MICROCOPY RESOLUTION TEST CHART

AD-A170 514

AIR FORCE INTEGRATED READINESS MEASUREMENT SYSTEM (AFIRMS)

HEADQUARTERS UNITED STATES AIR FORCES EUROPE (HQ USAFE) SUBSYSTEM SPECIFICATION

FINAL

DTIC
ELECTE
S AUG 0 4 1986 **D**
D

Prepared by

SofTech, Inc.
2000 N. Beauregard St.
Alexandria VA 22311

31 May 1985
Change 1
30 September 1985

DTIC FILE COPY

Prepared for

United States Air Force
Readiness Assessment Group

Contract No. F49642-83-C-0022

CDRL 0029

HEADQUARTERS UNITED STATES AIR FORCES EUROPE (HQ USAFE)
SUBSYSTEM SPECIFICATION

TABLE OF CONTENTS

SOFTech

SOFTech

LIST OF ILLUSTRATIONS

LIST OF TABLES

SOFTech

SECTION 1. GENERAL

1.1 Purpose of the Subsystem Specification. The Subsystem Specification for the Headquarters, United States Air Forces Europe (HQ USAFE) site of the Air Force Integrated Readiness Measurement System (AFIRMS), (Contract No. F49642-83-C-0022), is written to fulfill the following objectives:

a. To provide a detailed definition of the HQ USAFE subsystem functions.

b. To communicate specification details of the subsystem functional requirements.

c. To define in detail the interfaces with other systems and subsystems and the facilities to be utilized for accomplishing these interfaces.

The subsystem specification also contains, as appendices, the specifications for each of the products required for subsystem implementation.

This subsystem specification applies to HQ USAFE and only broadly relates to the other major commands (MAJCOMs). Each MAJCOM's requirements are thoroughly specified during the in-depth analysis that precedes its implementation.

1.2 Introduction to AFIRMS. This section provides a brief introduction to the AFIRMS. A more complete description is provided in the AFIRMS Functional Description.

1.2.1 AFIRMS Synopsis.

1.2.1.1 Key AFIRMS Concepts. AFIRMS is an automated, tasking based, capability assessment system. As such, AFIRMS evaluates unit and force capability to perform tasked missions based on the availability of specific resources.

a. The conceptual requirements for AFIRMS are two-fold:

    (1) Assessment of combat capability against specific tasking. The user can select any planned or ad hoc tasking against which to make capability assessments, i.e., War Mobilization Plan (WMP), Operation Plan (OPlan), Fragmentary Order, Air Tasking Order (ATO), Contingency Plan, etc.

SOFTech

(2)   Assessment of combat capability based on budget appropriations. AFIRMS provides a tool for computing long-term readiness and sustainability trends, spanning two to six fiscal years. This tool permits comparison of readiness and sustainability by fiscal year and can therefore highlight the impact of appropriation changes. Thus, changes in funding are related to changes in force readiness and sustainability. Also, senior Air Force decision makers are supported during budget deliberations and Air Force budget allocations.

b.   AFIRMS implementation has two key concepts:

(1)   Integrated approach to tasking based capability assessments. AFIRMS has two integrative dimensions. First, all applicable resources and their usage interactions of such resources are considered. For example, in sortie capability assessment, AFIRMS evaluates capability in terms of all four essential resource types (aircrew, aircraft, munitions, fuel), their interdependencies, and their generative components (such as spares for aircraft, training qualifications for aircrew, load crews for munitions, and hot pits for fuel). Second, other automated systems (such as the Combat Supplies Management System (CSMS), Combat Fuels Management System (CFMS), Weapon System Management Information System (WSMIS), etc.) outputs are integrated into capability assessment calculations through system interfaces between those systems and AFIRMS.

(2)   Data Quality Assurance. Capability assessment is no better than the data upon which it is based. Therefore, AFIRMS emphasizes a user orientation toward quality assurance of source data. Unit and other data input level users are provided effective tools to accomplish their daily activities and therefore develop a vested interest in AFIRMS data currency and validity. Capability assessment data can then be extracted for use by higher or parallel users with maximum confidence in its vitality.

1.2.1.2 AFIRMS Functions. Four basic AFIRMS functions combine to assess readiness capability:

a.   Translate Tasking. As a tasking based capability assessment system, tasking must be converted into a standard format recognized by AFIRMS. Tasking is defined in AFIRMS to the unit level and may consist of actual, hypothetical, standard, or contingency tasking. Any of these taskings can be defined within specified WMP or OPlan constraints, at the option of the user. Likewise, the tasking may be defined by the user for present, historic or future requirements.

b.   Define Resources. The resource definition function of AFIRMS ensures that information about inventory status is available and accurate. Wherever possible, this data is obtained by interface with other functional systems. As with tasking, resource information can be defined for actual, hypothetical, standard, or contingency situations, either present, historic, or future.

SOFTECH

c. Determine Ability to Perform. Determining the force's ability to perform is the essential function of AFIRMS. The tasking and resource data are processed to determine how much of the specified tasking can be accomplished with the resources available. Ability to perform is evaluated in terms of the task metric (sorties,etc.) and the cost metric (dollars) to provide readiness/sustainability and dollars to readiness assessments.

d. Aggregate, Analyze and Present Data. Aggregation, analysis and resentation ensure the proper grouping and display of data to provide useful information at the unit, major command and HQ USAF. Aggregation refers to the creation of a composite understanding of capability for several units.

1.2.2 AFIRMS Documentation. A set of nine types of documents describes AFIRMS. A list of these AFIRMS documents is provided below along with a short description of the particular aspects of AFIRMS which are addressed by each document.

a. Functional Description (FD). The FD provides the description of AFIRMS concepts in user terms. It is the baseline document which ties the AFIRMS documents together.

b. Economic Analysis (EA). The EA states AFIRMS estimated costs. It explains the cost factors of AFIRMS implementation alternatives and states the recommended alternative.

c. Management Plan. The Management Plan provides the top-level integrative frame of reference for the AFIRMS Program. The plan focuses on the processes which provide technical and administrative control of AFIRMS. Key annexes to the Management Plan are the Evolutionary Implementation Plan, the Configuration Management Support Plan, and the Systems Interface Support Plan.

d. System Specification. The AFIRMS System Specification adds the design requirements to the functional concepts in the FD. It divides the system into subsystems (HQ USAF, HQ USAFE (MAJCOM), and Wing (unit)) and assigns functions required within each subsystem. The system specification details the overall architecture, intersite interface gateways, processing logic flows and the communications network specifications.

e. Subsystem Specifications. There are three AFIRMS subsystem specifications: HQ USAF, HQ USAFE (MAJCOM/numbered Air Force), and the Wing (unit/squadron). Subsystem specifications detail the specific design and/or performance requirements of the system at that level. Design details cover the architecture, required functions, the functional users, intrasite interface gateways, and applicable processing logic flows.

f.   Database Specifications. There are three AFIRMS database
     specifications: HQ USAF, HQ USAFE (MAJCOM/numbered Air Force), and
     Wing (unit/squadron). These specifications describe the database
     architecture, size and content, as well as logical data relationships
     for the functions performed at each of the AFIRMS levels.

g. Data Requirements Document (DRD). The DRD identifies, categorizes, and groups the generic types of data used in AFIRMS. It also defines each type of AFIRMS data element (attribute class).

h. Product Descriptions (PDs). The PDs visually portray the products which implement the AFIRMS functions as input and output tools.

i. Transform and Model Descriptions. The Transform and Model Descriptions Document defines how AFIRMS calculates the output data from the input data. Specific algorithmic calculations are provided. Logical groups of algorithms forming AFIRMS models and transforms are described.

1.3 Project References. Accurate assessment of force readiness and sustainability has been a constant concern of Air Force commanders and their staffs. This concern has been supported by an intensified DoD-wide interest in capability. In response to this Air Force concern, the Directorate of Operations and Readiness initiated the AFIRMS Program. AFIRMS has been under development through a learning prototype and is designed to provide Air Force commanders with a complete, timely, and accurate assessment of their operational readiness and sustainability. In performing this function, AFIRMS provides combat capability assessments to Air Force leaders at HQ USAF, major command (MAJCOM), and wing levels of command to aid them in making total force readiness decisions. AFIRMS also supports day-to-day operations and crisis management as well as planning and programming activities at all command levels.

The Program Management Office (PMO) responsible for contract management of the AFIRMS Learning Prototype Phase (LPP) and this document is the Data Systems Design Office (DSDO/XO), Gunter Air Force Station (AFS), Alabama; the Office of Primary Responsibility (OPR) is the United States Air Force Readiness Assessment Group (AF/X00IM). Three operational centers have been in use as LPP testbed sites: The Pentagon, Washington, D.C.; HQ USAFE, Ramstein Air Base (AB), Germany; and, the 52nd Tactical Fighter Wing (TFW), Spangdahlem AB, Germany.

References which are applicable to the history and development of the AFIRMS Program are listed below along with references concerning programming and documentation standards.

a. AFIRMS Data Requirements Document, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

b. AFIRMS Economic Analysis, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

SOFTECH

c.   AFIRMS Evolutionary Implementation Plan, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

d.   AFIRMS Functional Description, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

e.   AFIRMS HQ USAF Database Specification, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

f.   AFIRMS HQ USAF Subsystem Specification, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

g.   AFIRMS HQ USAFE Database Specification, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

h.   AFIRMS HQ USAFE Subsystem Specification, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

i.   AFIRMS Product Descriptions, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

j.   AFIRMS System Specification, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

k.   AFIRMS Transform and Model Descriptions, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

l.   AFIRMS Wing Database Specification, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

m.   AFIRMS Wing Subsystem Specification, Final, SofTech, Contract No. F49642-83-C-0022, 31 May 1985. (Unclassified)

n.   System Interface Design for the AFIRMS LPP and the Combat Fuels Management System (CFMS), SofTech, Contract No. F49642-83-C-0022, 28 February 1985. (Unclassified)

o.   System Interface Design for the AFIRMS LPP and the Air Force Operations Resource Management System (AFORMS), SofTech, Contract No. F49642-83-C-0022, 2 November 1984. (Unclassified)

p.   AFR 700-2, Information Systems Planning, 26 October 1984. (Unclassified)

q.   AFR 700-5, Information System Requirements Board, 9 November 1984. (Unclassified)

r.   AFR 205-16, Automated Data Processing (ADP) Security Policy, Procedures, and Responsibilities, 1 August 1984. (Unclassified)

s.   AFR 300-4, Vol. 4, Air Force Data Dictionary, 1 May 1984. (FOUO)

t.   DoD-STD-7935.1, Automated Data Systems (ADS) Documentation Standards, 24 April 1984. (Unclassified)

SOFTECH

u. JCS Pub 1, Department of Defense Dictionary of Military and Associated Terms, 24 April 1984. (Unclassified)

v. AFR 700-1, Managing Air Force Information Systems, 2 March 1984. (Unclassified)

w. AFIRMS LPP ADP Security Plan, SofTech, Contract No. F49642-83-C-0022, 13 February 1985 (FOUO)

x. AFR 300-4, Vol. 3, Air Force Data Dictionary, 15 August 1983. (FOUO)

y. Sustainability Assessment Model (formerly CAC) Functional Description, Contract No. F33700-83-G-002005701, 8 April 1983. (Unclassified)

z. AFR 700-3, Information Systems Requirements Processing, 30 November 1984. (Unclassified)

aa. MIL-STD-480 Configuration Control-Engineering Changes, Deviations, and Waivers.

bb. MIL-STD-483 Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs.

*cc. USAF Operational Major Command Functional Area Requirement (FAR), SofTech, Contract No. F49642-82-C-0045, 15 December 1982. (Unclassified)

dd. AFR 55-15, Unit Combat Readiness Reporting (C-Ratings) (Unit Status and Identity Report (UNITREP), RCS:HAF-XOO(AR)7112(DD)), 22 November 1982. (Unclassified)

*ee. USAFE Annex to USAF FAR, SofTech, Contract No. F49642-82-C-0045, 20 August 1982. (Unclassified)

*ff. AFIRMS FAR, SofTech, Contract No. MDA-903-76-C-0396, 14 March 1980. (Unclassified)

gg. AFIRMS Data Analysis, SofTech, 15 February 1979. (Unclassified)

hh. User's View of AFIRMS, SofTech, 1 November 1978. (Unclassified)

ii. AFR 700-9, Information Systems Standards, 15 March 1985. (Unclassified)

jj. AFM 11-1, Vol. 1, U.S. Air Force Glossary of Standardized Terms, 2 January 1976. (Unclassified)

* Material contained in references cc and ee expands on that found in reference ff.

kk. AFIRMS Data Automation Requirement (DAR), *Final, SofTech, Contract* No. MDA-903-76-C-0396, 14 March 1980. (Unclassified)

ll. JCS Memorandum of Policy #172, 1 June 1982. (Unclassified)

mm. Federal Information Processing Standards Publication (FIPS PUB) 1.

nn. FIPS PUB 15, Section 1.

oo. Military Aiflift Command (MAC) AFIRMS Requirements Analysis, SofTech, Contract No. F49642-83-C-0022, 30 September 1985. (Unclassified)

pp. Analysis of Military Airlift Command (MAC) Capability Assessment Metrics, SofTech, Contract No. F49642-83-C-0022, 30 September 1985. (Unclassified)

qq. Strategic Air Command, (SAC) AFIRMS Requirements Analysis, SofTech, Contract No. F49642-83-C-0022, 30 September 1985. (Unclassified)

rr. Analysis of Strategic Air Command (SAC) AFIRMS Capability Assessment Metrics, *SofTech, Contract* No. F49642-83-C-0022, 30 September 1985. (Unclassified)

1.4 Abbreviations and Acronyms.

AB   -   Air Base

ADP   -   Automated Data Processing

ADPS   -   Automated Data Processing System

AF   -   Air Force

AFIRMS   -   Air Force Integrated Readiness Measurement System

AFR   -   Air Force Regulation

AFS   -   Air Force Station

ALC   -   Air Logistics Center

ANSI   -   American National Standards Institute

ASCII   -   American Standard Code for Information Exchange

ATO   -   Air Tasking Order

BPI   -   Bits Per Inch

BPS   -   Bits Per Second

CAS   -   Combat Ammunition System

CBU   -   Cluster Bomb Unit

CFMS   -   Combat Fuels Management System

CN   -   Central Node

CNM   -   Central Node Module

CONPLAN   -   Concept Plan

CONUS   -   Continental United States

CPI   -   Characters Per Inch

CPL   -   Characters Per Line

CPS   -   Characters Per Second

CPU   -   Central Processing Unit

CRC   -   Cyclical Redundancy Checking

CRT   -   Cathode Ray Tube

CSMS   -   Combat Supplies Management System

SOFTECH

DAR	-	Data Automation Requirement
DBMS	-	Database Management System
DDN	-	Defense Data Network
DoD	-	Department of Defense
DRD	-	Data Requirements Document
DSDO	-	Data Systems Design Office
EA	-	Economic Analysis
EIP	-	Evolutionary Implementation Plan
EMSEC	-	Emanations Security
FA	-	Functional Area
FAW	-	Functional Area Workstation
FD	-	Functional Description
FIPS PUB	-	Federal Information Processing Standards Publication
FOUO	-	For Official Use Only
FTP	-	File Transfer Protocol
HOL	-	High Order Language
HQ USAF	-	Headquarters, United States Air Force
HQ USAFE	-	Headquarters, United States Air Forces Europe
IAW	-	In Accordance With
I/O	-	Input/Output
IP	-	Internet Protocol
IPS	-	Inches Per Second
ISO	-	International Standards Organization
LED	-	Light-Emitting Diode
LPI	-	Lines Per Inch
LPM	-	Lines Per Minute
LPP	-	Learning Prototype Phase
MAC	-	Military Airlift Command

SOFTech

MAJCOM	-	Major Command
MDS	-	Mission, Design, Series
MICAP	-	Mission Capable
NATO	-	North Atlantic Treaty Organization
NBS	-	National Bureau of Standards
NSA	-	National Security Agency
OCR	-	Optical Character Reader
OPlan	-	Operation Plan
OPORD	-	Operation Order
OPR	-	Office of Primary Responsibility
PD	-	Product Descriptions
PMO	-	Program Management Office
POL	-	Petroleum, Oil, and Lubricants
POM	-	Program Objective Memorandum
PPL	-	Preferred Products List
SCL	-	Standard Conventional Load
SMTP	-	Simple Mail Transfer Protocol
TAF	-	Tactical Air Force
TCP	-	Transmission Control Protocol
TFW	-	Tactical Fighter Wing
USAFE	-	United States Air Forces Europe
WIN	-	WWMCCS Intercomputer Network
WMP	-	War Mobilization Plan
WSMIS	-	Weapon System Management Information System
WWMCCS	-	World Wide Military Command and Control System

SOFTech

SECTION 2. SUMMARY OF REQUIREMENTS

AFIRMS is a tasking based capability assessment system that assesses readiness and sustainability by applying specific tasking (identified to accomplish the assessments desired) against selected unit and theatre resources through the use of automated assessment models. As a decision support tool, it provides Air Force commanders at all levels with the ability to assess capability to meet a specific tasking. The requirement for AFIRMS is two-fold:

   a.   Assess capability against any tasking. The operator of the system
        can select a tasking against which to make assessments, i.e., War
        Mobilization Plan (WMP), Operations Plan (OPlan), what-if plan, and
        Air Tasking Order (ATO). AFIRMS then provides a capability
        assessment against that scenario in a mission unit of measure.

   b.   Correlate dollar costs to readiness assessment impacts of
        appropriations by fiscal year. The capability metric transformed
        from missions to dollars for assessments from this budgetary
        perspective.

The worldwide operational AFIRMS is a hierarchically structured system which can be visualized as a pyramid of distinct operational sites. Each operational site performs a set of functions which are distinct from, although similar to, other sites and transmits information logically upward to a parent site. There are three basic levels within the AFIRMS pyramid, each level being considered as an AFIRMS subsystem. The highest level subsystem, the apex of the pyramid, is the HQ USAF subsystem. The second level of the pyramid consists of the MAJCOM subsystems. Each Major Command contains at least one AFIRMS MAJCOM subsystem; one for the MAJCOM HQ, and one for each Numbered Air Force (or Air Logistics Center) in the MAJCOM, as applicable. The base of the pyramid is composed of a set of wing subsystems. Each wing within a MAJCOM contains an AFIRMS wing subsystem which is connected to the parent MAJCOM.

SOFTECH

2.1 HQ USAFE Subsystem Description. The HQ USAFE site in the operational
AFIRMS is one of several mid-level command entities in the eventual worldwide
AFIRMS network. The HQ USAFE site receives planning data from HQ USAF and, if
necessary, communicates it to the wings. In USAFE's North Atlantic Treaty
Organization (NATO) role, USAFE monitors the wing's resource status and
provides logistical support and/or resupply to the wings.

SOFTECH

HQ USAFE tasking data consists of (but is not limited to); WMPs, OPlans, Designed Operational Capability (DOC) statements, Concept Plans (CONPLANs), and ad hoc or what-if plans. This tasking data reaches the MAJCOM by way of:

a. Documents via couriers. Data in hardcopy report format is keyed into the AFIRMS site via cathode ray tube (CRT). Hardcopy interfaces are kept minimal, with interfaces relying on automated means as much as possible.

b. Messages over AUTODIN and/or vocal orders over AUTOVON and AUTOSEVOCOM.

c. Computer tapes from the World Wide Military Command and Control System (WWMCCS) Intercomputer Network (WIN).

d. System interface with other MAJCOM ADP systems such as MAC's Information Processing System (IPS).

Resource data used by HQ USAFE consists of information concerning munitions, fuels, spares, maintenance support, base status, aerial port, aircraft, and aircrew. This information is supplied through wing and MAJCOM reports consisting of inputs from operations, personnel, and logistics resource managers. HQ USAFE resource data includes:

a. Detailed summaries of resource inventory status data maintained at each wing.

b. Aggregated wing information as reported by individual units.

c. Other in-theatre resource information as maintained by HQ USAFE.

d. Out-of-theatre resupply information as provided by HQ USAF, HQ Air Force Logistics Command (AFLC), HQ MAC, etc.

Assessments begin at the wing level by collecting information on unit-possessed and MAJCOM-supplied resources and the status and capability of aircrews, aircraft, maintenance support, and base support facilities. This information is compared against the wing's tasking to provide an integrated look at individual wing capabilities. Individual wing resource status summaries are transmitted to HQ USAFE where they are aggregated to form a theatre-wide or MAJCOM-level force assessment. HQ USAFE then transmits this MAJCOM resource and unit status data for the Air Staff for use in total-force assessments.

SOFTECH

AFIRMS HQ USAFE level products provide capability assessment insights that assist in objectively:

a. Creating hypothetical tasking scenarios.

b. Checking the validity of proposed tasking.

c. Assigning forces.

SOFTech

d. Distributing/allocating resources.

e. Supporting Program Objective Memoranda (POM) deliberations.

f. Supporting crisis and wartime decision making.

2.1.1 HQ USAFE Subsystem Architecture. The general subsystem architecture for AFIRMS sites is based upon a centralized database and a set of functional area databases (see Figure 2-1).

The centralized database is accessed via one or more central node modules (CNMs). Each CNM services one or more functional areas (FAs) and shares the centralized database with any other CNMs comprising the central node.

2.1.1.1 Central Node Modules. Each CNM possesses the following:

a. A full duplex high band width communications path to each on-line storage device that has any part of the centralized database resident upon it.

b. One or more high band width full duplex communications paths to one or more other CNMs comprising the central node. If only two CNMs comprise a central node, two communications paths between the two are provided.

c. One private on-line storage device which contains the system software for that CNM and which is used for system storage space only.

d. A copy of the DBMS being used for the system. Control for updates of, and retrievals from, the centralized database is distributed between the CNMs. Ideally, the physical updates and retrievals themselves are also distributed between the CNMs.

Each CNM is responsible for updating the FA databases attached to it as required. It is also responsible for transmitting the data updates made by one or more of its attached FAs to all other CNMs to allow them to update their FA databases as required.

2.1.1.2 Functional Areas. Each FA has an intelligent device containing its own database and copies of required software.

The data resident on the FA database consists of update/read and read only data elements. The specific data resident is determined by the data needed for a functional area's normal uses. See the HQ USAFE Database Specification for details of the data requirements by functional user. When an update is made at the FA, the update transaction is sent to the central node to allow update of the centralized database and for synchronization of the databases of other FAs.

SOFTECH

Figure 2-1. AFIRMS HQ USAFE Subsystem Architecture

SOFTech

2.1.1.3 Communications. A communications path is provided for normal communications with a higher level site. In addition to this normal channel which is shared between all CNMs, each CNM has an alternate temporary path to the HQ USAF site. Since this alternate path is variable in nature, the software is capable of communicating using a variety of protocols and speeds.

A communications path is provided for normal communications between a FA device and a CNM. In addition to this normal channel, each FA has an alternate temporary path of communications (i.e., a dial-up phone line). The HQ USAF CNM has the required receiving equipment to accept the alternate path transmission. (The HQ USAFE CNM also has the necessary receiving equipment to accept the alternate path communications from the wing's FA.) It is possible for the HQ USAFE FA to use the alternate transmission path to link directly to a CNM at HQ USAF. Interface specifications for these alternate FA communications paths, as well as the determination as to which FAs require this MAJCOM specific functionality, are defined during the Analysis Phase of each functional block implementation.

2.2 HQ USAFE Subsystem Functions. Three levels of functions are of interest in this subsystem specification. They are: Basic AFIRMS Functions, Secondary AFIRMS Functions, and System Functions.

    a.   Basic AFIRMS Functions. The building block functions which are specific to AFIRMS are used (in different forms and combinations) to support the user with various types of data/information. The Basic AFIRMS Functions at the HQ USAFE level are:

        (1)   Translate Tasking. Translates tasking so that it can be used in measuring ability to perform, i.e., converts tasking to quantities of aircraft, crews, munitions, Petroleum, Oil and Lubricants (POL), etc. required to accomplish that tasking. The Translate Tasking function assists in evaluation of alternative task assignments. HQ USAFE products that use this function include:

            (a)   Aircraft Tasking

            (b)   Mission Profile Definition

            (c)   Order Assignments

            (d)   Wing Flying Day

            (e)   War Mobilization Plan

            (f)   Wing Operations Rates

SOFTECH

(2)   Define Resources. Provides inventory status and availability of resources (such as fuels, munitions, aircraft, and crews) for use in capability assessment. The Define Resources function assists in allocation of physical resources and forecast results of trial or final allocations. HQ USAFE products that use this function include:

(a)   Munitions Status

(b)   Resource Reallocation

(c)   Wing Resource Summary

(d)   Wing Resupply Schedule

(3)   Determine Ability to Perform. Given current and forecast readiness factors, AFIRMS transforms WMPs, ATOs, OPlans, and "what-if" exercises into measurable tasking; computes current readiness to perform the task, projects readiness into the future, calculates resources consumed by performing the task, and prepares schedules for performing the task. This function provides users with the capability to measure (and aggregate) readiness and sustainability vs. standard or one-time tasking, and measure (and aggregate) readiness or sustainability vs. revised standards, and/or revised standard tasking using historic data.

HQ USAFE products that use the Determine Ability to Perform function include:

(a)   Base Fuels Capability

(b)   Capability Perspective

(c)   Individual Resource Capability

(d)   Integrated Capability

(e)   Munitions Capability

(g)   Sortie Generation Model

(4)   Aggregate, Analyze and Present Data. This function deals with the task of properly grouping data from various wings and MAJCOMs to provide meaningful and useful data at MAJCOM and HQ USAF levels. It also develops trend and variance data to facilitate exception type reporting on unusual developments in day-to-day data.

Aggregation refers to the creation of a composite understanding of the readiness and sustainability of a number of units. Thus, a MAJCOM with many reporting wings, each with its own deficiencies and strengths, can assess the readiness (and sustainability) of all units taken as a whole.

SOFTECH

HQ USAFE products that use the Aggregate, Analyze, and Present Data function are:

(a) Base Status Report Generation

(b) Dollars to Readiness Model

(c) Resource Summary Report Generation

(d) Unit Status Report Generation

b.   Secondary AFIRMS Functions. In order to carry out the Basic AFIRMS Functions, AFIRMS must maintain and verify data. To help ensure the accuracy of the data and to take advantage of its availability, AFIRMS provides a variety of associated capabilities which are not directly related to capability assessment. These functions are secondary and some of them may be eliminated if the circumstances in which AFIRMS operates were to change. Examples of these secondary functions are: display tasking; perform ad hoc queries; and display information on an evolving schedule. For a detailed listing of these functions, refer to the AFIRMS System Specification.

c.   System Functions. The standard building block functions such as graphics or data mangement which might occur in any system, and which, together with specially written subfunctions, are used to support the Basic and Secondary AFIRMS Functions. For a detailed listing of these functions, refer to the AFIRMS System Specification.

2.2.1 Accuracy and Validity. The accuracy of the AFIRMS database is essential for the generation of accurate measurements. There are two categories of accuracy and validity that must be addressed. The first is related to electronic manipulation, storage, and transmission of data in the AFIRMS system. The second is related to the interface between the user or other Air Force systems, and the AFIRMS system.

a.   Electronic Manipulation/Storage/Transmission.

(1)   The nature of the models/displays created with AFIRMS does not require precision beyond that achievable with off-the-shelf standard micro or minicomputers that support hardware or software floating point computations.

(2)   Errors in data transmissions will not exceed 1 part in 10^9. Parity checking and cyclical redundancy checking (CRC) ensure that the data actually used internal to the AFIRMS sites has an error probability well below this figure by correcting all 1-bit errors. (Double-bit errors are detected but not corrected.)

b.   User Interfaces to AFIRMS. The user interfaces of interest are those interfaces that introduce new information into AFIRMS. The concern is that the information destined to enter the database be valid. Valid here means that:

(1)   The individual entering the information is authorized to do so (i.e., only logistics personnel may be authorized to update logistics information, using logistics data forms).

SOFTech

(2)   The information is as "error free as possible." This suggests that input data must, in general, be entered through well-engineered interfaces that prompt the user and check field contents.

(3)   Certain information passed into the database has sufficient criticality to require verification beyond that identified in (2) above, prior to database updates. This verification occurs via supervisory review. Under this method, the data is entered by an authorized individual. However, the information cannot update the database or be transmitted to higher headquarters by the individual who entered it until a supervisor authorizes the AFIRMS system to accept the data. The method of authorization might require that the supervisor log on to the AFIRMS system and enter an "unlocking" command that allows the data to be entered and the database updated. Information requiring supervisory review is kept minimal. Specific data requiring this quality assurance technique are identified during the Analysis Phase of each functional block implementation.

c.   System Interfaces to AFIRMS. Data obtained by interface with other data systems is subject to the same data accuracy and validity criteria as for user input data.

2.2.1.1 Data Accuracy. AFIRMS uses five main approaches to ensure the accuracy and currency of data.

a.   Provide benefits to the organizations which input readiness data. If the organization which inputs data receives benefits from the system, then it is motivated to ensure that data entered is current and accurate.

b.   Simplify data input by using simple devices and by grouping inputs. For example, a bar code reader is a candidate device for entering a complex identification number that might be subject to error if entered via keyboard.

c.   Use automated edit check as well as checks for the reasonableness of input data against stored parametric values. That is, all inputs are programmatically edited to further ensure the accuracy and integrity of the database. The system validates length, format, and legal values of all formatted alphanumeric input data.

d.   Automatically review/check all data entry information for consistency against other related information.

e.   Obtain, edit, and incorporate data and/or assessments from other automated systems.

2.2.2 Timing.

a.   User Response Time. AFIRMS is an information processing system which is user intensive; that is, in general, users enter data through a data capture device and request readiness status onto an output display. Thus, it is imperative that AFIRMS response time to user requests be kept minimal.

SOFTECH

Response time as it applies to user terminals, consists of two parts; command acceptance and command execution.

(1)   Command Acceptance. Command acceptance is the time between the user's initiating transmission of a command or transaction to the system (such as by depression of the ENTER key or entry of the last character of a menu response) and the appearance of the first line of the acknowledgment from the system on the user's terminal that the message has been received or an error condition exists. AFIRMS, under loaded conditions (more than 85% of terminals in use) supports a command acceptance time of less than 2.5 seconds 90% of the time. At no time does command acceptance time exceed six seconds.

(2)   Command Execution. Command execution is the elapsed time between the command or transaction entry, and the appearance of the first line on the user's display terminal (excluding graphics).

(a)   For functions such as command entry, text editing or message writing applications, the appearance of a keyed character on the screen is immediate in the perception of the user.

(b)   Queries. AFIRMS allows for local (intrasite) queries only, with response times as follows:

<u>1</u>   Simple. Response time of 1 to 3 seconds.

<u>2</u>   Medium. Response time of 4 to 10 seconds.

<u>3</u>   Complex. Response time of 11 to 30 seconds.

Categorization of specific queries within these definitions is accomplished during the Analysis Phase of the functional block developments. These times do not include sortie generation model, dollars to readiness model, or similar model execution times.

b.   Data Currency. When changes are made to data at the functional area level, those changes are transmitted to the central site database. After the central database is updated, the changes are subsequently transmitted to other functional areas having the data in question resident on their local database. The time that it takes to complete the transactions on the central database and all affected functional areas designates the currency of data at the site.

(1) Mission-Related Data -   Within a site this time period must be less than three minutes for mission-related data 90% of the time with the system operating in a normal mode. AFIRMS mission-related data consists of current tasking and current primary resource status information or that data associated with a crisis mode. Primary resources are those resources directly utilized by the capability assessment model.

SOFTECH

(2) Non-Mission-Related Data – Data currency within a site must be achieved within one hour for non-mission-related data 90% of the time with the system operating in a normal mode. AFIRMS non-mission-related data consists of that information relating to ad hoc, historic, exercise, or contingency simulations which neither relate to the current situation nor are designated as crisis mode items.

c.   Data Age. The maximum time span allowed for known data updates between MAJCOM and HQ USAF sites is six hours, regardless of state of change for the data.

2.3 Flexibility. AFIRMS provides an architecture that matches the specific requirements of each MAJCOM to an AFIRMS site with compatible hardware/software capability. Additionally, it has the capability to grow, i.e., add/change system focus as time passes. Capabilities incorporated for adapting the HQ USAFE subsystem to changing requirements include the following:

a.   Configuration of AFIRMS sites from modular hardware and software components. The modular applications software is written in DoD standard host independent high order languages (HOL) for ease of transportability among different hardware configurations. Acceptable HOLs are ADA, C, or other strongly typed languages which support modular software design, readability and increased maintainability.

b.   A hardware/software building block approach, coupled with transportable software, to facilitate expansion of operational AFIRMS in the future.

c.   Utilization of DoD standardized data communications protocols and external user interfaces. AFIRMS implements DoD standard protocols for network and distributed system data communications and terminal interfaces. Utilization of the DoD standard protocols provides for interoperability among different vendor equipments, existing and developmental Air Force Automated Data Processing (ADP) systems, and is in accordance with Air Force policy and guidance.

d.   Ability to interface an AFIRMS site to other Air Force or MAJCOM-unique ADP systems after the AFIRMS site has been designed and installed. AFIRMS software is structured so as to provide for new system integration to the greatest extent possible. This is facilitated by maintaining distinct layers of software, as in the

International Standards Organization (ISO) 7-layer Reference Model, and by the use of controlled standardized data gateways (intersite or intrasite standard data communications formats).

e. Ability to support secondary (or backup) interfaces, by which an intermediate AFIRMS site may be bypassed. For example, the ability of a functional area, in place or deployed, to communicate directly with a MAJCOM.

SECTION 3. ENVIRONMENT

3.1 Equipment Environment. Equipment is provided to HQ USAFE (and all other AFIRMS sites) on an "as needed" basis. AFIRMS uses existing facilities and equipments wherever possible. However, at a minimum, each AFIRMS site contains the equipment required for the Central Node and one Functional Area workstation. The Central Node contains the AFIRMS database for that site as well as the communications support for site to site communications.

AFIRMS utilizes standard Air Force equipment sources such as the Air Force Standard Multiuser Small Computer initiative by the Air Force Computer Acquisition Center, TEMPEST and Phase IV Program equipment sources. AFIRMS is designed to allow for the integration of different computers, peripherals, and communications standards throughout the system. This provides for a faster and more cost effective AFIRMS development, and a higher degree of operational flexibility.

3.1.1 Central Node Equipment. Each AFIRMS site contains a Central Node consisting of the following equipment;

a. One or more processors, each capable of handling four or more functional areas. Each processor is a 32-bit machine with at least a 24-bit address structure. Each processor has several high bandwidth full duplex communications paths to the other processors, if any, in the central node. Each processor has the ability to connect three or more terminals.

b. One or more direct access, high speed storage devices capable of containing the centralized data base and capable of being logically accessed by multiple processors. Each high speed storage device has at least one high bandwidth full duplex communications path to each of the processors in the central node.

c. One direct access, high speed storage device capable of containing all software and system files for each processor in the Central Node.

d. A mass storage device, i.e. 9-track tape or optical storage device, capable of being accessed by multiple processors.

e. A communications controller capable of handling all external communications lines and capable of being accessed by multiple local processors.

f. Encryption devices for each physical line that may pass classified data. The encryption device is able to operate in a synchronous or asynchronous mode and to operate at the speeds identified in Section 3.1.4 of this subsystem specification, "Communications Equipment."

SOFTECH

g. Power conditioning and failure protection mechanisms are required as stated in Section 3.1.5.2 of this subsystem specification, "Electrical Power." All "wall power" must be filtered to protect equipments against power surges. Filtered *power is also required for systems that process classified data* to prevent data emanations. Power failsafe backup provisions are provided to preserve memory in the event of power failure. Backup power terminates during normal shutdown.

h. A CRT terminal and line printer for system maintenance and operator use.

i. Main Memory. An initial user memory capacity of a minimum of four megabytes of user memory is required. This user memory is expandable (in minimum 512K byte increments) up to at least 10 megabytes. All memory specifications are made in 8-bit bytes. The physical organization of the main memory is modular so that a failure in one module (except the module containing the operating system or similar support software) does not deprive the system of the remaining memory. Memory must be byte addressable and volatile.

   (1) Error Detection. As a minimum, a memory error detection and correction feature are provided that detect double bit errors and correct all single bit errors for each byte of memory.

   (2) Memory Protection. The capability to inhibit any attempt by an applications program to write into or read from memory areas not allocated to that program is required.

3.1.2 Functional Area Equipment. Each functional area which needs to access, enter, or modify AFIRMS data is provided with a functional area workstation to communicate with the Central Node. Each functional area workstation contains the following equipment:

a. One processor capable of handling one or more users depending on the needs of the functional area. The processor is, at a minimum, a 16-bit machine.

b. One direct access, high speed storage device capable of containing the local database and the software/system files.

c. A mass storage device, e.g., floppy disk drive.

d. A communications controller capable of handling all external asynchronous/synchronous communications between the functional area workstation and the central node.

e. Several miscellaneous input/output devices. The number of each type of device depends on the requirements of the functional area, and is be determined during the Analysis Phase that precedes implementation at each site.

f. An encryption device for communicating with the Central Node if the workstation is to handle classified data. The encryption device is able to operate either in a synchronous or asynchronous mode and to operate at the speeds required by the communications lines.

SOFTECH

g. Power conditioning and failure protection mechanisms are required. All "wall power" must be filtered to protect equipments against power surges. Filtered power is also required for systems that process classified data to prevent data emanations. Power failsafe backup provisions are provided to preserve memory in the event of power failure. Backup power must terminate during normal shutdown.

h. Main Memory. An initial user memory capacity of a minimum of two megabytes of user memory is required. This user memory is expandable (in minimum 512K byte increments) up to at least 8 megabytes. All memory specifications are made in 8-bit bytes. The physical organization of the main memory is modular so that a failure in one module (except the module containing the operating system) shall not deprive the system of the remaining memory.

   (1) Error Detection. As a minimum, a memory error detection and correction feature is provided that detects double bit errors and corrects all single bit errors for each byte of memory.

   (2) Memory Protection. The capability to inhibit any attempt by an applications program to write into or read from memory areas not allocated to that program is required.

3.1.3 Input/Output Devices. HQ USAFE device requirements for CRT terminals, printers, disk drives and magnetic tape drives are determined during the Analysis Phase of each block implementation.

a. CRTs must possess the following characteristics;

   (1) Monochrome Terminals: Alphanumeric keyboard and video display; interface via standard RS-232-C port; ability to function as a system console; and sound an audible tone or "BEEP" when the ASCII "BEL" character or its equivalent is received.

      (a) Keyboards must possess the following characteristics:

         1 Be capable of generating the ASCII 128-character subset in accordance with (IAW) FIPS PUB 1.

         2 At a minimum, conform to the ANSI Standard X4.14-1971.

         3 Have a repeat function for all printable ASCII characters, cursor controls, and spacing functions.

         4 Have separate keys for carriage return, control, escape, and spacing functions.

         5 Have a minimum of 16 programmable function keys.

         6 Have a numeric keypad to the right of the character keys and allow numeric entries from either the regular character key or the numeric keypad.

SOFTECH

<u>7</u>   Have at least four cursor movement keys separate from function keys.

<u>8</u>   Have a detachable keyboard.

<u>9</u>   Have a (screen) hardcopy function.

(b)   Video Displays must possess the following characteristics:

<u>1</u>   Display a minimum of 24 lines of 132 characters each.

<u>2</u>   Characters displayed consist of the ASCII 95-character subset IAW FIPS PUB 15, Section 1.

<u>3</u>   If the dot matrix character generation technique is used, the matrix must be at least 7x9.

<u>4</u>   Full descenders will be used on the lower case such as "g, j, p, q, y" and appropriate special characters.

<u>5</u>   Implement a visible cursor denoting the next character position in such a manner that its location is obvious to the operator and does not obscure any information (excluding underline) which may be displayed at that position.

<u>6</u>   The cursor must be addressable and the capability must be provided for the applications program to clear the display and to position the cursor at any location on the screen.

<u>7</u>   Have a non-glare viewing surface.

<u>8</u>   Provide reverse video, bold, blink, and underscore capabilities under application program control.

<u>9</u>   Brightness must be externally adjustable by the terminal operator.

<u>10</u>   The display must be green or amber.

<u>11</u>   Have selectable terminal transmission rates of 300, 1200, 2400, 4800, and 9600 bits per second (bps).

<u>12</u>   Have a minimum 11-inch screen measured diagonally.

<u>13</u>   Have smooth scrolling capability.

<u>14</u>   Support shading and marking patterns (preprogrammed and programmable).

(c)   Other Required CRT Terminal Characteristics:

<u>1</u>   Local memory

<u>2</u>   Built-in diagnostics and testing

SOFTech

<u>3</u>   TEMPEST certified - for terminals which display classified information

<u>4</u>   Screen print function

(2)   Color Graphics Terminals must possess the following characteristics:

(a)   Minimum of 16 special function (programmable) keys. Refer to Table 3-1 for some of the required function key features.

(b)   10% of the terminals require a video interface board for use with video projectors

(c)   Screen definition of not less than 720x484 individually addressable and color definable pixels (i.e., medium resolution)

(d)   Minimum 11" CRT screen

(e)   TEMPEST certified - for terminals which display classified information

(f)   Support 9600 baud rate

(g)   Display a minimum of 16 colors

(h)   Screen print function

b.   Printers must possess the following characteristics;

(1)   Letter Quality Printers must:

(a)   Print at least 55 characters per second (CPS).

(b)   Print at least 132 characters per line (CPL).

(c)   Have a pressure-feed mechanism, interchangeable tractor feed and an automatic single sheet feeder.

(d)   Print the complete 95 character ASCII subset IAW FIPS PUB 15, Section 1.

(e)   Have operator selectable print spacing of 10 pitch, 12 pitch, and proportional spacing.

(f)   Accept forms from 4 1/2 to at least 14 7/8 inches in width.

(g)   Print clearly up to 3 part paper.

(h)   Interface via RS-232-C serial port and parallel port.

(i)   Provide at least one font which is readable by an optical character reader (OCR).

(j)   Provide clearly marked vertical and horizontal forms alignment that indicate the standard first print position.

SOFTech

(k)   Have operator controls for power online/offline, advance to top of form and manual adjustment of vertical and horizontal paper alignment.

(l)   Be TEMPEST certified, when used for classified information printout.

(2)   Dot Matrix Printers must possess the following characteristics:

(a)   Print at least 200 CPS at 132 characters per line at 10 characters per inch (CPI).

(b)   Have dot addressable graphics with a minimum resolution of 70 dots per inch, vertical and horizontal.

(c)   Provide correspondence quality print capability of at least 40 CPS at 10 CPI.

(d)   Use an operator adjustable pin feed tractor for positive form registration movement.

(e)   Print the complete 95 character ASCII subset IAW FIPS PUB 15, Section 1.

(f)   Accept forms ranging from 4 1/2 to 14 7/8 inches in width.

(g)   Print full descenders used on the lower case characters "g, j, p, q, y" and appropriate special characters.

(h)   Print 6 and 8 lines per inch (LPI), operator selectable.

(i)   Print clearly using up to 3 part paper.

(j)   Have controls for power, online/offline, advance to top of form and manual adjustment of vertical and horizontal paper alignment.

(k)   Provide clearly marked vertical and horizontal forms alignment that indicate the standard first print position.

(l)   Provide program control of line feed and form feed.

(m)   Interface via RS-232-C serial port and parallel port.

(n)   Be TEMPEST certified.

(3)   High Speed (Line) Printers must possess the following characteristics:

(a)   Print at least 500 lines per minute (LPM) (at 132 CPL) using the character set specified in (b) below.

(b)   Print the complete 95 character ASCII subset IAW FIPS PUB 15, Section 1.

(c)   Support horizontal spacing of 10 or 12 CPI.

SOFTech

(d)   Have vertical spacing of 6 or 8 LPI switch or programmer selectable.

(e)   Print at least 132 characters per line.

(f)   Print clearly using up to 3 part paper.

(g)   Have vertical format control via programmer or printer.

(h)   Be TEMPEST certified.

(i)   Have a diagnostic light-emitting diode (LED) indicator for status.

(j)   Interface via RS-232-C serial port and parallel port.

(4)   Color Graphics Printers must possess the following characteristics:

(a)   Plot the displayed graph in the same ratio (horizontal to vertical) as the screen display, in no more than 90 seconds.

(b)   Provide minimum resolution of 100x85 horizontal to vertical dots per inch.

(c)   Print at least eight colors.

(d)   Print on bond paper and transparency (developing of transparency not acceptable).

(e)   Interface via RS-232-C serial port or parallel port.

(f)   Accept a minimum paper size of 8.5x11 inches.

c.   Floppy/Microfloppy Disk Drives must possess the following characteristics:

(1)   Minimum of two read/write heads to provide access to double-sided disks.

(2)   Provide a formatted storage capacity for one diskette of at least 1.5 megabytes.

(3)   Use, at a minimum, a 5.25 inch double sided/double density diskette for floppy disk drives and 3.5 inch diskette for microfloppy disk drives.

(4)   Be compatible with FA workstation hardware selection.

d.   Magnetic Tape Drives must possess the following characteristics:

(1)   Be nine (9) track.

(2)   Support a 10.5 inch reel of .5 inch by 2400 foot standard reel tape.

(3)   Support speed read/write operations at a minimum of 75 inches per second (IPS), streaming at a minimum of 200 IPS.

(4)   Perform error checking on all read operations.

SOFTECH

(5)   Perform a read after write with error checking on all write operations.

(6)   Have write protection and beginning and end of tape sensor.

(7)   Support a minimum of dual-density (1600/6250 bits per inch (BPI)) tape read and write capability.

3.1.4 Communications Equipment. Communications equipment is provided to supply both a primary and a secondary secure communications path to all higher and lower level sites. Requirements for specific types and quantities of communications hardware are determined during the Analysis Phase that precedes implementation of each functional block at each site.

3.1.4.1 Primary Intrasite Communications. Primary communications equipment between central nodes and functional area workstations provides the following capabilities:

a.   Encryption of both classified and unclassified data transmitted to and from a functional area.

b.   A transmission rate of 9600 baud and greater, using either asynchronous or synchronous equipments.

c.   A 24 hour a day dedicated line from the central node to each functional area workstation.

d.   Conditioning to a bit error rate of 1 in 10^9.

3.1.4.2 Secondary Intrasite Communications. Secondary (backup) communications equipment provides the following capabilities:

a.   Encryption of data transmitted between sites and classified data transmitted between a functional area and its central node.

b.   A transmission rate of 300 baud and greater, using either asynchronous or synchronous equipments.

c.   Multiple physical paths for a single logical path (i.e., rerouting).

d.   Availability, as required, in the event primary communications fail. Over a given 24-hour period, secondary media are accessible at least 80% of the time.

SOFTECH

3.1.4.3 Communications Hardware.

a.   Modems:

  (1)   Limited Distance Modems. Limited distance modems are required for
        on-base use. The modems must be capable of operating over available
        non-conditioned voice grade telephone lines at distances of at least 6 miles.
        The following characteristics are required:

     (a)   Switchable and capable of transmitting and receiving data at rates of
           300, 600, 1200, 2400, 4800, and 9600 bits per second (BPS) up to 6 miles.

     (b)   The limited distance modem shall meet EIA Standard
           EIA-RS-232-C/CCITT Recommendation V.24 for interfacing with
           external equipment.

  (2)   Long Distance Modems. Modems used outside the United States (Europe,
        Asia) on non-conditioned commercial telephone lines. The modem is a
        CODEX/V.29 data modem model 21962 and must be homologated (PTT
        option) to the country where the system is installed. The CODEX Universal
        PTT option, Product code 22120, is provided when required.

b.   Line Drivers. Line drivers are required to boost the electronic signal for
     communications between modems and CRTs over long distances (i.e., 75 feet or
     more).

c.   Encryption Devices. NSA-endorsed Data Encryption Standard (DES) devices are
     required. Functionality may be combined for encryption devices and long/limited
     distance modems.

3.1.5 Environmental and Physical Facilities. AFIRMS equipment must operate throughout
the ranges of electrical power and environmental tolerances stated below.

3.1.5.1 Space.

a.   Site Locations. Systems are installed at various Air Force installations in
     Europe. The central node location space ranges from a minimum of 20 square
     feet for the smallest configuration, to a maximum of 200 square feet for the
     largest configuration.

b.   Flooring. Equipment shall not require raised flooring. The flooring may be
     carpeted. There will be no special static control facilities.

c.   Ceiling Height. The distance from the floor surface to the unobstructed ceiling
     is at least 8 feet.

d.   Access Route. Equipment is installed in buildings with access being the size of
     a normal office doorway. Additionally, some equipment is installed in
     facilities with vault doors, raised thresholds, and access by stairways. Some
     facilities are established computer facilities with a double door access route.

SOFTecH

3.1.5.2 Electrical Power.

All equipments must be capable of operating within the requirements of MIL-E-4158 and are further defined by the following:

a.	Voltage regulation steady state	+10% to -15%
b.	Voltage disturbances	30% for less than 0.5 seconds
	Momentary undervoltage	-100% acceptable to 20 milliseconds
	Transient overvoltage	200% for less than 20 milliseconds
	Surges	IAW IEEE 587-1980
c.	Voltage harmonic distortion	+3% -5% (with linear load)
d.	Frequency variation	50/60Hz plus or minus 1Hz
e.	Frequency variation rate of change	1Hz/second
f.	Power factor	0.8
g.	220/240 Volts +or-10%, single phase, 2 wire.	
h.	105/110 Volts +or-10%, single phase, 2 wire.	

In addition, an electrical power fault detection device is provided to prevent equipment failure (e.g., disk head crash).

3.1.5.3 Air Conditioning.

The ambient temperature will be maintained by the U.S. Government between 60 and 90 degrees Fahrenheit with a relative humidity of between 20 and 90 percent, non-condensing. No special dust, static electricity control, or chilled water facilities are available. The computer is integrated with the air conditioning system to provide automatic thermal shutdown to prevent equipment failure during extreme high or low temperature conditions.

3.1.5.4 Remote Locations.

Remote equipment is installed in various office environments within U.S. Air Force organizations. Terminals, office printers, and modems shall fit on normal table tops or desk surfaces.

3.1.5.5 TEMPEST Requirement.

All equipments, connectors, and cabling that convey classified information must meet the limits specified in NACSIM 5100A. All equipment must be on the Preferred Products List (PPL) or approved by AFCSC/EPV San Antonio, TX 78243.

SOFTech

3.2 Support Software Environment. AFIRMS software is broken up into two general categories: Applications Software and Support Software. Applications Software is that software which applies specified algorithms to a given data set, and/or stores/retrieves/formats/analyzes/displays a given set of data. Applications software programs/algorithms are enumerated and defined in the AFIRMS Transforms and Models Document. This paragraph describes the support software which interfaces with the HQ USAFE subsystem applications software to create the environment necessary to support AFIRMS' general functionality and the AFIRMS Applications Software.

3.2.1 Central Node Support Software. Each AFIRMS Central Node requires the support software identified in this section.

3.2.1.1 Operating System. A general purpose operating system provides file access, program control, and data communications interfaces. Operating system operation (e.g., device I/O) must not significantly impact the timing and flexibility of AFIRMS operational software. The operating system must be able to:

a. Concurrently process a combination of interactive and local batch processing.

b. Support a multi-programming environment.

c. Support both file and record level locking protection capabilities.

d. Provide control over all hardware and software.

e. Support logical as well as physical mode access to all system peripheral devices including terminals.

f. Be capable of detecting and marking bad blocks while formatting system and data disks as well as during normal operation.

g. Support up to 8 concurrent interactive users in a minimum configuration and up to 20 concurrent interactive users in a maximum configuration.

h. Provide access to a calendar clock which provides the calendar date and time with a resolution of one microsecond (for purposes of statistical performance analysis data collection) showing hours, minutes, and seconds for time; and day, month, and year for date. This calendar clock is accessible to all programming languages.

i. Detect and terminate attempts to read or write outside of any programs allocated memory and detect and terminate attempts by any applications program to execute privileged and undefined instructions.

SOFTECH

j. Provide high order language (HOL) runtime support for input/output (I/O), scheduling, and interprocess communication and coordination.

k. Provide memory fault detection and recovery capabilities.

l. Support high level control of interrupt detection, definition, and processing activities.

m. Provide the capability to perform dynamic load analysis and reporting.

n. Provide host language interfaces (system directives) to system functions.

3.2.1.2 **Utility Routines.** The following utility routines are required:

a. File Management System

b. Sort and Merge Utility

c. Translation Utility (character code conversion, e.g. ASCII to EBCDIC and vice-versa)

d. Save and Restore Utility (to and from tape)

e. Security Utility (Error surveillance and alerts; to recognize, record and indicate misuse, and attempted misuse, of the system.)

f. Logging/Accounting Utility (An automated audit trail will show: access made to files; how, and from where the access was initiated; the identity of the person or process that initiated the access; and all unauthorized attempts.)

g. Diagnostic Software

h. Mail Utility

3.2.1.3 **Communications Software.** The specific requirements for communications software are determined during the Analysis Phase that precedes implementation at each site. However, at a minimum, a host interface to the Defense Data Network (DDN) is required for each AFIRMS site. This interface implements the full DDN protocol suite, and supports site-to-site communications over the DDN. It also provides the standard DDN services of terminal-to-host communications, file transfer, and electronic mail to users of the AFIRMS system. Connection to the DDN is via the ARPANET network access protocols or X.25. Host-to-host communication shall be via the Transmission Control Protocol (TCP), MIL-STD 1778, and Internet Protocol (IP), MIL-STD 1777. The services which are supported are TELNET, File Transfer Protocol (FTP), and the Simple Mail Transfer Protocol (SMTP).

SOFTECH

Encryption services provided by the DDN are limited to SECRET security classifications. However, with user acquisition of TOP SECRET security classification encryption devices, the DDN can be accessed for transmission of TOP SECRET information.

3.2.1.4 Database Management System (DBMS). The AFIRMS DBMS performs the action of retrieving a record from a file, writing a record to a file, and deleting and creating records in a file. The DBMS also performs functions such as opening and closing the database, transaction flow, handling of the DBMS command language requests, transaction parsing, and automatic editing on input. In addition, the DBMS allows for host language interfaces; save and restoration of full or partial database images; restart and recovery capability with multi-user and multi-thread concurrency controls; and some level of distributed or decentralized data management with the appropriate synchronization and concurrency controls. The specific level of data synchronization control and data distribution or decentralization required is determined during the Analysis Phase that precedes implementation of each functional block for each MAJCOM.

For a detailed statement of required AFIRMS DBMS capabilities, refer to the *AFIRMS HQ USAFE Database Specification.*

In addition to the software that comprises the AFIRMS DBMS, a software package provides a shell to the DBMS which accomplishes the following:

a. Controls entry to and exit from DBMS functions.

b. Provides a link or connection between the communications software and the DBMS.

c. Controls data retrieval and data update transactions.

d. Generates a queue for transactions by transaction priority.

e. Performs update notifications to other sites for data changes (deletions, additions or modifications) in a DBMS file.

f. Determines whether data retrieval and update transactions are to be routed to the local (functional area) database or the central database.

g. Provides a link between parameter screen software and the DBMS in order to verify the validity of parameter selections.

SOFTECH

3.2.2 Functional Area Support Software. Each AFIRMS functional area requires the support software specified in this section.

3.2.2.1 Operating System. Functional Area operating system capabilities are identical to those of the Central Node Module, identified in Section 3.2.1.1 of this subsystem specification. However, the following exception applies:

a. The FA operating system must support at least one interactive user in a minimum configuration and up to 3 concurrent interactive users in a maximum configuration.

3.2.2.2 Utility Routines. FA utility routine requirements are the same as those of the CNM, identified in Section 3.2.1.2 of this subsystem specification.

3.2.2.3 Communications Software. The specific requirements for communications software are determined during the Analysis Phase that precedes implementation at each site. Communications between the CNM and the intelligent FA terminals is accommodated by communications protocol(s) identified or confirmed during the Analysis Phase of each functional block implementation. The volume and frequency of the various information gateways by functional area is presented in the AFIRMS HQ USAFE Database Specification and Section 4.3.2 of this subsystem specification.

3.2.2.4 Database Management System (DBMS). Functional Area DBMS and DBMS support capabilities are identical to those of the Central Node Module, identified in Section 3.2.2.1 of this subsystem specification.

3.2.2.5 Display/Graphics Software. AFIRMS display screens are categorized by their method of display; graphic, tabular, integrated graphic and tabular. The tabular screens display the data values listed in table format, i.e., rows and columns. The tabular screens may use color to identify data of like types to help the user assimilate the information. The tabular screens also use colors to highlight a line and/or field as a screen place marker for the user, or to call attention to changes in data currency.

SOFTECH

The graphic screens are of three types: bar graph, line graph, and pictoral (i.e., maps). These are output screens only (i.e., they cannot be updated through the display screen). In addition, the bar graph screens have a data value atop each graphed bar that quantifies the analog display.

The display screen generation software uses standard routines to generate these screens. In summary, the generalized routines and particular features are:

a. Tabular Screen Generator must possess the following characteristics:

(1) Right-justified numeric data.

(2) Left-justified alphanumeric data.

(3) Line highlighter that can be turned (i.e., toggled) on or off.

(4) Field highlighter that can be turned (i.e., toggled) on or off.

(5) Full screen editor (for extensive data input and editing capability)

(6) Linkable to a special area on the screen to display remarks for a row of data (e.g., Unit and Base Status products). This requires that the display routine know where the cursor is by page and by row in order to call up the correct set of remarks/data.

(7) Variable legend, either data-driven or user-defined.

(8) Blanking of repeating column data (selectable).

(9) Capability to identify (e.g., via blinking, changed color, etc.) a row or column of data that has changed from an original or previous data set. The means by which this "data change indicator" is activated is determined during the Analysis Phase that precedes implementation of particular functions which require this capability.

(10) Field and row coloring depending on value of data field (selectable).

(11) Column headings programmable separately from body of table.

(12) Non-sequential paging (up/reverse, down/forward) as well as horizontal and vertical segmentation (i.e., virtual screen) capability.

(13) Scrolling capability to augment the paging feature.

(14) Direct access to data from a screen display without using a full screen editor.

(15) Data entry validation capabilities to include checking of input data for range, value and format, as well as upper and lower limit checking.

SOFTECH

(16) Grid generation capability.

(17) Title, subtitle, and heading generation capability.

(18) Horizontal/vertical field count/sum feature.

b. The Graphic Screen Generator must possess the following characteristics;

    (1) Line Graph and Bar Graph Generators share some common capabilities:

        (a) Variable legends, either data-driven or user-defined.

        (b) Automatic x- and y-axis scaling.

        (c) Y-axis rescaling after screen display initiated by a function key.

        (d) Capability to identify (e.g., via blinking, changed color, etc.) data that has changed from an original or previous data set. The means by which this "data change indicator" is activated is determined during the Analysis Phase that precedes each functional block implementation.

        (e) Field coloring depending on value of data field (selectable).

        (f) Capability to generate a hard copy from a screen display.

    (2) Map Maker capabilities:

        (a) Linkable to a special area on the screen to display remarks or other data relevant to the display. This requires the routine to know where the cursor is on the display in order to call up the correct information.

        (b) A coordinate system so Air Bases or other items of interest can be inserted, labeled and deleted by a nontechnical user using latitude and longitude or Geographic Reference (GEOREF) map coordinates (the positioning is reasonably accurate with relation to one another).

        (c) Coloring of the base position according to the dynamic values of a set of database variables (the color indicates a condition or status).

        (d) A change indicator for positions whose status or condition values were changed.

        (e) Continuously variable software zoom (if not a hardware capability).

        (f) The capability to generate and display special symbols.

        (g) Capability to generate a hard copy from a screen display.

c. Display Screen Parameter Software must possess the following characteristics:

    (1) The parameter software interacts with the AFIRMS database when necessary, to determine, generate, and list the appropriate parameter choices for the database set requested. For example, if ATO 3 (the

SOFTECH

specified database set) does not have CBU-52 munitions (a parameter selection) tasked, then the list of choices for a munition type (the parameter) will not include CBU-52.

(2)   The parameter software is interpretive in nature so as to:

(a)   Ensure a consistent and well-defined interface to the database transaction software.

(b)   Provide a flexible and user-friendly mechanism for user selection of alternative data sets.

(c)   Allow the user to enter synonymous parameter selections; e.g. "YES", "YE", "Y", "OK" can all be entered (and subsequently interpreted by the system) as an affirmative, instead of forcing the user to precisely reflect database values.

(3)   The parameter software also permits write-in choices where appropriate. In some instances it is not possible or practical to list all appropriate parameter selections.

d.   Function Keys. AFIRMS is operated utilizing a system of menus and special function keys. Some of the product screen function keys can be seen at the bottom of the display screens described in the AFIRMS Product Description annexes. As the number of available function keys is less than the number of required keys, arrays of keys are utilized to overcome that problem.

The first array contains the basic key functions needed for every display screen. Except for the Base Status Map, the graphic displays require only the first array. The tabular input screens require key functions to add, delete, and change/edit data. A paging and/or scrolling capability is required. Some records have sub-records (e.g., a wing with several munitions as in the Wing Resource Summary Product, a mission with two aircraft Mission Design Series and/or aircraft Standard Conventional Loads as in the Tasking Information products). Therefore, the second array is reserved for editing records, and the third array is reserved for editing sub-records. Switching between arrays is done with two special function keys. An arrow on either or both ends of the function key array shows the user which array is in use. The required functions of these function keys are outlined in Table 3-1.

SOFTECH

Table 3-1

PRODUCT DISPLAY SCREEN FUNCTION KEY DESCRIPTION

Key Label	Function Description
1st Array:	
DISPLAY PARAM SELECT	Takes the user back to the parameter selection screen. The parameter choices the user made to display the product are redisplayed.
LINE HIGHLIGHT TOGGLE	Changes the state of the Line Highlighter toggle. If it is turned/toggled OFF, the state is changed to ON and the Line Highlighter appears. If it is toggled ON, the state is changed to OFF and the Line Highlighter is removed from the tabular display. The function key is not active when a graphic screen is displayed.
HARD COPY	Spawns a batch process to print a color copy of the display. This key is on the 1st array only if the product has a single screen display. For multiscreen displays, the key is on the 2nd array with the paging keys.
TOP MENU	Returns the user to the first/top menu.
PREVIOUS MENU	Returns the user to the menu from which the product was selected.
HELP	Interrupts the product display and takes the user to the HELP system. When finished with the HELP screen, the user returns to this display.
UPDATE SCREEN	Causes the system to refresh or update the product display using the current parameter choices. Normally used with a resource status product when the system notifies the user that the status data has been updated.
2nd Array:	
PAGE REVERSE	Page the product in reverse order. It pages a full or half page at a time, depending on the paging option selected. It is active only when a tabular product is displayed and is longer than one page of display.
FULL PG HALF PG	Changes the paging state to FULL or HALF paging, depending on the current state. The current paging state is always highlighted or colored.
PAGE FORWARD	Causes the system to page the product forward in sequential order. It pages a full or half page at a time, depending on the paging option selected. It is active only as described in PAGE REVERSE above.
CHANGE XXXXXX DATA	Permits editing of the screen data. The 'XXXXXX' is changed to the appropriate term (such as aircraft or aircrew) when the product is designed. Used only for tabular products. Pressing the function key a second time de-activates the CHANGE mode.
ADD XXXXXX DATA	Permits the addition of a record to the database. Used only for tabular products. Pressing the function key a second time de-activates the ADD mode.

SOFTecH

Table 3-1

PRODUCT DISPLAY SCREEN FUNCTION KEY DESCRIPTION (Continued)

Key Label	Function Description
DELETE XXXXXX DATA	Permits the deletion of a record from the database. Used only for tabular products. Pressing the function key a second time de-activates the DELETE mode.
ENTER	Updates the data base as directed by the three previous keys keys (CHANGE, ADD, and DELETE XXXXXX DATA). The ENTER key acts as a confirmation step for the CHANGE/ADD/DELETE keys.
INTERROGATE BASE	Interrogates the cursor position and displays a box containing data corresponding to the base displayed under the cursor (see Base Status Map).
DELETE DATA BOX	Deletes the box containing the base data.
SCALE UP	Increases the y-axis scale of the bar graph by approximately 100% after the screen is displayed. Used with bar graphs only.
SCALE DOWN	Decreases the y-axis scale of the bar graph by approximately 50% after the screen is displayed. Used with bar graphs only.
3rd Array:	
PAGE REVERSE	Page the product in reverse order. It pages a full or half page at a time, depending on the paging option selected. It is active only when a tabular product is displayed and is longer than one page of display.
FULL PG HALF PG	Changes the paging state to FULL or HALF paging, depending on the current state. The current paging state is always highlighted or colored.
PAGE FORWARD	Causes the system to page the product forward in sequential order. It pages a full or half page at a time, depending on the paging option selected. It is active only as described in PAGE REVERSE above.
CHANGE XXXXXX DATA	Same as CHANGE XXXXXX DATA key above except only sub-record data is changed. The system prevents changes to record keys/data.
ADD XXXXXX DATA	Same as ADD XXXXXX DATA key above except able to add sub-records only.
DELETE XXXXXX DATA	Same as DELETE XXXXXX DATA key above except able to delete sub-records only.
ENTER	Updates the data base as directed by the three previous keys (CHANGE, ADD, and DELETE XXXXXX DATA). The ENTER key acts as a confirmation step for the CHANGE/ADD/DELETE keys.

SOFTech

3.2.2.6 User Interface Software. The primary functions of this software subsystem are as follows:

    a.   It provides the AFIRMS user's sole view of the AFIRMS system.

    b.   It serves as the link by which the AFIRMS user's requests are translated into internally recognized system functions, validated, and subsequently performed by the system.

The software providing user interface to the AFIRMS system possesses the following characteristics:

    a.   Menu driven with a command language available to provide software capabilities for experienced users.

    b.   Consistent menu displays and underlying definitions.

    c.   User-friendly.

    d.   Fault-tolerant.

    e.   Menu paging or scrolling.

    f.   Help available at all levels of user/system interaction.

    g.   Allows for multiple access paths to all user functions (via functional area workstation groupings, alphabetical lists, logically related system functions, etc.)

    h.   Provides functionality to accept specified user parameters which limit information returned for screen data retrieval requests.

    i.   Provides functionality to allow interactive "through the display screen" updates to the AFIRMS database (as discussed in section 3.2.2.5 of this subsystem specification).

    j.   Detects and automatically logs off terminals which have been inactive for an operator definable period of time. This time is determined and set by the system operator.

3.3 Interfaces. AFIRMS avoids data redundancy when possible; however, some redundancy is required for deployment and response time requirements. AFIRMS, where possible, also maximizes the use of USAF and MAJCOM-unique data systems

(as well as other suitable DoD Automated Data Processing Systems (ADPSs)) to provide AFIRMS information. This paragraph provides a description of the HQ USAFE subsystem intrasite interfaces. Interfaces to the HQ USAF and wing subsystems, as well as interfaces to external (e.g., USAF, DoD) automated systems are discussed in the AFIRMS System Specification.

The HQ USAFE subsystem interfaces with wing and HQ USAF subsystems through computer-to-computer network software products. These products link various operating systems and provide the functionality required to effect information flows between AFIRMS subsystems.

As AFIRMS intends to host on existing hardware and equipments as much as possible, the specific protocols to be used are largely dependent upon existing and/or planned Air Force ADPSs. Thus, they are determined or confirmed during the Analysis Phase that precedes implementation of each functional block.

AFIRMS is developed to take advantage of currently existing systems that already provide accurate data collection. It is also designed to take advantage of systems that produce capability assessments using a subset of the resources AFIRMS ultimately uses to produce its capability assessments. In order to handle interfaces with future developing systems, AFIRMS is designed modularly with generic data gateway interfaces. As these new systems are implemented, they can easily be interfaced with AFIRMS. These generic interfaces apply to communications networks as well as data systems.

AFIRMS is data collection intensive. However, AFIRMS attempts to minimize duplication of the collection of any data that is already being collected by another system (e.g., munitions data collected by Combat Ammunition System (CAS)). In addition, AFIRMS does not compute an assessment that is already suitably available in another system (e.g., spares analysis computed by Weapon System Management Information System (WSMIS)).

3.3.1 AFIRMS Intrasite Interfaces. The transactions that occur within a particular AFIRMS site require three types of interface specifications:

a. Intrasite Transaction Header. This interface specification defines the format of the information required to transmit any transaction to/from the CNM from/to any functional area workstation.

Appendix A provides the detailed specification of the information contained in this header interface.

. Display Screen Interfaces. These interface specifications define the format of the data that is retrieved on behalf of the functional user in accordance with his/her input parameters and subsequently transmitted to the functional area. Each of these interface specifications also requires an Intrasite Transaction Header as defined above.

SOFTECH

Table 3-2 provides a cross-reference between the AFIRMS output reports set forth in Section 4.3.2 of this subsystem specification and the AFIRMS internal interface specifications provided in Appendix B.

c.   Data Update and Retrieval Transaction Interfaces.

The logical data flow for data update and retrieval transactions is provided in Tables 3-3 and 3-4 respectively.

Tables 3-5 and 3-6 provide the interface specifications for the data update and data retrieval requests, respectively. Each of these requests also requires an Intrasite Transaction header as defined above.

SOFTECH

Table 3-2

AFIRMS OUTPUT REPORT

(Cross-Reference to Appendix B)

Screen Title	Interface Spec. Appendix Cross-Reference
Aircraft and Mission Tasking Details	APIB/S
Aircraft Spares Support Capability	APIB/S
Aircraft Tasking	B-2
Attrition Statistics	APIB/S
Attrition Trends	APIB/S
Base Fuels Capability	B-2
Base Status (Input)	B-1
Base Status (Output)	B-1
Capability Perspective	B-2
Communications Support Status	APIB/S
Dollars to Readiness - Comparisons	B-6
Dollars to Readiness Associations	B-6
Dollars to Readiness - Resource Perspective	B-6
Individual Resource Capability	B-2
Integrated Capability	B-2
MICAP Forecast	APIB/S
Mission Area Tasking	APIB/S
Mission Profile Definition	B-1
Mission Tasking	APIB/S
Munitions Capability	B-2
Munitions Status	B-1
Munitions Substitution Sortie Capability	APIB/S
Munitions Substitution Sortie Requirement	APIB/S
OPlan/OPORD Associations	B-1
Order Assignments	B-1
Process Status	B-1
Resource Reallocation	B-1
Resource Unit Price	B-1
Status Map	B-3
Unit Status (Input)	B-1
Unit Status (Output)	B-1
War Mobilization Plan	B-1
Wing Flying Day	B-1
Wing Operations Rates	B-1
Wing Resource Summary	B-1
Wing Resupply Schedule	B-1

*APIB/S - Analysis Phase Initial Block for each Segment

TABLE 3-3a

DESCRIPTION OF DATA FLOW
FOR
DATA RETRIEVAL TRANSACTIONS
(Functional Area Workstation)

User logs onto FAW by entering username and password.
If username/password combination is invalid, then
    The FAW keeps track of the number of consecutive times this occurs, as well as the
    invalid information.

    If invalid information has been entered three times in a row, then
        FAW logically locks the terminal from further use by saving the information on
        the disk and indicating that state.
        FAW generates a siren-like sound indicating the security violation.
        FAW displays the security violation screen.
        FAW sends to the ACNM (if possible) a security message indicating the problem.
        The ACNM notifies the security officer via three ways:
        (1) Sends a message directly to his/her terminal if he/she is logged on.
        (2) Sends a security message to his/her mailbox.
        (3) Sends the security message to the system manager's hardcopy device.
    Else
        FAW gives user another chance to logon properly.
    Endif

Else [valid user logon has occurred on the FAW]
    FAW attempts to logon to the ACNM by passing the username/password entered.
    The ACNM performs security checks.

    If a security violation has been detected, then
        ACNM logically locks the terminal port from further use by saving information
        on
        the disk and indicating that state.
        The ACNM notifies the security officer via three ways:
        (1) Sends a message directly to his/her terminal if he/she is logged on.
        (2) Sends a security message to his/her mailbox.
        (3) Sends the security message to the system manager's hardcopy device.
        The ACNM tells the FAW of the security violation.

    Else [valid user logon has occurred on the ACNM]
        AFIRMS processes are started that run on the user's behalf.

        If there is no problem starting these processes, then
            AFIRMS code and data needed for the user are downloaded.

            If all necessary data and code reach the FAW successfully, then
                The ACNM gets ready for requests from the FAW on behalf of the
user.
                The ACNM tells the FAW that fact.
            Else
                There is a problem.
            Endif
        Endif

SOFTECH

TABLE 3-3a

DESCRIPTION OF DATA FLOW
FOR
DATA RETRIEVAL TRANSACTIONS
(Functional Area Workstation) (Continued)

```
        If there is a problem on the ACNM, then
            The ACMN informs the FAW of the problem.
            The ACNM logs the user off AFIRMS.
            The FAW notifies the user of the problem.

            If a local database for this user exists from a previous logon, then
                the user is allowed to make requests of his/her local database only.
            Else
                The FAW notifies the user of the problem.
                The FAW logs the user off AFIRMS.
            Endif
        Endif
    Endif
Endif


[CNM checks for data stored on behalf of the user on non-volatile random access medium.]
If ACNM finds data destined for the user, then
        ACNM sends FAW user data summary.
Endif


ACNM sends FAW the currently available CPU/processing power for each CNM.
FAW notifies user of data stored on his/her behalf (e.g., previous request, mail).
If user chooses details of his/her CNM data, then
        FAW displays user data summary.
        [User selects which data he/she wishes to view/delete.]
Endif

    If user wishes to view/delete a dataset, then
        If ACNM can be talked to via normal communications link or dial-up, then
            The view/delete request is transmitted to the ACNM.
        Else
            The user is notified that there is a problem.
            The user is asked to make another request.
        Endif
    Endif
```

SOFTECH

TABLE 3-3a

DESCRIPTION OF DATA FLOW
FOR
DATA RETRIEVAL TRANSACTIONS
(Functional Area Workstation) (Continued)

```
FAW user requests screen for viewing via FAW MMI.
[FAW database is checked for required data.]
If all data exists (is resident) locally, then
      FAW software determines if the response time would be faster by allowing a CNM to
      perform the request.

      If processing is faster on the CNM, then
           The request is transmitted to the ACNM.
      Else [processing is faster locally]
           The FAW handles the request locally.
      Endif

Else [some or all of the data exists elsewhere]
      The user is informed that his/her request requires access to the CNM's database.
      The user is asked for confirmation of the request.

      If the user confirms the request, then
           If the ACNM can be talked to via normal link or dial-up, then
                The request is transmitted to the ACNM.
           Else
                The user is notified there is a problem.
                The user is requested to make another screen selection.
           Endif
      Else [the user didn't confirm the request]
           The user is requested to make another screen selection.
      Endif
Endif
```

Acronym Definitions

ACNM   -   the CNM directly attached to the user's FAW
AFAW   -   all functional area workstations attached to an ACNM
CNM   -   central node module/manager
FAW   -   functional area workstation
MMI   -   man-machine interface
NCNM   -   CNM that the user is newly attached to (assuming he logged off while his
              request was being processed)
NFAW   -   newly logged-onto FAW
OCNM   -   original CNM that received a FAW request
OFAW   -   original FAW that made a request
PCNM   -   the CNM that actually performed the FAW request

SOFTECH

33401   3-26

TABLE 3-3b

DESCRIPTION OF DATA FLOW
FOR
DATA RETRIEVAL TRANSACTIONS
(Central Node Manager)

The ACNM receives a FAW request for data retrieval.
[The OCNM determines which CNM can best process the request.]
If the request should be handled by a "different" CNM, then
     The request is transmitted to the CNM that can best handle it.
Endif

If there are requests currently queued, then
[A separate queue is maintained for updates. It is always serviced before the query queue
in order to minimize database conflicts.]
     The request is queued according to priority using a FIFO algorithm.
     As requests are completed, the next request performed is the one at the top of the
     highest priority queue with a request currently queued.

Else [there are no other requests queued]
     The request is performed immediately.
     The PCNM transmits to each AFAW and all other CNMs its currently available
     (unused) CPU/processing power.
Endif

The CNM that processes the request transmits to each attached FA and all other CNMs
its currently available processing power. Each of the "other" CNMs also transmits this
processing capability to its FAWs.
[When an interactive request is completed, the results are sent back to the requesting
user.]

If the request was handled by other than the OCNM, then

     [First a check is made to see if the user is still logged onto any of the
     OCNM's FAWs.]
     If the PCNM can talk to the OCNM, then
          The PCNM sends a "check if the user is still logged on" request to the OCNM.
          The OCNM sends a response to the PCNM.

          If the user is still logged onto the OCNM, then
               The PCNM transmits the results to the OCNM.

          Elseif the user is logged onto any of the PCNM's FAWs, then
               The PCNM transmits the results to the user's NFAW.

SOFTech

TABLE 3-3b

DESCRIPTION OF DATA FLOW
FOR
DATA RETRIEVAL TRANSACTIONS
(Central Node Manager) (Continued)

```
        Elseif the PCNM can talk to the other CNMs, then
            The PCNM sends a "check if user is still logged on" request to each of the other
            CNMs in sequence to determine if the user is logged onto any other CNM's FAWs.

            If the user is not logged onto the system, then
                The PCNM transmits the results to the OCNM.
                The OCNM saves the results on a non-volatile, random access medium for
                later use.

            Else
                The PCNM transmits an "asynchronous event" message to the CNM which
                is attached to the NFAW the user is logged onto.
                That CNM then transmits the message to the user's NFAW.
            Endif

            Else [the communications links between the CNMs not working]
                The PCNM saves the results on non-volatile, random access medium for later use.
            Endif

        Else [communications link between the PCNM and the OCNM not working]
            If the user is logged onto any of the PCNM's FAWs, then
                The PCNM transmits the results to the user's NFAW.

            Else
                The PCNM saves the results on non-volatile, random access medium for later use.
            Endif
        Endif
Endif

If the user is logged onto any FAWs when his/her request completes, then
    The ACNM transmits the results to the user's FAW regardless of whether the user
    is logged onto the OFAW from which the request was made, or a NFAW.
Endif
```

The PCNM must transmit to each attached FA and all other CNMs its available CPU/
processing capability. This capability is used by:
(1) The FAWs to determine if a CNM can handle a request faster, and
(2) The CNMs to determine which CNM can handle a request faster.

Acronym Definitions

ACNM   - the CNM directly attached to the user's FAW
AFAW   - all functional area workstations attached to an ACNM
CNM   - central node module/manager

SOFTech

TABLE 3-3b

DESCRIPTION OF DATA FLOW
FOR
DATA RETRIEVAL TRANSACTIONS
(Central Node Manager) (Continued)

FAW   - functional area workstation
MMI   - man-machine interface
NCNM   - CNM that the user is newly attached to (assuming he logged off while his
             request was being processed)
NFAW   - newly logged-onto FAW
OCNM   - original CNM that received a FAW request
OFAW   - original FAW that made a request
PCNM   - the CNM that actually performed the FAW request

SOFTECH

TABLE 3-4a

DESCRIPTION OF DATA FLOW
FOR
DATA UPDATE TRANSACTIONS
(Functional Area Workstation)

After reviewing the retrieved data, the user updates a record.
The editor does not allow the user to change any field that he/she does not have privilege for.
The OFAW sends the updated record (including its keys) to the ACNM.
The OFAW also updates its local database. A copy of the "before" and "after" database
record images is saved in case the update must be backed out.

[Note: The user is not prevented from making further requests of AFIRMS at this point. All
messages from the ACNM occur asynchronously. The user is notified each time
asynchronous messages occur. At that point, he/she can request a display containing a list
of all asynchronous events pertaining to him/her. This display is a temporary "window"
which is used only for viewing any asynchronous events. It cannot be used for any screen
which can be requested via the normal screen selection list. This window can also be looked
at via the normal screen selection list. Viewing of this screen does not in any way destroy
the state of the screen the user was viewing prior to looking at the window. That is, after
the user has completed viewing the window, the next screen seen is the one the user was
viewing at the time he/she requested to look at the window, restored to its original state.]

For all other FAW's receiving the changed information from their ACNM,
    The local database is updated with the changed information.

    If the user is currently looking at the changed information, then
        The FAW indicates to the user that a change has occurred.
        The user can then look at the screen via a window that contains all
        asynchronous events, if desired.
    Endif
Endfor

If the OFAW receives a security violation message from the ACNM, then
    The OFAW logically locks the terminal from further use by saving the information on
    the disk and indicating that state.
    The OFAW generates a siren-like sound indicating the security violation.
    The OFAW displays the security violation screen.
    The OFAW backs out the update that was attempted.
    The OFAW deletes the "before" and "after" database record images.

Elseif the OFAW cannot send a message to its ACNM because of communications
problems, then
    The OFAW backs out the update that was made previously.
    The OFAW deletes the "before" and "after" database record images.
    The OFAW allows the user to continue making other requests.

Elseif the OFAW receives a processing error message from the ACNM, then
    The ACNM saves the update information on non-volatile random access medium for
    later use in attempting to update the cental database.
    The OFAW deletes the before and after database record images.
Endif

SOFTECH

TABLE 3-4a

DESCRIPTION OF DATA FLOW
FOR
DATA UPDATE TRANSACTIONS
(Functional Area Workstation)

Acronym Definitions

ACNM   – the CNM directly attached to the user's FAW

AFAW   – all functional area workstations attached to an ACNM

CNM   – central node module/manager

FAW   – functional area workstation

MMI   – man-machine interface

NCNM   – NM that the user is newly attached to (assuming he logged off while his request was being processed)

NFAW   – newly logged-onto FAW

OCNM   – original CNM that received a FAW request

OFAW   – original FAW that made a request

PCNM   – the CNM that actually performed the FAW request

SOFTECH

TABLE 3-4b

DESCRIPTION OF DATA FLOW
FOR
DATA UPDATE TRANSACTIONS
(Central Node Manager)

The ACNM receives an OFAW update request.

[The OCNM determines whether the update request should be processed immediately or not.]

If there are other update requests in the update queue, then

    The update request is queued at the end of the update queue.

    As update requests are completed, the request that is at the top of the update queue is performed.

Endif

[The OCNM performs a security check to make sure the user is allowed to make the update to the database.]

If the user is not allowed to make the update [a security violation has occurred] then

    The OCNM informs the FAW of the problem.

    The OCNM notifies the security officer via three ways:

    (1) Sends a message directly to his/her terminal if he/she is logged on.

    (2) Sends a security message to his/her mailbox.

    (3) Sends the security message to the system manager's hardcopy device.

Else [the user is allowed to make the update]

    The OCNM attempts to update the central database.

    If the user making the update request is still logged onto the OFAW, then

      The OCNM sends the update status back to the OFAW.

    Else

      The OCNM saves the update status on non-volatile random access medium for later use.

    Endif

    [The OCNM determines whether other CNMs need that update information.]

    If other CNMs need the update information, then

      It is sent to them. In addition to the changed information, the time/date of the update, as well as the username of the person that made the change, are sent.

    Endif

    All CNMs that receive updated information must send those changes to each of their AFAWs that currently have a local database containing that record.

    [Data consistency checks are made.]

    If other data within the central database is inconsistent with the newly updated information, then

      That data is made consistent by:

      (1) intelligent software, or

      (2) requesting the user to make other information consistent; otherwise the original change is backed out and all FAWs originally receiving that change are notified.

    Endif

Endif

TABLE 3-4b

DESCRIPTION OF DATA FLOW
FOR
DATA UPDATE TRANSACTIONS
(Central Node Manager) (Continued)

Acronym Definitions

ACNM   - the CNM directly attached to the user's FAW
AFAW   - all functional area workstations attached to an ACNM
CNM   - central node module/manager
FAW   - functional area workstation
MMI   - man-machine interface
NCNM   - NM that the user is newly attached to (assuming he logged off while his
         request was being processed)
NFAW   - newly logged-onto FAW
OCNM   - original CNM that received a FAW request
OFAW   - original FAW that made a request
PCNM   - the CNM that actually performed the FAW request

SOFTECH

Table 3-5

CNM DATA RETRIEVAL REQUEST INTERFACE SPECIFICATION

CNM Data Retrieval Request   Date: 31-May-1985
Interface Specification

The CNM Data Retrieval Request buffer layout is as follows:

Screen # requested	# of parameters to follow

Repeats <# of parameters to follow >times

Parameter number	Parameter selection number	Length of parameter value	Parameter value

Field Name	Field Length
Screen number requested	3
Number of parameters to follow	2
Parameter number	2
Parameter selection number	2
Length of parameter value	3
Parameter value	?

Note: Each field whose length is "?", represents a variable length field. Only these
        fields are preceded by a 2-byte length descriptor i.e.c.

SOFTECH

33401

Table 3-6

CNM DATA UPDATE REQUEST INTERFACE SPECIFICATION

CNM Update Request Interface Specification   Date: 31-May-1985

The CNM Update Request buffer layout is as follows:

┌─ Repeats for the number of keys for this screen

Screen # for update	Column # for screen	Length of key value	Key value

┌─ Repeats # of changes to follow| times

# of changes to follow	Column # for screen to modify	Length of new value	New value
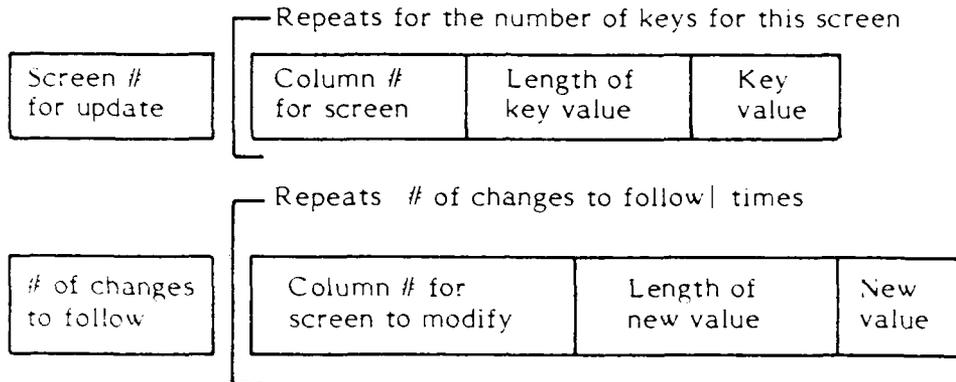
| Field Name	Field Length
Screen # for update	3
Column # for screen	2
Length of key value	2
Key value	?
# of changes to follow	3
Column # for screen to modify	2
Length of new value	2
New value	?

Note: Each field whose length is "?", represents a variable length field. Only these fields are preceded by a 2-byte length descriptor field.

SOFTECH

3.4 Security. The HQ USAFE operational AFIRMS ADPS processes data up to a classification level of TOP SECRET. HQ USAFE personnel accessing AFIRMS must have clearances and a need-to-know at the highest classification level of data being processed or stored in the facility. Although sites at the wing level operate in the Controlled Security Mode, HQ USAFE (MAJCOM Headquarters) and the HQ USAF sites operate in the System High Security Mode. This is accomplished by utilizing a combination of the following security measures:

a. Personnel Security. All personnel having access to MAJCOM and HQ USAF AFIRMS facilities and/or data have a security clearance equal to the highest level of classification being processed, stored, or displayed. At all AFIRMS sites, each user's identity is positively established via user IDs and logon passwords (terminal display of which is suppressed), which are to authenticate/verify AFIRMS users' identities and their corresponding access privileges. AFIRMS provides a capability to prevent unauthorized users from executing a protected program or series of programs.

A personnel security program is implemented for the AFIRMS program in accordance with the provisions of DoD Regulation 5200.2/AFR 205-32 USAF Personnel Security Program. Personnel access controls must be implemented for the AFIRMS central computer facilities and remote terminal areas.

(1) Central Computer Facility. Strict personnel access controls are implemented to ensure that the only personnel admitted are those who require access to the central computer facility and possess a security clearance at least equal to the highest classification of information being processed or openly stored at the facility.

(2) Remote Terminal Area(s). Authorization for access to, and the use of, remote terminal devices is to be based on an individual's duties, his/her need to use the terminal, and possession of a security clearance of the required level.

b. Physical Security. Measures are taken to ensure external protection for AFIRMS against unauthorized access to the central computer facility, to the system from remote terminals, and to data storage media.

(1) Central Computer Facility. Central computer facility physical security must meet the requirements established for the highest classification and all sensitivity categories of data that are either resident in the ADPS or openly stored.

(2) Remote Terminal Area(s). Physical security measures at remote sites must fulfill the minimum requirements for the highest classification of information accessed from or stored at the site.

c. Hardware Security. AFIRMS system hardware meets all of the provisions recommended in DoD 5200.28M, ADP Security Manual for hardware security features.

SOFTECH

d.   Software Security. The operating systems selected for use meets the general software security requirements stated in DoD 5200.28M. In addition to the security protection features contained in the operating systems, a combination of system and application software protection features are utilized to provide the following security protection to comply with applicable DoD and Air Force security policies.

   (1)   Access Control to prevent unauthorized entry to systems, files and programs. Wings cannot query HQ USAFE (MAJCOM-level) data. Information flow is one-way (upwards) from wings to HQ USAFE.

   (2)   File Security to prevent unauthorized access or alterations to files.

   (3)   Error Surveillance and Alerts to recognize, record and indicate misuse of the system.

   (4)   File Security to prevent unauthorized access or alterations to files. An automated audit trail will show: access made to files; how, and from where the access was initiated; the identity of the person or process that initiated the access; and all unauthorized attempts.

   (5)   User Monitoring and Isolation to ensure the user has access to only the system information to which he is entitled.

e.   System Stability. All AFIRMS components operate so that one can automatically or administratively detect and report system hardware and software malfunctions in time to prevent unauthorized disclosure.

f.   Data Integrity. Each database, file, and data set/element is identified with an origin, use, and an explicitly defined set of access controls. These access controls are based on classification, sensitivity, user clearance, and established need-to-know.

g.   National Bureau of Standards (NBS) or National Security Agency (NSA) approved data encryption devices may be required for transmission of sensitive unclassified data depending on the nature of the data.

h.   Emanations Security (EMSEC). ADP and communications equipment utilized to process classified material at AFIRMS sites are TEMPEST approved. All devices that are not TEMPEST approved will be tested and approved for placement in the ADP facilities in such a manner as to control compromising emanations. All equipments are installed IAW the guidelines stated in NACSIM 5203.

i.   Procedural Security. Security operating procedures meet the requirements of AFR 205-1 and 205-16 and include the following:

   (1)   System Access Controls

   (2)   File Access Controls

   (3)   Personnel Access Controls

   (4)   Security Markings

SOFTECH

        (5)   Protecting Classified Output

        (6)   Physical Security

        (7)   Protection of Residual Information

        (8)   Declassification Guidelines

3.5 Controls.

The AFIRMS system requires integrated control functions which operate at system levels independent of stated AFIRMS operational functionality. These functions are implemented and utilized in such a way as to minimize their impact on AFIRMS execution.

Control functions are logically separated into two functional categories; System/Operations Management Controls, and Intrasite Access and Data Flow Controls.

3.5.1 System/Operations Management Controls.

These controls incorporate the following functions:

a. The application of software monitoring and diagnostic utilities.

b. The application of hardware monitoring and diagnostic utilities.

c. The ability to start, stop, and restart AFIRMS system and communications processes, including upper-level control of network performance.

d. The ability to alter AFIRMS subsystem runtime parameters dynamically (e.g., process priorities, operating system parameters, etc.)

3.5.2 Intrasite Access and Data Flow Controls.

These functions address control requirements imposed by security and data integrity issues. They also assist in supporting downgraded operational modes. These functions include:

a. Dynamic imposition of limitations/new priorities on intrasite data communications to and/or from specific functional areas.

b. Dynamic limitations/alterations of data access and/or data modification authorizations for specific functional areas.

SOFTECH

SECTION 4. DESIGN DETAILS

4.1 General Operating Procedures. After AFIRMS is installed, user/operator manuals guide system operation. The user/operator manuals contain instructions on how to turn equipment on and off, as well as clear, concise instructions for the operation of AFIRMS. Operating procedures for both the system software, hardware, and functional products are provided as a combination of vendor-provided documents and AFIRMS user manuals. The vendor-supplied documents detail hardware and system software procedures while AFIRMS user manuals detail functional product procedures including communications and security. The manuals are written in sufficient detail to enable the system user to respond to most situations he/she may encounter. The specific requirements for AFIRMS user/operator manuals are determined during the in-depth analysis that precedes implementation at each AFIRMS site.

4.1.1 System Start, Restart, and Stop Times. Maximum system start, restart, and stop times are provided below. AFIRMS hardware must accommodate these times. All specified times are non-data communications related; i.e., they do not include the amount of time that may be required to transfer additional required data from the CN to the FA upon system startup. Data communications times are dependent upon the data distributions at each AFIRMS site. These times presume a booted and ready Central Processing Unit (CPU); that is to say, times exclude host machine power up and initial bootstrap.

	Central Node	Functional Area
System Start	45 seconds	90 seconds
System Restart*	90 seconds	180 seconds
System Stop (Down)	90 seconds	180 seconds

* Precise definition and features of the System Restart are reviewed and determined during the analysis phase that precedes implementation at each site.

SOFTECH

4.2 Wing Subsystem Logical Flow. AFIRMS logical and intrasite information flow is shown in Figures 4-1 and 4-2, respectively. Squadrons are linked hierarchically to a wing which may be linked hierarchically to an Air Division (SAC) or Airlift Division (MAC), which may be linked hierarchically to a Numbered Air Force (NAF) (MAC & SAC), which is ultimately linked hierarchically to a MAJCOM (HQ USAFE), which in turn is linked to HQ USAF.

AFIRMS is a "push" system only. This means that there is upward reporting of data at regular intervals, with no provision for ad-hoc querying of databases between sites. The data accessible at AFIRMS sites is at the level of detail appropriate to the particular command level. However, flexibility to increase the frequency of upward reporting cycles is provided for exception reporting on a case-by-case basis. Implementation of this exceptional reporting requirement is procedural in nature, and thus external to AFIRMS.

4.3 Subsystem Data. The HQ USAFE site operates on the following types of data:

a. Tasking Data. Tasking data consists of; WMPs, OPlans/OPORDs, and special ad-hoc taskings from HQ USAF.

b. Resource Data. Resource data is data collected and maintained by the wing squadrons and consists of aircraft status, aircrew status, fuels status, munitions status, and (for later implementation blocks) logistics support status.

c. Theatre resource data such as depot level fuels and munitions is maintained and provided by depots and support units via automated systems such as CAS, CFMS, etc.
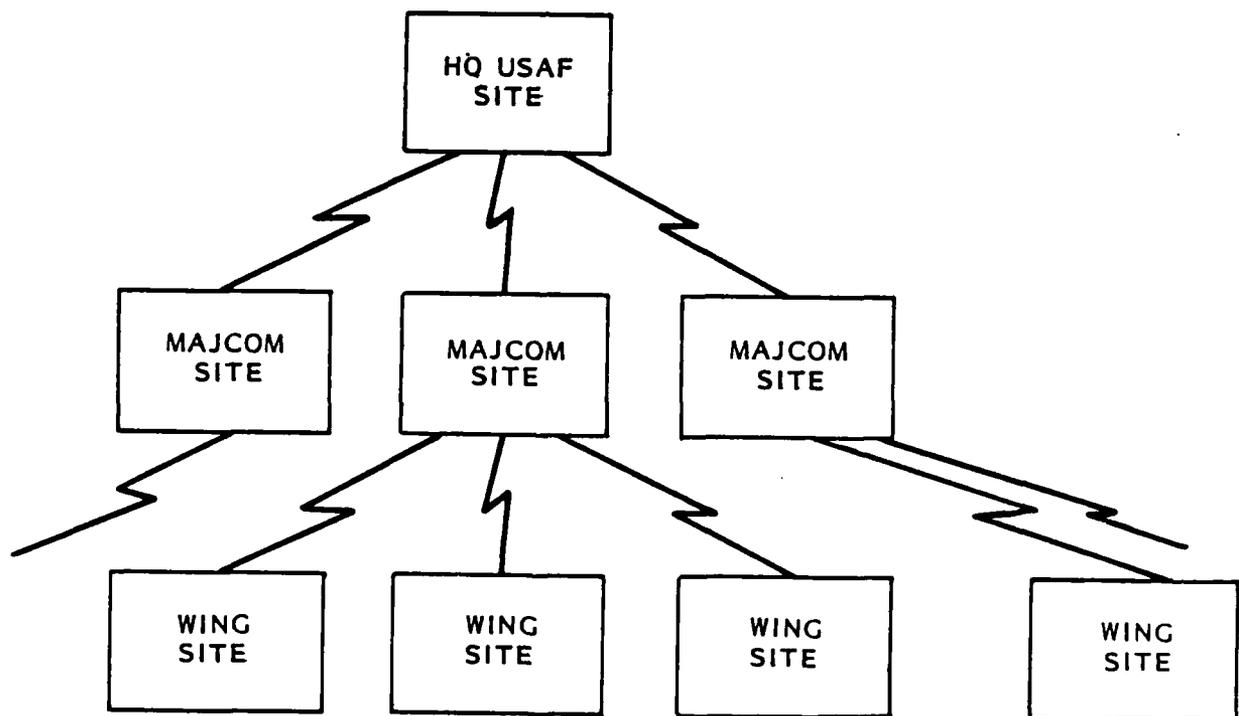
Figure 4-1. AFIRMS Logical Flow

SOFTECH
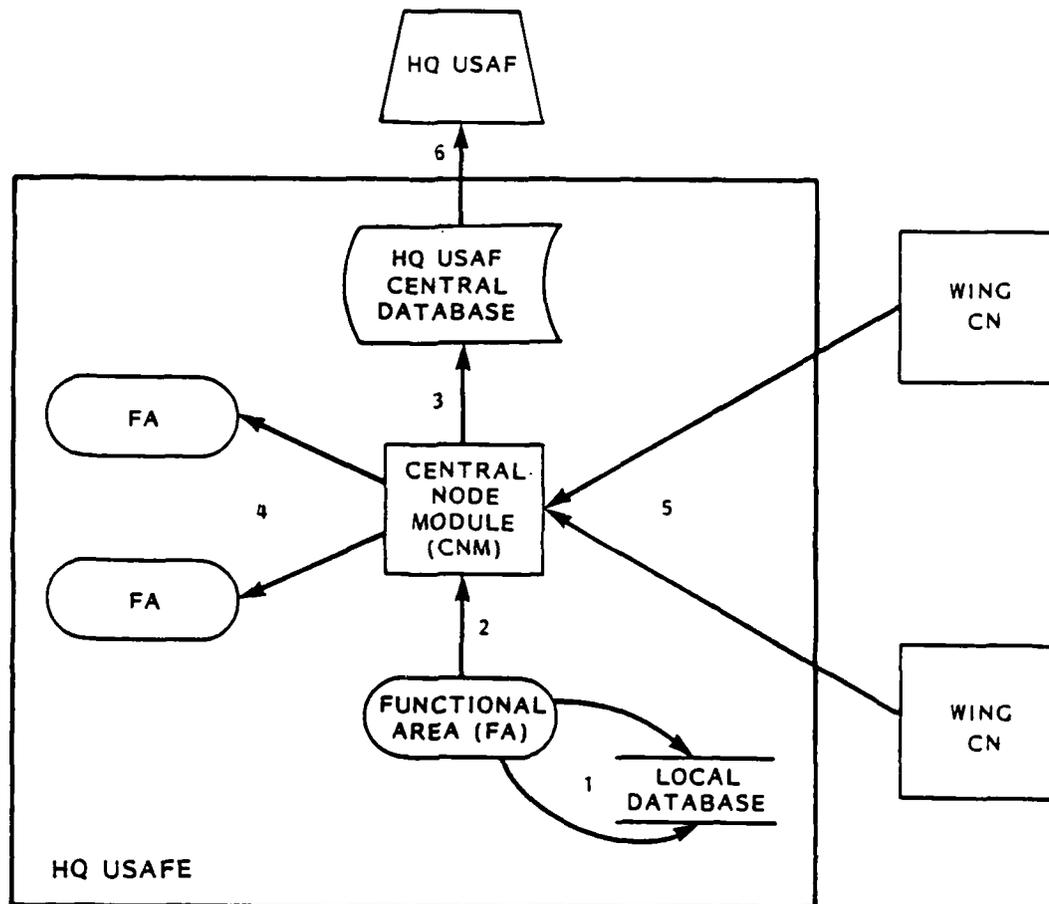
1. DATA IS UPDATED AT THE FUNCTIONAL AREA.

2. UPDATED DATA IS PASSED TO THE CENTRAL
    NODE MODULE.

3. THE CENTRAL NODE MODULE UPDATES THE
    CENTRAL DATABASE.

4. THE CENTRAL NODE MODULE SENDS NOTIFICATION
    OF DATA UPDATE TO OTHER FUNCTIONAL AREAS
    AFFECTED.

5. THE CENTRAL DATABASE IS ALSO UPDATED ON A
    PERIODIC BASIS (AT A MINIMUM, EVERY 6 HOURS),
    OR ON REQUEST FROM THE MAJCOM SITE, WITH
    DATA THAT HAS BEEN UPDATED VIA THE WING LEVEL
    FUNCTIONAL AREAS ROLLED UP (AGGREGATED)
    AND TRANSMITTED TO THE MAJCOM.

6. ON A PERIODIC BASIS (AT A MINIMUM, EVERY 6
    HOURS), OR ON REQUEST FROM HQ USAF, DATA IS
    TRANSMITTED TO THE AIR STAFF LEVEL.

Figure 4-2.   AFIRMS MAJCOM Information Flow

4.3.1 Inputs.

a. The following input data is provided to the HQ USAFE subsystem:

    (1)   Tasking Data

    (2)   Munitions Status

    (3)   Fuels Status

    (4)   Base and Unit Status

    (5)   Aircrew Status

    (6)   Aircraft Status

    (7)   Major Base Facility Status

    (8)   Communications Support Status

    (9)   Transportation Support Status

    (10)   Maintenance Support Status

    (11)   Aerial Port and Airfield Status

Note: This data is input by HQ USAFE for exercise purposes, and also for units unable to report this data electronically, e.g., deployed units, communications links down or inoperative for various reasons, etc.

b. Input Records. Input record nomenclature, source, expected volume, frequency, priority, degree of sensitivity and requirement for timeliness are described in the AFIRMS Product Descriptions Document. Interface specifications corresponding to input record requirements are provided in Table 3-5 of this subsystem specification. The transaction header interface specification detailed in Appendix A contains information to discriminate between input records and input data element transactions.

c. Input Data Elements. Data elements for each input record type are described in the AFIRMS Database Specifications and the Data Requirements Document. Interface specifications corresponding to input data element requirements are provided in Table 3-5 and Appendix B of this subsystem specification. The transaction header interface specification detailed in Appendix A contains information to discriminate between input records and input data element transactions.

4.3.2 Outputs. Operational AFIRMS outputs include reports and graphic readiness measurement displays as follows:

a. Output Reports. All AFIRMS output reports can be displayed on the user's terminal or printed as hardcopy. There are no requirements for preprinted forms for generation of hardcopies.

SOFTech

Table 4-1 provides information concerning the format, complexity, security classification, and estimated daily volume and frequency of AFIRMS output reports. For response times of these AFIRMS output reports, please reference Section 2.2.3 of this subsystem specification, in which AFIRMS query response times are provided for varying degrees of query complexity.

Table 4-2 details the primary and secondary functional area users of AFIRMS output reports. In addition, these outputs are fully described in the AFIRMS Product Description series. (Additional output report requirements for each MAJCOM will be reviewed during the in-depth analysis that precedes implementation at that site.)

b.   Output Data Elements. Output data elements are named in the AFIRMS HQ USAFE Database Specification and described in the AFIRMS Data Requirements Document; the corresponding interface specifications are provided in Appendix B of this subsystem specification.

SOFTECH

Table 4-1

AFIRMS OUTPUT REPORTS

Screen Title	Format	Estimated Daily Volume and Frequency	Complexity	Security Classification
Aircraft & Mission Tasking Details	Tabular	1 pg @1	Medium	U-TS*
Aircraft Spares Support Capability	Graphic	1 pg @20	Complex	U-TS*
Aircraft Tasking	Graphic	1 pg @12	Medium	U-TS*
Attrition Statistics	Tabular	2 pg @16	Simple	Secret
Attrition Trends	Graphic	1 pg @8	Simple	Secret
Base Fuels Capability	Graphic	1 pg @20	Medium	U-TS*
Base Status (Input)	Tabular	8 pg @16	Simple	U-S*
Base Status (Output)	Graphic	8 pg @16	Simple	U-S*
Capability Perspective	Graphic	1 pg @2	Complex	Secret
Communications Support Status	Graphic	8 pg @24	Simple	U-S*
Dollars to Readiness Associations	Tabular	3 pg @8	Simple	Unclass
Dollars to Readiness - Comparisons	Graphic	1 pg @8	Complex	U-S*
Dollars to Readiness - Resource Perspective	Graphic	1 pg @2	Complex	U-S*
Fuels Capability	Graphic	1 pg @20	Medium	U-TS*
Individual Resource Capability	Graphic	1 pg @12	Complex	U-TS*
Integrated Capability	Graphic	1 pg @12	Complex	U-TS*
MICAP Forecast	Tabular	8 pg @16	Medium	Unclass
Mission Area Tasking	Graphic	1 pg @4	Medium	Secret
Mission Profile Definition	Tabular	8 pg @16	Simple	U-S*
Mission Tasking	Graphic	1 pg @12	Medium	U-TS*
Munitions Capability	Graphic	1 pg @20	Medium	U-TS*
Munitions Status	Tabular	8 pg @48	Medium	U-S*
Munitions Substitution Sortie Capability	Graphic	1 pg @4	Complex	Secret*
Munitions Substitution Sortie Requirement	Graphic	1 pg @4	Complex	Secret*
OPlan/OPORD Associations	Tabular	3 pg @8	Simple	Unclass
Order Assignments	Tabular	8 pg @8	Simple	U-S*
Process Status	Tabular	3 pg @20	Simple	Unclass
Resource Reallocation	Graphic	1 pg @8	Simple	Secret
Resource Unit Price	Tabular	3 pg @4	Simple	Unclass
Status Map	Graphic	3 pg @20	Simple	U-S*
Unit Status (Input)	Tabular	8 pg @	Medium	U-S*
Unit Status (Output)	Tabular	8 pg @16	Medium	U-S*
War Mobilization Plan	Tabular	2 pg @4	Simple	Secret
Wing Flying Day	Tabular	3 pg @4	Simple	U-S*
Wing Operations Rates	Tabular	3 pg @4	Simple	U-S*
Wing Resource Summary	Tabular	20 pg @8	Medium	U-S*
Wing Resupply Schedule	Tabular	20 pg @4	Simple	U-S*

*Some classifications have a range, i.e., U-TS, meaning Unclassified through Top Secret. That range normally results from a variable tasking classification (e.g., some tasks are Unclassified, some are Confidential, some are Secret, etc.)

SOFTECH

Note 1: Depending on input parameters, some times will increase/decrease depending on the amount of data retrieved. For example, requesting Munitions Capability for 60 days doubles the amount of data and time over a 30 day parameter input and increases the data retrieval time.

Note 2: 1 pg @ 1 denotes that the average screen length (volume) is one page, and it is accessed once daily.

Table 4-2

AFIRMS OUTPUT REPORTS BY FUNCTIONAL AREA USERS

Screen Title (Implemented)	Primary User(s)	Supporting User(s)
Aircraft Tasking	BS, LRC	DOJN, DOX, XPX
Base Fuels Capability	LRC	LGSF
Base Status Map	Reports Cell	BS, LRC
Base Status (I/O)	Reports Cell	BS, ESRC, COMM, LRC,PRC
Base Status (Output)	ALCC, BS, LRC,	ESRC, COMM, PRC
Capability Perspective	DOCR	
Dollars to Readiness Associations	XPX	LGSF, LGSS, LGWR
Dollars to Readiness - Comparisons	XPX	DOJN, LGSF, LGSS, LGWR
Dollars to Readiness - Resource Perspective	XPX	DOJN, LGSF, LGSS, LGWR
Fuels Capability	LRC	LGSF
Individual Resource Capability	BS, LRC	XPX, DOX, DOJN, LGSF,LGSS, LGWR
Integrated Capability	BS, LRC	XPX, DOX, DOJN, LGSF, LGSS, LGWR
Munitions Capability	LRC	XPX, DOJN
Munitions Status	LRC	BS
Mission Profile Definition	DOX, DOJN	XPX
OPlan/OPORD Associations	BS, XPX, DOX	DOJN
Order Assignments	BS, DOJN	XPX
Process Status	BS, LRC, XPX	
Resource Reallocation	LRC	
Resource Unit Price	XPX	LGSF, LGSS, LGWR
Resupply Schedule	LRC, LGX, BS	XPX
Unit Staus (Output)	BS, LRC, ALCC	
Unit Status (I/O)	Reports Cell	BS, LRC, ALCC, ESRC, COMM
War Mobilization Plan	DOX, DOJN, XPX	
Wing Flying Day	BS, DOJN	DOX, XPX
Wing Operations Rates	BS, LRC	DOX, LGX
Wing Resource Summary (O)	LRC	
Wing Resource Summary (I/O)	LRC	
Base/Unit Status Rollup	DOCR	
Resource Rollup	DOCR	
Run $-Readiness	XPX	
Run SGM	BS, XPX, DOX, DOJN, LRC	
Transmit Base Status	DOCR Reports Cell	
Transmit Unit Status	DOCR Reports Cell	
Transmit Resource Status	DOCR Reports Cell	

Table 4-2

AFIRMS OUTPUT REPORTS BY FUNCTIONAL AREA USER (Continued)

Screen Title (Unimplemented)	Primary User(s)	Supporting User(s)
Aircraft Spares Support Capability	LRC	LGSS
Attrition Statistics	PRC	BS
Attrition Trends	PRC	BS
Communications Support Status	COMM	Reports Cell
Fuel Status Map	LRC	ALCC, BS
Individual Resource Capability	XPX	LGSF, LGSS, LGWR
MICAP Forecast	LRC	LGSS
Mission Area Tasking	DOJN, XPX	
Mission & Aircraft Tasking Detail Summary	DOJN, DOX, XPX	BS, LRC
Mission Tasking	DOX, XPX, DOJN	BS
Munitions Substitution Sortie Capability	XPX, DOJN	LRC
Munitions Substitution Sortie Requirement	XPX, DOJN	LRC

ABBREVIATIONS/ACRONYMS/AIR FORCE CODES

ALCC	-	Airlift Control Center
BS	-	Battle Staff
COMM	-	Communications Readiness Center
DOCR	-	Command and Control Reports Division
DOJN	-	Combat Employment Capability Division
DOX	-	Operations Plans (Contingency/Exercise/Special Plans)
ESRC	-	Engineering and Services Readiness Center
LGSF	-	Energy Management
LGSS	-	Supply Management
LGWR	-	Munitions Requirements Division
LGX	-	Logistics Plans
LRC	-	Logistics Readiness Center
PRC	-	Personnel Readiness Center
XPX	-	Operations Plans

4.3.3 Database Description. For detailed AFIRMS database requirements, refer to the AFIRMS HQ USAFE Database Specification.

a. Database Identification. The label by which the HQ USAFE database is uniquely identified is "HQUSAFEDB." The HQ USAFE subsystem maintains databases as follows:

(1) Real: This database contains peacetime and crisis tasking, and other day-to-day operational data.

(2) What If: This physical database is comprised of three types of logical databases:

(a) Exercise - This database contains data which provides a simulation of an actual crisis.

(b) Ad-Hoc What If - This database contains data which provides a simulation of a hypothetical crisis or situation.

(c) Historical - This database contains data which provides a historical view of the real, exercise, or ad-hoc what if databases.

b. Storage. The master file(s) containing the HQ USAFE database are stored on-line on mass-storage disk devices and off-line on magnetic tape and formatted floppy/microfloppy disk.

c. Database Query Capabilities. The design of the AFIRMS database supports the requirements for an interactive query capability accessing current and/or what-if data for the above-named databases. Historical data resides primarily on off-line media and is copied to on-line media on an "as-needed" basis.

(1) Ad-Hoc Querying. Selected users may execute ad hoc queries against any on-line databases to which they are permitted access. Ad hoc querying is constrained by AFIRMS security and control requirements. This capability is limited to databases located at the functional area and the central location within a site. Controls within the DBMS and security software are used to limit access to both the functional area and central database on a user-by-user basis.

Ad hoc query access is provided by the AFIRMS executive. The user has the ability to interactively query the database via an "English-like" AFIRMS query utility. The user does not have the ability to update any data while in this mode. Ad hoc queries are limited to current or crisis mode data only. When data is requested, if it is not present in the local functional area database, the request is transmitted to the central node. The request is then processed at the central node and the results returned to the requesting functional area for display. There is no capability for ad-hoc querying across sites within AFIRMS.

SOFTECH

(2)   What-If Capability. A what-if capability exists in AFIRMS to enable certain users to input hypothetical tasking, resource, or operations scenarios to better predict future readiness capability. The data is input into the local database through a highly structured AFIRMS environment. The what-if capability of AFIRMS directly affects the amount of data redundancy necessary at each site and, accordingly, the amount of physical storage capacity necessary to handle it. What-if data storage needs vary according to the level in the command structure and the functional users' what-if exercise needs.

d.   Database Backup, Restoration, and Archiving. Backup of the database to off-line media occurs on a daily, weekly, monthly, and yearly basis; each backup is maintained for a different length of time:

(1)   Daily Database Backups. Daily backups are maintained for five working days.

(2)   Weekly Database Backups. Weekly backups are maintained for five weeks.

(3)   Monthly Database Backups. Monthly backups are maintained for 12 months.

(4)   Yearly Database Backups. Yearly backups are maintained for five years.

Restoration occurs in the event that data in the database has been lost or damaged. Whenever a transaction occurs in the local database, it will be logged to a journal file for use in the event restoration is needed. Restoration consists of reloading the latest copy of the database from off-line media, if necessary, and applying the journal log file to it.

Archiving of data to tape or disk is accomplished as required by AFIRMS users.

e.   Database Size. It is estimated that the size of all the files contained in the HQ USAFE database is a total of approximately 74 megabytes.

f.   Database Elements. AFIRMS HQ USAFE database elements are described in the AFIRMS HQ USAFE Database Specification and Data Requirements Document.

4.4 Program Description. This subsystem specification is to contain, as annexes, C-level program specifications which detail specific requirements for the subsystem functional products. The HQ USAFE subsystem consists of the following programs in addition to systems software:

Screen/Process Title

Aircraft & Mission Tasking Details
Aircraft Spares Support Capability
Aircraft Tasking
Attrition Statistics

SOFTECH

Attrition Trends
Base Fuels Capability
Base Status (Input)
Base Status (Output)
Base Status Report
Base/Unit Status Rollup
Capability Perspective
Communications Support Status
Dollars to Readiness Associations
Dollars to Readiness - Comparisons
Dollars to Readiness - Resource Perspective
Flying Schedule
Fuels Capability
Individual Resource Capability
Integrated Capability
MICAP Forecast
Mission Area Tasking
Mission Profile Definition
Mission Tasking
Munitions Capability
Munitions Capability
Munitions Status
Munitions Substitution Sortie Capability
Munitions Substitution Sortie Requirement
OPlan/OPORD Associations
Order Assignments
Post Base Status
Post Resource Updates
Post Unit Status
Process Status
Resource Reallocation
Resource Status Rollup
Resource Unit Price
Run Dollars to Readiness Model
Run Sortie Generation Model (SGM)
SGM Associations
Status Map
Transmit Base Status
Transmit Resource Status
Transmit Unit Status
Unit Status (Input)
Unit Status (Output)
War Mobilization Plan
Wing Flying Day
Wing Operations Rates
Wing Resupply Schedule

For detailed descriptions of these products, refer to the AFIRMS Product Descriptions Index and Document.

SOFTECH

APPENDIX A. INTRASITE TRANSACTION HEADER

Field Name	Field Description

TRANS_ID
a. Transaction identifier.
b. Each terminal has its own IDs.
c. The legal values are 1-->65535. After 65535, it reverts back to 1.

TRANS_MSG_LEN
a. Transaction message length.
b. The length is the sum of the transaction header plus data length.
c. The legal values are 85-->8192.

REQ_REP_FLAG
a. Request/Reply flag.
b. User interactive display software always sends requests. The host always sends replies in response to the request as long as the transaction was not submitted as a batch job. The host occasionally sends unsolicited requests to the CGC (i.e., update messages). It does not expect a reply.
c. The legal values are "Q" for request and "P" for reply.

JOB_TYPE
a. Interactive/Batch/Network flag.
b. All jobs must run interactively if they expect a product screen display. Otherwise, they can be run as batch. Note: batch jobs never send back replies. Their status can be monitored through the batch monitor screen.
c. The legal values are "I" for interactive, "B" for batch, and "N" for network.

SRC_NODE_ID
a. Source node ID.
b. This is the node ID of the requestor.

SRC_TERM_ID
a. Source terminal ID.
b. This is the terminal ID of the requestor.
c. The legal values are local site dependent. Note: the value 1111 is reserved for host generated transactions (i.e., unsolicated update messages).

SRC_USER_NAME
a. Source username.
b. This is the username of the requestor.
c. The legal values are site dependent. They must match the username used for logging into the host.

DST_NODE_ID
a. Destination node ID.
b. This field is filled in by a transaction router. It is the same as the SRC_NODE_ID for the local requests that require a reply. In general, it is always the node ID of where the transaction is destined. It differs from the SRC_NODE_ID only for network messages.

SOFTECH

Field Name	Field Description

DST_TERM_ID
a. Destination terminal ID.
b. This field is filled in by a transaction router. It is the same as the SRC_TERM_ID for the requests that require a reply. In general, it is the terminal ID of where the transaction is destined. It differs only for network messages.
c. The legal values are remote site dependent.

DST_USER_NAME
a. Destination username.
b. This field is filled in by a transaction router. It is the same as the SRC_USER_NAME for the requests that require a reply. In general, it is always the username of where the transaction is destined.
c. The legal values are site dependent. They must match the username used for logging into the host for local transactions. For network, transactions, the username "*ROLLUP*" is reserved.

EXP_DAT_TIM
a. Transaction expiration date/time.
b. There are four subfields:
   1. Expiration year
      b. The legal values are $0 -- > 99$.
   2. Expiration day
      b. The legal values are $1 -- > 366$. Note: 366 is only valid for leap years.
   3. Expiration hour
      b. The legal values are $0 -- > 23$.
   4. Expiration minute
      b. The legal values are $0 -- > 59$.

MOD_REQ_ID
a. Module request ID.
b. This field is looked at only by the transaction routing mechanism to determine whether the transaction is destined for the database server or somewhere else.
c. The legal values are $1 --> 2$. Their meanings are as follows:
   1 = forward transaction to the database router
   2 = AFIRMS service request

FUNC_REQ_ID
a. Function request ID.
b. This field is looked at by the transaction routing mechanism only when MOD_REQ_ID = 2. It signifies what AFIRMS service to perform. Currently, the only service is to log off the user.
c. The legal values are $1 -- > 10$. Their meanings (when MOD_REQ ID=1) are as follows:
   1 = organize records (send transaction #2)
   2 = update record
   3 = insert record
   4 = delete record
   5 = logoff Database
   6 = edit info (send transaction #1)
   7 = insert continuation record
   8 = delete continuation record
   9 = log invalid batch job
   10 = transmit rollup status

SOFTech

Field Name	Field Description

Field Name | **Field Description**

MSG_PRIO
a. Message priority.
b. This field is used by the process controller to put each transaction it receives into the appropriate priority mailbox (i.e., queue).
   (1) The transaction router uses it as a consistency check to make sure the transaction is sent to the right mailbox, and
   (2) to set the priority of the Database server that will be processing that transaction, and
   (3) The Database server uses it to determine to which priority mailbox it should forward replies.
c. The legal values are 1 for low priority, 5 for medium priority, and 9 for high priority.

MSG_STAT
a. Message status.
b. This field is used for returning the status of a user's request.
c. The legal values are any 32-bit number. Note: MSG_STAT must be initially set to 0 in the original request.

MSG_SEG_CUR
a. Message number current.
b. This field is the current message segment number. It is always 1 unless there is a multi-part transaction (i.e., one that must split because it is too large for a single buffer).
c. The legal values are 1 -->255.

MSG_SEG_TOT
a. Message number total.
b. The legal values are 1 -->255.

SOFTECH

APPENDIX B

B.1 Data Interface Specification (GENEDIT)   Date: 31-May-1985

Screen Classification	Current Time-of-day DTG	Oldest screen value DTG	Latest screen value DTG	As-of-status DTG flag

┌── Repeats < # of subtitles > times

As-of-status DTG	# of subtitles

Subtitle

# of records

┌── Repeats < # of records > times

┌── Repeats for all fields in a record

# of continuation lines

Field

┌── Repeats < # of continuation lines > times
  ┌── Repeats for all fields in a continuation line
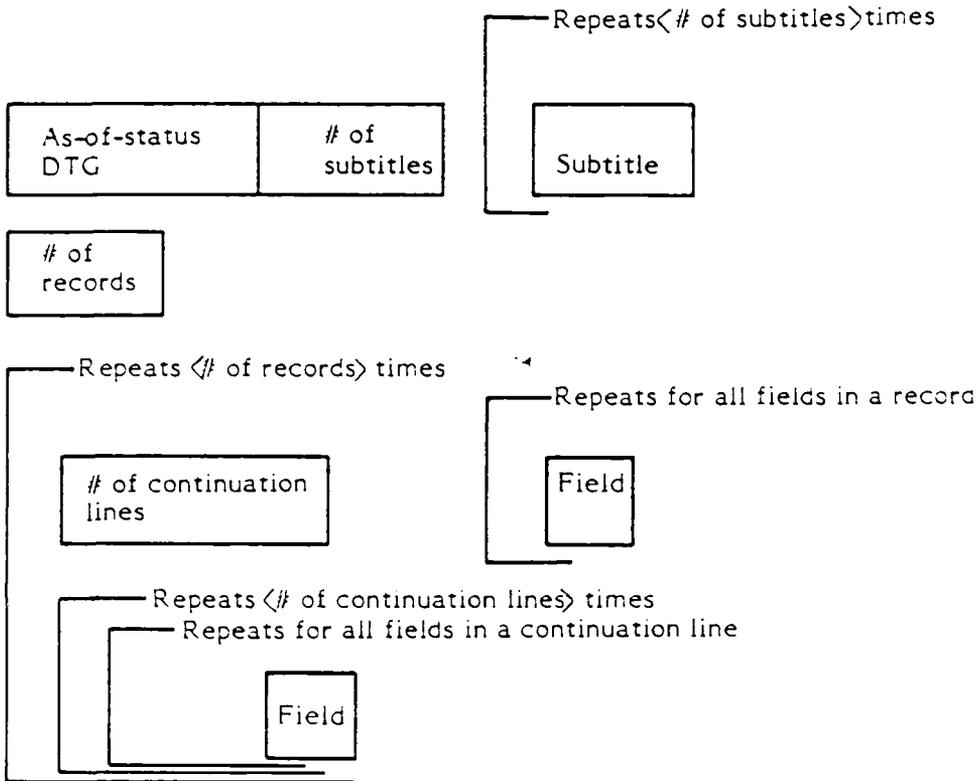
Field

Field Name	Field Length
Screen classification	1
Current time-of-day DTG	16
Oldest screen value DTG	16
Latest screen value DTG	16
As-of-status DTG flag	1
As-of-status DTG	?
# of subtitles	2
Subtitle	?
# of records	3
# of continuation lines	2
Length of field	2
Field	?

Note: (1) Each field whose length is "?", represents a variable length field. The fields are preceded with a 2-byte length descriptor.

(2) The number of fields in a record or a continuation line is screen specific.

SOFTECH

B.2 Data Interface Specification (CAPABILITY)   Date: 31-May-1985
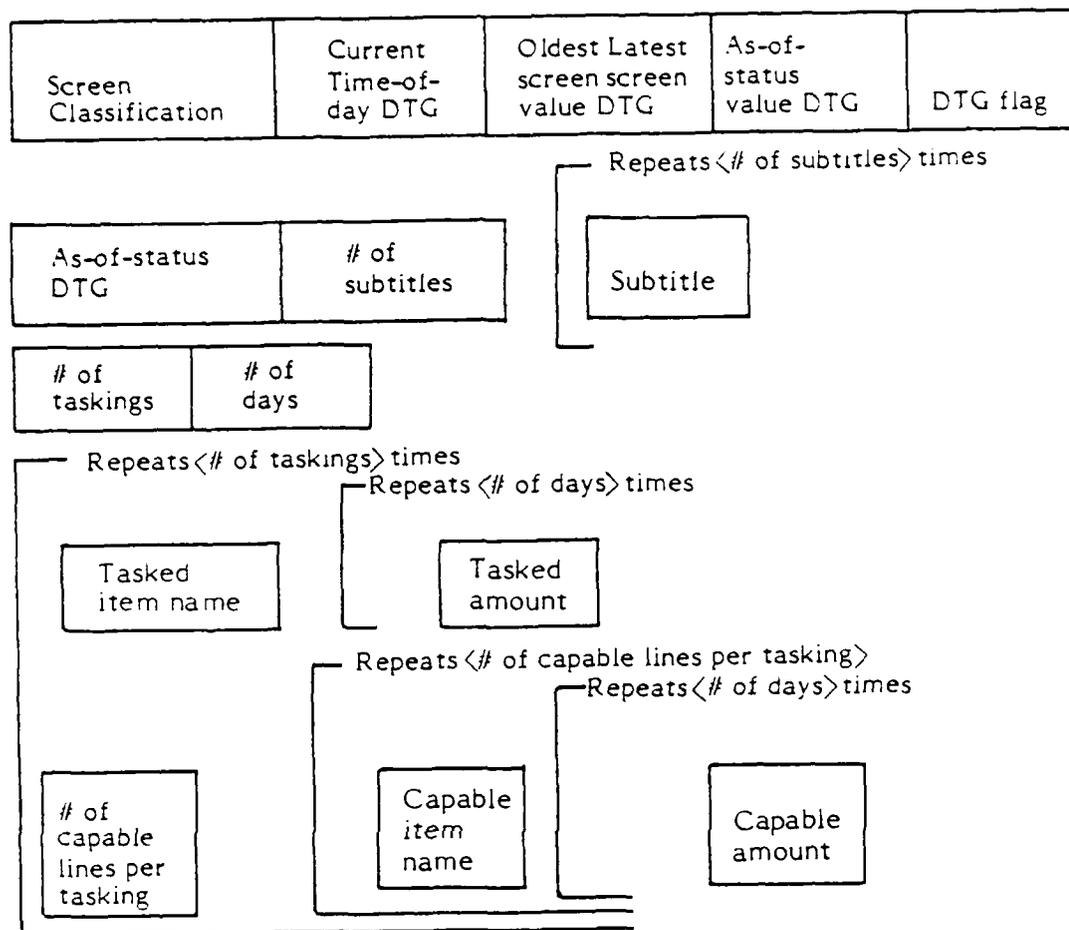
Screen Classification	Current Time-of-day DTG	Oldest Latest screen screen value DTG	As-of-status value DTG	DTG flag

Repeats ⟨# of subtitles⟩ times

As-of-status DTG	# of subtitles

Subtitle

# of taskings	# of days

Repeats ⟨# of taskings⟩ times

Repeats ⟨# of days⟩ times

Tasked item name

Tasked amount

Repeats ⟨# of capable lines per tasking⟩

Repeats ⟨# of days⟩ times

# of capable lines per tasking

Capable item name

Capable amount

| Field Name	Field Length
Screen classification	1
Current time-of-day DTG	16
Oldest screen value DTG	16
Latest screen value DTG	16
As-of-status DTG flag	1
As-of-status DTG	?
# of subtitles	2
Subtitle	?
# of taskings	3
# of days	3
Tasked item name	?
Tasked amount	?
# of capable lines per tasking	?
Capable item name	?
Capable amount	?

Note: Each field whose length is "?", represents a variable length field. The fields are preceded with a 2-byte length descriptor.

SOFTECH

34651   B-2

The AREA-C buffer layout for MAP SCREENS is as follows:

Screen Classification	Current Time-of-day DTG	Oldest screen value DTG	Latest screen value DTG	As-of-status DTG flag

Repeats⟨# of subtitles⟩times

As-of-status DTG	# of subtitles	Subtitle

Repeats⟨# of records⟩times
Repeats for the # of fields in this screen's record.
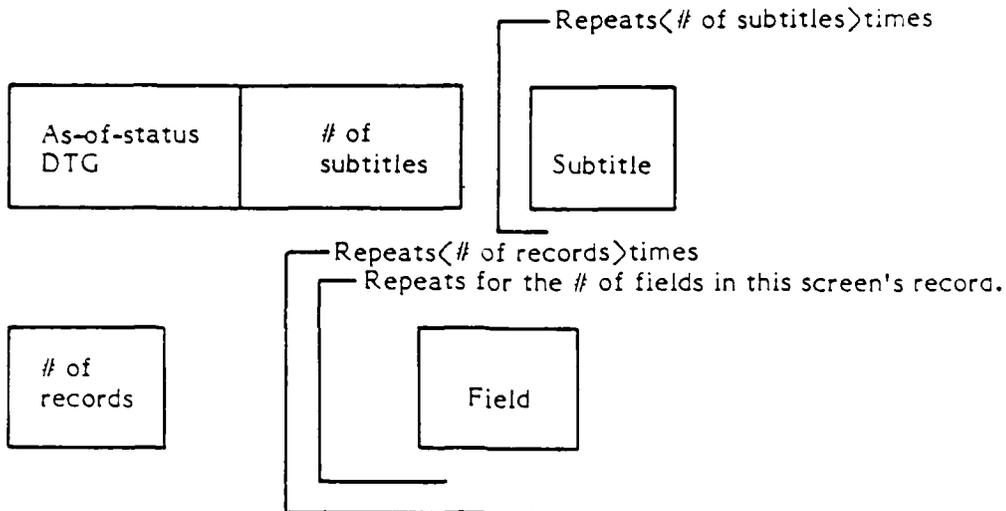
# of records	Field

Field Name	Field Length
Screen classification	1
Current time-of-day DTG	16
Oldest screen value DTG	16
Latest screen value DTG	16
As-of-status DTG flag	1
As-of-status DTG	?
# of subtitles	2
Length of subtitles	2
Subtitle	?
# of records	3
Length of field	2
Field	?

Note: (1) Each field whose length is "?", represents a variable length field. The fields are preceded with a 2-byte length descriptor.
   (2) The number of fields in a record is screen specific.

SOFTECH

The AREA-C buffer layout for AVAILABILITY FORECAST SCREENS is as follows:

Expenditure rate	Historical average flag	# of historical days avg.	Critical level	# of forecast days	# of offbase locations

Repeats < # of historical days plot > times
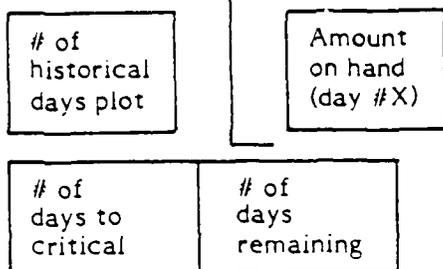
# of historical days plot		Amount on hand (day #X)

# of days to critical	# of days remaining

Field Name	Field Length
Screen classification	1
Current time-of-day DTG	16
Oldest screen value DTG	16
Latest screen value DTG	16
As-of-status DTG flag	1
As-of-status DTG	?
# of subtitles	2
Subtitle	?
Expenditure rate	?
Historical average flag	1
# of historical days avg.	3
Critical level	?
# of forecast days	3
# of offbase locations	1
# of historical days plot	3
Amount on-hand (day #1-n)	?
# of days to critical	3
# of days remaining	3

Note: Each field whose length is "?", represents a variable length field. These fields are preceded by a 2-byte length descriptor field.

SOFTECH

The AREA-C buffer layout for BAR CHART WITH LINE SCREENS is as follows:

Screen classification	Current Time-of-day DTG	Oldest screen value DTG	Latest screen value DTG	Task ID DTF flag
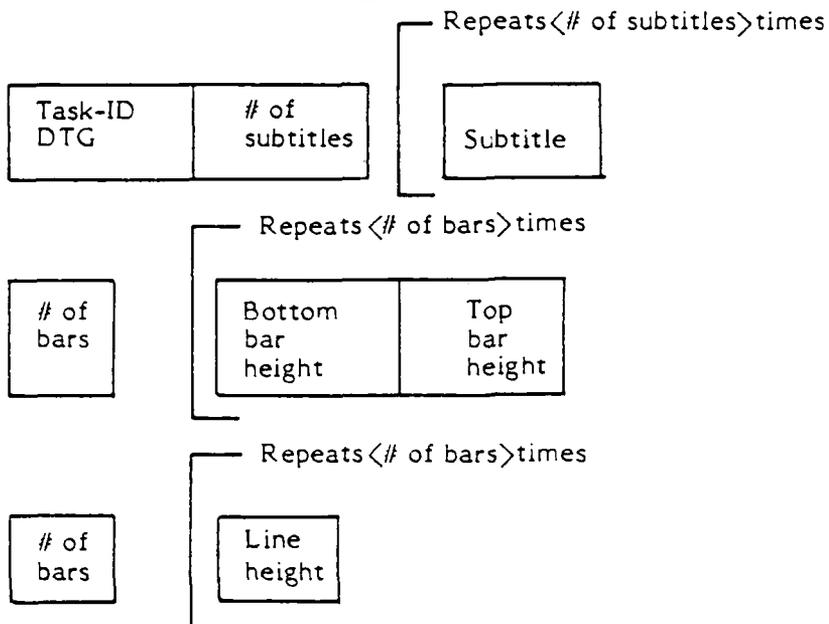
Repeats ⟨# of subtitles⟩ times

Task-ID DTG	# of subtitles		Subtitle

Repeats ⟨# of bars⟩ times

# of bars		Bottom bar height	Top bar height

Repeats ⟨# of bars⟩ times

# of bars		Line height

Field Name	Field Length
Screen classification	1
Current time-of-day DTG	16
Oldest screen value DTG	16
Latest screen value DTG	16
Task-ID DTG flag	1
Task-ID DTG	?
# of subtitles	2
Subtitle	?
# of bars	3
Bottom bar height	?
Top bar height	?
Line height	?

Note: Each field whose length is "?", represents a variable length field. Only these fields shall be preceded by a 2-byte length descriptor field.

SOFTech

B.6 Data Interface Specification (BAR CHART)   Date: 31-May-1984

The AREA-C buffer layout for BAR CHART SCREENS is as follows:

```
┌────────┐
│ # of   │
│ bars   │
└────────┘
```

Repeats ⟨# of bars⟩ times

Label for bar	Front bar value	Rear bar value	Front bar color	Rear bar color
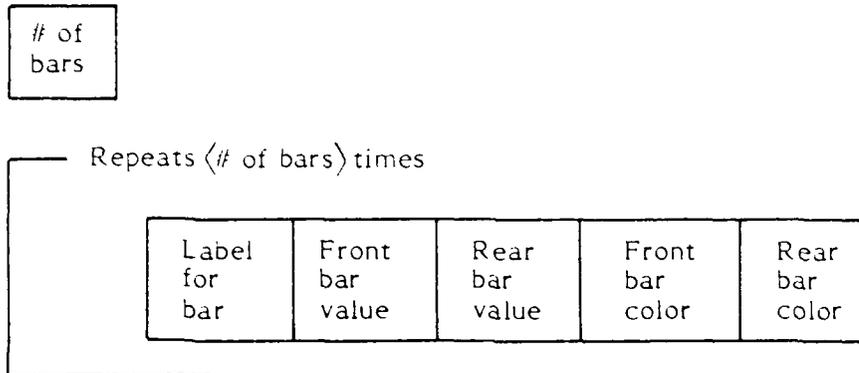
Field Name	Field Length
# of bars	3
Label for bar	?
Front bar value	?
Rear bar value	?
Front bar color	3
Rear bar color	3

Note: Each field whose length is "?", represents a variable length field. These fields are preceded by a 2-byte length descriptor field.

SOFTech

END

DTIC

8-86