILMOS-----------------|   |--(152001)
     |            |---COMBAT SERVICE CODE----|   |--(072000)
MAINMENU--|-TO----|   |---ARRIVED US NOT RES-----|   |--(071000)
     |            |---DAUSDR-----------------|   |--(120001)
     |            |---LAST COMBAT TOUR-------|---|--(422000)
     |            |---DSC/DSR----------------|   |--(417000)
     |            |---DGLC-------------------|   |--(091000)
     |            |---DEPENDENTS LOCATION----|   |--(097000)
     |            |---DUTY SECTION-----------|   |--(097002)
     |            |---FORMAL SCHOOL----------|   |--(499014)
     |            |---LOCAL HOME ADDRES------|   |--(499019)
     |            |---LOCAL SCHOOL-----------|   |--(176000)
     |            |---MOS--------------------|   |--(470000)
     |            |---PLATOON NUMBER---------|   |--(499021)
     |            |---T/O LINE NUMBER--------|   |--(499028)
     |--PER CHECKLIST---|-----|---WORK STATION-----------|   |--(499002-004)
                  |---WORK PHONE-------------|   |--(499022-026)
                  |
                  |                        |--SPOUSE NAME----------|
                  |                        |--1ST CHILD------------|
                  |                        |--2ND CHILD------------|
                  |                        |--3RD CHILD------------|
                  |                        |--4TH CHILD------------|
                  |                        |--5TH CHILD------------|   |(343000-014)
                  |                        |--6TH CHILD------------|   |(344000-034)
                  |---RED------------------|--FATHER'S NAME--------|---|(345000-004)
                  |                        |--MOTHER'S NAME--------|   |(346000)
                  |                        |--DEATH GRATUITY-------|   |(347000)
                  |                        |--PAY ARREARS----------|
                  |                        |--DO NOT NOTIFY--------|
                  |                        |--INSURANCE------------|
                  |                        |--NEXT OF KIN----------|
                  |                        |--DIRECTIONS-----------|
                  |                        |--SGLI-----------------|
                  |
                  |                        |--COMPLETION-----------|   |(168000-003)
                  |                        |--UPDATE---------------|   |(172000-003)
                  |---SECURITY INVESTIGATION--|--DELETE---------------|---|(185000-003)
                                           |--GRANTED/DENIED-------|   |(169000-007)
                                           |--ACCESS CODE----------|   |(499017)
```

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```
                   TO

                              |---EXCESS ATTACHED------:    |-(106000-001) (419000)
                |----TAD------:---EXCESS NOT ATTACHED--:----|-(335000)  (460000)
                |             |---EXCESS SCHOOL--------:    |-(112000)  (171000)
                |
                |----FAP------|-(306000)  (335000)
                |----PLATOON--|-(470000)  (335000)
                |
                |             |---HOSPITALIZED LV------|
                |             |---HOSPITALIZED---------:    |-(104000-013)
                |----SICK-----:---SICK DISPENSARY------:----|-(115020-022)
                |             |---SICK QUARTERS--------:    |-(115024-029)
                |             |---SICK OTHER-----------:
                |
                |             |---ABSENT LESS 24 HRS---:    |-(279000-011)
                |----UA-------:---FAILED RETURN LV-----:----|-(115020-022)
                |             |---ABSENT OVER 24 HRS---:    |-(115024-029)
                |
MAINMENU--TO----:             |---REMAIN---------------:----|-(113000-001)
                |----PEB------:---ORDERED HOME---------:
                |
                |             |---CONFINED-------------:    |-(310000-009)  (112000)
                |----CONFINEMENT--|---STATUS CHANGE----:----|-(335000)  (460000)
                |
                |----UA-------|---UA EXCUSED SAME DAY--:----|-(280000-002, 321000-001)
                |             |---PREV EXCUSED---------:
                |             |---PREV EXCUSED SAME DAY:
                |
                |             |---ON LIBERTY-----------:    |-(281000-001)
                |----IHCA-----|---ON LEAVE-------------:----|-(115020-022)
                |             |---WHILE UA-------------|    |-(115024-029)
                |             |---DELIVERED------------:
                |
                |             |---ON LIBERTY-----------:    |-(291000-001)
                |----IHFA-----|---ON LEAVE-------------|    |-(115021-022)
                |             |---WHILE UA-------------:----|-(115024-029)
                |             |---DELIVERED------------:    |-(150000)
                |             |---STATUS CHANGE--------:
                |
                |----MILAF----|-(338000)
                |----MISSING--:-(223000) (220000) (227000) (225000) (229000)
                |
                |             |---IN SICK STATUS-------:    |-(394000)
                |----SICK MISCONDUCT--|---AFTER SICK STATUS---:----|-(396000)
                |
                |             |---ASSIGNED TO----------:    |-(337000)
                |----WEIGHT CONTROL---:---EXTENDED ON--:----|-(337001)
                |
                |----APPELLATE LEAVE--:-(061001)
                |----ADMINISTRATIVE LV-:-(061000)
                |----EXCESS LAW LEAVE--:-(110000)
```

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```
                     FROM

                  |----TAD NOT ATTACHED-----|     |--(460000)  (107000)
         |----TAD-------------------|             |----|--(112000)  (167000)
         |                          |----TAD ATTACHED---------|     |--(325000)  (137000)
         |
         |----FAP-------------------|     |--(307000)  (339002)  (221000)
         |----SICK------------------|     |--(105000)  (177000)
         |----PED-------------------|-----|--(112000)  (395000)
         |----MILAP-----------------|     |--(460000)  (339000)
         |----MISSING---------------|     |--(135000)  (224000)
         |----SICK MISCONDUCT-------|
         |
         |                          |----ANNUAL LEAVE-----------|
         |                          |----LEAVE OVERSEAS---------|
         |                          |----EMERGENCY OVERSEAS-----|
         |                          |----EMERGENCY LV-----------|
         |                          |----SICK LEAVE-------------|
         |                          |----SICK LV OVERSEAS-------|
         |----LEAVE-----------------|----SPEC LV OVERSEAS-------|----|--(115020-022)  (115024-029)
         |                          |----EXCESS LEAVE-----------|     (378000)
         |                          |----EXCESS LEAVE OVERSEAS|
         |                          |----SEPARATION LEAVE-------|
MAINMENU----|FROM----|                |----APPELLATE LEAVE--------|
         |                          |----ADMIN LEAVE------------|
         |                          |----EXCESS LEAVE LAW-------|
         |
         |                          |----UA---------------------|
         |                          |----UA SAME DAY------------|
         |                          |----UA EXCUSED-------------|
         |----UA--------------------|----UA EXCUSED SAME DAY----|----|--(280000-002)  (321000-001)
         |                          |----PREV EXCUSED-----------|
         |                          |----PREV EXCUSED SAME DAY|
         |
         |                          |----ACQUITTED--------------|     |--(313001)  (135000)  (322000)
         |----CONFINEMENT-----------|----CHARGES DROPPED--------|----|--(112000)  (313002)  (198000)
         |                          |----EXPIRATION-------------|     |--(460000)  (313000)
         |
         |                          |----IHCA EXCUSED-----------|
         |----IHCA------------------|----IHCA NOT EXCUSED-------|----|--(262001-002)
         |                          |----IHCA EXCUSED/NOT-------|     |--(314000-001)
         |                          |----IHCA WHILE UA----------|
         |
         |                          |----IHFA EXCUSED-----------|     |--(322000)
         |----IHFA------------------|                           |----|--(292000-001)
                                    |----IHFA NOT EXCUSED-------|     |--(460000)  (112000)
```

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FROM

```
                               |---TAD RATIONS---------|
                               |---STOP TAC RATIONS----|
                               |---VHA-----------------|      |--(325000)  (142000)
                               |---START COMRATS-------|      |--(167000)  (301001)
                               |---START BAS------------|-----|--(322000-001)
                               |---CLOTHING COMBAT-----|      |--(388001)  (305005)
                               |---CLOTHING FR COMBAT--|      |--(137000)  (305003)
                               |---CLOTHING CONFINEMENT-|
                               |---TIME LOST-----------|
                               |
                               |                              |----START FSA TYPE I-------|
                               |                              |----START FSA TYPE II-R----|
                               |                              |----START FSA TYPE II-S----|
                               |                              |----START FSA TYPE II-T----|
                               |                              |----STOP FSA TYPE I--------|
                               |                              |----STOP FSA TYPE II-R-----|
                               |                              |----STOP FSA TYPE II-S-----|
                               |                              |----STOP FSA TYPE II-T-----|    |(190000-003)
                               |---FSA-----------------|------|----CHECK FSA TYPE I-------|----|(189000-003)
                               |                              |----CHECK FSA TYPE II-R----|    |(398000-003)
                               |                              |----CHECK FSA TYPE II-S----|    |(397000-003)
                               |                              |----CHECK FSA TYPE II-T----|
                               |                              |----CREDIT FSA TYPE I------|
                               |                              |----CREDIT FSA TYPE II-R---|
                               |                              |----CREDIT FSA TYPE II-S---|
                               |                              |----CREDIT FSA TYPE II-T---|
                               |
                               |                              |----CORRECT/ADJUST---------|    |(188000)
                               |---CAREER SEA PAY------|------|----CREDIT-----------------|----|(147000)
                               |                              |----START------------------|    |(139001)
(MENU)----|FROM----|--PAY CHECKLIST--|----|                   |----STOP-------------------|    |(173000)
                               |
                               |                              |----START------------------|    |(130000)
                               |---DEMOLITION DUTY PAY-|------|----CHECK------------------|----|(129000)
                               |                              |----STOP-------------------|    |(131000)
                               |
                               |                              |----START------------------|    |(144002)
                               |---DIVING DUTY PAY-----|------|----CHECK------------------|----|(148000)
                               |                              |----STOP-------------------|    |(145001)
                               |
                               |                              |----START------------------|    |(129003-007)
                               |---STRESS DUTY PAY-----|------|----LAPSE DATE-------------|----|(130004-007)
                               |                              |----STOP-------------------|    |(130011)  (131004-008)
                               |
                               |                              |----CHECK ACIP-------------|
                               |                              |----START CREWMEMBER-------|
                               |                              |----CREDIT CREWMEMBER------|
                               |---FLYING DUTY PAY-----|------|----CHECK------------------|----|(130009-010)
                               |                              |----START NONCREWMEMBER----|
                               |                              |----CREDIT NONCREWMEMBER---|
                               |                              |----STOP-------------------|
                               |
                               |                              |----START------------------|    |(136000)
                               |---FOREIGN DUTY PAY----|------|----STOP-------------------|----|(175000)
                               |                              |----CHECK------------------|    |(125004)
                               |
                               |                              |----START------------------|    |(293001)
                               |---HOSTILE FIRE PAY----|------|----STOP-------------------|----|(294001)
                                                              |----CHECK------------------|    |(236001)
                                                              |----CREDIT-----------------|    |(297001)
```

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```
                           FROM

                           |----PARACHUTE DUTY PAY---|---|----START---------------|   |(130003)
                           |                             |----CHECK---------------|---|(129002)
                           |                             |----CREDIT--------------|   |(127003)
                           |                             |----STOP----------------|   |(131003)
            |--PAY CHECKLIST---|------|
            |              |                             |----START---------------|   |(235000)
            |              |----SPECIAL DUTY PAY-----|---|                        |---|(233000-004)
            |                                            |----STOP----------------|   |(233008-012)
            |
            |              |----DUTY STATUS-----------|  |----(460000)
            |              |----STRENGTH CATEGORY-----|  |----(112000)
            |              |----INDIVIDUAL LOCATION---|  |----(135000)
            |              |----RTD-------------------|  |----(198000)
            |              |----ADT-------------------|  |----(033000)
            |              |----BILLET DESCRIPTION----|  |----(177000)
            |              |----BILMOS----------------|  |----(152001)
            |              |----COMBAT SERVICE CODE---|  |----(072000)
MAINMENU---|FROM----|      |----ARRIVED US NOT RES----|  |----(071000)
            |              |----DAVSDR----------------|  |----(120001)
            |              |----LAST COMBAT TOUR------|--|----(422000)
            |              |----DSC/DSR---------------|  |----(417000)
            |              |----DGLC------------------|  |----(091000)
            |              |----DEPENDENTS LOCATION---|  |----(097000)
            |              |----DUTY SECTION----------|  |----(097002)
            |              |----FORMAL SCHOOL---------|  |----(499014)
            |              |----LOCAL HOME ADDRESS----|  |----(499019)
            |              |----LOCAL SCHOOL----------|  |----(176000)
            |              |----MOS-------------------|  |----(470000)
            |              |----PLATOON NUMBER--------|  |----(499021)
            |              |----T/O LINE NUMBER-------|  |----(499028)
            |--PER CHECKLIST---|------|----WORK STATION----------|  |----(499002-004)
                           |----WORK PHONE------------|  |----(499022-026)
                           |
                           |                             |----SPOUSE NAME---------|
                           |                             |----1ST CHILD-----------|
                           |                             |----2ND CHILD-----------|
                           |                             |----3RD CHILD-----------|
                           |                             |----4TH CHILD-----------|
                           |                             |----5TH CHILD-----------|   |(343000-014)
                           |                             |----6TH CHILD-----------|   |(344000-034)
                           |----RED----------------------|----FATHER'S NAME-------|---|(345000-004)
                           |                             |----MOTHER'S NAME-------|   |(346000)
                           |                             |----DEATH GRATUITY------|   |(347000)
                           |                             |----PAY ARREARS---------|
                           |                             |----DO NOT NOTIFY-------|
                           |                             |----INSURANCE-----------|
                           |                             |----NEXT OF KIN---------|
                           |                             |----DIRECTIONS----------|
                           |                             |----SGLI----------------|
                           |
                           |                             |----COMPLETION----------|   |(168000-003)
                           |                             |----UPDATE--------------|   |(172000-003)
                           |----SECURITY INVESTIGATION---|----DELETE--------------|---|(185000-003)
                                                         |----GRANTED/DENIED------|   |(169000-007)
                                                         |----ACCESS CODE---------|   |(499017)
```

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TRAINING

```
                                        |-----PHYSICAL FITNESS TEST-----|
                                        |-----RIFLE QUALIFICATION-------|    |(481000-005)
                                        |-----PISTOL REQUALIFICATION----|    |(485000-001)
                                        |-----LEADERSHIP TRAINING-------|    |(499015)
                                        |-----ESSENTIAL SUBJECTS TRAINING|   |(482002-003)
            |----TRAINING WITHIN UNIT---|-----GAS CHAMBER TRAINING------|----|(499006-011)
            |                           |-----DRUG LECTURE/TRAINING-----|    |(205000)
            |                           |-----SECURITY LECTURE/TRAINING-|    |(337000-001) (339000)
            |                           |-----DRIVER IMPROVEMENT SCHOOL-|    |(339002) (338000)
            |                           |-----WEIGHT CONTROL PROGRAM----|
            |                           |-----MILITARY APPEARANCE PROGRAM|
            |                           |-----SWIMMING QUALIFICATION----|
            |
MAINMENU--|--TRAINING ----|
            |
            |                           |-----COMPLETION OF SECURITY----|    |(168000-003)
            |                           |-----UPDATE INVESTIGATION------|    |(172000-003)
            |                           |-----DELETE INVESTIGATION------|    |(165000-003)
            |                           |-----LEVEL OF CLEARANCE--------|    |(169000-007)
            |                           |-----ACCESS CODE --------------|    |(499017)
            |----TRAINING OUTSIDE UNIT--|-----BOAT OPERATOR'S PERMIT----|----|(499016)
                                        |-----LOCAL ADMIN SCHOOLS INFO--|    |(499014)
                                        |-----OTHER LOCAL SCHOOLS INFO--|    |(499019)
                                        |-----INTENDED MOS (IMOS)-------|    |(171000)
                                        |-----PROJECTED COMPLETION DATE-|    |(419000)
                                        |-----ACTUAL COMPLETION DATE----|    |(418000-002)
                                        |-----FORMAL SCHOOLS INFO-------|    |(063000) (097000-002)
```

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```
DEPENDENTS INFORMATION

|----DEPENDENT ADD--------|
|----MARITAL STATUS-------|
|----ACTIVE DUTY SPOUSE---|      |--(088000)  (092000)  (423000-001)
|----NUMBER OF DEPENDENTS-|      |--(090000)  (417000)  (252000)
|----DOLB-----------------|------|--(499023-025)
|----DGLC-----------------|      |--(091000)  (407000)
|----LOCATION CODE ALL----|      |--(089000)  (272000)
|----LOCATION CODE ONE----|
|----LOSS ALL-------------|
|----LOSS ONE-------------|
|----LOCAL RECALL---------|
|
|                                |----START COMRATS-----------|
|                                |----START BAS---------------|
|                                |----STOP COMRATS------------|
|                                |----BAQ---------------------|
|                                |----VHA---------------------|   | (137000)      (186003)
|                                |----STOP VHA----------------|   | (142000)      (400000)
|                                |----FEDERAL TAX INFO--------|   | (138000)      (187000-001)
|----PAY CHECKLIST--------|------|----STATE TAX INFO----------|---| (187007)      (187010-015)
|                                |----ADEQUATE QUARTERS-------|   | (088001)      (187037-039)
|                                |----INADEQUATE QUARTERS-----|   | (089001)      (189000-003)
|                                |----INADEQUATE QTRS W/SP----|   | (002000)      (009008-017)
|                                |----TERMINATE QTRS----------|   | (190000-003)
|                                |----SGLI--------------------|
|                                |----START FSA---------------|
MAINMENU------|DEPENDENTS---|    |----STOP FSA----------------|
|
|                                |----SPOUSE------------------|
|                                |----1ST CHILD---------------|
|                                |----2ND CHILD---------------|
|                                |----3RD CHILD---------------|
|                                |----4TH CHILD---------------|
|                                |----5TH CHILD---------------|
|                                |----6TH CHILD---------------|
|                                |----FATHER------------------|   | (043000-010)
|                                |----MOTHER------------------|   | (044000-029)
|----RED------------------|------|----DEATH GRATUITY----------|---| (045000-040)
|                                |----PAY ARREARS-------------|   | (046000)
|                                |----DO NOT NOTIFY-----------|   | (047000)
|                                |----INSURANCE---------------|
|                                |----NEXT OF KIN-------------|
|                                |----DIRECTIONS--------------|
|                                |----SGLI--------------------|
|
|                                |----REMOVE SPOUSE-----------|
|                                |----REMOVE 1ST CHILD--------|
|                                |----REMOVE 2ND CHILD--------|
|                                |----REMOVE 3RD CHILD--------|
|                                |----REMOVE 4TH CHILD--------|
|                                |----REMOVE 5TH CHILD--------|
|----REMOVE RED INFO------|------|----REMOVE 6TH CHILD--------|---| (048000-036)
                                 |----REMOVE FATHER-----------|
                                 |----REMOVE MOTHER-----------|
                                 |----REMOVE DEATH GRATUITY---|
                                 |----REMOVE PAY ARREARS------|
                                 |----REMOVE DO NOT NOTIFY----|
                                 |----REMOVE INSURANCE--------|
                                 |----REMOVE NEXT OF KIN------|
                                 |----REMOVE DIRECTIONS-------|
                                 |----SGLI--------------------|
```

Screen Mapping (Page 14 of 27)

PAY

```
                                        |---BAQ---------------------|
                                        |---ASSIGN ADEQUATE QTRS-|      |---(187000-001)
                                        |---ASSIGNED LEASED QTRS-|      |---(187010-017)
                                        |---ASSIGN INADEQUATE----|      |---(187007)
            |--BAQ & HOUSING--|---------|---ASSIGN INADEQUATE----|------|---(187037-039)
            |                           |---TERMINATION----------|      |---(186002-003)
            |                           |---CHANGE PERCENTAGE----|      |---(184000)
            |                           |---CHANGE DOLLAR--------|
            |                           |---ERRONEOUS UIC/AAAN---|
            |
            |                           |---BAS------------------|
            |                           |---START FIELD RATIONS--|
            |                           |---STOP FIELD RATIONS---|
            |                           |---ONE TIME FIELD RATS--|      |---(071000)
            |                           |---CREDIT FIELD RATS----|      |---(072000)
            |                           |---START COMRATS--------|      |---(075000)
            |                           |---START BAS------------|      |---(074000)
            |                           |---CHECK COMRATS--------|      |---(137000)
            |                           |---CHECK BAS------------|      |---(142000)
            |                           |---STOP COMRATS---------|      |---(196000)
            |                           |---STOP BAS-------------|      |---(197000)
            |--SUBSISTENCE----|---------|---CREDIT TAD RATS------|------|---(138000)
            |                           |---CHECK TAD RATS-------|      |---(195000)
            |                           |---START COMRATS TAD----|      |---(143000)
            |                           |---STOP COMRATS TAD-----|      |---(025000)
            |                           |---STOP COMRATS DEPLOY--|      |---(166000)
            |                           |---STOP BAS DEPLOY------|      |---(167000)
            |                           |---START COMRATS TDY----|      |---(146000)
MAINMENU--|-PAY--|                      |---START EMER RATIONS---|      |---(289000)
            |                           |---STOP EMER RATIONS----|      |---(290000)
            |                           |---START BAS PEB--------|      |---(115021)
            |                           |---CHECK COMRATS SP-----|
            |                           |---CHECK BAS SP---------|
            |                           |---CREDIT TAD EMER LV---|
            |
            |                           |---CORRECT CLOCK--------|      |---(188000)
            |--CAREER SEA PAY-|---------|---CREDIT---------------|------|---(147000)
            |                           |---START----------------|      |---(139001)
            |                           |---STOP-----------------|      |---(173000)
            |
            |                           |---REENLISTED/RECALLED--|
            |                           |---OFFICER REVERTING----|
            |                           |---CONFINEMENT----------|      |---(005001-005)
            |                           |---RESTORED-------------|      |---(001001-002)
            |--CLOTHING-------|---------|---OCC------------------|------|---(011001)
            |                           |---RESERVE--------------|      |---(299000)
            |                           |---ASSIGNED COMBAT------|      |---(012000)
            |                           |---RETURNED COMBAT------|      |---(298000)
            |                           |---ICCA-----------------|
            |                           |---CCCA-----------------|
            |                           |---ITEMS WOMEN----------|
            |
            |                           |---START----------------|      |---(027000)
            |--DEPLOY PER DIEM-|--------|---STOP-----------------|------|---(028000)
            |                           |---CHECK----------------|      |---(032000)
            |                           |---CREDIT---------------|      |---(031000)
            |
            |                           |---START----------------|      |---(144002)
            |--DIVING DUTY----|---------|---LAPSE DATE-----------|------|---(148000)
                                        |---STOP-----------------|      |---(145001)
```

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```
PAY

                                                  |---START SINGLE--------|
                 |--EIC-----------|-----|---START----------------|---|----(182000-001)
                 |                      |---STOP-----------------|   |----(183000)
                 |
                 |--EBP-----------|-----|---(392000)
                 |
                 |                      |---FEDERAL EXEMPTIONS---|
                 |                      |---STATE EXEMPTIONS-----|
                 |                      |---FED ADDITIONAL-------|   |----(400000-003)
                 |                      |---STATE ADDITIONAL-----|   |----(302000)
                 |                      |---FED STOP ADDITIONAL--|   |----(303000-001)
                 |                      |---ST STOP ADDITIONAL---|   |----(401000)
                 |                      |---EXEMPTION------------|   |----(154003-004)
                 |                      |---STOP EXEMPTION-------|   |----(428000-001)
                 |--TAX-----------|-----|---EXCLUSION------------|---|----(402000)
                 |                      |---STOP EXCLUSION-------|   |----(403000)
                 |                      |---ONE MONTH EXCLUSION--|   |----(404000)
                 |                      |---COMBAT ADDITIONAL----|   |----(442000)
                 |                      |---STOP COMBAT ADD------|   |----(443000)
                 |                      |---STATE TAX CODE-------|   |----(405000)
                 |                      |---ALIEN----------------|
                 |                      |---ALIEN TERMINATION----|
                 |
                 |                      |---START TYPE I---------|
                 |                      |---START TYPE II-R------|
                 |                      |---START TYPE II-S------|
                 |                      |---START TYPE II-T------|
                 |                      |---STOP TYPE I----------|
                 |                      |---STOP TYPE II-R-------|
MAINMENU---|-PAY-|                      |---STOP TYPE II-S-------|
                 |                      |---STOP TYPE II-T-------|   |----(189000-003)
                 |--FSA-----------|-----|---CHECK TYPE I---------|---|----(190000-003)
                 |                      |---CHECK TYPE II-R------|   |----(398000-003)
                 |                      |---CHECK TYPE II-S------|   |----(397000-003)
                 |                      |---CHECK TYPE II-T------|
                 |                      |---CREDIT TYPE I--------|
                 |                      |---CREDIT TYPE II-R-----|
                 |                      |---CREDIT TYPE II-S-----|
                 |                      |---CREDIT TYPE II-T-----|
                 |
                 |                      |---START----------------|   |----(136000)
                 |--FOREIGN DUTY--|-----|---STOP-----------------|---|----(175000)
                 |                      |---CREDIT---------------|   |----(125000)
                 |
                 |                      |---CONSENT--------------|
                 |--GOVT PROPERTY-------|                        |---|----(379000-001)
                 |                      |---NONCONSENT-----------|
                 |
                 |                      |---START----------------|   |----(293000)
                 |--HFP-----------|-----|---STOP-----------------|---|----(294000)
                                        |---CHECK----------------|   |----(236000)
                                        |---CREDIT---------------|   |----(297000)
```

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PAY

```
                                               |---START-------------| |---(130000)
                   |---DEMOLITION DUTY-----|---|---CHECK-------------|-|---(129000)
                   |                           |---STOP--------------| |---(131000)
                   |
                   |                           |---START-------------| |---(130011)
                   |---STRESS DUTY---------|---|---CHECK-------------|-|---(130004-007)
                   |                           |---STOP--------------| |---(129004-007) (131004-008)
                   |
                   |                           |---START CREWMEMBER--|
                   |                           |---CREDIT CREWMEMBER-| |---(130009-010)
      |-INCENTIVE PAY--|---|---FLYING DUTY-----|---|---CHECK-------------|-|---(127001-002)
      |            |                           |---START NONCREWMEMBER-| |---(131001)
      |            |                           |---CREDIT NONCREWMEMBER-|
      |            |                           |---STOP--------------|
      |            |
      |            |---FLIGHT DECK DUTY- --|---|---(127000)
      |            |
      |            |                           |---START-------------| |---(130003)
      |            |                           |---CHECK-------------| |---(129002)
      |            |---PARACHUTE DUTY------|---|---CREDIT------------|-|---(127003)
      |                                        |---STOP--------------| |---(131003)
      |
      |                    |---START 25%-------|   |---(077003)
      |-RETENTION-------|--|                   |---|---(285000)
      |                    |---STOP 25%--------|   |---(286000)
      |
      |                    |---ANNUAL----------|
      |                    |---ANNUAL OVERSEAS-|   |---(115020-022)
      |                    |---EMERGENCY-------|   |---(115024-028)
      |                    |---EMERGENCY OVERSEAS--|   |---(325000)
      |                    |---EMERGENCY FR OVERS--|   |---(378000)
      |                    |---SICK------------|   |---(135000)
MENU--|-PAY--|-LEAVE-------|--|---SICK OVERSEAS---|---|---(177000)
      |                    |---SPECIAL---------|   |---(499023-026)
      |                    |---EXCESS----------|   |---(061000-001)
      |                    |---EXCESS OVERSEAS-|   |---(062000)
      |                    |---SEPARATION------|   |---(110000)
      |                    |---APPELLATE-------|   |---(111000)
      |                    |---ADMINISTRATIVE--|   |---(062001)
      |                    |---EXCESS LV LAW---|
      |
      |                    |---INITIAL---------|   |---(382000)
      |-UNIFORM ALLOW---|--|                   |---|---(383000)
      |                    |---ADDITIONAL------|
      |
      |                    |---OSD-------------|   |---(296001)
      |                    |---ASED------------|   |---(295001)
      |                    |---OPFLY BASE DATE-|   |---(456000)
      |                    |---DELETION--------|   |---(467000)
      |                    |---START CONT ACIP-|   |---(130001)
      |-OPFLY/ACIP------|--|---START MONTHLY ACIP--|---|---(130009)
      |                    |---START TIME CLOCK|   |---(464000)
      |                    |---CHECK MONTHLY ACIP--|   |---(129001)
      |                    |---STOP CLOCK------|   |---(465000)
      |                    |---STOP MONTHLY ACIP---|   |---(131001)
      |
      |-SGLI------------|--|---(309008-018)
      |
      |                    |---START-----------|   |---(233000-004)
      |-SDP-------------|--|                   |---|---(233008-012)
                           |---STOP------------|   |---(235000)
```

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```
                PAY

                                     |----4 YRS ENLISTED--------|
                                     |----ERRONEOUS-------------|
              |--SPECIAL PAY-----|---|----APPOINTED CMC---------|----|----(128000-005)
              |                      |----APPOINTED SGTMAJ------|
              |                      |----FORMER CMC------------|
              |                      |----FORMER SGTMAJ USMC----|
              |
              |                      |----MORE THAN 1 DAY-------|
              |                      |----1 DAY ONLY------------|    |----(322000-001)
              |--TIME LOST-------|---|----CREDIT 1 DAY +--------|----|----(231000-001)
              |                      |----CREDIT 1 DAY ONLY-----|    |----(308000)
              |                      |----TOTAL DAYS------------|
MAINMENU---|-PAY---|
              |                      |----START-----------------|    |----(388001)
              |--VHA-------------|---|                          |----|----(389001)
              |                      |----STOP------------------|
              |
              |                      |----START-----------------|    |----(200000)
              |--VEAF------------|---|----CHANGE----------------|----|----(199000-015)
              |                      |----STOP------------------|    |----(201000-015)
              |
              |--BEAF------------|---|----(273000)
```

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PERFORMANCE/PROMOTIONS/COMPOSITE SCORE

```
                                   |----PRO & CON MARKS------|   |(035000)       (263000)
                                   |----CRBF-----------------|   |(177000)       (336000)
                                   |----EDUCATION POINTS-----|   |(192000)       (470000)
            |----PERFORMANCE-------|---|----SPECIAL AWARDED--|---|(176000)       (053000)
            |                      |----SPECIAL DELETED------|   |(333000)       (499002-004)
            |                      |----RDS------------------|   |(265000)       (499021-022)
            |                      |----OCC FIELD 33---------|   |(334000-001)   (499028)
            |
            |                      |----PFC, LCPL, CPL, SGT--|   |(052004)       (052006)      (265000)      (191000-001)
            |                      |----NOT RECOMMENDED------|   |(052002)       (335000)      (263000)
            |----PROMOTIONS--------|---|----WILL NOT PROMOTE-|---|(052008)       (177000)      (499021)
            |                      |----RECOMMENDED----------|   |(052010)       (176000)      (193000)
---|COMPOSITE---|                  |----TEMP GRADE-----------|   |(052000)       (470000)      (499002-004)
   SCORE    |
            |                      |----AFADBD---------------|
            |                      |----CRBF-----------------|
            |                      |----PRO & CON MARKS------|
            |                      |----EXL------------------|
            |                      |----DOR------------------|   |(085000)       (163000)
            |                      |----EAST-----------------|   |(192000)       (193000)
            |                      |----NOT RECOMMENDED------|   |(335000)       (481000-003)
            |                      |----EDUCATION POINTS-----|---|(070001)       (485000-001)
            |----COMPOSITE SCORE---|---|----PEBD-------------|   |(482002)       (334000-001)
                                   |----PFT------------------|   |(333000)       (191000-001)
                                   |----RECOMMENDED----------|   |(063000)       (481005)
                                   |----RIFLE QUALIFICATION--|
                                   |----SEX------------------|
                                   |----SPECIAL AWARDED------|
                                   |----SPECIAL DELETED------|
                                   |----WILL NOT PROMOTE-----|
```

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DISCIPLINE

```
                                        |----REPORT CODE-----------|   |(499000)
                  |----LEGAL ACTION----------|----|----GOOD CONDUCT----------|---|(499001)
                  |                         |----CLASSIFIED MATERIAL--|   |(499017)
                  |                         |----SECURITY CLEARANCE---|   |(169007)
                  |
                  |----HISTORY---------------|----|(999000)
                  |
                  |                         |(056001)     (395000)
                  |                         |(176000)     (171000)
                  |                         |(177000)     (470000)
                  |----REDUCTION-------------|----|(499028)     (235000)
                  |                         |(145001)     (499002-004)
                  |                         |(499021-022) (131000-001)
                  |                         |(131003-008)
                  |
                  |                         |----PAY & ALLOWANCES------|
                  |                         |----BASIC PAY ONLY--------|   |(284000-001)
                  |----FORFEITURE------------|----|----COURT OF NJP----------|---|(283000-003)
                  |                         |----DECREASED TO NONE-----|   |(215000-003)
                  |                         |----DECREASED-------------|   |(218000-004)
                  |                         |----VACATED---------------|
                  |
                  |                         |----NONCONSENT------------|
                  |                         |----CONSENT LUMP SUM------|   |(278000-002)
                  |----FINES-----------------|----|----CONSENT INSTALLMENTS-|---|(229000-005)
MAINMENU------|DISCIPLINE--|                         |----NONCONSENT REDUCED---|   |(230000-002)
                  |                         |----CONSENT REDUCED-------|   |(275000-005)
                  |                         |----REDUCED INSTALLMENTS-|
                  |
                  |                         |----CORRECTIONAL----------|
                  |----CONFINEMENT-----------|----|                          |---|(210006-009)
                  |                         |----CONFINEMENT-----------|
                  |
                  |                         |(320000-004) (499000)
                  |----RESTORED--------------|----|(176000)     (499021-022)
                                            |(171000)     (499028)
                                            |(499002-004)
```

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CONTRACT

```
|---WILL REENTER-------|---|(123000)
|
|                           |---ACCEPTANCE----------|
|                           |---AFADBD--------------|   |(070000-001)
|                           |---COMPONENT CODE------|   |(085000)
|                           |---BEGAN DATE----------|   |(109000)
|                           |---ENLISTMENT DATE-----|   |(079000)
|                           |---EAS-----------------|   |(122000)
|                           |---ECC-----------------|   |(077000)
|                           |---EOS-----------------|   |(078000)
|---CONTRACT INFORMATION-|---|---HOME OF RECORD-------|---|(174000)
|                           |---LENGTH OF SERVICE---|   |(158000)
|                           |---LENGTH ENLISTMENT---|   |(155000)
|                           |---LSL BALANCE---------|   |(401000)
|                           |---NAME----------------|   |(238000)
|                           |---PEBD----------------|   |(063000)
|                           |---PROGRAM ELEMENT-----|   |(153000)
|                           |---SSN-----------------|   |(239001)
|                           |---TIME LOST-----------|   |(308000)
|
|                           |---AGREEMENT-----------|   |(116000)       (115024-026)
|                           |---EXT EFFECTIVE-------|   |(117001)       (115029)
|---EXTENSION-----------|---|---1ST EXT EFFECTIVE---|---|(400000)
|                           |---ADV LEAVE BALANCE---|   |(118001)
|                           |---CANCELED------------|   |(115020-021)
---|CONTRACT----|
|                           |---DISCHARGE USMC------|   |(004000-005) (112000) (077000)     (400000)
|---REENLISTMENT--------|---|---DISCHARGE USMCR-----|---|(004007-012) (174000) (115020-021)
|                           |---MECEP---------------|   |(004014)     (176000) (115024-026)
|                           |---ADV LEAVE BALANCE---|   |(177000)     (122000) (115029)
|
|                           |---ACCEPTANCE----------|
|---AUGMENTATION--------|---|                       |---|(048000)     (047000)
|                           |---NONACCEPTANCE-------|
|
|                           |---MEDICAL HOLD--------|
|---C OF G RETENTIONS---|---|---LEGAL HOLD----------|---|(077001-003) (285000)
|                           |---INVOLUNTARY---------|
|
|                           |---RETIREMENT US-------|   |(034000-040)
|                           |---RETIREMENT OS-------|   |(036000)
|---RETIREMENT/RESIGN---|---|---FMCR----------------|---|(037000)
|                           |---FMCR OVERSEAS-------|   |(038000)
|                           |---RESIGNATION---------|
|
|---ECC EXPIRED---------|---|(317000) (308000)
|
|                           |---TEMPORARY USMC------|   |(054000-040)
|                           |---TEMPORARY USMCR-----|   |(176000)
|---ACCEPTANCE----------|---|---PERMANENT USMC------|---|(128004)
|                           |---PERMANENT USMCR-----|   |(400000)
|                           |---ADV LEAVE BALANCE---|
|
|---REVERSION-----------|---|(049000) (050002) (176000) (177000) (109000) (077000) (122000) (158000) (155000)
|
|---FRAUDULENT ENLIST---|---|---DETERMINED----------|---|(355000) (356000)
|                           |---WAIVED--------------|
|
|---INVOLUNTARY EXT-----|---|(119000)
|
|---ENLISTMENT BONUS----|---|(392000)
```

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SERVICE

```
                                                                          |---ADT--------------------|
                                                |----ADT-------------|--|---CORRECTION 270 DAYS+--|--|(033000-001)
                                                |                        |---CORRECTION 270 DAYS---|
                                                |
                                                |----DCS/DRD---------|   |(422000)
                          |---DEPLOYMENT----|---|----SDPI------------|---|(477000)
                          |                     |----SEA SERVICE CLOCK---|   |(188000)
                          |                     |----UDP-------------|   |(478000)
                          |
                          |                     |----DUTY STATUS-----|   |(460000)
                          |---DUTY STATUS---|---|----STRENGTH CATEGORY---|   |(112000)
                          |                     |----DUTY LIMITATION-|   |(317000)
                          |                     |----RETURN FULL DUTY|   |(157000-012)
                          |
                          |                     |----MOS-------------|   |(176000)
                          |---MOS-----------|---|----BILMOS----------|   |(177000)
                          |                     |----IMOS------------|   |(171000)
                          |                     |----OTHER SERVICE---|   |(178000)
                          |
                          |                     |----ISSUED ACKNOWLEDGE--|   |(370000-001)
                          |                     |----EDA-------------|   |(370003)
                          |                     |----MODIFIED--------|   |(016001)
                          |---ORDERS--------|---|----CANCELED--------|---|(013000)
                          |                     |----RETRANSMISSION--|   |(015000)
MAINMENU---|SERVICE-------|                     |----ASG OSA---------|   |(014000)
                          |                     |----CANC OSA--------|   |(387000)
                          |                     |----MOD OSA---------|
                          |
                          |                     |----BILLET DESCRIPTION--|
                          |                     |----BILMOS----------|
                          |                     |----COPI------------|   |(499002-004)
                          |                     |----DCTB------------|   |(177000)
                          |                     |----DSSA------------|   |(274000)
                          |                     |----DUTY SECTION----|   |(074000)
                          |                     |----FAP MCC---------|   |(150000)
                          |                     |----LOCATION--------|   |(499021-022)
                          |                     |----IMOS------------|   |(141000)
                          |                     |----MOB RUC---------|   |(135000)
                          |---PRESENT DUTY--|---|----MCC-------------|---|(171000)
                          |                     |----SDPI------------|   |(098000)
                          |                     |----PTCD------------|   |(170000)
                          |                     |----PLATOON NUMBER--|   |(477000)
                          |                     |----PEN-------------|   |(470000)
                          |                     |----RCN-------------|   |(477000)
                          |                     |----RTD-------------|   |(470000)
                          |                     |----T/O LINE NUMBER-|   |(265000)
                          |                     |----T/O NUMBER------|   |(263000)
                          |                     |----TCD-------------|   |(198000)
                          |                     |----WORK PHONE------|   |(108000)
                          |                     |----WORK STATION----|   |(499028)
                          |
                          |                     |----PROMOTION PRES BRD--|   |(052004)      (053000)
                          |                     |----PROMOTION SAME--|   |(052002)      (056001-003)
                          |                     |----REDUCED PUNITIVE|   |(052008)      (059001)
                          |---GRADE/RANK INFO-|-|----REDUCED NONPUNITIVE-|---|(052010)
                          |                     |----REDUCED ERROR---|   |(052000)
                          |                     |----RESTORE GRADE---|   |(052006)
                          |                     |----PERMANENT GRADE-|   |(320000-004)
```

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PERSONNEL/MILITARY INFORMATION

```
                               |-------|---AWARDS--------------|
                               |-------|---BARRACKS NUMBER-----|
                               |-------|---BLOOD TYPE----------|
                               |-------|---DATE OF BIRTH-------|   |(499023-027)
                               |-------|---CIVILIAN EDUCATION--|   |(499000)
                               |-------|---COMBAT SERVICE------|   |(069000)
                               |-------|---EX-POW--------------|   |(151000)
                               |-------|---GOOD CONDUCT MEDAL--|   |(152001)
                               |-------|---HOME OF RECORD------|   |(174000)
                               |-------|---STREET ADDRESS------|   |(238000)
                               |-------|---CITY CODE-----------|   |(180000)
                               |-------|---ZIP CODE------------|---|(266000)
                               |-------|---TELEPHONE NUMBER----|   |(163000)
                               |-------|---NAME----------------|   |(165000)
                               |-------|---DUTY PREFERENCE-----|   |(239001)
                               |-------|---ETHNIC CODE---------|   |(140042)
MAINMENU-----|PERSONNEL--------|-------|---RACE AND SEX--------|   |(161000-018)
                               |-------|---RELIGION------------|
                               |-------|---SSN-----------------|
                               |
                               |                                   |---US CITIZEN BY BIRTH---|
                               |                                   |---NATURALIZED-----------|
                               |                                   |---RESIDENT--------------|
                               |-------|---CITIZENSHIP---------|---|---DERIVATIVE NATURAL----|---|(154000-006)
                                                                   |---DERIVATIVE BIRTH------|
                                                                   |---US NATIONAL BY BIRTH--|
                                                                   |---ALIEN-----------------|
```

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```
VRS

                                  |---NAME---------------|   |----(470000)
                                  |---SSN----------------|   |----(238000)
                                  |---PLATOON NUMBER-----|   |----(239001)
                                  |---BLOOD TYPE---------|   |----(499018)
                                  |---DATE OF BIRTH------|   |----(069000)
                                  |---TOTAL DEPENDENTS---|   |----(423000-001)
                                  |---DEPENDENTS LOCATION|   |----(417000)
                 |--PERSONAL-----|----|---DOLB---------------|---|----(407000)
                 |               |    |---ETHNIC CODE--------|   |----(266000)
                 |               |    |---HOME OF RECORD-----|   |----(174000)
                 |               |    |---MARITAL STATUS-----|   |----(272000)
                 |               |    |---RELIGION-----------|   |----(165000)
                 |               |    |---RACE/SEX CODE------|   |----(163000)
                 |               |    |---ACTIVE DUTY SPOUSE-|   |----(252000)
                 |               |
                 |               |                               |----US CITIZEN BIRTH-----|
                 |               |                               |----NATURALIZED----------|
                 |               |                               |----RESIDENT-------------|
                 |               |-|---CITIZENSHIP---------|---|----DERIVATIVE NATURAL---|-|---(154000-006)
                 |                                               |----DERIVATIVE BIRTH-----|
                 |                                               |----US NATIONAL BIRTH----|
                 |                                               |----ALIEN----------------|
                 |
                 |                    |---ADBD---------------|   |----(085000)
                 |                    |---COMPONENT CODE-----|   |----(109000)
                 |                    |---CURRENT ACTIVE DUTY|   |----(079000)
MAINMENU--|-VRS--|                    |---ENLISTMENT---------|   |----(070001)
                 |                    |---ACCEPTANCE---------|   |----(070000)
                 |                    |---ORIGINAL ENTRY-----|   |----(064000)
                 |--CONTRACT INFO--|--|---DAYS LOST----------|---|----(308000)
                 |               |    |---EAS----------------|   |----(077000)
                 |               |    |---ECC----------------|   |----(122000)
                 |               |    |---EOS----------------|   |----(078000)
                 |               |    |---LENGTH OF ENLIST---|   |----(155000)
                 |               |    |---PROGRAM------------|   |----(153000)
                 |               |
                 |               |                               |----AGREEMENT------------| |---(116000)    (400000)
                 |               |                               |----EFFECTIVE------------| |---(117001)    (118001)
                 |               |-|---EXTENSION-----------|---|----FIRST----------------|-|---(115020-021)
                 |                                               |----ADVANCE LEAVE--------| |---(115024-026)
                 |                                               |----CANCELED-------------| |---(115029)
                 |
                 |                    |---LIMITATION---------|   |----(460000)
                 |--DUTY STATUS----|--|---STATUS-------------|---|----(112000)
                 |                    |---STRENGTH CAT-------|   |----(157000-013)
                 |
                 |                    |---BILLET DESCRIPTION-|
                 |                    |---DCTB---------------|   |----(074000)
                 |                    |---FAP MCC------------|   |----(141000)
                 |                    |---LOCATION-----------|   |----(135000)
                 |--UNIT INFO------|--|---PEN----------------|---|----(499002-004)
                                      |---RCN----------------|   |----(265000)
                                      |---T/O LINE NUMBER----|   |----(263000)
                                      |---T/O NUMBER---------|
                                      |---WORK STATION-------|
```

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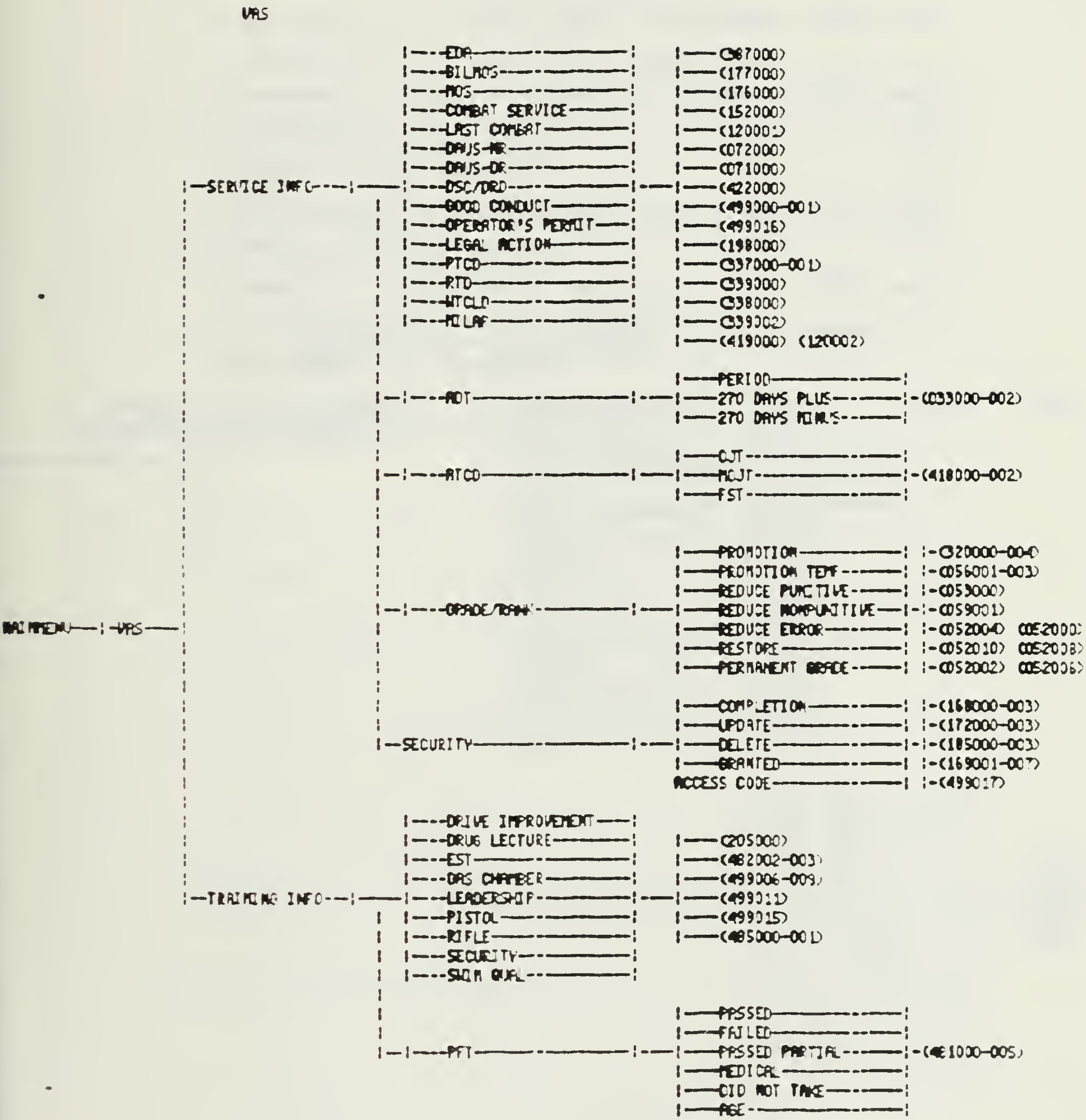

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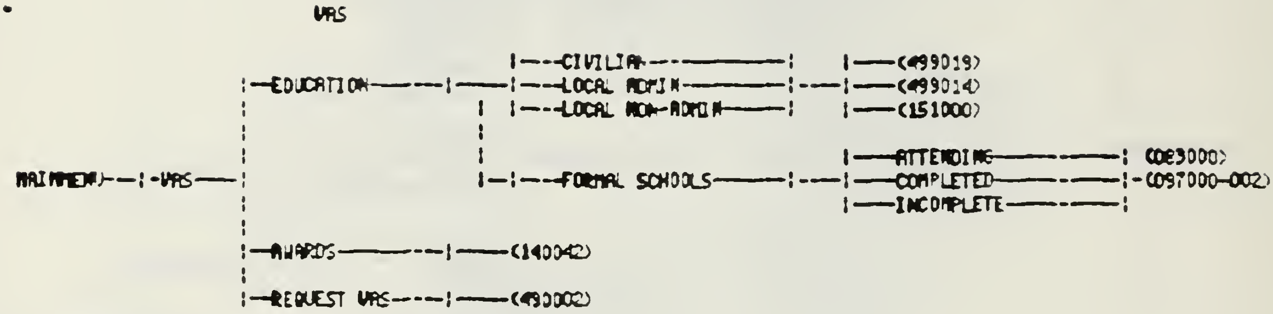

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```
EVENTS
                                         |----WILL DEPLOY----------|
                                         |----LAST UC CONUS--------|
                                         |----FIRST UD WESTPAC-----|   |(150000)
|----WESTPAC UDP----------|-----|----RETURN-----------------|---|(002000)
|                                        |----LAST UC WESTPAC------|   |(478000)
|                                        |----FIRST UC CONUS-------|
|
|----SEC-LOCATION---------|----(028000) (150000) (074000) (265000) (263000) (425000)
|
|----REDESIGNATION--------|----(448000) (150000) (274000) (425000)
|
|----ACTIVATION-----------|----(450000) (150000) (274000) (265000) (263000) (425000)
|
|----DEACTIVATION---------|----(451000)
|
|----HISTORICAL-----------|----(999000)
|
|----UNIT FROM ZERO-------|----(453000) (150000) (274000) (265000) (263000) (425000)
|
|----UNIT TO ZERO---------|----(452000)
|
|----TRANSFER-------------|----(446000) (150000) (274000) (265000) (263000) (425000)
|
|----DEPLOYED PAY---------|----(159000) (160000)
|
|----EXCLUSIVE------------|----(459000-009)
|
|                                        |----STOP BAS/COMRATS-----|   |(071000)
|                                        |----START PER DIEM-------|   |(033000)
|                                        |----START SEA PAY--------|   |(422000)
MMENU-----|UNIT INFO---|                 |----START FOREIGN DUTY---|   |(138000)
|                                        |----START HFP------------|   |(327000)
|                                        |----START FSA------------|   |(139001)
|                                        |----CHANGE DEP LOC-------|   |(136000)
|                                        |----DGLC-----------------|   |(293001)
|                                        |----TERMINATE BUT QTR----|   |(189003)
|----CHECKLIST------------|-----|----START VHA--------------|---|(031000)
                                         |----STOP PER DIEM--------|   |(417000)
                                         |----STOP SEA PAY---------|   |(186003)
                                         |----STOP FOREIGN DUTY----|   |(383001)
                                         |----STOP HFP-------------|   |(328000)
                                         |----STOP FSA-------------|   |(173000)
                                         |----STOP BAS/COMRATS-----|   |(175000)
                                         |----DSC/DRC--------------|   |(294001)
                                         |----ACT------------------|   |(190002)
                                         |----DAUS-DE--------------|   |(137000)
                                         |
                                         |                  |----SPOUSE NAME---------|
                                         |                  |----1ST CHILD-----------|
                                         |                  |----2ND CHILD-----------|
                                         |                  |----3RD CHILD-----------|
                                         |                  |----4TH CHILD-----------|   |(343000-014)
                                         |                  |----5TH CHILD-----------|   |(344000-034)
                                         |----RED-----------|---|----6TH CHILD-----------|---|(345000-004)
                                                            |----FATHER'S NAME-------|   |(346000)
                                                            |----MOTHER'S NAME-------|   |(347000)
                                                            |----DEATH GRATUITY------|
                                                            |----PAY ARREARS---------|
                                                            |----DO NOT NOTIFY-------|
                                                            |----INSURANCE CO--------|
                                                            |----NEXT OF KIN---------|
                                                            |----DIRECTIONS----------|
                                                            |----SGLI----------------|
```

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