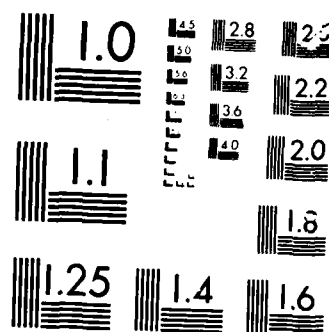CONCEPT DEVELOPMENT FOR THE DEFENSE MANPOWER DATA
INTERFACE SYSTEM(U) NAVAL POSTGRADUATE SCHOOL MONTEREY
CA J P BARRETT ET AL. MAR 86

UNCLASSIFIED

F/G 5/1

NL

MICROCOPY

NAVAL POSTGRADUATE SCHOOL
Monterey, California

DTIC
ELECTE
S JUL 0 9 1986
D
D

THESIS

CONCEPT DEVELOPMENT FOR
THE DEFENSE MANPOWER DATA INTERFACE SYSTEM

by

John P. Barrett, Jr.
and
Henry H. Slack, III

March 1986

Thesis Advisor: Norman F. Lyons

Approved for public release; distribution is unlimited

A169369

REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION	1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION/AVAILABILITY OF REPORT		
2b DECLASSIFICATION/DOWNGRADING SCHEDULE	Approved for public release; distribution is unlimited		
4 PERFORMING ORGANIZATION REPORT NUMBER(S)	5 MONITORING ORGANIZATION REPORT NUMBER(S)		

6a NAME OF PERFORMING ORGANIZATION	6b OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
Naval Postgraduate School	54	Naval Postgraduate School

6c. ADDRESS (City, State, and ZIP Code)	7b. ADDRESS (City, State, and ZIP Code)
Monterey, CA 93943-5000	Monterey, CA 93943-5000

8a. NAME OF FUNDING/SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

8c ADDRESS (City, State, and ZIP Code)	10 SOURCE OF FUNDING NUMBERS			
	PROGRAM ELEMENT NO	PROJECT NO	TASK NO	WORK UNIT ACCESSION NO

11 TITLE (include Security Classification)

CONCEPT DEVELOPMENT FOR THE DEFENSE MANPOWER DATA INTERFACE SYSTEM

12 PERSONAL AUTHOR(S)
Barrett, John P., Jr.   and   Slack, Henry H., III

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Master's Thesis	FROM ____ TO ____	1986 March	73

16 SUPPLEMENTARY NOTATION

17	COSATI CODES		18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	DEERS, DMDIS, Manpower, RAPIDS, DMDS, MCDN, DMDB, EDS, MCCDPA, MMS, MPI, OLDS

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

This thesis documents a concept development conducted for MPI-40, HQMC. It follows the requirements for concept development as outlined in Marine Corps Order (MCO) P5231.1, Life Cycle Management for Automated Information Systems (LCM-AIS). The concept developed during the course of the thesis was a means of improving procedures used by the Marine Corps for reporting data to the DEERS data base.
The documents produced were those required by MCO P5231.1 for a concept development, they were a Mission Elements Need Statement (MENS), Requirements Statement, Feasibility Study, and Economic Analysis.
This thesis recommends that a dedicated on-line link be created between the Marine Corps Data Network (MCDN) and the DEERS data base to transfer dependent data to DEERS. The thesis also recommends a link be established between MCCDPA and DMDC to transfer sponsor data daily.

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION	
☑ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	Unclassified	
22a NAME OF RESPONSIBLE INDIVIDUAL	22b TELEPHONE (Include Area Code)	22c OFFICE SYMBOL
Norman F. Lyons	408 646-2666	54Lb

DD FORM 1473, 84 MAR
83 APR edition may be used until exhausted
All other editions are obsolete

1

Concept Development For
The Defense Manpower Data Interface System

by

John P. Barrett Jr.
Major, United States Marine Corps
B.S., State College of New York at Plattsburg, 1974

and

Henry H. Slack III
Captain, United States Marine Corps
B.A., University of Illinois, 1975
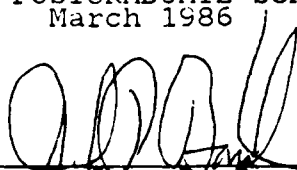M.B.A., National University, San Diego, Ca. 1979

Submitted in partial fulfillment of the
requirements for the degree of

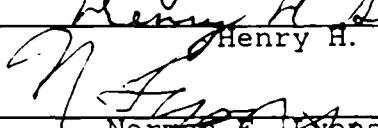MASTER OF SCIENCE IN INFORMATION SYSTEMS

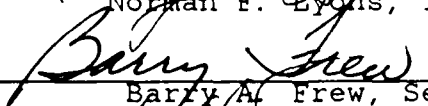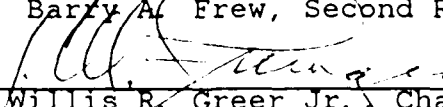from the

NAVAL POSTGRADUATE SCHOOL
March 1986

Authors: _____
                  John P. Barrett Jr.

          _____
                  Henry H. Slack III

Approved by: _____
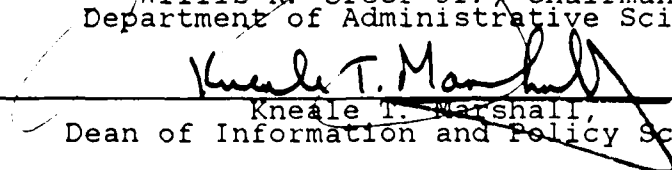   Norman F. Lyons, Thesis Advisor

          _____
                  Barry A. Frew, Second Reader

          _____
                  Willis R. Greer Jr., Chairman,
             Department of Administrative Sciences

          _____
                  Kneale T. Marshall,
             Dean of Information and Policy Sciences

2

ABSTRACT

This thesis documents a concept development conducted for MPI-40, HQMC. It follows the requirements for concept development as outlined in Marine Corps Order (MCO) P5231.1, Life Cycle Management for Automated Information Systems (LCM-AIS). The concept developed during the course of the thesis was a means of improving procedures used by the Marine Corps for reporting data to the the DEERS data base.

The documents produced were those required by MCO P5231.1 for a concept development, they are a Mission Elements Need Statement (MENS), Requirements Statement, Feasibility Study, and Economic Analysis.

This thesis recommends that a dedicated on-line link be created between the Marine Corps Data Network (MCDN) and the DEERS data base to transfer dependent data to DEERS. The thesis also recommends a link be established between MCCDPA and DMDC to transfer sponsor data daily.

Accesion For	
NTIS CRA&I	☑
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and / or Special
A-1	

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

A. BACKGROUND

The Defense Enrollment Eligibilty Reporting System (DEERS) is a Congressionally mandated Department of Defense (DOD) system designed to provide better management of the personnel benefits administered by DOD. The benefits which DEERS is designed to aid in the administration of medical, dental, Post exchanges, commissary, and special services. These are benefits which service members and their families earn as part of the service members compensation. The concept of DEERS operations is that every individual entitled to the benefits previously listed will have their name and a list of the benefits to which they are entitled entered into the DEERS data base. The DEERS data base can then be queried on-line by the benefits provider whenever an individual attempts to use these benefits to determine their eligibilty for the benefits. The purpose of the system is twofold. First, to allow DOD to gather accurate timely data on the use of the benefits so DOD and the Congress can program funds to meet user demands for these services. Second, to prevent the fraudulant use of these resources by ineligible individuals.

The primary limitation of using DEERS is that eligibility decisions made using it are only as good as the database. The database is only as good as the quality of the information submitted to it, and the speed with which this submitted information updates the database for future eligibilty determinations. The system, as currently administered, is adequate with regards to the quality of information submitted to DEERS. The speed with which submitted information updates the DEERS data base is however a problem DOD

9

and all the services are confronting. All of the military services are working to correct this problem. This is a problem which must be solved, since it deals with compensation for service members. A failure to grant benefits earned because of the slow functioning of the DEERS database update process is very similar to withholding pay because the computer did not function fast enough to produce pay checks. Both failures have devastating effects on the morale. Fortunately, pay is seldom delayed because the computer system supporting pay operates efficiently. Unfortunately, the DEERS computer system does not operate as well as the pay system. Service members and their dependants are being denied benefits due to an inaccurate DEERS data base caused by delays in updates to the data base.

The responsibility for developing and implementing systems to report DEERS data to DOD for the Marine Corps resides at the Manpower Department Headquarters United States Marine Corps. This thesis is written to assist the Manpower Department in the development of alternative concepts for improving procedures currently used for reporting data to DEERS.

B. PURPOSE

The purpose of this thesis is to prepare four documents required of the manpower Department to change the methods of reporting data to DEERS. These documents are outlined in Marine Corps Order (MCO) P5231.1, Life Cycle Management for Automated Information Systems (LCM-AIS) [Ref. 1]. These documents, as outlined in this order, are required for development or change to any DOD Automated Information System (AIS). The required documents are (1) a Mission Element Need Statement (MENS), (2) a Requirements Statement (RS), (3) a Feasibility Study (FS), and (4) an Economic Analysis (EA). These documents begin the process of

10

life cycle management and constitute the concept development phase of the life cycle. As each of these is completed it will be used by the Manpower Department as documentation to determine if further development should continue on the concepts. If further development is approved as a result of these documents, they will be used as the justification for future developement and funding of a system to improve procedures for reporting data to the DEERS. These documents will remain a vital part of the decision making process until the concept they document is abandoned or until the developed sytem has completed its' life cycle.

C. METHODOLOGY

The information needed to write this thesis was acquired from many sources including interviews at MPI-40 the DEERS project office, and the Realtime Automated Personnel Identification System (RAPIDS) office in Washington D.C. These sources provided valuable information, as did phone calls to these offices.

Once the information was gathered, the methodology was to put the information in the format required by MCO P5231.1, thus producing a Mission Element Need Statement, Requirements Statement, Feasibility Study, and Economic Analysis.

II. MISSIONS ELEMENT NEED STATEMENT (MENS)

A. MISSION AREA IDENTIFICATION

1. Mission and Authority

The Manpower Department, Headquarters Marine Corps (HQMC) is tasked with ensuring Marine Corps compliance with Department of Defense Instruction (DODI) 1336.5 [Ref. 2] and DODI 1000.13 [Ref. 3] [Ref. 2] which require periodic updates by the Marine Corps of the Defense Manpower Data Base (DMDB). This data base provides information for research, actuarial analysis, interagency reporting, and evaluation of Department of Defense (DOD) programs and policies. In addition, extracts of this data base are used to create the Defense Enrollment Eligibility Reporting System (DEERS), the Centralized System for Prior Service Enlistment Eligibility Information, and the DOD foreign language ability and performance data bases. [Ref. 3] is the DOD directive concerning procedures for issuance of DOD identification cards. An integral part of the issuance of identification cards for dependents under this instruction is the completion of a DD form 1172. The information from this form is appended to the DEERS data base when submitted as required by [Ref. 3] The Manpower Department has tasked Manpower Procedures and Integration-40 (MPI-40) with the coordination of Marine Corps input to the DEERS data bases.

2. Current Environment

The reporting requirements of [Ref. 2] are currently being met by the Marine Corps with resources from the Manpower Management System (MMS). This system requires Marine Corps units with administrative responsiblities, usually the battalion/squadron level, to submit a unit diary

on a daily basis. The information submitted on the unit
diary includes all the data elements the Marine Corps is
required to report on Marines to the DEERS data base by
[Ref. 2]. Marine Corps administrative units submit unit
diaries on-line via the Marine Corps Data Network (MCDN) to
the Marine Corps Central Design and Processing
Activity(MCCDPA), Kansas City, Mo. The MCCDPA receives and
processes unit diaries from Marine Corps units throughout
the world each day. The information from these unit diaries
is used by MCCDPA to keep the Marine Corps Central Master
File (MCCMF) current. The MCCMF is the data base for MMS
and is the best source for Marine Corps manpower informa-
tion. Weekly the MCCDPA creates a magnetic tape of extracts
from the previous weeks unit diaries. This tape contains all
data which must be reported in accordance with [Ref. 2] in
the required format. This tape is mailed to the Defense
Manpower Data Center (DMDC), Monterey, Ca. to update the
DMDB and DEERS data bases.

The requirements of [Ref. 3] are implemented in
Marine Corps administrative units by using instructions in
Marine Corps Order(MCO) P5512.11 [Ref. 4]. [Ref. 4] delini-
ates the procedures that must be followed to issue dependent
identification cards, and to register dependents data into
the DEERS data base. The responsibility for initiating the
information flow begins with the battalion/squadron level
administrative unit in the Marine Corps. This unit prepares
a DD form 1172 any time a Marine dependent requires an iden-
tification card, or there is a need to inform the DEERS of a
change in a Marine dependents eligibility for any DOD admin-
istered benefits. The DD form 1172's are mailed to
Electronic Data Systems (EDS), Santa Barbara, Ca. EDS is
under contract to the DOD to create an electronic record of
the data on the DD form 1172's they receive. This electronic
record is forwarded by EDS to DMDC for inclusion in the DEERS
data base.

13

3. Priority

The mission identified in this MENS has a high priority in relation to the other missions of the Manpower Department. This high priority is driven by the need to make the DEERS data base as current and as accurate as possible within the state of the current practice in Automated Information Systems (AIS). This requirement exists due to the use of the DEERS data base for eligibility checks prior to allowing Marines or their dependents to use DOD administered benefits. If Marines and their dependents cannot depend upon the use of benefits they have earned due to an inaccurate DEERS data base, the effect on morale will be devastating to the Marine Corps.

B. DEFICIENCY

1. Scope

The deficiency in updating the DEERS data base is a lack of timeliness. The DEERS 1984/1985 Annual Report [Ref. 5] reported the average delay between the completion of a DD form 1172 and the insertion of the data from that form to the DEERS data base at 54 days. Under the planned use of DEERS to determine eligibility for benefits, this delay would cause a dependent who was erroneously not in the DEERS data base to wait on average 54 days before this error was corrected. Marine Corps sponsors could also experience a denial of benefits due to an incorrect DEERS data base. The delay to correct sponsor errors under the current system is about 14 days. While waiting for the data base to be corrected the Marine or the dependent are not allowed to use the benefits they are entitled to use. This lack of timely means to correct the DEERS data base is a deficiency which has the potential to cause life threatening situations, such

as the denial of emergency hospital care, if eligible indi-
viduals are denied benefits due to an inacurrate DEERS data
base.

2. Jobs to be Accomplished

A system must be developed which will allow Marine
Corps administrative units to update the DEERS data base
within 72 hours from initial input. This will require
changes to the current procedures used in the Marine Corps
to input both service member and dependent data to the DEERS
data base within the 72 hour requirement.

C. EXISTING AND PROGRAMMED CAPABILITIES

1. Current Capability

The capabilities of the current system allow the
maintenance of the DEERS data base at a level which on
average requires 54 days to update data for dependents and
14 days to update data for Marines.

2. Programmed Capabilities

The DOD has began to employ a system called the
Realtime Automated Personnel Identification System (RAPIDS).
RAPIDS provides an on-line capability to update dependent
data in the DEERS Data base for those units possessing a
RAPIDS work station. The current DOD distribution plan does
not, however, provide sufficient numbers of RAPIDS work
stations for each Marine Corps administrative unit to have
reasonable access to a RAPIDS work station. This means the
Marine Corps will not be able to fully utilize this needed
capability.

15

3. Impact

The impact of maintaining the status quo is to risk severe morale problems within the ranks of the Marine Corps. The inability to correct errors quickly would find Marines and their families unable to use benefits to which they are entitled. An additional impact is the adverse publicity and Congressional pressure that would occur if incidents of eligible individuals being denied medical, commissary, or post exchange benefits for sustained periods were to become known to the public. The status quo would then become very untenable.

D. CONSTRAINTS

First, the Marine Corps has decentralized administration to the battalion/squadron level. The primary rationale for this administrative structure is that these units are considered to be the smallest self-sustaining units in combat. These units regularly deploy independently of larger units. Consequently, they are required to be self-sustaining in all aspects including administration. This administrative structure is also to provide personalized service to Marines and their dependents. Marine Corps policy dictates that a Marine should depend only on their battalion or squadron for administrative support. This administrative structure serves Marines and their dependents well. Any system developed for use by the Marine Corps should conform to this administrative structure.

Second, the current DOD distribution plan for RAPIDS work stations does not permit a distribution level for the Marine Corps that will allow each of its' administrative units to possess a RAPIDS work station. The Marine Corps administrative structure is unique among the military services. The other military services have large centralized

16

administrative structures which will permit these services to implement RAPIDS without requiring additional RAPIDS work stations, or changes to their administrative structures. The DOD RAPIDS work station distribution plan is based on all services utilizing centralized administration.

Third, any system developed to provide input to the DEERS data base must comply with references 2 and 3. These instructions provide guidance on the quality control and format of the data which is intended for submission to the DEERS data base.

Fourth, an operational system capable of overcoming the deficiencies noted in this MENS must be completed prior to the exclusive use of the DEERS data base to determine eligibility for the use of DOD administered benefits. Exclusive use of DEERS is planned for the mid-1990's.

E.   PROJECT MANAGEMENT

The project shall be managed by the DEERS Project Officer, MPI-40, HQMC. The current DEERS Project Officer is Captain D. P. Haeusler. AUTOVON 224-4115, Commercial (202)-694-4115.

III. REQUIREMENTS STATEMENT

A. GENERAL

   1. Purpose

   The Requirements Statement is the second of four documents that must be completed and approved in sequence to perform the concept development phase of an automated information systems life cycle in accordance with reference 1. The first document prepared in this life cycle was the MENS. It outlined a mission and deficiencies that exist in the Marine Corps ability to perform that mission. The approved requirements statement will describe the required capabilities any system proposed to overcome the deficiencies noted in the MENS must exhibit. It is necessary that the requirements statement be approved prior to proceeding with the concept development phase since the requirements it establishes will be the baseline for determining the feasibility of proposed systems in the Feasibility Study. The Feasibility Study is the third document produced in the concept development phase of the life cycle, and will constitute the next chapter of this thesis.

   2. Point of Contact

   The functional sponsor for this project is the Manpower Department, MPI-40, HQMC. The functional manager is Captain D. P. Haeusler. AUTOVON 224-4115 commercial (202)-694-4115

B. CURRENT SYSTEM

   1. Project References

   References 2 and 3 establish the DOD reporting requirements the Marine Corps must fulfill to maintain the

18

DEERS data base. References 5 and 7 reveal the inadaquacy of these requirements in maintaining the DEERS data base, and indicate the action the DOD is taking to correct these inadequacies in the maintenance of the DEERS data base.

2. Problem Description

The DEERS eligibility data base is used by the providers of DOD benefits to determine the eligibility of Marines and their dependents to receive DOD administered benefits. The 1984/1985 DEERS Annual Report [Ref. 5] states that on average 54 days elapse from the report of a change in a Marines dependents DEERS eligibility status to an update to the data base. The delay for a Marine is approximately 14 days from the report of a change in DEERS data to the change in the DEERS data base. The DOD goal is to make the data base changes within 72 hours of the report of the change [Ref. 5]. The DOD has taken steps to reach this goal. It is encouraging more frequent reports of Marine data made in accordance with [Ref. 2]. It is also exploring alternative means of reporting this data such as on-line capability vice the current magnetic tapes making more frequent reports practical. The DOD has also developed a system known as RAPIDS [Ref. 7] that allows on-line updates of dependent data to the DEERS eligibility data base. The current DOD distribution plan for RAPIDS will not however, permit, the Marine Corps to implement RAPIDS in its' administrative structure. A system must be developed that ensures the DEERS eligibility data base is current for Marines and their dependents.

3. Existing System

The description of the existing system must extend beyond Marine Corps systems even though the requirements eventually established will be for a system entirely within the Marine Corps. The description of systems that extend

beyond the scope of the requirements statement is necessary to understand system requirements to be established. The description of systems that are not within the control of the Marine Corps will be limited to the detail required to understand the Marine Corps system for which the requirements are being developed.

All data destined for the DEERS data base is initially reported by the first Commanding Officer with administrative responsibilities for the individual Marine. This is usually the Marines' battalion or squadron commander. The administrative section under this commander must report DEERS data concerning Marines on the unit diary. DEERS data on Marine dependents is reported at the same administrative level by completing a DD form 1172. The data flow for Marine data and the data flow for dependent data is similar only for the first report. This dictates that two different data flows exist at all other data points and must be addressed in this description of the existing system.

The first data flow to follow is that for data submitted on the Marine. The initial entry of the data is made on the unit diary by the Marines local administrative unit. The guidance used for making unit diary entries is contained in the Personnel Reporting Instruction Manual (PRIM) MCO P1080.35e [Ref. 6]. The PRIM establishes reporting requirements to the Marine Corps Manpower Management System (MMS). These requirements fulfill all the data requirements for DEERS, plus for all other manpower reporting requirements of the Marine Corps. Data is entered on the unit diary using an IBM series 1 terminal (327x) networked to the MCCDPA, Kansas City, Mo. via the MCDN. Unit diary data is sent to the MCCDPA each working day from each unit in the Marine Corps that has data to report. The volume of data varies from unit to unit, day to day. Unit diaries

have been as small as one entry, or as large as thousands of entries.

The MCCDPA processes the unit diaries the day they are received. Several concurrent processes occur during the processing of unit diaries. The two process that are of primary importance for passing data to the DEERS eligibility data base are the updates made to the Marine Corps Central Master File (MCCMF) and the spooling of data for the DMDC. The update to the MCCMF is to maintain the primary source of Marine Corps manpower information and the primary data base of the MMS. The spooling of data for the DMDC is done in accordance with reference 2. This reference establishes reporting requirements to the DMDC. Each week the MCCDPA formats the spooled data and loads it to a magnetic tape. This tape is forwarded by U.S. mail in accordance with reference 2 to the DMDC for inclusion to the DEERS data base. Reference 2 also requires the MCCDPA to submit quarterly extracts from the MCCMF of all reportable DEERS data in the same format as the weekly tape. This tape is mailed to the DMDC for quarterly reconciliation of the MCCDPA data bases and the DMDC data bases.

The mailing of weekly tapes by the MCCDPA exceeds the requirements for monthly and quarterly tapes set in [Ref. 2]. The weekly tapes are used to keep Marine Corps data in DMDC data bases current. The director, DMDC is working with the Marine Corps, MPI-40 to implement a daily transfer of this data via a dial-up modem. A daily update of Marine Corps data would result in a significant reduction to the current 14 day average it takes to update the DEERS eligibility data base for Marines. The equipment in use at the MCCDPA is listed below.

a. Amdahl 470V7A CPU's
b. NCR COMTEN line
c. IBM 3272,3274 Controllers

21

d. IBM 1403,3211 Printers

e. IBM 3505 Card reader

f. IBM 3525 Card punch

g. IBM 3880 Storage Controller

h. SDA 152 CCU and attached equipment

i. Memorex 3674 Storage controller

j. Memorex 3650,3653,3654 Disk drives

k. STC 3800 Tape control units

l. STC 3430,3470,3670 Tape drives

m. ITEL 7330 Disk drives

n. NTI terminals, remote controller/data stations

o. LUNDY 8700 optical character reader and processors

    The data flow described to this point is internal.
The remainder of this section will focus on data as it flows
in organizations external to the Marine Corps.   The external
organizations requirements are beyond the scope of a system
designed for the Marine Corps.   This material is presented
for background only.

    The DMDC is the   DOD's primary depository for
manpower information.   It has the responsibility for the
maintenance of several data bases each with many different
applications.   The tapes DMDC receives from the MCCDPA are
used to maintain these data bases.   The data base that is of
interest to this discussion is the DEERS enrollment data
base. DMDC maintains in this data base a record of every
individual ever enrolled in the DEERS, including individuals
not currently eligibile for benefits.   The DMDC updates this
data base as it receives the tapes.   The equipment used by
the DMDC is located at the Naval Postgraduate School,
Monterey, Ca. The following equipment is available there for
the DMDC to use.

    a. IBM 3033 processor

    b. IBM 3033S processor

    c. IBM 3851-A2 mass storage device.

d.   IBM 3350 Staging disk drives

e.   IBM 2835 Paging devices

f.   IBM 2305 Fixed head storage facility

g.   IBM 1403-NI line printers

h.   IBM 2501 B2 Card reader

i.   IBM 2540 Card reader/punch

j.   IBM 3420 Tape drives(multiple)

k.   IBM 2707 Transmission control circuit

l.   Versatec 8222A printer/ plotter

m.   Versatec 181-2 printer/plotter

n.   IBM 3705 communications comptroller

o.   IBM 3380 Disk facilities

p.   Disk controller

q.   IBM 3830-2 Tape controller

r.   Remote Job Entry facilities for the DMDC and contractor(DMDC only).

The DMDC on a daily basis sends to the Electronic Data Systems (EDS), via a dial up modem, any data necessary to update the DEERS eligibility data base. EDS maintains the data base for the DOD. The eligibility data bases are the data bases DOD activities query to determine an individuals entitlement to DOD benfits. The need to maintain the currency of these data bases, and the inability of the current system to do so adequately is the reason alternatives are being explored. EDS maintains two eligibility data bases that are reconciled daily. The rationale for redundant eligibility data bases is to protect against system failure for the DOD users. Each data base can support all the systems users on its own should the other fail. The eligibility data bases are located in Sacramento, Ca. and Camp A. P. Hill, Pa. The equipment available at these sites is identical. It consists of the following.

a.   AMDAHL 410 VB Mainframe Computer

b.   Terminals with dial up modems

c.   Tape drives

23

d. Disk drives

e. Output devices(i.e.,line printers and micrographic devices)

f. Front end processors

g. Telecommunications(i.e.,government leased lines, dialup, multi-drop)

h. Communication processors

i. Protocol converters

j. Modems

k. Line monitoring equipment

The data flow for DEERS dependent data submitted by the Marine Corps administrative units has virtually no similarity with the flow of data on Marines. This is the result of the current system for inpu of dependent data not being designed to support the DEERS eligibility data base, or other automated information systems. The Marine Corps has implemented guidance for use by its administrative units using [Ref. 4]. The same Commanding Officer responsible for submitting data on a Marine is responsible for submitting data on that Marines dependents. The process begins with the occurence of an event reportable to the DEERS. The report is generated by completion of the DD form 1172 as directed by [Ref. 4]. The DD form 1172 will always be forwarded to EDS for DEERS data base update. The DD form 1172 can also serve as documentation to authorize the issuance of a dependent identification card prior to mailing it to EDS. This is the original purpose for which DD form 1172's were designed.

The completed DD form 1172's from an administrative unit are mailed weekly or in groups of 50 which ever comes first to EDS in Santa Barbara, Ca. This ends the Marine Corps involvement in the reporting of DEERS dependent data. The mailing of DD form 1172's to EDS completes the Marine Corps responsibility for reporting dependent data to DEERS data bases.

The remainder of this section on the flow of dependent data to DEERS data base takes place in organizations outside the Marine Corps. This material as before is presented for background. It is an area beyond the scope of any requirements which may be made for a system designed for the Marine Corps.

EDS, in addition to maintaining the DEERS eligibility data base has a contract with the DOD to convert the data on the DD form 1172's to an electronic format. This permits its insertion to the DEERS data base. The EDS offices in Santa Barbara, Ca. upon receiving the DD form 1172's check to ensure the forms are properly completed. Forms not properly completed are returned to the originating administrative organization. Forms that are properly completed are given to clerks who enter the data on EDS terminals. The data is stored on an electronic media at EDS. Each evening EDS links to the DMDC via a dial-up modem to transmit the stored data. Each week EDS sends the DD form 1172's to the DMDC by courier as documentation for the DEERS data they have transmitted to the DMDC over the previous week.

The dependent data once at the DMDC follows a path similar to that of the data submitted on Marines. The differences which exist in the management of the data are not of any consequence to this requirements statement.

An optional means of entering dependent data to the DEERS eligibility data base is via RAPIDS. RAPIDS enters the data directly from an administrative office to the DEERS eligibility data base via the RAPIDS network. This system will not however, fulfill Marine Corps administrative requirements as it is currently to be configured. Its distribution is very limited. The DOD projects only a few RAPIDS work stations will be allotted to each Marine Corps

base, while a base may have 100 or more administrative units.

See Figure 3.1 for a depiction of the current data flow diagram.

C. REQUIRED CAPABILITIES

1. Capabilities Identification

First, the Marine Corps system for reporting data to the DEERS eligibility data base must comply with the DOD reporting requirements of DODI 1336.5 [Ref. 2] and DODI 1000.13 [Ref. 3].

Second, this system must meet the DOD goal [Ref. 5] of data entering the eligibility data base within 72 hours of its being initially reported.

Third, this system must employ RAPIDS [Ref. 5] and [Ref. 7], or a system with the same or better time capabilities than RAPIDS for submission of dependents data.

2. Organizational Structure

Every effort should be made to ensure the system designed to report DEERS data does not require changes to the current Marine Corps decentralized administrative structure. The structure is designed to support Marines while deployed in peace time or in combat. It provides Marines with outstanding service and their commanders with the authority needed to ensure their Marines administrative needs are met. The success of this structure will however, not bind this system under development to it. If necessary the Marine Corps administrative structure will be changed to allow the Marine Corps to meet the required capabilities that have been identified. The proper maintenance of DEERS data for Marines and their families is paramount to the rigid maintenance of the current Marine Corps administrative structure.
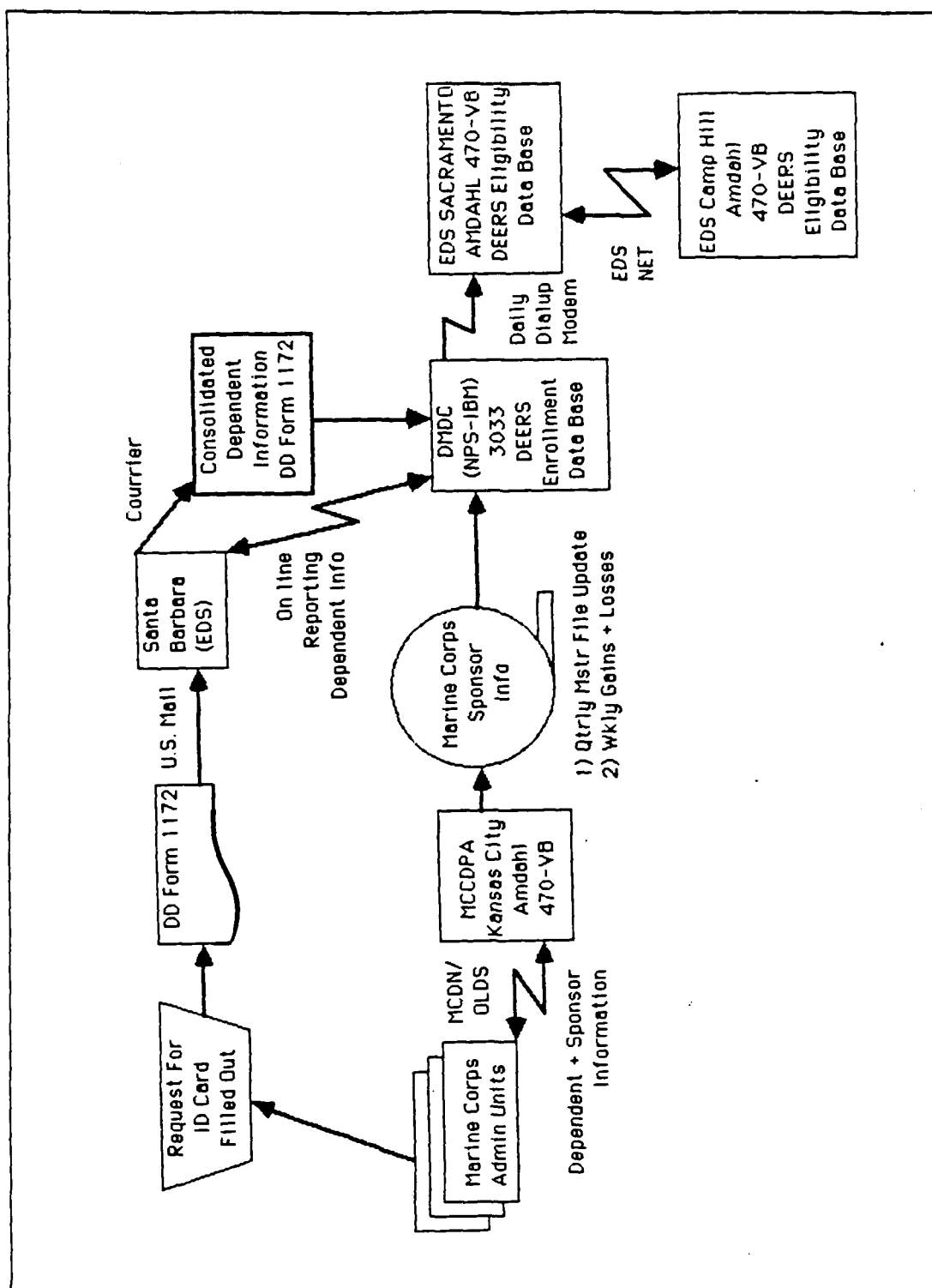
Figure 3.1   The Existing System.

The organizational structure outside the Marine Corps is beyond the scope of this requirements statement. The system designed for the Marine Corps must fit these existing structures. Data on Marines will still have to be reported by MCCDPA to the DMDC via a means acceptable to the DOD. Data on Marine dependents must still be reported to EDS via either U. S. mail or electronic means such as RAPIDS.

3. Interface with Other Systems

The system under development requires interface with a variety of systems. There are two major systems that will require coordination at the interface for the Marine Corps system to perform as required. These interfaces are between the MCCDPA and the DMDC for the transfer of Marines data, and between the Marine administrative units and EDS for the transfer of Marine dependent data. The interface between the MCCDPA and the DMDC is currently conducted by mailing magnetic tapes. The need to speed this process dictates more frequent tapes or an on-line link. This on-line link could be made using the DDN or commercial lines. The interface between the Marine Corps administrative units and EDS is currently done in two ways. The primary means is U. S. mail, a secondary means is RAPIDS. The use of mail has proven an unsatisfactory alternative due to the delays it causes in updating the DEERS eligibility data base. The use of RAPIDS work stations meets the time criteria. The RAPIDS does not however, fit the current Marine Corps administrative structure. A RAPIDS type interface for the Marine Corps must be established with necessary changes made to the RAPIDS or the Marine Corps administrative structure to complete the interface between the Marine Corps administrative units and EDS.

4. Operating Environment

This system is completely administrative. The only special consideration to be imposed on this system is that

28

the data used in the system is subject to the Privacy Act of 1974. All equipment used for this system will be standard business equipment.

5. Communications Requirements

The normal volume of data sent to the DMDC from the MCCDPA is 1500 records per week. This is currently communicated via a magnetic tape sent in the U. S. mail each week. The system under development will provide alternative means of communicating this data such as daily transmissions via DDN or commercial lines. The volume under such a system would be about 300 records per day. This would equate to about 10 to 15 minutes of transmission time per day given the current record size and using a 9600 baud commercial line for transmissions.

Within the Marine Corps data will be transmitted on the MCDN. The transmission from the Marine Corps to EDS could be via DDN or commercial lines. The Marine Corps currently submits about 93,100 dependent data (DD form 1172's) entries per year spread evenly throughout the year.

6. Classification

All data to be transmitted over this link is subject to the Privacy Act of 1974. MCDN is currently capable of handling privacy act data. Any new lines used must be capable of the same level of security.

7. Performance Requirement

The system link from the local administrative units to the DEERS data base must have a 90% availability rate. It also must have .5 hour response time with 99% of available time. This DEERS eligibility data base update capabilities must be the same as those implemented in the most current version of RAPIDS. The link from the MCCDPA to DMDC must be able to establish a link and successfully transmit data daily.

29

The performance requirement listed in para a. above are minimum standards. The system ability to meet the standards shall be measured by a system test that requires a demonstration of the ability of the system under various loads to perform to the standards established in para a. These system loads will vary from the lightest envisioned load to the heaviest envisioned load on the system. As the system concept is further developed the system loads will be defined in detail.

8. Requirements for back-up Capability

The failure of this system for relatively short periods does not require back-up capabilities as none of its' functions are critical to human life or national defense. System failure of other than short term cannot be envisioned short of a disasterous occurence. Should such an event occur back-up could be provided by the current manual system.

D. VALIDATION OF USER REQUIREMENTS

The validity of the requirement for a system which is capable of providing more timely updates to dependent data is evidenced by the tremendous expense DOD has incurred to develop RAPIDS as currently configured. Unfortunately, RAPIDS as currently configured will not provide more timely update of Marine dependent data to the DEERS data base, because Marine administrative units will not have access to RAPIDS. The requirement to update DEERS data base rapidly within the Marine Corps administrative structure has created the requirement for the development of a system that will allow the Marine Corps to gain the same benefits RAPIDS offers.

The validity of the requirement for the daily data transfer from the MCCDPA to the DMDC is derived from conversations with the DEERS Project Officer at HQMC and with the Director of the DMDC, both of whom expressed a need for a more rapid update to DMDC of Marine data.

IV. FEASIBILITY STUDY

A. GENERAL

1. Introduction

The feasibility study presents the results of an analysis of four alternative approaches proposed to satisfy the user requirements set forth in the Requirements Statement.

2. Purpose

To analyze the alternative means proposed to satisfy the user requirements set forth in the Requirements Statement. Also, to identify those alternative approaches which are operationally and technically feasible.

3. List of Alternative Approaches

Alternative #1, Maintain the existing system.

Alternative #2, Decentralized administration using MCDN to link with DEERS as a RAPIDS work station.

Alternative #3, Decentralized administration with centralized RAPIDS work stations.

Alternative #4, Centralized administration with RAPIDS work stations.

4. Content

The alternatives recommended for further analysis are #2,#3,and #4.

The alternative not recommended for further analysis is Alternative #1, maintaining the existing system.

Life cycle cost estimates for technically and operationally feasible alternatives are depicted in section E of this chapter.

Discussion of benefits for technically and operationally feasible alternatives are depicted in section F of this chapter.

The basis for selecting the feasible alternatives is explained in section G of this chapter.

5. Problem and User Requirements

Existing system problems are identified in the MENS. The user requirements to solve these problems are identified in the Requirements Statement.

6. Guidelines and Constraints

DOD guidelines and constraints for reporting DEERS data to DMDC are identified in references 1 and 2. Marine Corps constraints on the system require that any system developed enable DEERS data for Marines to be entered in the DEERS eligibility data base within 72 hours of its being reported by the administrative unit and DEERS data for dependents at the same speed as a standard DOD RAPIDS work station.

7. System Title

Upon approval of the Feasibility Study, the name used for this system will be the Defense Manpower Data Interface System (DMDIS).

B. FEASIBLE ALTERNATIVES

1. Background

It is recommended that the alternatives described in this section be developed conceptually and analyzed as alternatives to satisfying the user requirements specified in the MENS. The three feasible alternatives were selected from among four alternatives. The alternative not selected is described functionally in section C of this chapter titled Other Alternatives.

2. Description of First Recommended Alternative

Alternative #2, decentralized administration using MCDN to link with DEERS as a RAPIDS work station. This

33

alternative requires the development of a system that provides the capability for Marine Corps administrative units with MCDN/OLDS to access the DEERS data base as a RAPIDS work station through software located in a node on the MCDN. This action would provide timely updates of dependent data. Additionally, this alternative requires that the capability be developed to submit daily updates to the DEERS data base of sponsor data via the DMDC from the MCCDPA as each unit diary cycle is completed. This will provide for the timely updates of sponsor data to the DEERS.

a. Concept

All data would be entered by a decentralized Marine Corps administrative unit through the IBM series 1 known in the Marine Corps as the "white machine" which serves as a terminal on the MCDN/OLDS. The White Machine would function as it does currently , except that an additional item will be added to its main menu when the user initially logs on the MCDN. The addition to the menu would be to provide access to the DEERS data base as a RAPIDS work station. When this option is chosen, the MCDN software would route the request for a RAPIDS work station session from the local Marine Corps administrative unit to the MCDN node (any node in CONUS could be chosen) containing the software which allows the "white machine" to emulate a RAPIDS work station. The MCDN node will have a dedicated link to the DEERS eligibility data base to allow sessions at any time with minimal delay in completing the link. This configuration allows a RAPIDS terminal session to be held between any local Marine Corps administrative unit, and the DEERS data base. This session will be identical to those held at a standard DOD RAPIDS work station including the use of the verifying officers electronic signature. Upon completion of a RAPIDS terminal session, dependent data will be updated in the DEERS data base and the dependent will then be eligible to use the benefits they are entitled to use.

34

The second measure the Marine Corps must undertake is to provide daily updates of Marine sponsor data to the DEERS data base. This could be accomplished by eliminating the weekly tapes updates and substituting a daily on-line dial-up update from MCCDPA Kansas City Mo. to the DMDC Monterey, Ca. This can be accomplished at the MCCDPA by filing all unit diary transactions on disk which require an update to the DEERS data base. Upon completion of each unit diary cycle a dial-up link could be established using DDN or commercial circuits between MCCDPA and DMDC for the transfer of the data filed on the disk. The DMDC already has the capability to receive this data on the system currently used to receive Centralized System for Prior Service Enlistment Eligibility Information. The data format required for this transaction is identical to that currently used for weekly tapes.

Implementing the measures outlined in this concept would provide updates to the DEERS data base in a manner consistent with the state of the practice in AIS and fulfill the Requirements Statement. See figure 4.1 for a data flow diagram description of this concept.

b. Inputs

All inputs to this system will originate from the local Marine Corps administrative unit over the MCDN using the white machine to generate the input. The input will include both unit diary and RAPIDS entries. The guidance for data input procedures and verification will be found in the current edition of [Ref. 6] for unit diary entries and in the RAPIDS Program Specification [Ref. 7] for RAPIDS work station entries. The unit diary entries will not be entered directly into the DEERS data base, but will first be processed and formatted by MCCDPA Kansas City Mo. before
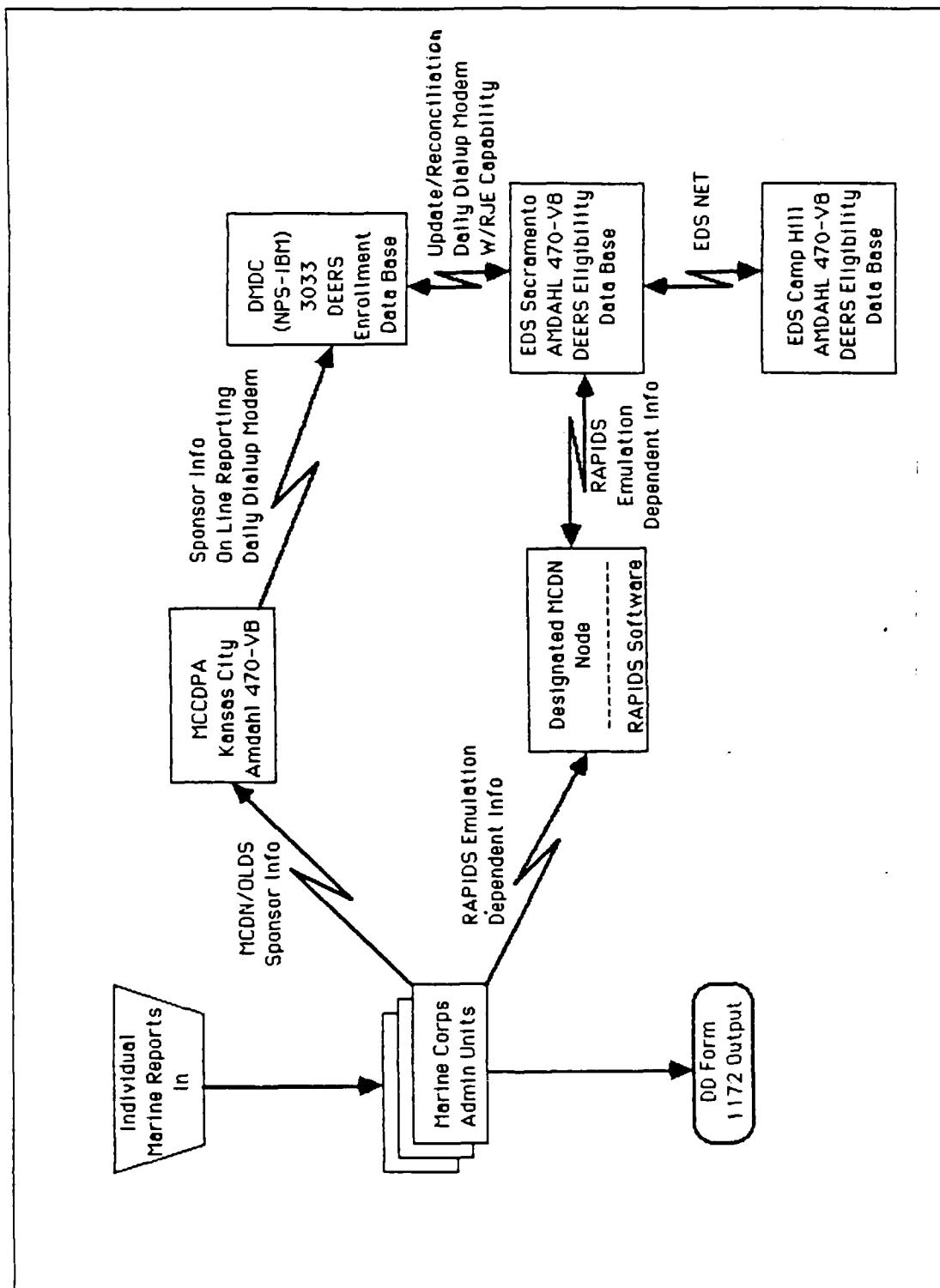
Figure 4.1   Decentralized Admin w/MCDN link to DEERS.

the data is transferred to the DMDC. DMDC will then enter unit diary (sponsor) data into the DEERS eligibility data base in Sacramento, Ca. The RAPIDS data (dependent) entered at the Marine local administrative unit will be input directly to the DEERS eligibility base via the link in the MCDN node that will be used to support RAPIDS work station type data entry.

c. Outputs

The outputs which are of concern to this system are as follows.

Accurate data on Marines and their dependents when the DEERS data base is queried. The DEERS data base will eventually be queried each time a Marine or a dependent attempts to use one of the benefits that requires an eligibility check tied to the DEERS data base. Each Marine administrative unit should have the ability to query the DEERS data base when logged on as a RAPIDS work station. This will allow audits to check for accuracy prior to errors becoming a problem and prevent needless reentry of previously reported data.

An area previously not addressed is the ability of the RAPIDS system to produce dependent identification cards as part of its output. The cost of this feature would be prohibitively expensive if each Marine Corps administrative unit were equipped with this capability. The proposed solution to this is that this feature of the system be centralized. The Provost Marshall on each base will have a DOD RAPIDS work station with identification card production capablities. This configuration would not be a change to current Marine Corps procedures, since the Provost Marshall is usually responsible for the issue of dependent identification cards on Marine Corps posts and stations. The impact this would have on the system effectiveness would be

minimal. Presently, less than 10% of all DEERS dependent data entries result in the issue of a dependents identification card, which means that in over 90% of the DEERS data entries no further action is required other than data entry. In the case where identification card issue is necessary, all data may be entered by the local Marine Corps administrative unit, and a hard copy DD from 1172 may be produced for the dependent with the printer on the White Machine using the capabilities of standard DOD RAPIDS software. The dependent then reports to the Provost Marshall as is the current procedure for identification card issue. This system will make the job of the Provost Marshall easier and the dependents wait for their identification card shorter. All the Provost Marshall must do is call up the dependents record on the RAPIDS work station, ensure the data entered by the administrative unit is correct, and give the RAPIDS work station the printed identification card command. This promises to be a very quick, highly automated procedure for identification card issue.

    d. Software

        The software for this system must provide the following capabilities.

        The software currently used for MCDN must be modified to provide the additional option of linking to a MCDN node for the purpose of linking to the DEERS eligibility data base as a RAPIDS work station.

        A designated MCDN node must have software developed which accepts a request for linkage as a RAPIDS work station from a terminal on the MCDN. The node must then create the RAPIDS work station environment for the linked MCDN terminal and forward the request to a DEERS eligibility data base. The software at the MCDN node must make the DEERS eligibility data base software respond as if it is linked to

a RAPIDS work station and the terminal on the MCDN functions as if it were a RAPIDS work station.

MCCDPA Kansas City Mo. must modify its software used to file data for transfer to DMDC so that it will prepare a file for transfer to DMDC daily vice weekly.

All of these software requirements are modifications to existing government owned software. This should reduce the required development cost, risk, and time.

    e. Equipment

    The equipment needed for this system is as follows.

1. The terminals on the MCDN. (White Machines)
2. The MCDN
3. A modem
4. DDN or leased communication lines
5. RAPIDS work stations for the Provost Marshall on each Marine Corps installation.

All the equipment needed is already government owned or leased, with the possible exception of the leased line. A commercial line (current policy favors the DDN which is government owed) or DDN is needed for the data transfer from MCCDPA Kansas City Mo. to DMDC each day. A leased line or DDN will also be needed on a dedicated basis as a link between the MCDN node and the DEERS data base to carry the RAPIDS dependent data traffic.

3. Description of Second Recommended Alternative

Alternative #3, decentralized administration with centralized RAPIDS work station. This alternative would report sponsor data in the same manner as alternative #2. However, dependent data would be reported by a central RAPIDS office remote to many Marine units. This office would be equipped with the standard DOD RAPIDS work station.

a. Concept

This concept would require the Marine and dependents to physically report to a central RAPIDS office located on each Marine Corps base. Often due to the size of Marine Corps bases, the central RAPIDS office would be remote from many Marines' local unit. Deployed units would be unable to care for the dependents of that units Marines due to the lack of access to the central RAPIDS office. The Commanding Officer of the Marines' unit would also lose control of dependent information reporting in that problems could not be resolved without going through burdensome administrative channels. This procedure is contrary to the Marine Corps policy to provide personalized service to Marines' and their dependents and the Marine Corps policy that a unit commander is responsible for all aspects of a Marines welfare. See Figure 4.2 for a diagram description of this concept.

b. Input

Sponsor input is performed using standard MCDN/OLDS capabilities as in alternative #2, with the MCCDPA required to report DEERS changes daily to the DMDC. Dependent information is reported to DEERS separately using a central RAPIDS work station capability on each base.

c. Outputs

Standard unit diary results are returned to the local administrative units using MCDN/OLDS, no DEERS information would be available at this level. The central RAPIDS center will be the source for all DEERS information on a Marine Corps base.

d. Software

The software for this system must provide the following capabilities.

40
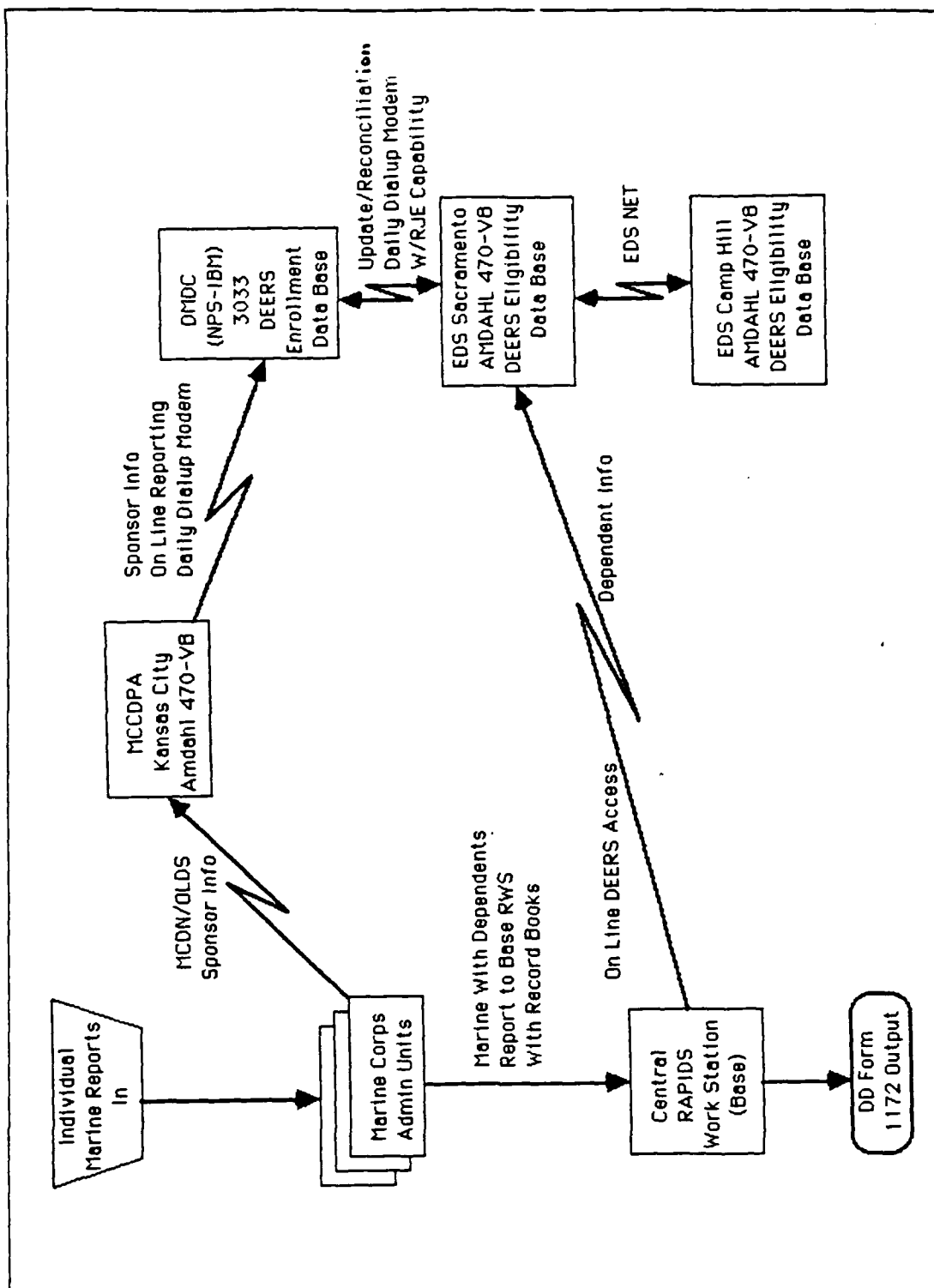
Figure 4.2   Decentralized Admin w/ Centralized RWS.

41

1. Current MCDN/OLDS software at the local unit.

2. Modified software at the MCCDPA to transmit sponsor data daily to the DMDC.

3. Current RAPIDS software for the central RAPIDS office.

    e. Equipment
        1. Terminals on the MCDN
        2. The MCDN
        3. A modem
        4. RAPIDS work station

4. <u>Description</u> <u>of</u> <u>Third</u> <u>Recommended</u> <u>Alternative</u>

    Alternative #4, centralized administration with RAPIDS work stations. This alternative requires the centralization of Marine Corps administrative units to the degree required to allow each administrative unit at least one RAPIDS work station under the current DOD RAPIDS terminal distribution plan.

    a. Concept

    This concept requires a major change in Marine Corps policy and philosophy. Administrative responsibility for a Marine would be removed from the unit and placed at the major command level. Each base would have one personnel administration center (PAC) with unit diary and RAPIDS capabilities. The PAC would be responsible for the administrative affairs of all the units on the base. MCCDPA would still be required to provide DMDC daily sponsor update under this alternative from the unit diary input to speed sponsor data updates to the DEERS data bases. See Figure 4.3 for a data flow diagram descriptive of this concept.

    b. Inputs

    The dependent input would be accomplished on a standard RAPIDS work station and sponsor data from the
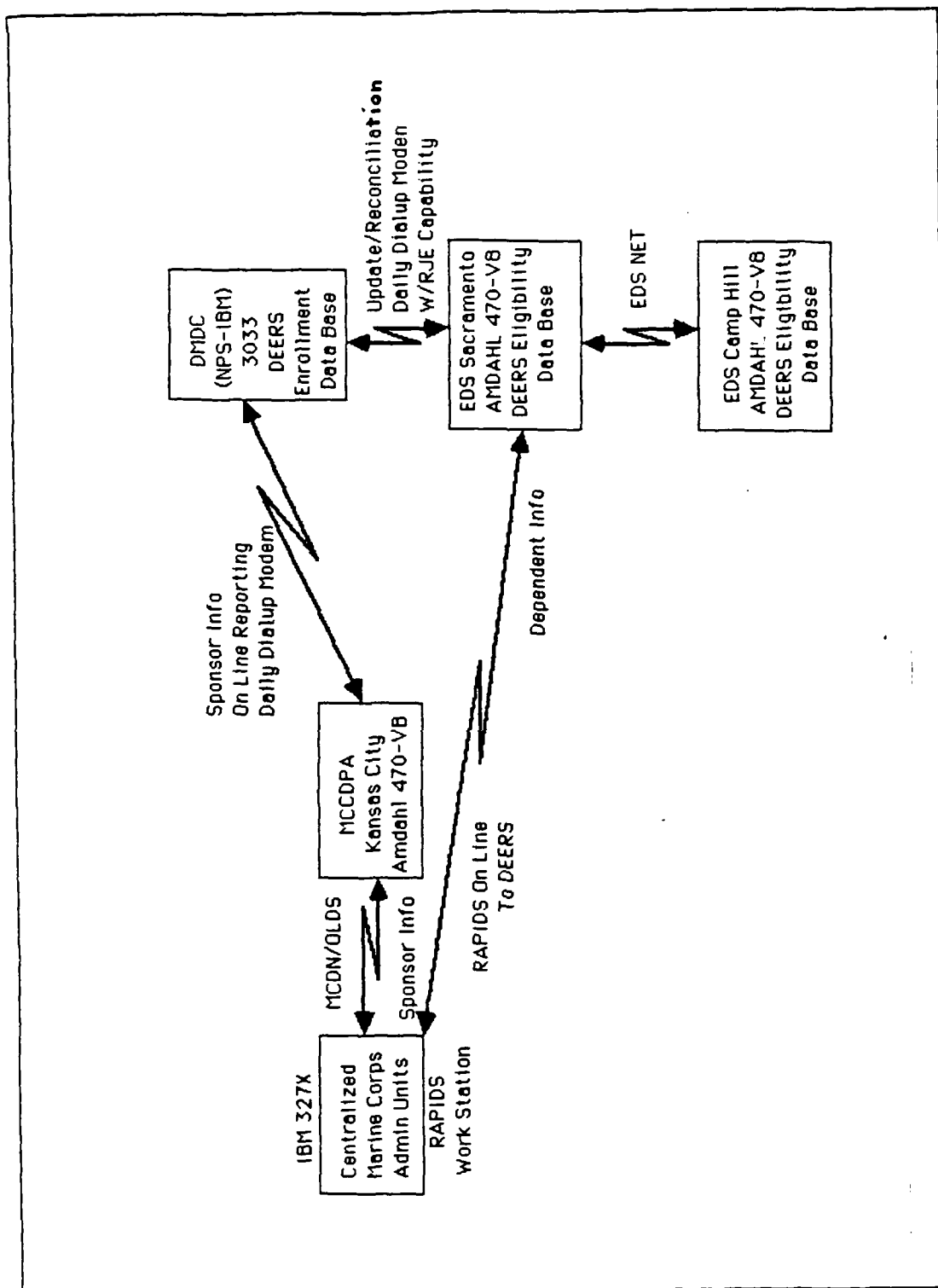
Figure 4.3   Centralized Admin w/ Central RWS.

MCDN/OLDS. MCCDPA Kansas City, Mo. will provide daily updates of Marine sponsor data to the DMDC.

c. Outputs

Same as alternative #2 except that the centralized administrative unit would have the capability of issuing dependent identification cards.

d. Software

The software for this system must provide the following capabilities.

1. Current MCDN/OLDS capabilities.
2. Current RAPIDS capabilities.
3. Software at MCCDPA to forward sponsor data to DMDC daily.

e. Equipment

1. Terminals on the MCDN.
2. The MCDN.
3. A modem.
4. RAPIDS work stations.

C. OTHER ALTERNATIVES

1. Background

This section describes the alternative not recommended for further conceptual development and analysis.

2. Description of Existing System

Alternative #1, maintain the existing system. The existing system is hampered by its' inability to quickly update the DEERS eligibility data base. The problem is primarily one of using manual methods to update dependent data and infrequent updates to DEERS of Marine sponsor data.

a. Concept

This system was developed before the need for an accurate and timely DEERS data base existed. This concept did not consider speed necessary for the update of the DEERS data base. This is a major flaw which requires a system modification or replacement.

b. Inputs

The inputs to this system are initially unit diary entries and DD form 1172's. The unit diary entries for this system and for the feasible alternatives are the same. The unit diary information in the current system is only forwarded to the DMDC once a week on a mailed tape. DEERS frequently does not receive the information for 14 days or more. The speed with which unit diary entries are received at DMDC/DEERS with the current system is very good compared to the speed with which dependent data submitted on DD form 1172's enters the DEERS data base. The DD form 1172's for dependent data input to the DEERS eligibility data base are typed by local administrative units. Each week or after the issue of 50 DD form 1172's (whichever is first), the administrative unit mails the completed paper DD form 1172's to EDS in Santa Barbara, Ca. There, the information on the DD form 1172's is again typed by a clerk to create an electronic record of the DD form 1172. This information is transferred daily via commercial lines to DMDC for processing. The paper DD form 1172's are also sent from EDS to DMDC by courier as do cumentation for the EDS input data. The DMDC on a daily basis transfers the updates it receives from EDS in Santa Barbara, Ca. to the DEERS eligibility data base in Sacramento,Ca. The time delay between the initial issuance of the paper DD form 1172 and the data entry concerning its' issue into the DEERS data base averages 54 days. This lack of timeliness has mandated a replacement system.

45

c.   Outputs

The only outputs to the Marine Corps from this system are to the organizations using the DEERS data base to check for eligibility. This is the only check the Marine Corps, a Marine sponsor, or a Marine dependent has on the DEERS data base output. The first indication of a problem in this data base is when service is denied. Under the current system, if this output is incorrect, there is a long wait to correct the system.

d.   Software

The software for this system is that used for the MCDN/OLDS and at the MCCDPA Kansas City,Mo.

e.   Equipment
    1.   White Machine
    2.   MCDN/OLDS
    3.   MCCDPA equipment

D.   FEASIBILITY DETERMINATION

1.   Purpose

The purpose of this section is to present the results of the analysis of the four alternatives that have been presented for technical and operational feasibility. The criteria for technical and operational feasibility are taken directly from reference 1.

2.   Technical Feasibility

a.   Issues

The technical characteristics of any system designed to fulfill the Requirements Statement would include, as a minimum, the following:

Hardware
    a.   Terminals in Marine Corps administrative office capable of inputting all required data for the DEERS data base. This could be a combination of MCDN and RAPIDS or just MCDN hardware.

46

b. MCCDPA Kansas City must configure its' hardware so that unit diary data for Marine sponsors will be passed to the DMDC at the completion of each unit diary cycle.

Communications

All communications must be able to travel via the MCDN, DDN or commercial lines. Any other mode of data transmission is too slow to fulfill the requirements of this system.

Operating Software

a. The software must be able to be integrated with current software used by the Marine Corps, the DMDC, RAPIDS, and DEERS.

b. The software must be developed to allow use of a modem to transfer data. Maintainability and proper documentation should be the result of the application of these techniques.

c. The software must present a man-machine interface that is easily understood. Help facilities must be available which will make it possible for any clerk in an administration office to operate the system with minimal training.

b. Analysis

Alternative #1, This alternative fails to meet technical requirements for feasibility. All data is not input or transmitted electronically as is required to meet the need for speed in this system.

Alternatives #2,#3, and #4 could meet all of the technical requirements for feasibility.

3. *Operational Feasibility*

a. Issues

The operational characteristics of any system designed to fulfill the requirements statement would be, as a minimum, the following:

1. The policy of higher headquarters and Marine Corps policy as defined in [Ref. 2], [Ref. 4], [Ref. 5], and [Ref. 6] must be followed as written, or changed prior to further development of this concept.

2. Dependent eligibility data must enter the DEERS data base from the administrative units with the same speed as the current version of RAPIDS. Sponsor data must enter the eligibility data base within 72 hours of its being submitted by the administrative unit.

3. The Marine Corps is committed to decentralized administrative units for reasons previously stated. Any system developed must, to the greatest extent practical, retain administrative control at the current decentralized level.

   b. Analysis

   Alternative #1, Failed operational feasibility.

   Alternatives #2, #3, and #4 all meet the operational feasibility test in that they comply with the required references and report information within the required time.

   4. Feasibility Summary
      a. Feasible Alternatives

      Alternatives #2, #3, and #4 are operationally and technically feasible.

      b. Infeasible Alternatives

      Alternative #1 is operationally and technically infeasible.

      See Table 4.1 for a summary of the feasible alternatives.

E. LIFE CYCLE COST ANALYSIS
   1. Background

      This section is intended only to make the initial estimate of system cost. The question to be answered in this section is whether the cost is in the range where funds could conceivably be made available for development of any of the three feasible alternatives.

48

TABLE I
SUMMARY OF FEASIBLE ALTERNATIVES

DMDIS REQUIREMENTS	ALT #1	ALT #2	ALT #3	ALT #4
Comply w/DODI 1336.5		x	x	x
Comply w/DODI 1000.18		x	x	x
72 Hour Update		x	x	x
RAPIDS Capability f/Dependent Data		x	x	x
Security (Privacy Act)	x	x	x	x
90% System Availability		x	x	x
99% Probability of Completing Link Within .5 Hours		x	x	x
Backup Capability	x	x	x	x
Data (Daily) Transfer From MCDN Node to DMDC		x	x	x

X = Meets Requirement

2. Cost Estimating

Non-recurring cost-Alternative #2

    a.   Create the MCDN software to provide MCDN terminals with the capability of linking to a DEERS eligibility data base as a RAPIDS work station. Estimated cost $2 million. (See chapter 5, Economic Analysis for detailed explanation of cost estimates in this section.)

    b.   Modify the MCDN software main menu to include the option of linking to the DEERS data base as a RAPIDS work station. Estimated cost $80,000.

Recurring cost-Alternative #2.

    a.   Software maintenance per year after one year. Estimated cost $275,000 per year.

    b.   Dedicated leased line from a MCDN node to a DEERS eligibility data base. Estimated cost $12,000 per year.

    c.   Daily data transmissions via commercial line from the MCCDPA Kansas City, Mo. to the DMDC, Monterey, Ca. Estimated cost $600 per year.

    d.   Total Cost : development year $2,092,600, 1st to 5th years $287,600 per year.

Non-recurring cost-Alternative #3.

    a.   None, all standard DOD RAPIDS work station costs are borne by DOD.

Recurring cost-Alternative #3.

    a.   Daily data transmissions via commercial lines from the MCCDPA to the DMDC. Estimated cost $600 per year.

    b.   Total Cost : 1st to 5th year $600 per year.

Non-recurring cost-Alternative #4

    a.   Set up of centralized administration offices on each Marine Corps installation. Estimated cost $12 million.

Recurring cost-Alternative #4.

    a.   Daily data transmission via commercial line from the MCCDPA to the DMDC. Estimated cost $600 per year.

    b.   Total Cost : development year $12,000,600, 1st to 5th years $600 per year.

F. BENEFIT ANALYSIS

1. Background

Benefits must be considered when determining the economic feasibility of an alternative. This section is intended to make an initial estimate of the benefits to be derived from the development of each feasible alternative.

2. Benefits Estimation

The estimated benefits gained by each technically and operationally feasible alternative are unquantifiable in nature, having no associated monetary value. However, these unquantifiable benefits possessed by each alternative levies a tremendous impact on the functions and operations of the Marine Corps. The associated benefits for each alternative, although often common to each, benefit an alternative in varying degrees. In order to quantifiably measure their respective impacts, a weighting criteria was developed to assign a specific value to each benefit as it relates to that alternative. This information is captured in Chapter 5, Benefits Analysis Summary, Table VI. This section will only discuss the benefits of each alternative from an unquantitative position.

Alternative #2 requires decentralized administration using MCDN to link with a RAPIDS capability. The implementation of such a capability would allow for the timely update of the DEERS data base for sponsor and dependent data. The resulting benefits are first manifested under a decentralized administrative organization. Retaining decentralized administration avoids the loss of the Marine for the entire day as would be the case under a centralized organization. The centralized organization is normally in a remote location requiring extensive logistics requirements. Productivity can be considerably diminished if a Marine is

removed from his unit for an entire day. Second, retaining decentralized administration to the squadron/battalion level allows the individual units to perform their own functions when deployed in a mission oriented environment. Third, the implementation of this alternative can offer personalized service to the Marine sponsor and dependents. The local administrative unit will provide easy accessability contributing to high morale as well as a more accurate data base. The local commander would have complete control of all administrative functions allowing the correction of errors to be resolved more quickly.

Alternative #3 requires decentralized administration with centralized RAPIDS. All benefits noted in alternative #2 are nullified when a unit is deployed and centralized RAPIDS is maintained. All benefits discussed for alternative #2 are nullified when a unit deploys because the administrative function of dependent care remains on the base while all other administrative functions accompany the unit. Alternative #3 offers no new benefits above the minimum requirements.

Alternative #4 requires centralized administration with RAPIDS capability. All benefits noted in alternative #2 are removed when a unit is deployed stemming from a centralized organization. When a unit deploys, all administrative functions remain under the purview of centralized control not allowing the unit to perform its' administrative function. Additionally, Centralized Marine Corps administration would require that Marine and dependents report to a remote central administration thus losing the Marine for an entire day, even for the most menial of administrative matters. This alternative offers no new benefits above the minimum requirements.

G. THE SELECTION PROCESS

  1. <u>Purpose</u>

    The purpose of this section is to describe the basis used for selecting the feasible alternatives.

  2. <u>The</u> <u>Process</u>

    The four original alternatives were analyzed for technical and operational feasibility. After conducting this analysis, only three alternatives were found to meet all the criteria for technical and operational feasibility. The alternative which did not meet these criteria was eliminated from consideration. All three remaining alternatives were analyzed for initial determination of "affordability". The three remaining feasible alternatives were determined to have a cost within the range of funding which could conceivably be made available for the system. The conclusion of the feasibility study is that alternatives #2, #3, and #4 are feasible. Accordingly, alternatives #2, #3, and #4 are recommended for further development.

V. ECONOMIC ANALYSIS

A. INTRODUCTION

1. Background

This concept development is a response to a need the Marine Corps recognized for an improved means of reporting data to the DEERS eligibility data base. The concept development cycle for any Automated Information System within the Marine Corps is outlined in [Ref. 3]. The requirements for the MENS, Requirement Statement, and Feasibility Study as outlined in [Ref. 3] have been met in the previous three chapters of this thesis. The final step required by [Ref. 3] is this Economic Analysis. An Economic Analysis of the feasible alternatives that were determined in the last chapter is the subject of this chapter.

2. Scope

The scope of the Economic Analysis is limited to addressing the benefits and costs of the feasible alternatives for fulfilling the requirements established in the Requirements Statement.

3. Methodology

The Economic Analysis of the feasible alternatives was conducted using the techniques outlined by Zimmerman [Ref. 9]. Software cost estimates for this economic analysis were generated using the techniques outlined by Boehm in [Ref. 10].

The benefits offered by this alternative are not quantifiable, therefore they are described in a qualitative manner. A qualitative comparison of the costs and the benefits is then conducted to arrive at a recommended alternative for further development.

54

A sensitivity analysis was performed to determine the results of changes in assumptions on the cost to benefit ratio of the alternatives.

B. OBJECTIVE

The objective of the Economic Analysis is to provide decision makers at HQMC with a comparison of the cost to the benefits for each of the feasible alternatives. The Economic Analysis should provide decision makers with sufficient information to decide if the concept is worthy of further development in any of the feasible configurations, and if it is worthy of further development to determine which alternative is developed.

C. ASSUMPTIONS

The assumptions, constraints, limitations, and exclusions related to this Economic analysis are the following:

1. The economic life used for DMDIS will be five years from date of implementation.

2. The discount rate is ten percent with no differential inflation rate applied [Ref. 9].

3. Contractor support will be used for the detailed design and implementation of the system.

4. Labor rates for software development and maintenance are $80 per hour.

5. All system costs to date are sunk costs.

6. The base year for the cost analysis is FY86.

7. Two lines of COBOL code are required to perform the same functions as one line of code in C.

8. The modifications required to MCDN software for alternative #2 that will link MCDN terminals to the RAPIDS emulation software in a MCDN node will require 2000 lines of COBOL code.

9. The Annual Traffic Change (ATC) [Ref. 10] for software used in alternative #2 will be 15%.

10. Manpower cost under all alternatives are equal.

11. There will be no non-recurring cost associated with alternative #3. The centralized RAPIDS office will be located in the offices of the organizations currently responsible for the issuance of dependent identification cards. No additional space or Marine Corps equipment will be necessary to perform the data entry.

12. All costs of the standard DOD RAPIDS work stations will be borne by the DOD. This includes equipment, software, and communications costs.

13. If alternative #4 were selected significant non-recurring costs would be incurred in the establishment of the centralized administrative offices on each Marine Corps installation. A very rough figure of $1 million for each major Marine Corps installation to provide facilities and implement centralization will be used in this analysis.

14. The intermediate Constructive Cost Model (COCOMO) [Ref. 10] using the organic development mode and all cost drivers as nominal will produce accurate software development and maintenance effort estimates.

D. ALTERNATIVES

1. Alternative #1, Current System

The current system was found to be an infeasible alternative during the conduct of the feasibility study, therefore it cannot serve as a baseline for this economic analysis and will not be considered in this analysis.

2. Alternative #2, #3, and #4

These alternatives are technically and operationally feasible. They will be examined in this analysis.

E. COST ANALYSIS

1. General

The cost involved in the development and maintenance of DMDIS can be divided into three categories for analysis. These categories are sunk cost, non-recurring cost, and recurring cost. The most significant cost for all the alternatives is the sunk cost, which will not be used to compute the system cost in this analysis. These are costs which can no longer be avoided, the money was previously spent. The reason for discussing such costs in this cost analysis is to emphasize the remarkable degree to which the proposed systems can take advantage of previous systems (sunk cost) to save in this systems development and maintenance. The costs which will be used in this cost analysis include the non-recurring and recurring costs.

56

2. Non-recurring Cost

Non-recurring costs are those costs expected only one time during the system life. These costs are usually incurred during the initial development of the project.

a. Software Development Costs

Alternative #2 - Software that will cause a MCDN terminal to function as a RAPIDS work station must be developed. The software for current RAPIDS work stations consists of 21,000 lines of code written in C. Whichever node in the MCDN is chosen to host the RAPIDS emulation software will require it be written in COBOL. The reason for this requirement is that Marine Corps programmers are all trained in COBOL, none are required to know C. Therefore, if this software is to be written by Marines it must be in COBOL. The translation from C to COBOL will have to be contracted out since the Marine Corps lacks in house knowledge to translate C to COBOL. A conversion factor of two lines of Cobol for each line of C has been assumed. This means approximately 42,000 lines of COBOL code must be developed to fulfill the need for RAPIDS emulation software. The cost estimation model used to develop software cost is COCOMO [Ref. 10]. It predicts that 162 man months and 17.3 months are required to develop this software, given the assumptions made previously. At the assumed $80.00 per hour rate for software development cost and 152 hours per man month, the development cost for this software would be $1.97 million.

An additional software development requirement for alternative #2 is the needed modification to the MCDN software that provides MCDN terminals the option from the main menu to chose to link to the RAPIDS emulation software. An estimated 2000 lines of Cobol code are required to make this modification. Using COCOMO 6.6 man months are required to code this requirement, or about $80,000.

The total software development cost under alternative #2 then is approximately $2.03 million.

Alternative #3 and #4 - There are no software development costs for these alternatives to the Marine Corps. All software costs are borne by the DOD for RAPIDS.

b. Office Set-up Costs

Alternatives #2 and #3 - There are no set-up costs involved in these alternatives. The required administrative adjustments under these alternatives can be made with resources Marine Corps units currently possess.

Alternative #4 - There are extensive office set-up costs associated with this alternative. All the administrative records and resources on each Marine Corps installation would have to be moved to a central location. Currently, no major Marine Corps installation has vacant facilities that would be sufficient for central administrative offices aboard that installation. There are currently 12 major Marine Corps installations that do not have PACs. It is assumed that the average cost per installation to bring the facilities available up to a condition that would meet the minimal requirements for a centralized administrative office would be $1 million. This equates to a total estimated cost of $12 million for office set-up cost under alternative #4.

3. Recurring Cost

a. Software Maintenance Costs

Alternative #2 - This alternative requires an estimated 44,000 lines of code be generated before it can function. This code must be maintained if the system is to continue to function properly. The expected change to code the Annual Traffic Change (ATC) [Ref. 10], is 15%. This means 6600 lines of code will have to be written or modified each year to keep the software for this alternative current.

58

Using the COCOMO again [Ref. 10] it was estimated that the cost of maintaining this software will be $275,000 annually.

Alternative #3 and #4 - These alternatives do not require the generation of any software, therefore they do not require software maintenance expense.

   b.   Dedicated Leased Line

Alternative #2 - This alternative requires the Marine Corps to acquire a lease line between the MCDN node hosting the RAPIDS emulation software and a DEERS eligibility data base. The cost for a 9600 baud dedicated leased line is about $12,000 annually.

Alternative #3 and #4 - These alternatives use the DOD issue RAPIDS work station. All costs associated with these RAPIDS work stations are borne by the DOD.

   c.   Commercial Lines

Alternatives #2, #3, and #4 - All three feasible alternatives require the MCCDPA, Kansas City, Mo. to send daily electronic sponsor data updates to the DMDC, Monterey, Ca. The current traffic is about 300 records per day between these organizations. This would require about 10 to 15 minutes per day to transmit on commercial lines. The DMDC requires this data be sent to them during the evening or night Monterey hours. It is estimated the cost would be about $50.00 per month or $600.00 annually.

   4.   Cost Summary

Various life cycle cost summaries for each feasible alternative are depicted in Table II, Table III, Table IV, Table V, and Table VI of this chapter. Table II summarizes the undiscounted costs for alternative #2. Table III summarizes the undiscounted costs for alternative #3. Table IV summarizes the undiscounted costs for alternative #4. Table V computes the total Present Value, Value Analysis, and Discounted Annual Cost for alternatives #2, #3, and #4. Table VI computes the Benefit Cost Ratio using Uniform

59

Annual Cost (UAC) for alternatives #2, #3, #4. All table computations were derived using methods described in [Ref. 9] and [Ref. 10]

F.   BENEFIT ANALYSIS

As previously discussed in Chapter 4, the benefits for each feasible alternative are largely unquantifiable in nature. The costs associated with each alternative were analyzed in section E and summarized in Tables II through VI of this chapter. However, the benefits resulting from each alternative cost vary according to the impact they project in the operations and functions of the Marine Corps. Benefits for each alternative are discussed below. Table VII depicts the weighting criteria used for each alternative in a Benefits Analysis Summary. High weights were given to the system which demonstrated a greater propensity for an accurate DEERS data base and was the most available to Marines and their dependents.

Alternative #2, meets all minimum requirements established in Table I of Chapter 4. The benefits which would result from the implementation of alternative #2 are initially manifested in the decentralization of administration. Under this concept, all administrative functions for the Marine sponsor and their dependents are performed by the local unit. This means that the sponsor or dependents will not be required to travel to a remote centralized administrative center to execute any administrative matters such as the DD form 1172. It is estimated that 93,100 DD form 1172's are prepared each year. If a centralized RAPIDS center existed, then 93,100 individuals would be lost from their units, for an estimated one day to complete the DD form 1172's. Decentralization avoids this situation by saving an enormous amount of time and cost. Additionally, morale is

TABLE II
UNDISCOUNTED COST: ALTERNATIVE #2

COST ELEMENT	FY87	FY88	FY89	FY90	FY91	FY92	COST
NON-RECURRING COST							
SOFTWARE: DEVELOPMENT	2,030,000						$2,030,00J
RECURRING							
SOFTWARE: MAINTENANCE	-0-	275,000	275,000	275,000	275,000	275,000	$1,375,000
DEDICATED LEASED LINE	-0-	12,000	12,000	12,000	12,000	12,000	$ 60,000
COMMERICIAL LINE	-0-	600	600	600	600	600	$ 3,000
TOTAL	2,030,000	287,600	287,600	287,600	287,600	287,600	$3,468,000

61

TABLE III

UNDISCOUNTED COST: ALTERNATIVE #3

COST ELEMENT:	FY87	FY88	FY89	FY90	FY91	FY92	COST
Non-Recurring (None)	--	--	--	--	--	--	--
Recurring:							
Commercial Lines	--	$600	$600	$600	$600	$600	$3000
TOTAL:	--	$600	$600	$600	$600	$600	$3000

62

TABLE IV
UNDISCOUNTED COST: ALTERNATIVE #4

COST ELEMENT	FY87	FY88	FY89	FY90	FY91	FY92	COST
NON-RECURRING							
CENTRAL OFFICE SET-UP	12,000,000	-00-	-00-	-00-	-00-	-00-	$12,000,000
RECURRING							
COMMERICIAL LINE	600	600	600	600	600	600	$ 3,000
TOTAL	12,000,000	600	600	600	600	600	$12,003,000

63

TABLE V
TOTAL PRESENT VALUE COST

COST CATEGORY	FY87	FY88	FY89	FY90	FY91	FY92	TOTAL
UNDISCOUNTED COST:							
ALTERNATIVE #2	2,030,000	287,600	287,600	287,600	287,600	287,600	3,468,000
ALTERNATIVE #3	-0-	600	600	600	600	600	3,000
ALTERNATIVE #4	12,003,000	600	600	600	600	600	12,003,000
PRESENT VALUE FACTOR	1.0	.954	.867	.788	.717	.652	
DISCOUNTED COST:							
ALTERNATIVE #2	2,030,000	274,370	249,349	226,628	206,209	187,515	3,174,071
ALTERNATIVE #3	-0-	572	520	472	430	391	2,385
ALTERNATIVE #4	12,003,000	572	520	472	430	391	12,005,385

64

TABLE VI
BENEFIT COST RATIO CALCULATIONS

ALTERNATIVE	UAC	RCR
ALTERNATIVE #2	798,107	2.51
ALTERNATIVE #3	600	333.33
ALTERNATIVE #4	3,018,704	.03

$$\text{UNIFORM ANNUAL COST} = \frac{\text{PRESENT VALUE COST}}{\text{CUMULATIVE DISCOUNT FACTOR}}$$

$$\text{BENEFITS COST RATIO} = \frac{\text{WEIGHTED BENEFITS}}{\text{UNIFORM ANNUAL COST}} \quad \times\ 100{,}000$$

TABLE VII
BENEFIT ANALYSIS SUMMARY

BENEFIT	RELATIVE WEIGHT	SCORE			WEIGHTED SCORE		
		ALT #2	ALT #3	ALT #4	ALT #2	ALT #3	ALT #4
ACCURATE DEERS DATA BASE	10	10	2	1	100	20	10
AVAILABILITY OF ADMIN SUPPORT TO MARINES AND DEPENDENT	10	10	2	1	100	20	10
TOTAL					200	40	20

enhanced if the Marine knows that his personal administrative matters are handled by the local unit. Decentralization also gives the local commander complete control of all administrative functions. This is evidenced when errors are detected. The local commander has the ability to correct these errors quickly avoiding the burdensome administrative channels required by a centralized administration. A second benefit is demonstrated when a unit is deployed. The decentralized administrative unit would accompany the unit thus allowing the Marine sponsor to service their dependents immediately in any case there is an emergency. This situation complies with general Marine Corps policies and missions to keep the unit in tact. A third demonstration of the benefits this alternative can offer is the personalized service the Marine receives by their local units. Since the administrative unit is within close proximity of the Marine, the data would be more easily updated, thus contributing to a more accurate data base.

Alternative #3 meets all minimum requirements established in Table I of chapter 4. However, the implementation of this alternative does not offer the benefits that alternative #2 does to the same degree as alternative #2, and does not offer some of them at all. Although alternative #3 has decentralized administration, it requires a separate central RAPIDS capability thus removing the benefits such as local commander control, input during unit deployment, and personalized service which all contribute to a more accurate data base.

Alternative #4 meets all minimum requirements established in Table I of chapter 4. However, the implementation of this alternative does not offer any of the benefits that alternative #2 to the same degree as alternative #2 and does not offer some of the benefits at all. This alternative completely removes all administrative functions from the

local unit with the centralized concept. Thus, benefits such as local commander control, input during unit deployment, and personalized service would not exist under this alternative.

G. CONCLUSIONS

The question which must be asked is, does the user want to implement a system such as DMDIS based solely on cost? If the answer to this question is yes, then the clear choice is alternative #3. All computations depicted in Tables II through VI support alternative #3 as being the lowest cost alternative. However, the benefits analysis in section F of this chapter and Table VII demonstrate that alternative #2 to be the more beneficial alternative, albeit in unquantifiable terms. The development of any AIS is to improve the current performance of a system. Using this approach to compare alternatives, alternative #3 has the lowest cost, but offers low benefits. Alternative #4 has the highest cost with the lowest benefits. Alternative #2 offers moderate cost with high benefits. This alternative alone offers a system which meets all of the technical measures of feasibility and meets the operational measures of feasibility without requiring extensive change to the Marine Corps administrative structure. Change to this administrative structure should not be lightly made. The administrative structure as it is currently organized, is designed to support Marines' in the field, which is where the mission of the Marine Corps is fulfilled. The other alternatives do not support Marines' in the field as well as alternative #2.

H. RECOMMENDATIONS

In reviewing all three feasible alternatives, with consideration to cost and benefits, it is highly recommended that alternative #2 be implemented. It offers the best balance of benefits to cost, and fulfills a critical need in Marine Corps administration.

APPENDIX

LIST OF ACRONYMS

ACU	Administrative Control Unit
ADP	Automated Data Processing
AIS	Automated Information Systems
BCR	Benefit Cost Ratio
CRT	Cathode Ray Tube
DEERS	Defense Enrollment Eligibility Reporting System
DOD	Department of Defense
DMDB	Defense Manpower Data Base
DMDC	Defense Manpower Data Center
DMDIS	Defense Manpower Data Interface System
EA	Economic Analysis
EDS	Electronic Data Systems
FS	Feasibility Study
HQMC	Headquarters Marine Corps
ID	Identification
LCM	Life Cycle Management
MENS	Mission Element Need Statement
MCCMF	Marine Corps Central Master File
MCCDPA	Marine Corps Central Design and Procesing Activity
MCDN	Marine Corps Data Network
MCO	Marine Corps Order
MMS	Manpower Management System
MPI	Manpower Programs and Integrations
OLDS	On Line Diary System
PRIM	Personnel Reporting Instruction Manual
PX	Post Exchange
RASC	Regional Automated Services Center
RS	Requirements System
RWS	RAPIDS Work Station
UAC	Uniform Annual Cost
USMC	United States Marine Corps

LIST OF REFERENCES

1. MCO 5231.1, _Life Cycle Management for Automated Information Systems (LCM-AIS)_, Department of the Navy, HQMC, Washington, DC, August 1983.

2. DODI 1336.5, _Magnetic Tape Extracts of Active Duty Military Personal Records_, Department of the Navy, HQMC, Washington, DC, August 1983.

3. DODI 1000.13, _Identification Cards for Members of the Uniformed Services, Their Dependents, and Other Eligible Individuals_, Department of Defense, Washington, DC, June 1984.

4. MCO P5512.11, _Identification Cards for Members of the Uniformed Services, Their Dependents, and Other Individuals_, Department of the Navy, HQMC, Washington, DC, May 1985.

5. DAR, _DEERS Annual Report 1984/1985_, Department of Defense, Washington, DC, May 1985.

6. MCO P1080.35E, _Personal Reporting Instruction Manual_, Department of the Navy, HQMC, Washington, DC, January 1985.

7. PSRW, _Program Specification(PS) for the RAPIDS WORKSTATION_, Department of the Navy, RAPIDS Project Office, Washington, DC, 1984.

8. PMC, _Program Management Charter for DMDIS_, Manpower Department, Code MPI-40, HQMC, Washington, DC, January 1986.

9. _Economic Analysis Procedures for ADP_, Naval Data Automation Command, Navy Yard, Washington, DC 20374, PUB15, 7000, March 1980.

10. Boehm, Barry W., _Software Engineering Econmics_, Prentice-Hall, Englewood Cliffs, New Jersey 07632, 1981.

INITIAL DISTRIBUTION LIST

		No.	Copies
1.	Captain Dave Haeusler Commandant of the Marine Corps Code MPI-40 Washington, DC 20380		1
2.	Library,Code 0142 Naval Postgraduate School Monterey, CA 93943-5002		2
3.	Superintendent,Code 54LB ATTN: N.R. Lyons Naval Postgraduate School Monterey, CA 93943-5000		1
4.	Superintendent,Code 54FW ATTN: B.A. Frew Naval Postgraduate School Monterey, CA 93943-5000		1
5.	Superintendent,Code 37 Computer Technology Programs Curricular Officer Naval Postgraduate School Monterey, CA 93943-5000		1
6.	Captain Henry H. Slack Commandant of the Marine Corps Code MPI-40 Washington, DC 20380		1
7.	Major John P. Barrett Commandant of the Marine Corps Code C-4 Washington, DC 20380		3
8.	Defense Technical Information Center Cameron Station Alexandria, VA 22304-6145		2
9.	Superintendent,Code 0309 Marine Corps Representative Naval Postgraduate School Monterey, CA 93943-5000		1

END

DTIC

7 — 86