AD-A285 571

USER MANUAL FOR THE AUTOMATED AIRDROP INFORMATION RETRIEVAL SYSTEM - HUMAN FACTORS DATABASE

By
Paula M. Poole*
Marcie S. Kronberg
Debra Meyers*

*GEO-CENTERS, Inc.
Newton Centre, MA 02159

September 1994

FINAL REPORT
January 1993 - February 1994

94-32340

DISCLAIMERS

The findings contained in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

Citation of trade names in this report does not constitute an official endorsement or approval of the use of such items.

DESTRUCTION NOTICE

For Classified Documents:

Follow the procedures in DoD 5200.22-M, Industrial Security Manual, Section II-19 or DoD 5200.1-R, Information Security Program Regulation, Chapter IX.

For Unclassified/Limited Distribution Documents:

Destroy by any method that prevents disclosure of contents or reconstruction of the document.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	Sep 94	Final Jan 93 - Feb 94

4. TITLE AND SUBTITLE
User Manual for the Automated Airdrop Information Retrieval System - Human Factors Database (AAIRS-HFD)

5. FUNDING NUMBERS
PE 612786
PR D283
TA AA
WU COO
C 90-D-0002
   93-D-0005

6. AUTHOR(S)
Paula M. Poole*, Marcie S. Kronberg, and Debra Meyers*

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Behavioral Sciences Division, Science & Technology Directorate, U.S. Army Natick Research, Development and Engineering Center   (ATTN: STRNC-YBH)
Natick, MA 01760-5020

8. PERFORMING ORGANIZATION REPORT NUMBER
NATICK/TR-94/033

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

*Affiliation with GEO-CENTERS, INC., Newton Centre, MA 02159

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

The Automated Airdrop Information Retrieval System - Human Factors Database (AAIRS-HFD) is a computerized system for the management of literature regarding human factors issues as related to airdrop systems/components.   Two major categories define the focus and content of the database: (1) Human Factors Issues major topics include: Airdrop Delivery Method; Jump Mission Characteristics; Airdrop Tasks & Procedures; Hazards & Emergencies; Aerospace Biomechanical Factors; Aerospace Physiological/Medical Factors; Psychological Factors; Personnel Attributes; Load/Cargo Attributes; and Other Airdrop Human Factors Issues and (2) Airdrop Systems/Components major topics include: Static Line Personnel Parachute Assembly; Military Free Fall Personnel Parachute Assembly; Tandem Personnel Parachute System; Individual Equipment & Weapons Containers; Container Release Assemblies; Individual Protective/Life Support Equipment; Cargo/Resupply Parachute Assembly; Free Fall Cargo/Resupply Parachute Assemblies; Cargo/Resupply Container Systems; Cargo/Resupply Platform Systems; Tools & Equipment for Rigging; Tools & Equipment for Derigging; Aircraft Components; Training Devices; and Other Airdrop Systems/Components. System capabilities include: text and keyword searches; on-screen viewing; printed reports; maintenance of source and keyword databases; and automated backups.   This report contains detailed information regarding the operation of AAIRS-HFD's search modules including instructions for installing the system, conducting keyword and text searches, viewing results on-screen and generating printed output.

14. SUBJECT TERMS
HUMAN FACTORS ENGINEERING   PARACHUTES   PSYCHOPHYSIOLOGY   CARGO
AIRDROP OPERATIONS   PARACHUTISTS   DATABASE SYSTEMS
PARACHUTE JUMPING   AIRBORNE   USER MANUAL
PARACHUTE DESCENT   MALFUNCTIONS   WOUNDS AND INJURIES

15. NUMBER OF PAGES
119

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	SAR

User Manual for the
Automated Airdrop Information Retrieval System -
Human Factors Database
(AAIRS-HFD)

iii

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

FIGURES

FIGURES (cont.)

TABLES

PREFACE

User Manual for the

Automated Airdrop Information Retrieval System -

Human Factors Database (AAIRS-HFD)

SECTION 1. INTRODUCTION

1.1 Background. Employment of parachutes by the military has given rise to an area of scientific investigation which examines a wide range of human performance characteristics of airborne activities. New capabilities of high performance aircraft have expanded the operational requirements placed on military airborne personnel. This has increased the importance of understanding how human factors can affect the performance of an aerial delivery system. Traditional human factors standards and guidelines used during the materiel design process are not applicable to a majority of these systems. It has become apparent that human factors guidance unique to the design of advanced airdrop systems needs to be established.

Government, industry, academic organizations, and private interest groups have conducted research and generated a diverse body of data related to human factors in airdrop. To a large degree, however, these data have not been documented within the regular channels of literature accession, making it difficult to locate important information critical to the design of airdrop systems. Consequently, the field of human performance in airdrop lacks both definition and structure.

This report describes the steps that have been taken to begin building a framework for study within this field. Specifically, the report presents the Automated Airdrop Information Retrieval System - Human Factors Database (AAIRS-HFD), a Human Factors Issues Taxonomy and an Airdrop Systems/Components Taxonomy. The AAIRS-HFD and the taxonomies are designed to meet the challenges faced by scientists, engineers and other users in assembling information on a given topic concerning human factors issues in airdrop operations or system design. They are also intended to be of assistance in familiarizing new staff members and researchers with this field of study.

1

1.2 Focus of the Database and Taxonomies. The investigation of airdrop human performance factors involves the application of many technical specialties. Indeed, human performance/airdrop-related information can be found in the following: scientific journals; academic reports; military technical reports; other government agencies' reports; foreign government reports; commercial periodicals, newspapers and magazines; researchers' individual collections; subject matter expert/user feedback; observational data from field exercises; video recordings; and anecdotal stories. Because there is such a broad array of information related to the topic, it was decided that an automated database should be established to help in the organization and accession of literature that is relevant to a number of technical disciplines within the field of airdrop.

The objective of the database is to provide users with information regarding airdrop human factors issues and airdrop systems/components. To accomplish this objective, the database was designed to allow users to conduct two types of keyword searches: A Human Factors Issues Search and An Airdrop Systems/Components Search. The keyword searches would require lists of keywords organized by major topics. Thus, a Human Factors Issues Taxonomy and an Airdrop Systems/Components Taxonomy were created.

The taxonomies consist of information presented in a list-like manner, with hierarchical organization where applicable (see Appendix A). The establishment of the taxonomies has been an evolutionary process with two objectives: to provide the structural framework for the keyword searches in AAIRS-HFD and to act as a reference tool for airdrop professionals applying human factors techniques to the design and development of airdrop systems/components. The taxonomies began as two collections of terms and phrases representing a broad array of airdrop human factors issues and airdrop systems/components. Based on the knowledge of many human factors and airdrop experts, they were organized, classified and refined to workable lists. An ongoing, comprehensive review of airdrop literature has also helped to further refine the taxonomies.

2

The structure of the taxonomies is directly related to the menu structure of AAIRS-HFD. Firstly, each major category of information is made accessible in the database via two independent keyword searches: a Human Factors Issues Search and an Airdrop Systems/Components Search. Likewise, there are two separate taxonomies. Each type of search and taxonomy is organized by major topics. Major topics are accessible via menus in the database. In the taxonomies, major topics are numbered and appear in bolded text that is flush with the left margin (see Figure 1). Under each major topic there are keywords. The database offers keywords via menus for the purpose of assigning them to literature or selecting them for keyword search criteria. In the taxonomies, keywords fall under major topics and appear in regular upper and lower case text that is flush with the left margin (see Figure 1). Some of the keywords have what are referred to as "descriptions". Keyword descriptions consist of additional terms that help further define and classify keywords for the database user. The descriptions may include several "tiers" of indents, with each successive indent being more specific. Keyword descriptions in the database are presented in text windows during the selection of search keywords. In the taxonomies, keyword descriptions appear in lower case text that is indented under respective keywords (see Figure 1).

A. Taxonomy of Human Factors Issues

1. Airdrop Delivery Method ◄—————— *Major Topic*

Military Free-Fall (MFF) Parachuting ◄—————— *Keyword*
    high altitude low opening (HALO) ◄—┐
    high altitude high opening (HAHO) ◄—┘ —— *Keyword Description*
Static Line Parachuting
    conventional
    nonconventional
Personnel Non-Aerodynamic Decelerator
    fast rope
    rappelling
Non-Intentional Parachuting
    ejection seats
    crew capsules

Figure 1. Sample page from Human Factors Issues Taxonomy.

3

More detail on the menu structure of AAIRS-HFD can be found in Section 4, Processing Reference Guide. The Human Factors Issues Taxonomy and the Airdrop Systems/Components Taxonomy are presented in their entirety in Appendix A. Major Topics for each area are presented below.

Human Factors Issues Major Topics:
- Airdrop Delivery Method
- Jump Mission Characteristics
- Airdrop Tasks & Procedures
- Personnel Parachuting Malfunctions
- Cargo/Resupply Airdrop Malfunctions
- Aerospace Biomechanical Factors
- Aerospace Physiological/Medical Factors
- Injuries/Illnesses
- Psychological Factors
- Personnel Attributes
- Load/Cargo Attributes
- Other Airdrop Human Factors Issues

Airdrop Systems/Components Major Topics:
- Static Line Personnel Parachute Assembly
- Military Free-Fall Personnel Parachute Assembly
- Tandem Personnel Parachute System
- Individual Equipment & Weapons Containers
- Container Release Assemblies
- Individual Protective/Life Support Equipment
- Cargo/Resupply Parachute Assembly
- Cargo/Resupply Container Systems
- Cargo/Resupply Platform Systems
- Tools & Equipment for Rigging
- Tools & Equipment for Derigging
- Aircraft Components
- Training Devices
- Other Airdrop Systems/Components

1.3 General Information on Operation and Administration.

1.3.1 Purpose of the System. The purpose of Natick's AAIRS-HFD is to manage information related to Airdrop Human Factors Issues and Airdrop Systems/Components. The system offers automated access to this information via keyword and text searches. Depending on the user's requirements, the database is capable of displaying information on the screen or generating output in the form of a reference or a detailed report.

1.3.2 Additional Documentation. The following documents may be necessary for the operation of AAIRS-HFD: manual(s) for host PC and printer and manual(s) for host operating system (DOS). Under normal conditions, however, consulting these documents should not be required.

1.3.3 Maintenance of Data. It is projected that the contents of AAIRS-HFD will be maintained by personnel in the Behavioral Sciences Division of the Science and Technology Directorate. A manual is available for maintaining the database (Poole, Kronberg, & Meyers, 1994). Decisions regarding appropriate subject matter for inclusion in the database are made by those who have established, and subsequently, by those who maintain the database. In addition, changes in the state of the art or the pursuit of new lines of research in the field of human factors related to airdrop operations may affect the composition of the database. Knowledge of a password is required to access the maintenance module; therefore, individual users will not be able to modify or augment the database. However, suggestions are welcome and a form for such comments is available in Appendix B.

1.3.4 The User Manual. The purpose of this manual is to provide users with the information necessary to effectively operate the keyword search, text search and exit modules of the database system effectively.

5

1.3.5 Security. The literature contained in AAIRS-HFD is unclassified. The inclusion of classified documents is not permitted. A password is not necessary to operate the user module of the system that allows searches and generates output. However, a password is required to operate the maintenance module of the system that allows modification of existing records and appending of new records.

1.3.6 Availability of the Literature in the Database. Users outside of Natick and USARIEM may want to acquire documents summarized in the database. Those users should follow the usual procedures for acquiring such materials. Although the location of source is documented for each literature entry, the staffs of Natick and the Natick Technical Library cannot provide the literature summarized in Natick's AAIRS-HFD.

If an organization is registered with the Defense Technical Information Center (DTIC), members of the organization may obtain technical reports published by the Department of Defense (DoD) and DoD contractors by contacting:

> Defense Technical Information Center
> Cameron Station
> Alexandria, Virginia 22304-6145
> Commercial: (202) 274-7633
> DSN: 284-7633

Others interested in obtaining DoD technical reports should contact:

> U.S. Department of Commerce
> National Technical Information Service (NTIS)
> 5285 Port Royal Road
> Springfield, Virginia 22161
> Commercial: (703) 487-4650

To assist users in obtaining technical reports, the database contains, as part of the reference to such reports, the accession code, or "DTIC" number, used as an identifier by both DTIC and NTIS.

SECTION 2. SYSTEM SUMMARY

2.1 Overview.

2.1.1 Application Summary. A menu-driven user interface allows individuals who are interested in Airdrop Human Factors Issues and Airdrop Systems/Components to gain access to the contents of AAIRS-HFD. The contents of AAIRS-HFD is comprised of literature entries, referred to as records. Each record in AAIRS-HFD co   reference information, textual summaries and keywords. Users are offered two major types of search functions: keyword searches and text searches. After successfully conducting either type of search, the user is given a list of literature that meets the demands of the search specifications. The user can view the contents of each entry on the screen or generate printed output. The maintenance module of AAIRS-HFD allows authorized database maintenance personnel to control what information is stored in the database. The exit module allows user's to properly close the system. In addition, the exit module allows maintenance personnel to run a backup program that stores the updated system onto floppy diskettes.

2.1.1.1 Contents of Literature Entries. The contents of each literature entry or record includes reference-identifying information such as: title, subtitle, author(s), editor(s), volume number, page number(s), day, month(s), year, report number, DTIC/NTIS number, organization, journal, publisher, source location and source type. These pieces of information are called fields and are stored within the source database. Fields applicable to any one record are largely determined by what type of source the information came from. For example, the subtitle, report number, DTIC/NTIS number, editor(s), day and publisher fields would probably remain empty for a journal article.

7

In addition to reference fields, textual information including an overall summary and applicable comments are stored in memo fields for each literature entry. Human Factors Issues keywords and Airdrop Systems/Components keywords are stored in separate databases, but are associated with the source database through the use of relational databasing techniques.

2.1.1.2 Conducting a Keyword Search. There are two types of keyword searches offered: a "Human Factors Issues Search" and an "Airdrop Systems/Components Search". Each of these searches allows the user to choose one or more major topics of interest involving either Human Factors Issues or Airdrop Systems/Components. Under each major topical area, the system offers the user a predefined list of applicable keywords. The user can choose up to six keywords from one or more major topics. Before conducting a search, the user connects their selected keywords with an "and" or an "or."

2.1.1.3 Conducting a Text Search. The "Text Search" allows the user to enter text in the form of a partial word, word, phrase, sentence, or several sentences. Text may be searched for in one or more of the following fields: title, subtitle, author(s), editor(s), year, ID/document #, organization, location of source, overall summary and comments.

2.1.1.4 On-screen Viewing. Once a keyword or text search has been conducted, the user is presented a list of titles that represent qualifying matches. The user may view a title that is currently highlighted in the list of matches. Viewing a title displays four screens of information, including all applicable reference information, textual summaries, Human Factors Issues keywords and Airdrop Systems/Components keywords assigned to that title. Fields containing lengthy text can be opened up for viewing; on-screen instructions for doing so are available.

8

2.1.1.5 Printed Output. The user may generate one or more printed reports. Each report consists of either a single title that is currently highlighted in the list of matches or all titles in the list of matches. Also, the user may generate either a reference report or a detailed report. The reference report contains reference information for the chosen literature, whereas the detailed report contains reference information as well as keywords and any applicable textual summaries and comments for the chosen literature.

2.1.1.6 System Maintenance. The maintenance module allows database maintenance personnel to edit existing literature entries and add new literature entries to AAIRS-HFD. In addition, maintenance personnel may add, edit and delete Human Factors Issues and Airdrop Systems/Components keywords and keyword descriptions from a series of keyword lists. As noted earlier, knowledge of a password is required to access this module.

2.1.1.7 General System Tree Diagrams. The main menu of AAIRS-HFD offers four options: Keyword Search, Text Search, Maintain System and Exit. Each of these options are displayed and briefly described in the tree diagrams appearing in Figures 2-5.

Keyword Search

Human Factors Issues

Enter up to 6 Search Keywords from the following Major Topics:

Airdrop Delivery Method
Jump Mission Characteristics
Airdrop Tasks & Procedures
Personnel Parachuting Malfunctions
Cargo/Resupply Airdrop Malfunctions
Aerospace Physiological/Medical Factors
Injuries/Illnesses
Psychological Factors
Personnel Attributes
Load/Cargo Attributes
Other Airdrop Human Factors Issues

Airdrop Systems/Components

Enter up to 6 Search Keywords from the following Major Topics:

Static Line Personnel Parachute Assembly
Military Free-Fall Personnel Parachute Assembly
Tandem Personnel Parachute System
Individual Equipment & Weapons Containers
Container Release Assemblies
Individual Protective/Life Support Equipment
Cargo/Resupply Parachute Assembly
Cargo/Resupply Container Systems
Cargo/Resupply Platform Systems
Tools & Equipment for Rigging
Tools & Equipment for Derigging
Aircraft Components
Training Devices
Other Airdrop Systems/Components

Display Keyword Choices — **Erase Keyword Choices** — **Conduct Search**

List of Matching Records

View Highlighted

Reference Information, Textual Summaries and Related Human Factors Issues and Airdrop Systems/Components

Return to Matches

Print Report

Scope of report, type of report and type of printer

Quit Search

Temporary files are deleted and control is sent to main menu

Figure 2. Keyword Search tree diagram.

Text Search

Enter Search Text in the following Database Fields:

Title/Subtitle
Author/Editor
Year
ID/Document #
Organization
Location of Source
Summary
Comments

Display User's Text — **Erase User's Text** — **Conduct Search**

List of Matching Records

View Highlighted

Reference Information, Textual Summaries and Related Human Factors Issues and Airdrop Systems/Components

Return to Matches

Print Report

Scope of report, type of report and type of printer

Quit Search

Temporary files are deleted and control is sent to main menu

Figure 3. Text Search tree diagram.

10

Figure 4. Maintain System tree diagram.

Figure 5. Exit tree diagram.

11

2.1.2 Controls. Personnel in the Behavioral Sciences Division of the Science and Technology Directorate are responsible for managing the system and providing supervisory controls.

2.2 System Environment.

2.2.1 Hardware Required. A 386 IBM compatible computer with a color monitor, a minimum of 3MB of memory and 3MB of hard disk space is necessary to run the system. A mouse can be used to run the system, but it is not necessary. (Hard disk requirements may increase as the database is further developed.) A printer is not required to use the system for conducting searches and viewing literature, but a printer is required if hard-copy reports are desired.

2.2.2 Software Required. DOS version 3.31 or higher is necessary to support the operation of AAIRS-HFD. DOS version 4.01 or higher, however, should be used by maintenance personnel due to the fact that files backed up with DOS version 4.01 are compatible with systems running on earlier versions of DOS, whereas files backed up with earlier versions of DOS cannot be successfully installed on systems running with DOS 4.01 or higher.

Specific requirements for DOS settings, such as files and buffers statements, are described in Appendix C. CONSULTING THIS APPENDIX SHOULD ONLY BE NECESSARY IF INSTALLATION IS REQUIRED. It should be noted that AAIRS-HFD is supported by the Distribution Kit for FoxPro (v 2.5) which is licensed by Microsoft Corp. FoxPro support files are embedded within the compiled file called "aairs.exe". A complete listing of files needed to run AAIRS-HFD and a complete listing of diskette contents are located in Appendix C.

2.3 Assistance and Problem Reporting. While using the system, assistance may be required or a problem may need to be reported. If the present report does not address the user's needs, the following guidelines should be of assistance.

A Suggestion and Comment Form is available in Appendix B of this manual. Users are encouraged to use these forms to voice suggestions and/or comment on any problems encountered while using the system. If the system is being used on a PC targeted as the AAIRS-HFD Workstation, completed forms may be left at the workstation. If the system has been loaded on any other PC, completed forms may be returned to personnel responsible for distributing the system software. Maintenance personnel are responsible for the management of such reported problems or suggestions.

SECTION 3. ACCESS TO THE SYSTEM

3.1 Use of the System.

3.1.1 Access Control. In order to protect the integrity of the database, the capability for the typical user to modify or supplement existing data is not available. The maintenance module of the system requires users to enter a password, the details of which are explained in the Maintenance Manual for AAIRS-HFD (Poole et al., 1994).

3.1.2 Installation. Under normal conditions, the database will be used on a PC where it has already been installed. Should software installation be necessary, instructions are located in Appendix C.

3.2 Initiating a Session. To begin a working session with Natick's AAIRS-HFD, the user must change to the directory in which the system has been installed, type *aairs*, and press ↵ (see Table 1 for instructions). The first screen welcomes the user to Natick's AAIRS-HFD (see Figure 6).

Table 1. Initiating a Session.

What To Type:	What Will Happen:
C:\>*cd \aairs* ↵	Changes to the directory where the system resides.
C:\aairs>*aairs* ↵	Executes start-up file for the system.

14
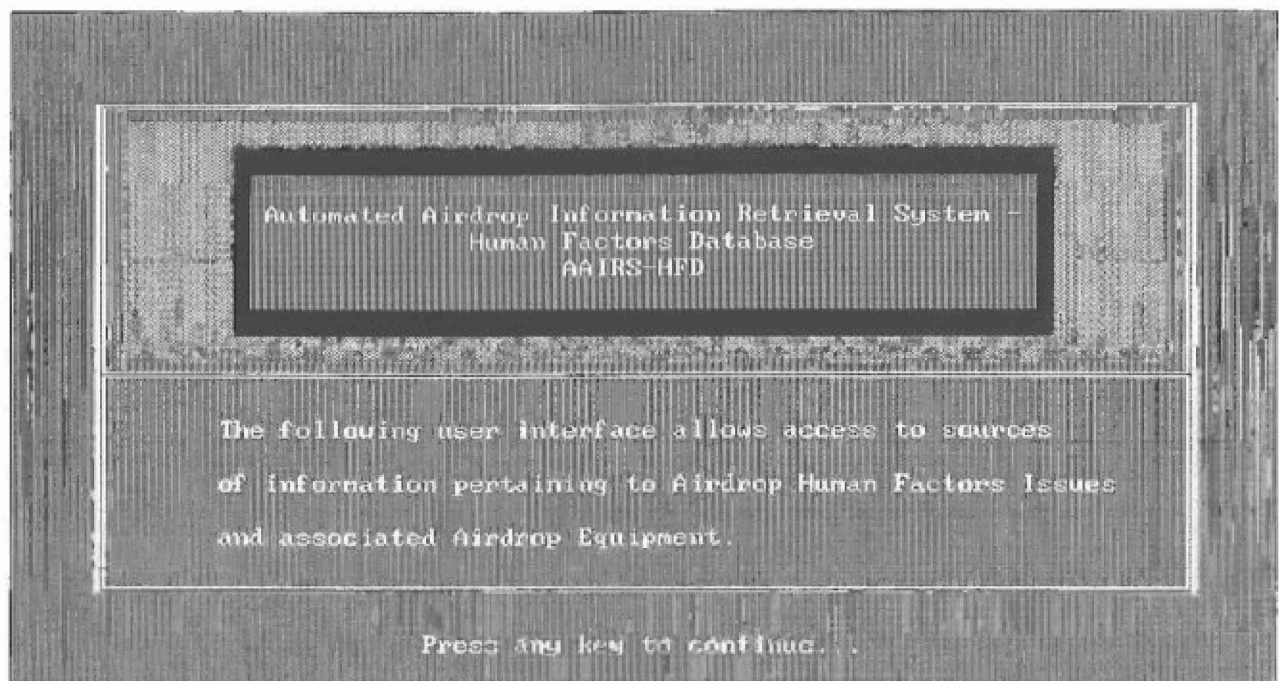
Figure 6. Welcoming screen for Natick's AAIRS-HFD.

Upon pressing any key, the system begins a working session with the main menu displayed and ready for use. Consult Section 4, Processing Reference Guide, for complete user operating instructions.

3.3 Stopping and Suspending Work. The proper way to interrupt use of the system is to exit from the main menu by using the "Exit" option. **REBOOTING OR POWERING DOWN THE COMPUTER SHOULD NOT BE USED AS METHODS OF EXITING THE SYSTEM.** These methods do not shut down the system properly; they leave temporary files that should be deleted in the system directory. If this happens, subsequent use of the system will generate error messages. A list of error messages and suggested corrective actions is presented in Appendix D.

SECTION 4. PROCESSING REFERENCE GUIDE

4.1 Capabilities. The main menu offers a "Keyword Search" option, a "Text Search" option, a "Maintain System" option, and an "Exit" option. Selection of the Keyword Search option offers two types of searches: a Human Factors Issues Keyword Search and an Airdrop Systems/Components Keyword Search. Keyword searches run independently of one another and of text searches. After conducting either a keyword or a text search, a list of matching literature titles is displayed with options to view references and/or summaries on the screen, generate reference and/or textual output to a printer, or quit the search. Selection of the maintenance option allows updates to the source database, the Human Factors Issues databases and the Airdrop Systems/Components databases. Selection of the exit option closes the system, offers a backup option and returns the user to DOS. As noted earlier, instructions for maintenance options can be found in the Maintenance Manual for AAIRS-HFD (Poole et al., 1994).

4.2 Conventions. AAIRS-HFD was designed to run on a PC with a color monitor. Operation with a monochrome monitor is possible, but not desirable due to lack of contrast while using the system's menus and windows. The main color of the system is blue with contrasting red, yellow, cyan, and white graphics and text. A cursor, appearing as a white or yellow blinking underbar, usually is waiting for text input or another keystroke. The insert mode is automatically turned on at the beginning of each session, but it can be manually turned off by pressing insert. (This will leave the computer in a "typeover" mode.) Keystrokes required to operate the system include: ↵, <Esc>, <Tab>, Delete, Backspace, ↑ ↓ ←→, <PgUp>, <PgDn>, Home, End, <F2>, <F3>, <F4>, and <F10>. The system can also be operated with a mouse. Traditional conventions for the mouse are used; position mouse cursor on menu item and click the pad. Some system options require the user to confirm or negate a selection. Usually, this is done with a yes or no response. Users can enter "y" for yes and "n" for no; any other keystroke is not accepted. On-screen

16

instructions are available throughout the system and generally appear at the bottom of a screen or popup menu.

When menus are accessed, the active option is denoted by a light bar which is a red rectangle with yellow text. Non-active menu options are presented in cyan text with no contrasting rectangle. Some of the system's menus employ the use of "hot keys." With hot keys, the user can press a key letter in the title of the menu option (usually the first letter) to perform the functions of multiple keystrokes. Hot keys appear in a different color and are used as a shortcut to both selecting and activating a menu item. Normally, without hot keys, the user would scroll to the desired menu option using ↑ ↓ ← →, <PgUp> or <PgDn> and then press ↵ to activate it. Although hot keys are more efficient while actually using the system, for purposes of demonstration, the examples in this report utilize the arrow and return keys for selecting and activating options.

4.3 Processing Procedures. Instructions for all main and submenu options, with the exception of maintenance, are described below. Section 4.3.1 describes how to conduct Human Factors Issues and Airdrop Systems/Components keyword searches; Section 4.3.2 describes how to conduct a text search; Section 4.3.3 describes how to view and print information available after conducting either a text or keyword search; and Section 4.3.4 describes how to exit the system.

4.3.1 Keyword Search. As indicated earlier, there are two types of keyword searches in AAIRS-HFD: the "Human Factors Issues Search" and the "Airdrop Systems/Components Search". Each search references the same body of literature. The user is advised to become familiar with the structure and availability of keywords offered under these options prior to conducting a search. Familiarity can be gained by experimenting with on-screen choices or by examining the taxonomies of keywords found in Appendix A.

Due to the fact that the operation of these two keyword searches are identical with the exception of content, only one type, the Human Factors Issues keyword

search, is presented in this manual. To conduct such a keyword search, highlight "Keyword Search" on the main menu (see Figure 7). Pressing ↵ will display a submenu offering the two keyword search options (see Figure 8). From this submenu, highlight "Human Factors Issues Search" by using ↑ ↓ and press ↵. Subsequently, another submenu appears with Human Factors Issues keyword search options (see Figure 9).
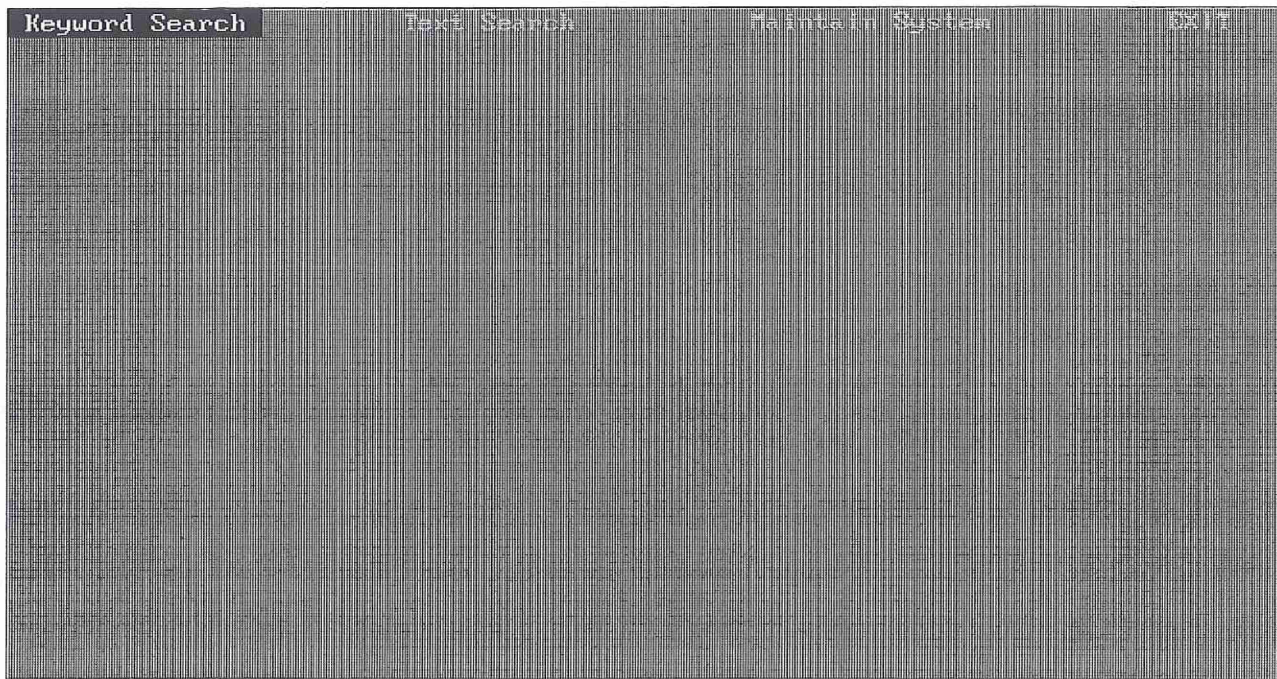
Figure 7. Main menu with "Keyword Search" highlighted.
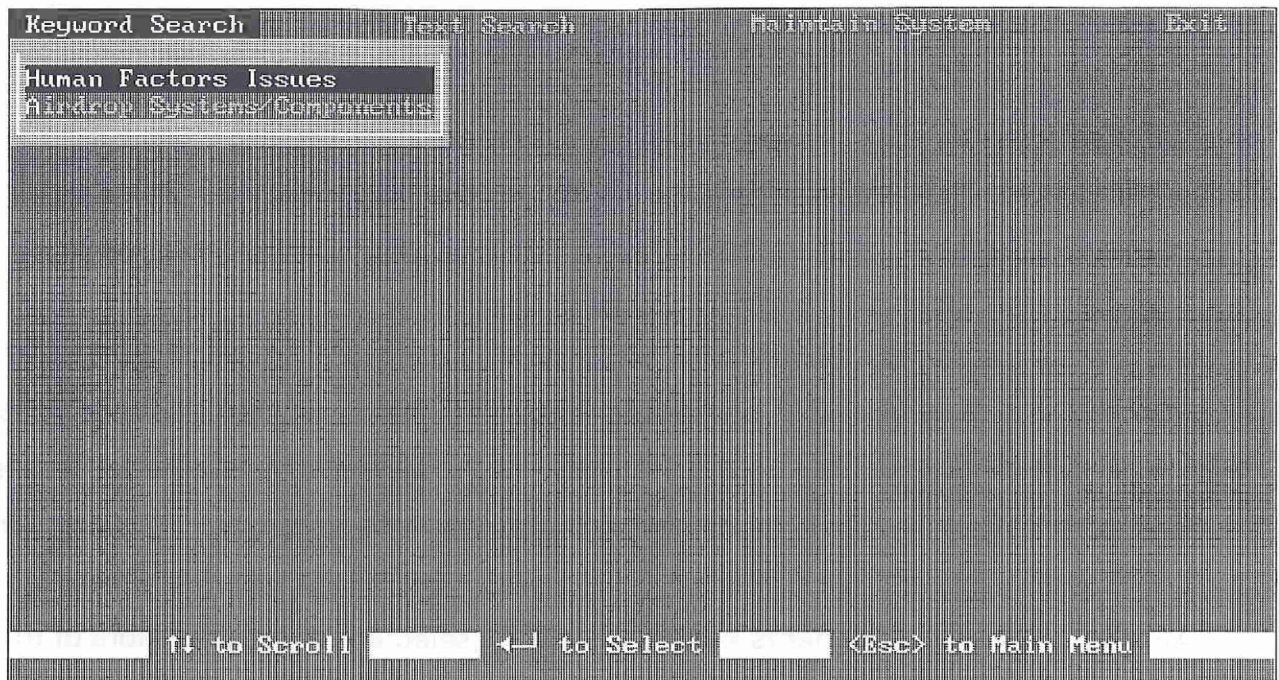
Figure 8. Submenu with "Human Factors Issues Search" highlighted.

Figure 9. Human Factors Issues Search options.

19

Both types of keyword searches allow the user to identify literature to which one or more Human Factors Issues or Airdrop Systems/Components has been assigned. The keyword searches run independent of one another, however, a single literature entry may have both Human Factors Issues keywords and Airdrop Systems/Components keywords assigned to it. Therefore, a search cannot be conducted using both types of keywords at the same time. Human Factors Issues keywords may be selected from one or more of the following major topics: Airdrop Delivery Method; Jump Mission Characteristics; Airdrop Tasks & Procedures; Hazards & Emergencies; Aerospace Biomechanical Factors; Aerospace Physiological/Medical Factors; Psychological Factors; Personnel Attributes; Load/Cargo Attributes; and Other Airdrop Human Factors Issues. These major topics appear in list form in Figure 10.

Airdrop Systems/Components keywords may be selected from one of more of the following major topics: Static Line Personnel Parachute Assembly; Military Free-Fall Personnel Parachute Assembly; Tandem Personnel Parachute System; Individual Equipment & Weapons Containers; Container Release Assemblies; Individual Protective/Life Support Equipment; Cargo/Resupply Parachute Assembly; Free-Fall Cargo/Resupply Parachute Assemblies; Cargo/Resupply Container Systems; Cargo/Resupply Platform Systems; Tools & Equipment for Rigging; Tools & Equipment for Derigging; Aircraft Components; Training Devices; and Other Airdrop Systems/Components. These major topics appear in list form in Figure 11.

Figure 10. Major topics to choose from during a Human Factors Issues Search.
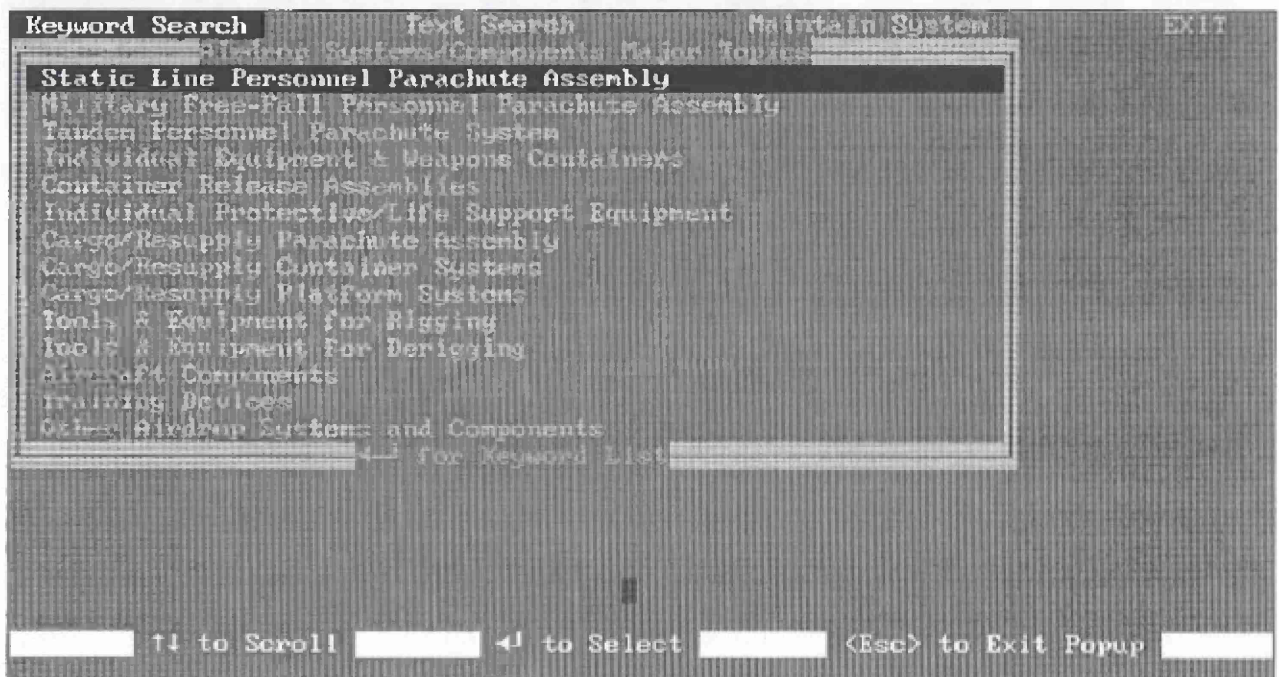
Figure 11. Major topics to choose from during an Airdrop
Systems/Components Search.

21

For example, to search for literature that has the keyword phrase "Opening/G-Force" assigned to it, highlight the "Human Factors Issues Major Topics" option (see Figure 9) and press ↵ to display the major topics for Human Factors Issues (see Figure 10). Next, highlight "Aerospace Biomechanical Factors" from the list of major topics using ↑ ↓ and press ↵ (see Figure 12).
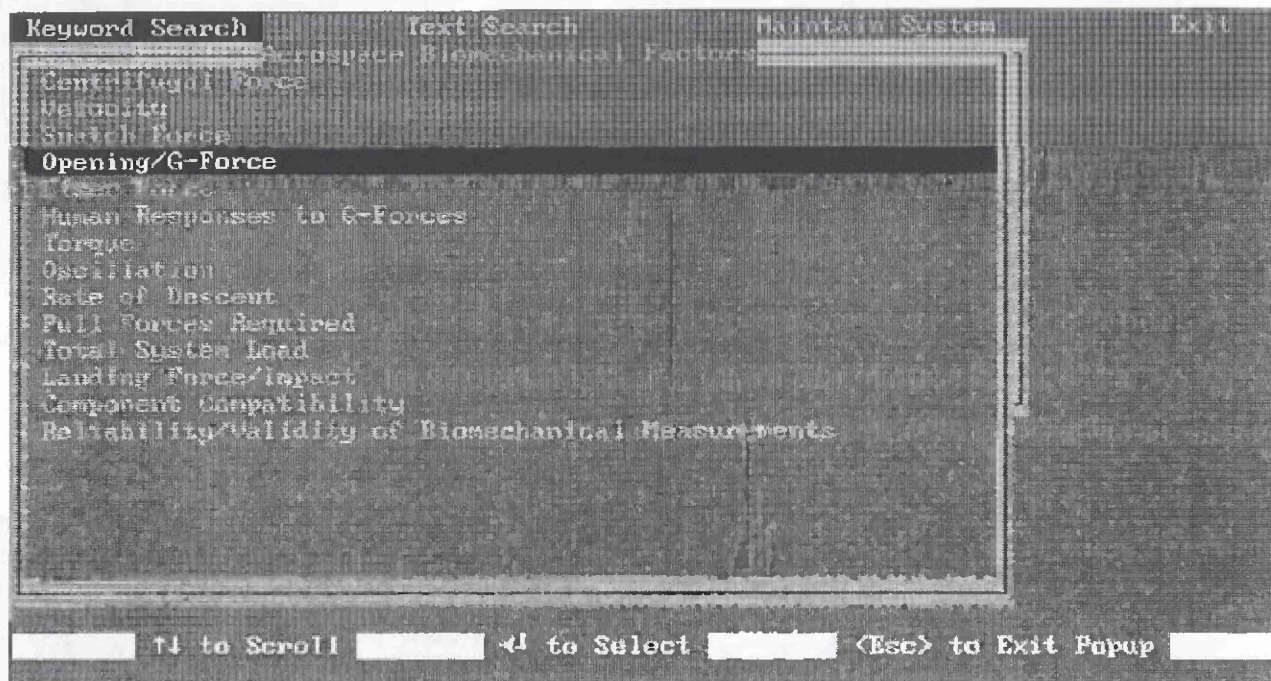
Figure 12. Keywords available under the major topic of "Aerospace Biomechanical Factors".

Now locate "Opening/G-Force" in the list of keywords using ↑ ↓ and press ↵. A window containing a description, if any, of the selected keyword and on-screen instructions for exiting from the scrollable description area of the screen will appear (see Figure 13). Exiting from the description with <Esc> displays a question asking the user to confirm or negate the selection (see Figure 13). If there is no further description of the selected keyword, the user Is simply asked to confirm of negate their selection.

22
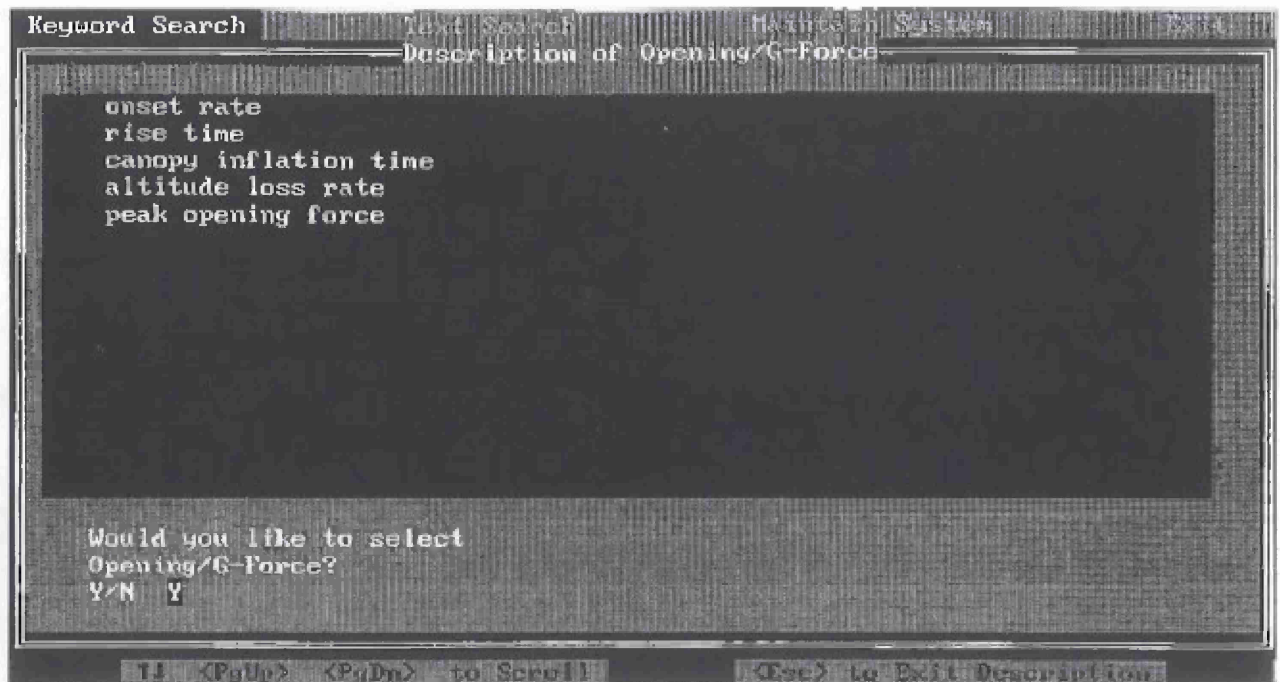
Figure 13. Description of "Opening/G-Force".

Upon negating the selection, the user is returned to the keyword list. Upon confirming the selection of the keyword, "Opening/G-Force" is displayed in a window titled: "User's Selections" (see Figure 14). After pressing any key to remove the list from the screen, the user may select another keyword from the "Aerospace Biomechanical Factors" list or press <Esc> to exit the keyword list.
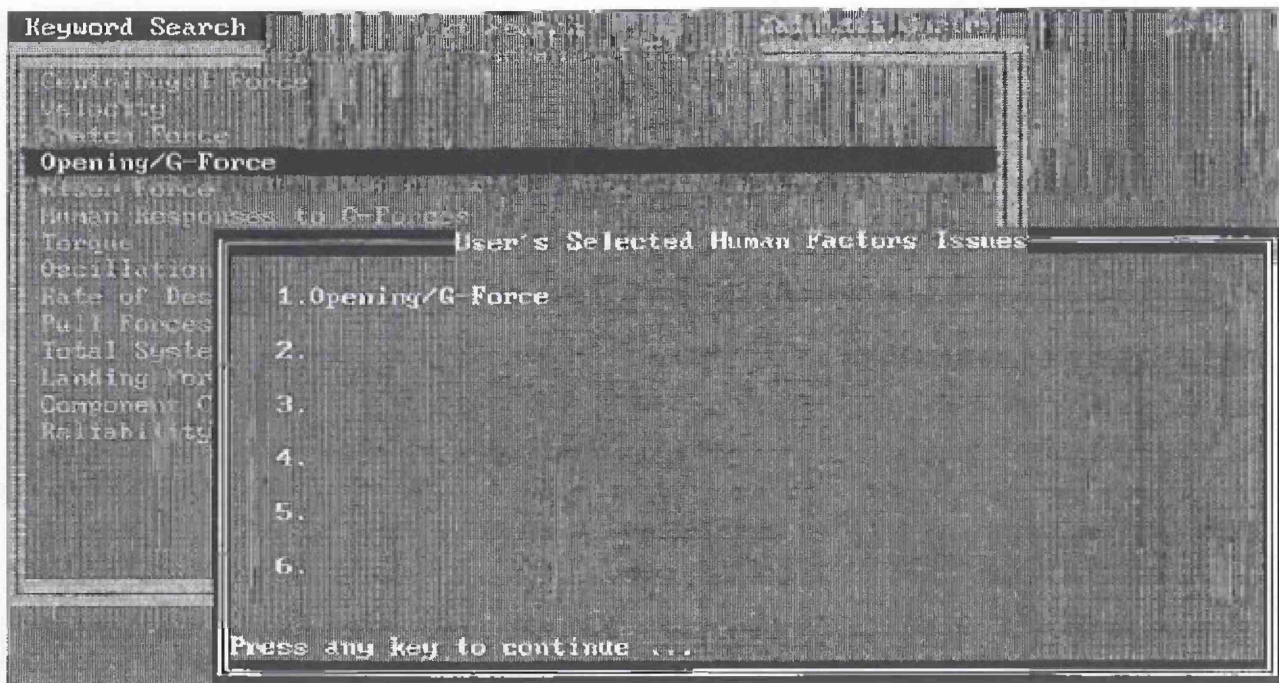
Figure 14. User's keyword selections.

From this point, it is possible to: 1) select more keywords; 2) display user's keywords; 3) erase user's keywords; or 4) conduct the search. Each of these options is described below.

4.3.1.1 Selecting Additional Keywords. The user may build a search sequence that includes up to six keywords. All search keywords do not have to be chosen from the same major topic. To add another keyword to the search sequence, simply highlight the desired major topic, select the additional search keyword, and press ↵. In the example presented in Figures 15-17, the keyword "Injury Rate" is chosen from the major topic of "Injuries/Illnesses". Notice that there is no description for this keyword (see Figure 16). It should be noted that each keyword added to a search sequence increases the system search time.

24
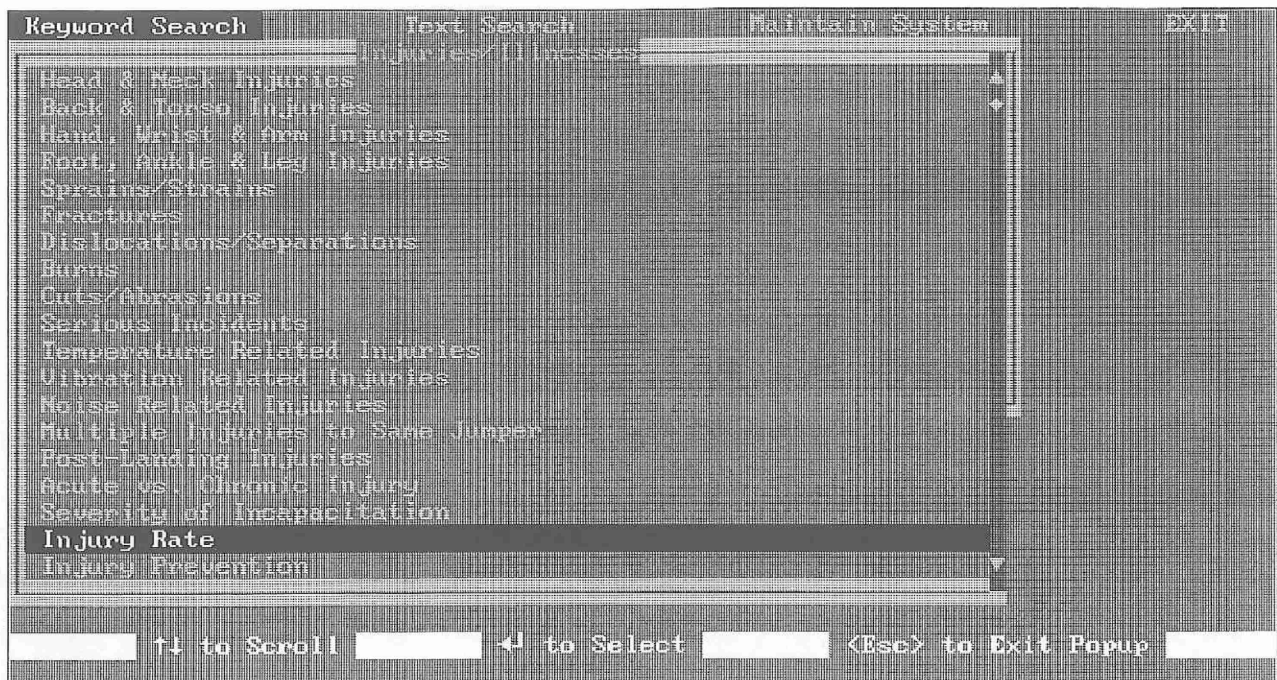
Figure 15. Keywords available under the major topic of "Injuries/Illnesses".
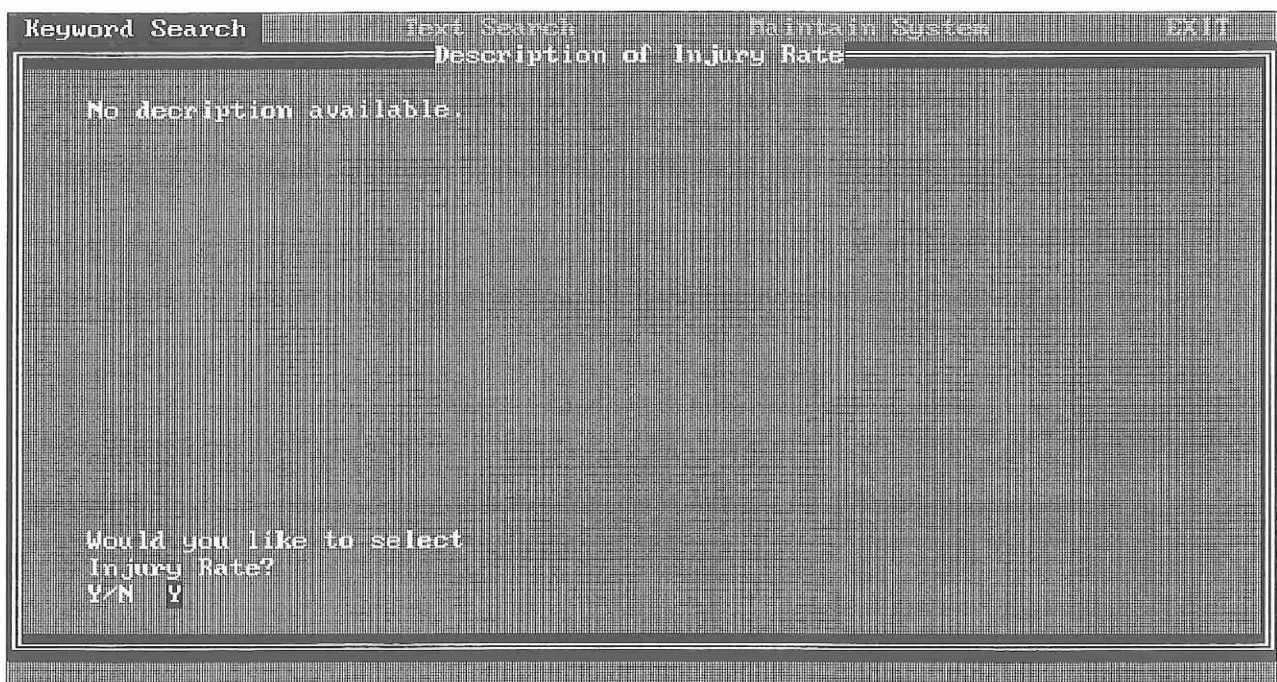
Figure 16. Confirming selection of a keyword.
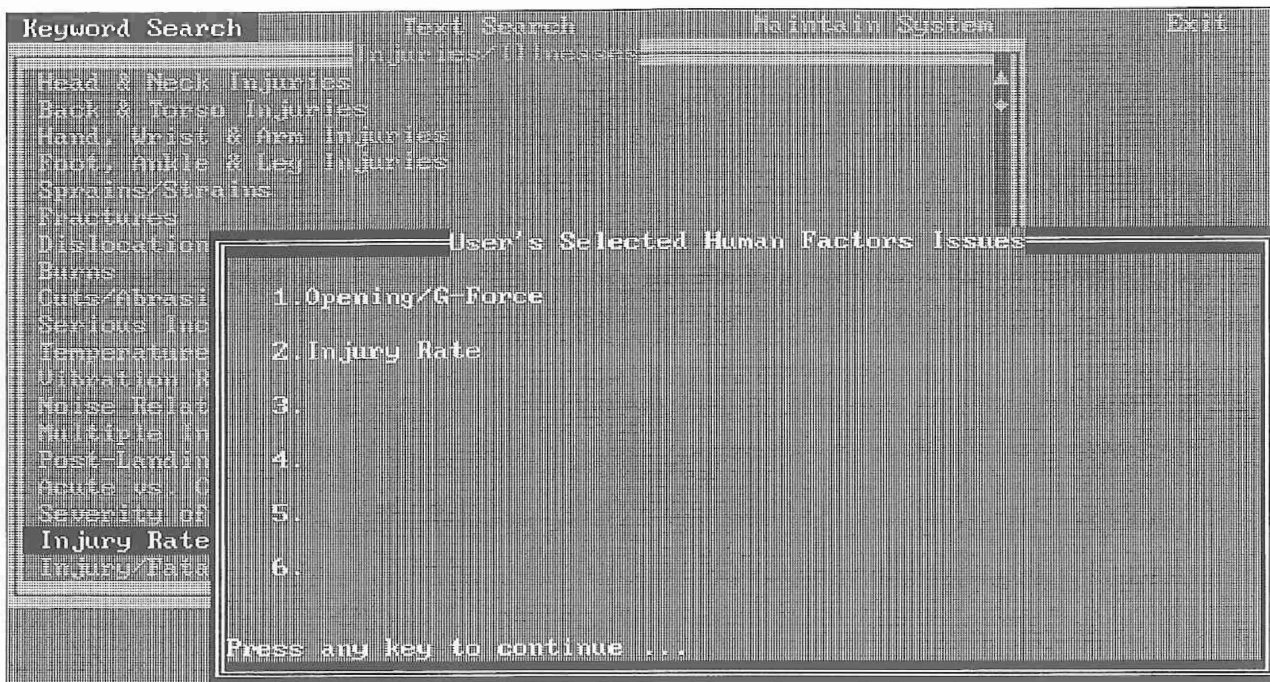
Figure 17. User's keyword selections.

4.3.1.2 Displaying User's Keywords. The user may wish to review specified keywords before conducting a search. An option under both the "Human Factors Issues Search" and the "Airdrop Systems/Components Search" entitled "Display User's Selections" is available. This option allows the user to examine the list before choosing a logical "and" or a logical "or" type of keyword search. To display user's selections, highlight the "Display User's Selections" option using ↑ ↓ and press ⏎ (see Figure 18).

```
Keyword Search          Next Search          Maintain System          Exit
┌─────────────────────────┐
│Choose Human Factors Issue(s)│
├─────────────────────────┤
│Display User's Selection(s)  │
│Erase User's Selection(s)    │
│Begin Search                 │
└─────────────────────────┘
        ┌────────User's Selected Human Factors Issues────────┐
        │                                                    │
        │    1.Opening/G-Force                               │
        │                                                    │
        │    2.Injury Rate                                   │
        │                                                    │
        │    3.                                              │
        │                                                    │
        │    4.                                              │
        │                                                    │
        │    5.                                              │
        │                                                    │
        │    6.                                              │
        │                                                    │
        │           Press any key to continue...             │
        └────────────────────────────────────────────────────┘
```
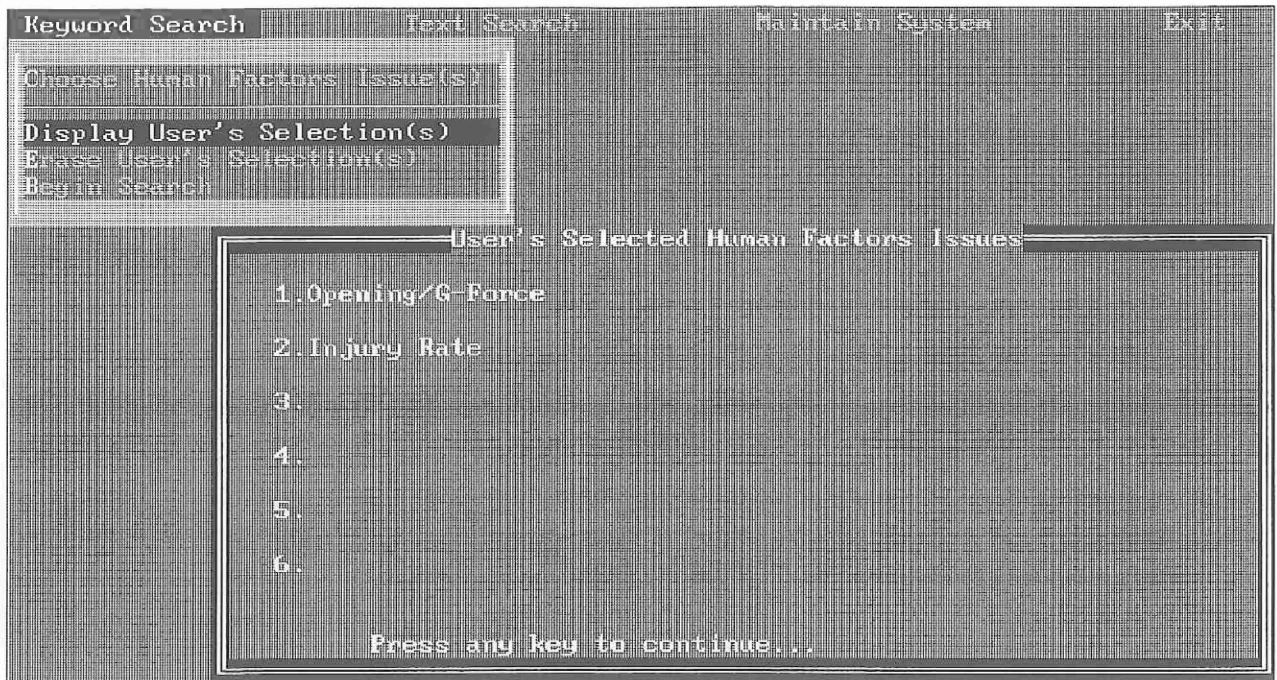
Figure 18. Displaying user's keyword selections.

<u>4.3.1.3 Erasing User's Selections</u>. The user may wish to erase all keywords that have been specified in order to start another search with a "clean slate." To erase all user input, highlight the "Erase User's Selections" option using ↑ ↓ and press ←┘. The user is asked to confirm or negate the request. Confirming the request for erasure displays the screen shown in Figure 19. Negating the request for erasure returns the user to the list of keyword search options, leaving all previously specified keywords intact.

27
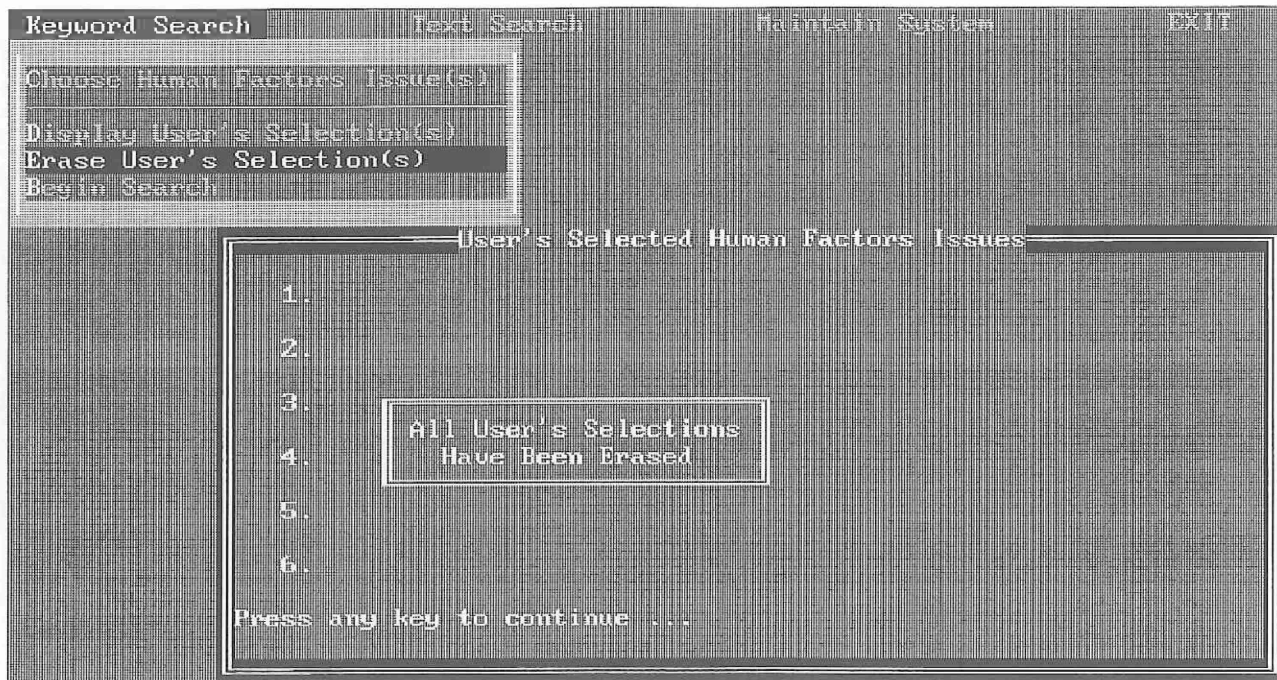
Figure 19. Erasing user's keyword selections.

4.3.1.4 Conducting a Keyword Search. The user may conduct a keyword search after specifying up to six search keywords from either the human factors issues keyword lists or the airdrop systems/components keyword lists. To conduct a search, choose the "Begin Search" option using ↑ ↓ and press ⏎ . Then the user is asked to confirm the search request. If more than one keyword is chosen, the user is asked whether the keywords are to be connected with a logical "and" or a logical "or." A logical "and" specifies that **each** qualifying piece of literature must have **all** the search keywords assigned to it. A logical "or" specifies that **each** qualifying piece of literature must have **at least one** of the search keywords assigned to it. Enter **A** to connect keywords with a logical "and" or **O** to connect keywords with a logical "or". The user is again asked to confirm or negate the request. The following example involves a logical "and" keyword search (see Figure 20). When only one search keyword is specified, the system does not display the "logical connection" dialogue discussed above.

28

Figure 20. Selecting a logical "and" Keyword Search.

Negating the request for a search returns the user to the list of keyword search options, leaving all input intact. Upon confirming the request for a search, the system begins its search for literature that meets the keyword search specifications. All literature in the database is evaluated to determine if it meets the specifications of the user's search keywords. In the current example, qualifying literature must have both "Opening/G-Force" and "Injury Rate" assigned as Human Factors Issues. Qualifying literature is written to a list of matches.

During a keyword search, the message, "Please wait while search is being conducted," is displayed. An unsuccessful search displays a message stating "No matches found" and then returns the user to the main menu, keeping previous input intact. This allows the user to make note of unsuccessful combinations of keywords and, if desired, conduct another search. A successful search displays a list of literature titles that meets the demands of the logical "and" keyword search specifications (see Figure 21).

29

Figure 21. Results of a successful logical "and" Keyword Search.

For comparison, Figure 22 displays the results of a logical "or" keyword search involving the same two keywords: "Opening/G-Force" and "Injury Rate."

Figure 22. Results of a successful logical "or" Keyword Search.

Titles appear in the left-hand column and subtitles appear in the right-hand column. If a title is longer than 50 characters and/or the subtitle is longer than 25 characters, only a portion of each is displayed because of screen limitations. It is possible to view the entire contents of titles and subtitles by first highlighting the record of interest and then using ← → , <Home>, or <End> to scroll horizontally.

At this point, the user may want to view and/or print the results of the keyword search. The instructions for viewing and printing results from a keyword search are the same as those for viewing and printing results from a text search. Therefore, the text search is described next and instructions for viewing and printing follow (see Section 4.3.3, Viewing and Printing Options). Examination of the results of a Human Factors Issues Search may be useful in the generation of subsequent Airdrop Systems/Components Searches and vice versa.

It should be noted that the user may also generate a list of all the titles contained in AAIRS-HFD by leaving all search keyword entries blank. The user, however, is required to confirm or negate a request for this type of search.

4.3.2 Text Search. To conduct a text search, highlight "Text Search" on the main menu by using ← → and press ↵ . The text search offers the user a chance to search for all literature containing specified text embedded anywhere in one or more of the following fields: title, subtitle, author(s), editor(s), year, ID/Document #, organization, location of source, overall summary and comments (see Figure 23). Table 2 describes each searchable database field and the acceptable entry forms. The case of the characters (upper or lower) entered for a search text does not have to match the case of the characters stored in the database.
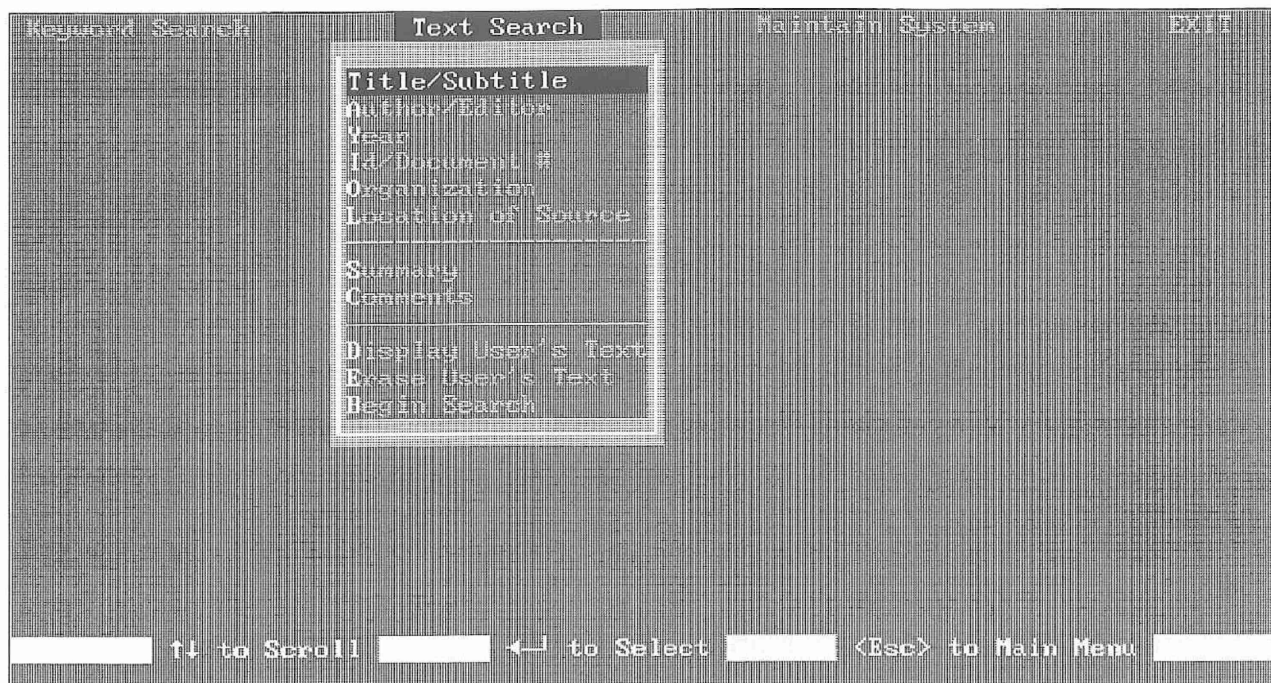
Figure 23. Searchable database fields during a Text Search.

Table 2. Searchable Database Fields with Acceptable Entry Forms.

Database Field:	Entry Form:
Title/Subtitle	up to 254 characters
Author/Editor	up to 45 characters; may include initials with last name
Year	four digit years only; entering both a starting and ending year defines a specific range; entering only a starting year defines a range that is greater than or equal to the starting year; entering only an ending year defines a range that is less than or equal to the ending year
ID/Document #	up to 25 characters
Organization	up to 254 characters
Overall Summary	up to 254 characters
Comments	up to 254 characters

For example, to search for literature with the text "injury" or "injuries" in the title, simply highlight "Title" from the list of text search options using ↑ ↓ and press ↵. The search text "injur" can then be entered in the title field, followed by a ↵ (see Figure 24). Keep in mind that the search text can be located anywhere within the search field of a qualifying title.

Figure 24. Entering title text.

From this point, it is possible to: 1) enter more text in another searchable database field; 2) display user's text; 3) erase user's text; or 4)conduct the search. Each of these options is described below.

4.3.2.1 Entering Additional Search Text. It is possible to build a search sequence that includes user specified text in one, a few, or all of the eight searchable database fields. For example, to further qualify the search with a range of years, highlight "Year" on the text search menu and press ↵. If literature dated 1960 and later is desired, enter "1960" in the start year field, enter nothing in the end year and press

↵ (see Figure 25). If multiple fields are included in the search sequence, each of the user-specified text strings must be found if a literature entry is to qualify as a match. In other words, specified text is connected with a logical "and" when the search is conducted. To add another item to the search sequence, the user highlights the desired field, enters additional search text and presses ↵ . Again, it is possible to enter as much or as little text as desired. Generally, the more text specified, the fewer pieces of literature will be found. Conversely, specifying shorter strings will result in more literature being found. The time it takes the system to complete a search increases with the amount of specified search text.

Figure 25. Entering year range.

4.3.2.2 Displaying User's Text. The user may wish to check text specifications before conducting a search. An option in the "Text Search" menu entitled "Display User's Text" is available for such an action. This option allows the user to check for typographical errors or study a complicated search sequence. To display user's text, highlight the "Display User's Text" option using ↑ ↓ and press ↵ (see Figure 26).

34

Figure 26. Displaying user's text.

4.3.2.3 Erasing User's Text. The user may wish to erase all text that has been specified in order to start another search with a "clean slate." To erase all user input, highlight the "Erase User's Text" option using ↑ ↓ and press ↵. The user is asked to confirm or negate the request. Confirming the request for erasure displays the screen shown in Figure 27. Negating the request for erasure returns the user to the list of text search options, leaving all previously specified text intact.

Figure 27. Erasing user's text input.

4.3.2.4 Conducting a Text Search. The user may conduct a text search after specifying search text. To do so, choose the "Begin Search" option using ↑ ↓ and press ↵ . The user is then asked to confirm or negate the request.

Negating the request for a search returns the user to the list of text search options, leaving all input intact. Upon confirming the request for a search, the system begins its search for literature that meets each of the text specifications. All literature in the database is evaluated to determine if it meets the specifications of the user's search text. Qualifying literature is written to a list of matches.

During a text search, the message, "Please wait while search is being conducted," is displayed. An unsuccessful search displays a message stating "No matches found" and then returns the user to the main menu, keeping previous input intact. A successful search displays a list of literature titles that meets the demands of the search specifications (see Figure 28). Titles appear in the left-hand column and subtitles appear in the right-hand column. If a title is longer than 50 characters or a

36

subtitle is longer than 25 characters, only a portion is displayed because of screen limitations. It is possible to view the entire contents of each title by first highlighting the title and then using ←→, <Home>, or <End> to scroll the contents horizontally.

Figure 28. Results of a successful Text Search.

At this point, the user may want to view and/or print the results of the text search. The instructions for viewing and printing results from a text search are the same as those for viewing and printing results from a keyword search. For viewing and printing instructions, please consult Section 4.3.3 of this report.

It should be noted that the user may also generate a list of all the titles contained in AAIRS-HFD by leaving all search text entries blank. The user, however, is required to confirm or negate the request for this type of search.

4.3.3 Viewing and Printing Options. As discussed earlier, the instructions in this section can be used for viewing and printing literature found as the result of either a text search or a keyword search. For purpose of demonstration, the search conducted

37

in Section 4.3.1, Keyword Search, is continued in this section. At the bottom of the screen displaying the list of matches, there are on-screen instructions. Pressing ↑ ↓, <PgUp>, and <PgDn> allows the user to scroll the list of matches and highlight a title of interest (see Figure 29).
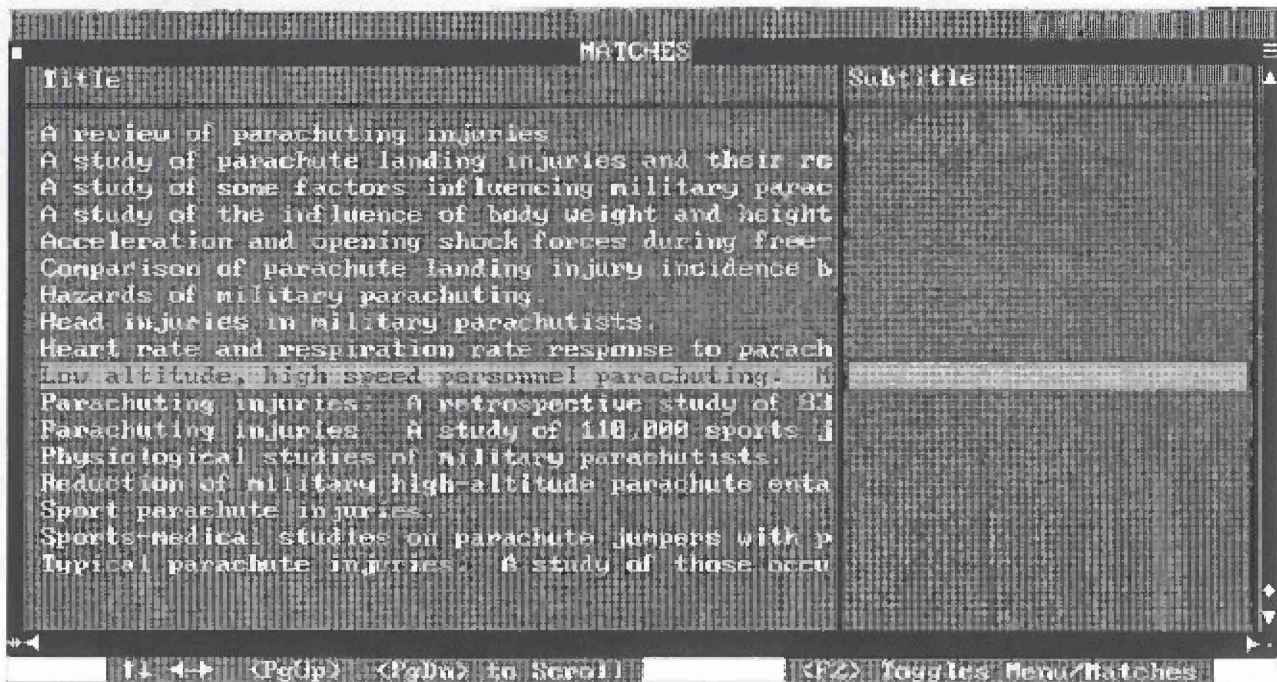
Figure 29. A list of matches with on-screen instructions.

Pressing <F2> acts as a toggle switch between the list of matches and the View/Print menu. While the cursor is active on the list of matches, pressing <F2> presents the user with a View/Print menu at the top of the screen. This menu allows viewing of information stored for the currently highlighted title, returning to the list of matches, generating printed output, or quitting the search (see Figure 30). Pressing <F2> while the menu is active returns the user to the list of matches. Before describing these menu options, the information stored in the database for a piece of literature will be explained and illustrated.
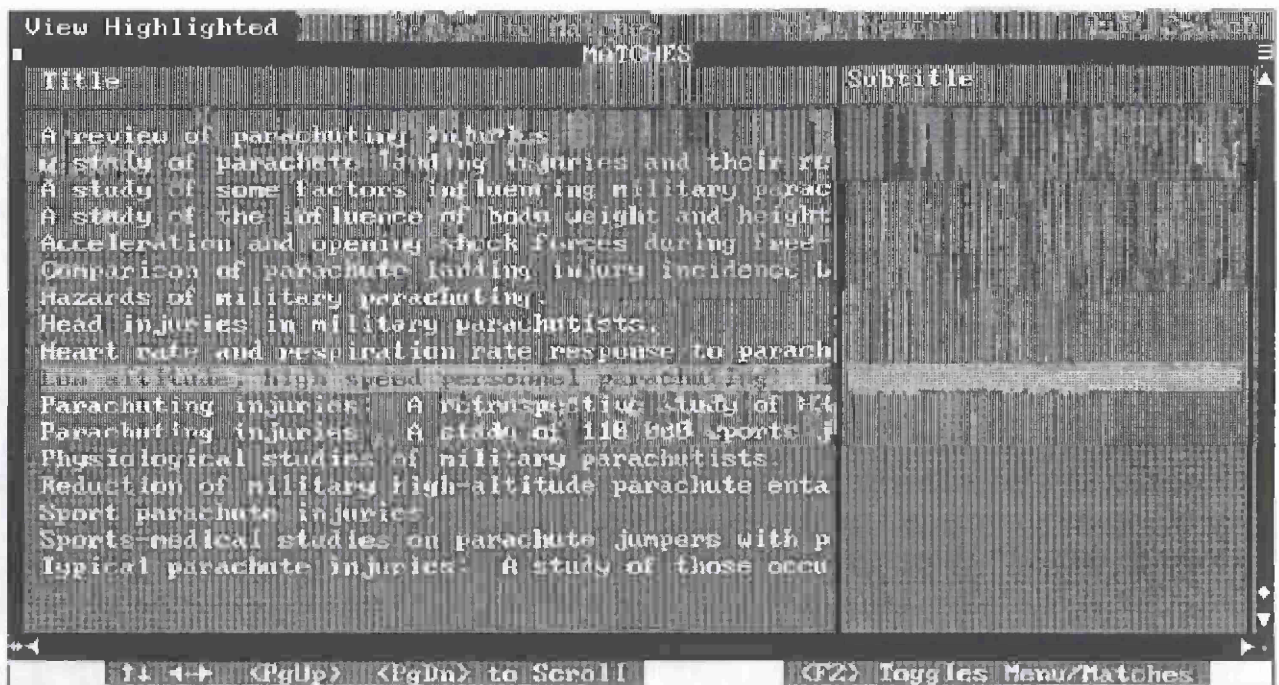
Figure 30. View/Print menu.

4.3.3.1 Contents of a Database Entry. Whether a record is viewed on-screen or as printed output, the contents are the same. For purposes of explanation, the presentation that would be viewed on the screen is described and illustrated here. For each literature title, there are four screens of information. Additional screens of textual information may be accessed at the user's discretion. Fields of information that do not apply to a record are left blank. The contents of each of the four screens are as follows:

a. First Screen (see Figure 31) -- This screen contains the title and reference information. For journal articles, the name of the journal, year of publication, volume number, and relevant page numbers are presented. In the case of technical reports, the name and location of the organization releasing the report and the date of publication are presented along with any internal control number assigned by the organization and the DTIC accession code. For books, the year of publication and name and location of the publisher are presented.

39

```
Title: Low altitude, high speed personnel parachuting:  Medical and
       physiological issues.


Subtitle:



Year: 1987 Month(s): Feb       Day:       Volume:        Page(s):
DTIC/NTIS #:  AD-A181199                   Report #: USAARL REPORT # 87-3
      Organization: U.S. Army Aeromedical Research Laboratory
  Journal/Publisher: U.S. Army Aeromedical Research Laboratory
  Location of Source: MANPRINT Office
     Type of Source: Technical Report/Note
        ←┘ to Continue to Screen 2            <F10> to Exit
```

Figure 31. First screen of record information.

b. Second Screen (see Figures 32 and 33) -- This screen contains textual information including a summary and comments as well as authors/POCs and editors. The "Summary" and "Comments" memo fields are hidden textual fields that display the word "memo" as a type of place marker. Capitalization of the first "M" in the word "Memo" denotes some type of textual contents, whereas all lower case letters denote an empty field. The Summary memo field will almost always have information stored in it, whereas the Comments memo field may or may not contain information, depending upon the nature of the particular literature. Instructions for opening and closing the memo fields are available on-screen and in the next section, 4.3.3.2 Viewing Highlighted. A description of each of the memo fields is as follows:

Summary -- The Summary presents the most important points of the literature. The extent to which details are included in the summary depends on the nature of the literature. For example, the summary of an authored book is very

40

general, whereas the summary of a review article is likely to contain specific information.

Comments -- The Comments field contains observations of the AAIRS-HFD reviewer. These comments may provide the user with additional information (e.g., the paper is a roundtable discussion or an abstract presented at a specific conference) or may alert the user to shortcomings in experimental design.

Usually, summaries included in AAIRS-HFD with wording such as: "the authors cite others on..." alerts the user to thoughts that are not the author's own. However, the author of a paper may cite numerous references to the work of others, and it would be cumbersome to include the above wording in every instance. The user is advised to consult the actual publication in order to determine the origin of specific ideas and information.

Figure 32. Second screen of record information.
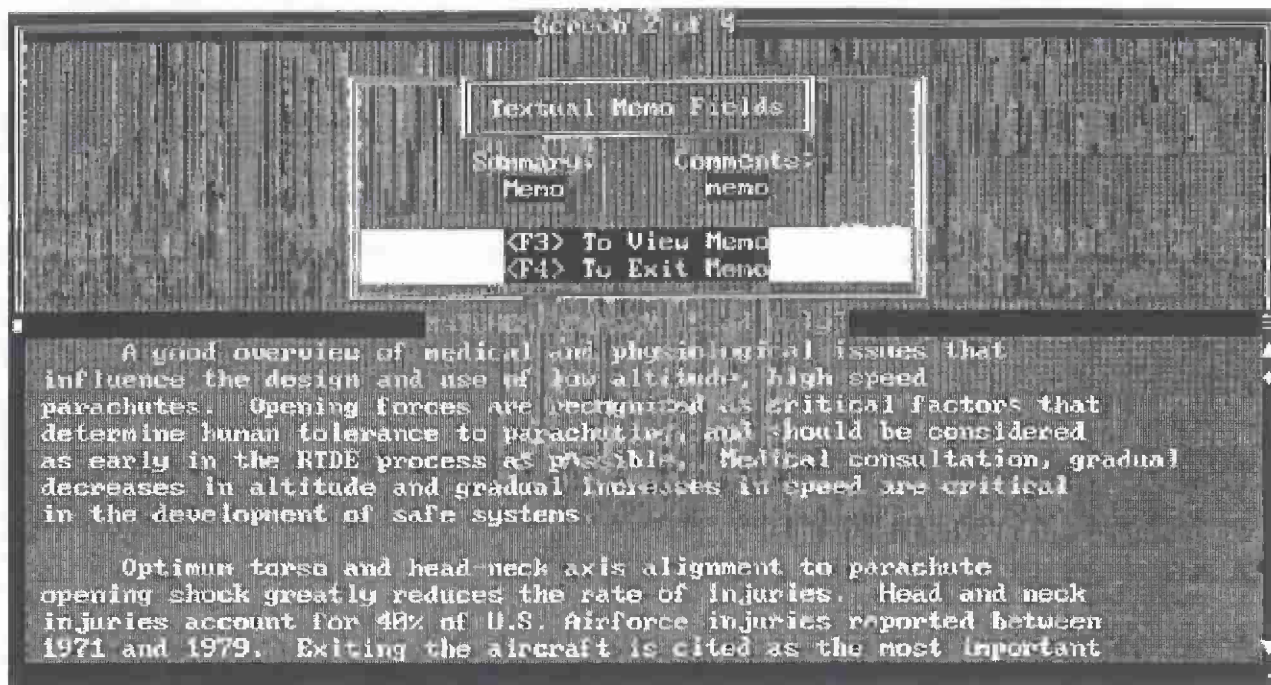
Figure 33. Second screen of record information with an "opened" summary memo field.

c. Third Screen (see Figure 34) -- This screen lists the Human Factors Issues keywords assigned to the entry. If there are no Human Factors Issues keyword assignments, the text "no assignments" appears.
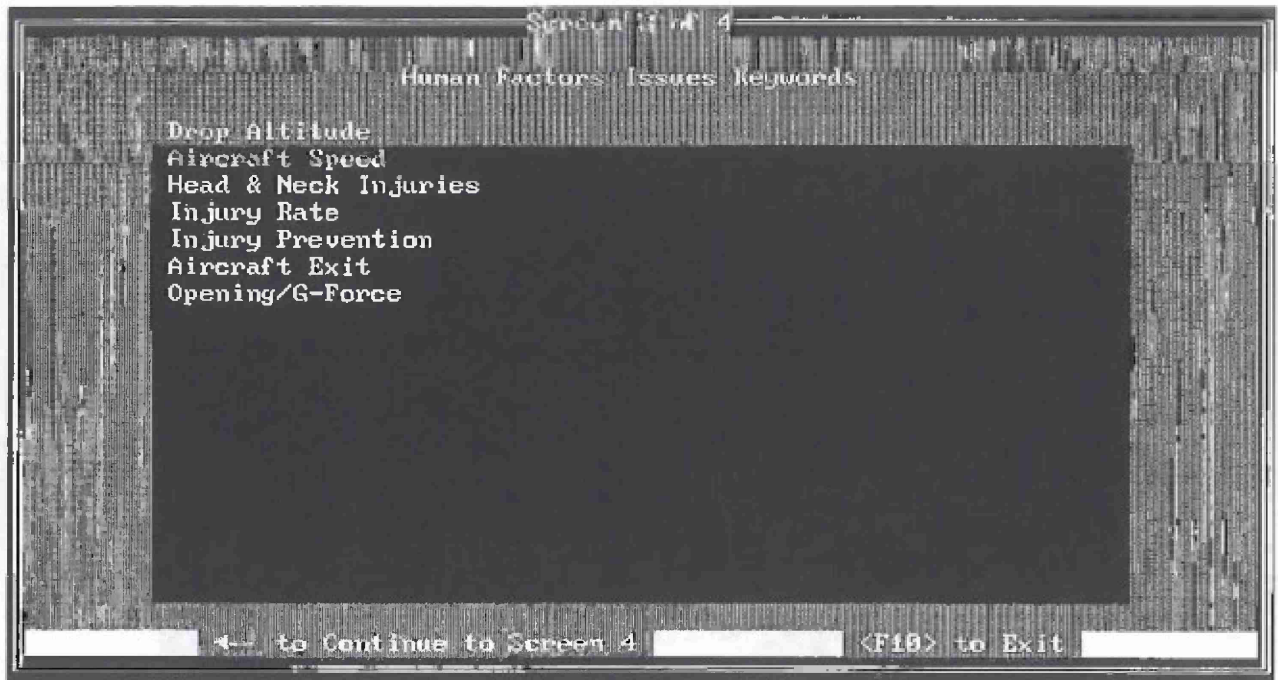
Figure 34. Third screen of record information.

d. Fourth Screen (see Figure 35) -- This screen lists the Airdrop Systems/Components keywords assigned to the entry. If there are no Airdrop Systems/Components keyword assignments, the text "no assignments" appears.
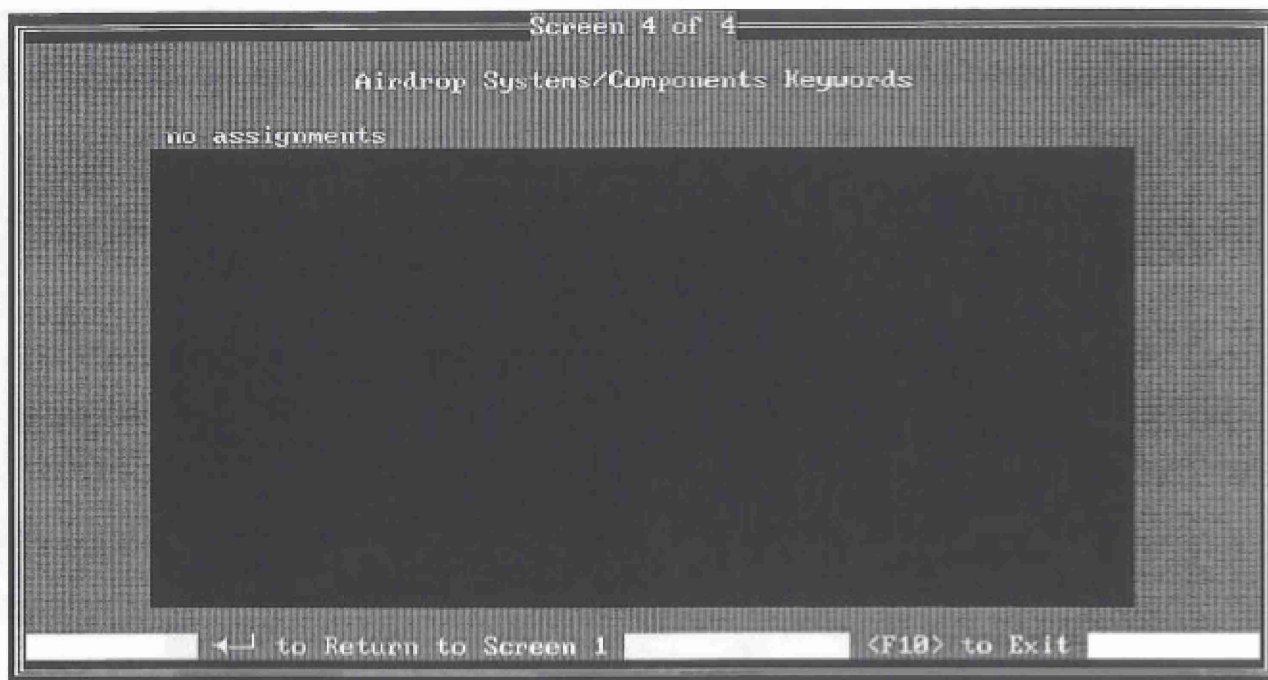
Figure 35. Fourth screen of record information.

4.3.3.2 Viewing Highlighted. In order to view the title that is currently highlighted in the list of matches, select the "View Highlighted" option from the View/Print menu using ← → and press ↵ . This allows the user to view all of the information stored in the database for the highlighted title. Information for each record is presented on the screens displayed in Figures 31-35.

In addition to fields of information for the highlighted title, there are also on-screen instructions denoting functions of pertinent keystrokes. Basically, ↵ is used to proceed from screen to screen, ← and → are used to position cursor on memo fields, <F3> and <F4> are used to open and close memo fields and <F10> is used to exit the record.

To view textual information stored for either of the memo fields, place the cursor in the desired memo field using ↵ or ← → and press <F3> (see Figure 33). If a memo field contains information, the letter "M" in the word "Memo" will be capitalized. If a memo field does not contain information, the letter "m" in the word "memo" will not be capitalized. Notice in the example in Figure 32 that there is only information in the Summary field.

Once a memo field, or text window, has been opened with <F3>, it can be scrolled using ↑ ↓, <PgUp>, and <PgDn>. To close a memo field, press <F4>. After exiting a record using <F10>, the system returns to the screen displaying both the View/Print menu and the list of matches with the next title highlighted. The View/Print menu is active, so the user may simply press return to open the next record for viewing or select any other menu option which are described in the following sections (see Figure 30).

4.3.3.3 Returning to List of Matches. To return to the list of matches, highlight the "Return to Matches" option on the View/Print menu using ← → and press ↵ (see Figure 30). Doing so allows the user to change the position of the highlight bar in the list of matches to a different title of interest (see Figure 29). As mentioned earlier, pressing <F2> can also return the user to the list of matches. The "Return to Matches" menu option was included for mouse users as an alternative to pressing <F2>.

4.3.3.4 Printing a Report. To print a report, select "Print Report" from the View/Print menu (Figure 30) using ← → and press ↵ . Then, the user may choose either the "Currently Highlighted" or the "Entire List of Matches" option using ↑ ↓ and press ↵ (see Figure 36). The "Currently Highlighted" option outputs information stored for the one selected title. The "Entire List of Matches" option outputs information stored for all titles in the list of matches. The demonstration in Figure 36 involves a single record using the "Currently Highlighted" option. After selection of the option, a message appears asking the user to confirm or negate the print request. Pressing Y

45

continues with the print request; pressing N cancels the print request and returns the user to the View/Print menu (see Figure 36).
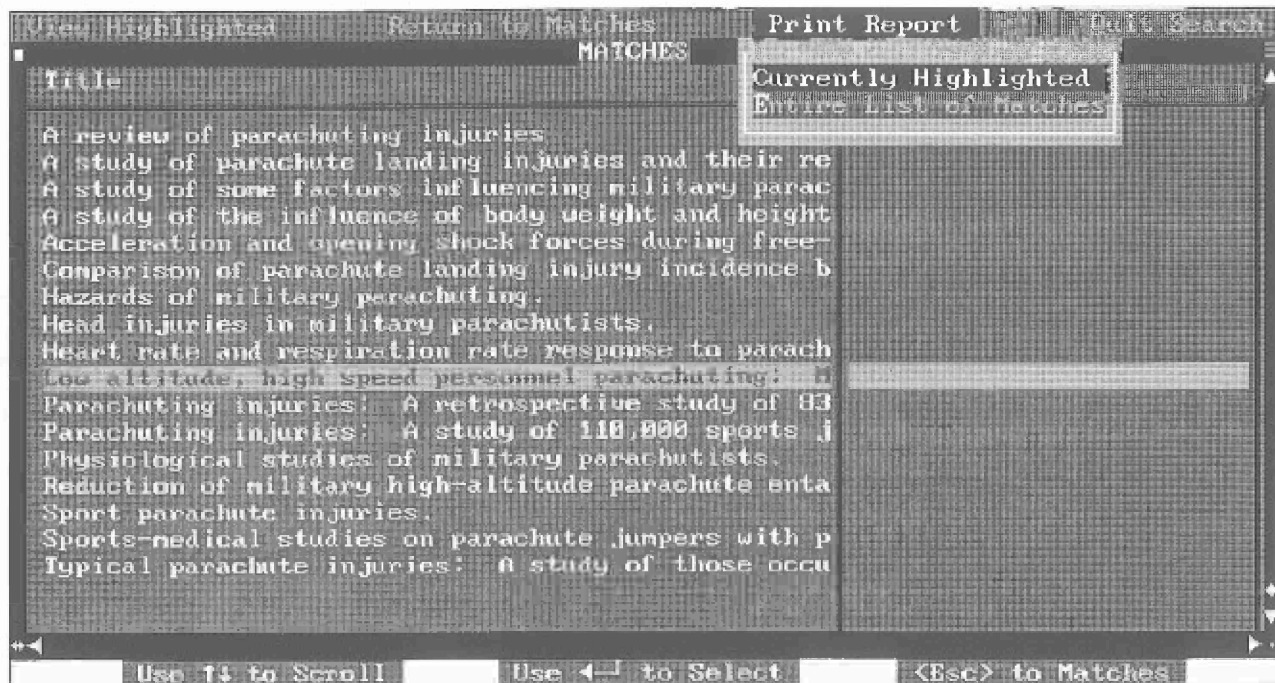
Figure 36. Choosing currently highlighted record.

Upon continuing with the print request, the user chooses to print either a reference report or a detailed report (see Figure 37). A reference report includes information stored in the database that is required for referencing an article or a book. A detailed report includes the contents of a reference report, as well as textual summaries and comments and assigned / Human Factors Issues keywords and Airdrop Systems/Components keywords. The report generated for purpose of demonstration involves a detailed report.
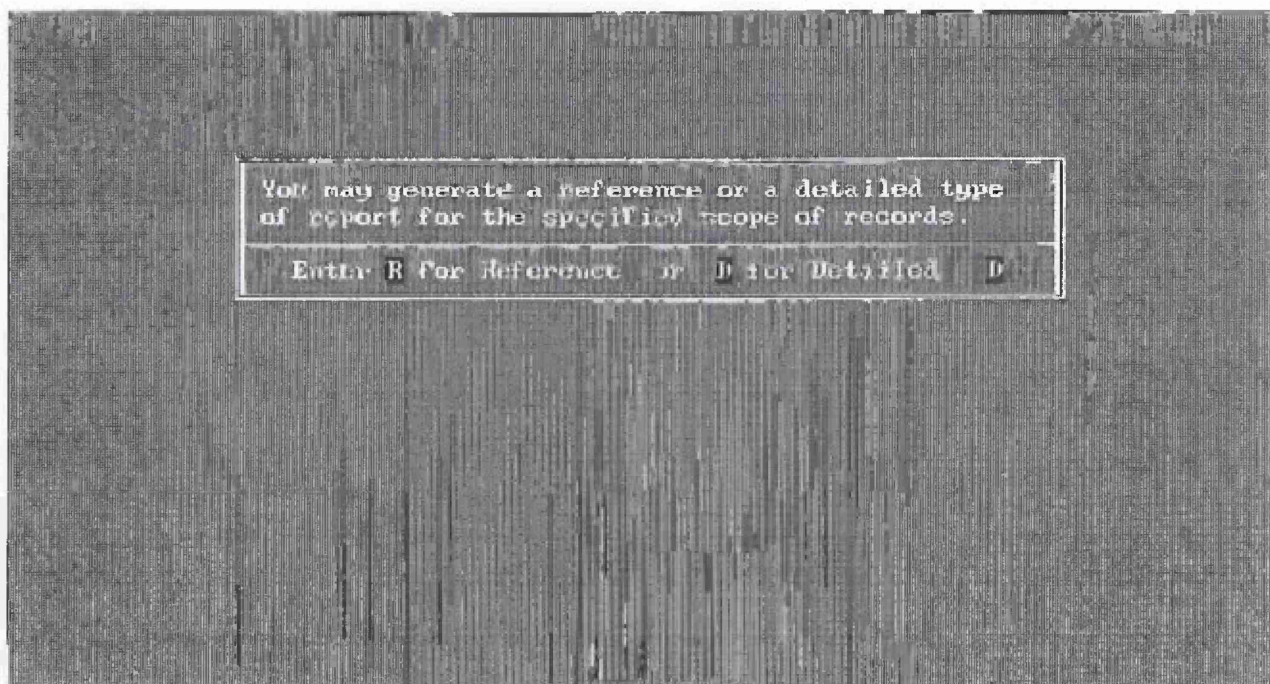
Figure 37. Choosing a detailed type of report.

Upon selection of the type of report, a list of printer choices appears. There are two types of printers from which to choose, in addition to an option to cancel the print request. The printer choices are either a dot matrix printer or a laser printer (Hewlett Packard compatible) (see Figure 38).
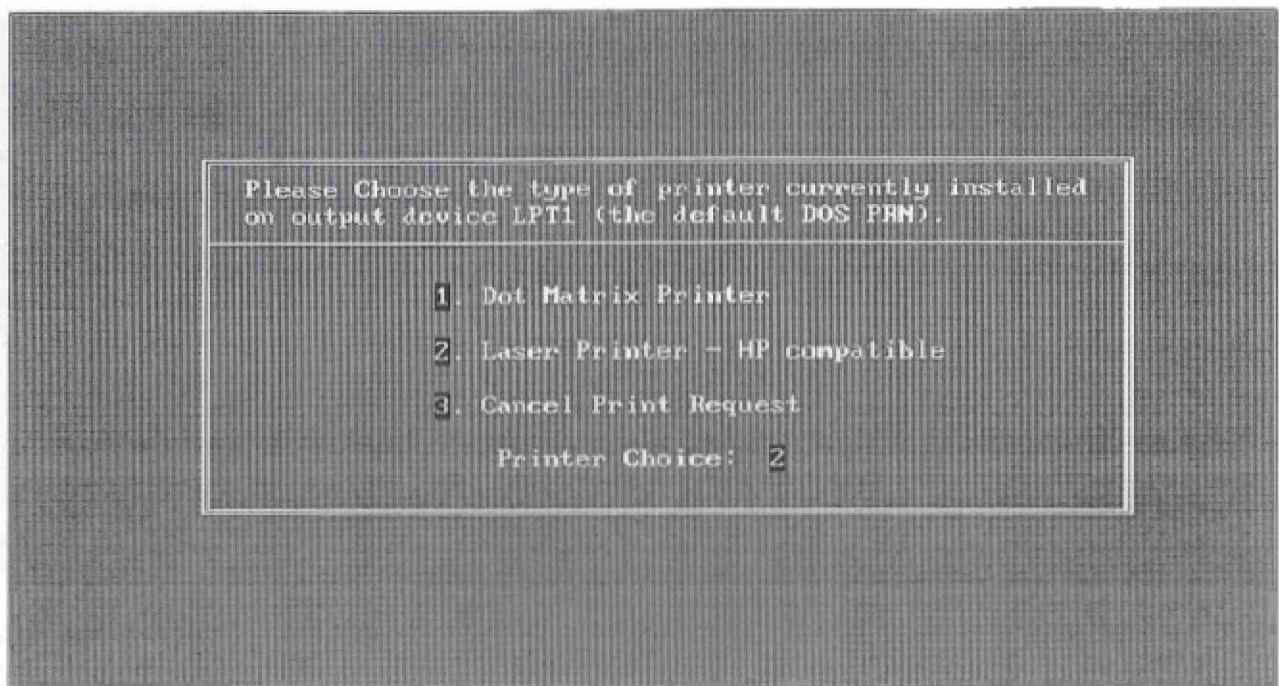
Figure 38. Choosing printer options.

The output of the two types of printers differ only in graphical presentation and not in content. The cancel option returns the user to the list of matches. Selecting a type of printer automatically begins the print job. The message, "Please wait while the report is being printed..." is displayed on the screen until printing has been completed.

A print job that is in process may be canceled as follows. First, take the printer off line; usually this is accomplished by pressing the printer's on line button (check printer manual if this does not work). Second, wait for the system to generate a "Printer not ready. Retry?" message. Respond to this message by highlighting "No" and press ↵ . After a short pause, the message appears again; respond by highlighting "No" and press ↵ . Next, the system returns to the View/Print menu. After canceling a print job, several pages may still print, depending on the size of the printer's memory. Once the printer has stopped, the printer's buffer must be cleared and the printer must be set on line. In most cases, clearing the buffer can be done be pressing the form feed button on the printer. After the printer stops printing, set

48

it back on line by pressing the on line button. If the printer does not have a form feed button, consult the printer's manual for buffer clearing instructions. The detailed report for the currently highlighted title displayed in Figures 39 and 40, was generated using a Hewlett Packard LaserJet IVL laser printer.

```
┌─────────────────────────────────────────────────────┐
│         Automated Airdrop Information Retrieval System-    │
│            Human Factors Database (AAIRS-HFD)             │
│                                                          │
│                    Detailed Report                       │
│                  November 30, 1993                       │
└─────────────────────────────────────────────────────┘
```

The literature listed below was located in Natick's AAIRS-HFD
as a result of the following keyword search specifications.
If multiple keywords were specified, they were connected with
a logical <OR>.

Human Factors Issues:

1. Injury Rate
2. Opening/G-Force
3.
4.
5.
6.

Airdrop Equipment:

1.
2.
3.
4.
5.
6.

Title: Low altitude, high speed personnel parachuting: Medical
       and physiological issues.

Subtitle:

Author(s)/POC(s): D. J. Wehrly

Editor(s):

Year: 1987   Report #: USAARL REPORT # 87-3
                               DTIC/NTIS #: AD-A181199
Month(s): Feb   Day: Volume: Pages:

Page 1

Figure 39. First page of a sample report.

50

Organization: U.S. Army Aeromedical Research Laboratory

Journal/Publisher: U.S. Army Aeromedical Research Laboratory

Source Type: Technical Report/Note

Source Location: MANPRINT Office

OVERALL SUMMARY:

A good overview of medical and physiological issues that influence the design and use of low altitude, high speed parachutes. Opening forces are recognized as critical factors that determine human tolerance to parachuting, and should be considered as early in RTDE process as possible. Medical consultation, gradual decreases in altitude and gradual increases in speed are critical in the development of safe systems.

Optimum torso and head-neck axis alignment to parachute opening shock greatly reduces the rate of injuries. Head and neck injuries account for 40% of U.S. Airforce injuries reported between 1971 and 1979. Exiting the aircraft is cited as the most important determination of proper head/neck alignment.

It is recognized that estimates of the neck's ability to tolerate forces occurring during low altitude, high speed parachute jumps need to be further defined. Such research will require new instrumentation designed to measure all head, neck and torso forces and accelerations.

COMMENTS:

HUMAN FACTORS ISSUES KEYWORDS:

Drop Altitude
Aircraft Speed
Opening Forces
Head & Neck Injuries
Injury Rate
Injury Prevention
Aircraft Exit

AIRDROP SYSTEMS/COMPONENTS KEYWORDS:

Page 2

Figure 40. Second page of a sample report.

After generating a printed report using the "Currently Highlighted" option, the system returns the user to the list of matches with the next title highlighted (see Figure 30). The user may select another title and/or activate the View/Print menu by pressing <F2>. After generating a printed report using or the "Entire List of Matches" option, the system returns the user to the list of matches with the first title highlighted.

4.3.3.5 Quitting a Search. To quit a search, highlight the "Quit Search" option on the View/Print menu using ← → and press ↵ (see Figure 30). Quitting a search will clear the text or keywords specified for the search. A message asking the user to "Please wait while the system is being reset." is displayed while temporary files are deleted from the system. The system then returns to the main menu, from which the user may conduct another search or exit to DOS (see Figure 41).

4.3.4 Exiting the System. In order to exit to DOS, highlight the "EXIT" option on the main menu using ← → and press ↵ (see Figure 41). After pressing ↵ once more, the system asks the user if they "Would like to backup modifications to floppy diskettes?" A typical user would answer "N" for no because a backup is not necessary due to the fact that no changes were made to any of the databases or text files. Maintenance personnel, however, would answer "Y" for yes if they made any changes to the system. Further backup instructions can be found in the Maintenance Manual for AAIRS-HFD (Poole et al., 1994). After answering no to the backup question, FoxPro closes the system and the user is returned to the DOS prompt. **THE METHOD DESCRIBED ABOVE IS THE ONLY PROPER WAY TO EXIT THE SYSTEM.** Exiting the system by any other method, such as soft booting or powering down the system, will result in error messages during subsequent operation of the system. Assistance for dealing with such messages is located in Appendix D.
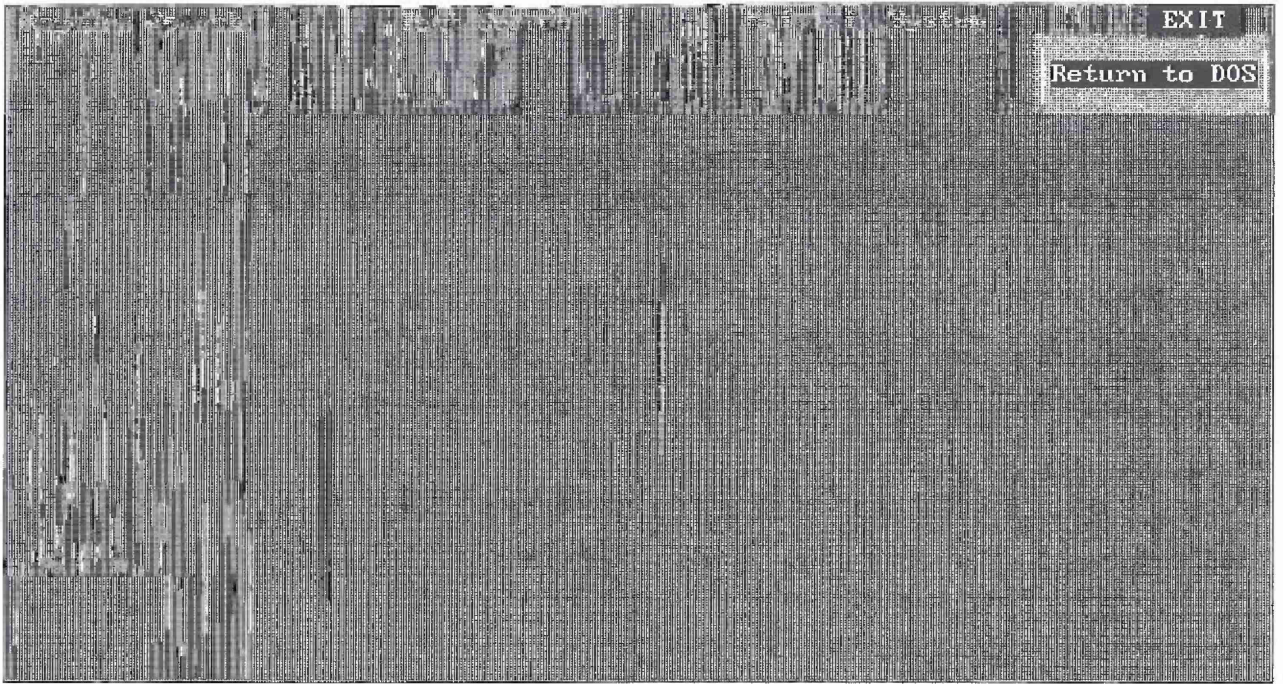
Figure 41. Exiting the system.

SECTION 5. CONCLUSION

It has been the authors' goal to provide a user manual that offers an overall summary of the database including a project background as well as a comprehensive processing guide with detailed, step-by-step instructions and graphical screen representations. At the time this manual was published, Natick's Automated Airdrop Information Retrieval System - Human Factors Database included approximately 50 literature entries. It is still early in the stages of database development. However, review and entry of literature is continuing. As the database expands and the number of users increases, feedback from these users may necessitate further programming enhancements. Enhancement will be documented as manual supplements.

SECTION 6. REFERENCES

Poole, P. M., Kronberg, M. S. and Meyers, D. (1994). Maintenance Manual for Natick's Automated Airdrop Information Retrieval System - Human Factors Database (AAIRS-HFD) (Tech. Rep. NATICK/TR-94/032). Natick, MA: U.S. Army Natick Research, Development and Engineering Center.

Wehrly, D. J. (1987). Low altitude, high speed personnel parachuting: Medical and physiological issues (Tech. Rep. USAARL Report # 87-3). Fort Rucker, AL: U.S. Army Aeromedical Research Laboratory.

Appendix A:

Taxonomies of Human Factors Issues and

Airdrop Systems/Components

Table of Contents

A. Taxonomy of Human Factors Issues

1. Airdrop Delivery Method

Military Free-Fall (MFF) Parachuting
      high altitude low opening (HALO)
      high altitude high opening (HAHO)
Static Line Parachuting
      conventional
      nonconventional
Personnel Non-Aerodynamic Decelerator
      fast rope
      rappelling
Non-Intentional Parachuting
      ejection seats/escape systems
      crew capsules
Platform Airdrop
      low velocity platform airdrop (LVAD)
      low altitude parachute extraction (LAPE)
Container Airdrop
      container delivery system (CDS)
      high speed aerial delivery container (HISAC)
Special Operational Forces (SOF) Load
Door Bundle
Free Drop

2. Jump Mission Characteristics

Combat-Related Personnel Airdrop
      mass assault
      non-conventional mission
Training-Related Personnel Airdrop
      basic training
      new equipment training
      sustainment/refresher training
Test & Evaluation-Related Personnel Airdrop
Search & Rescue/Relief-Related Personnel Airdrop

Combat-Related Cargo Airdrop
     specialized mission
Training-Related Cargo Airdrop
     new equipment/rigging training
     sustainment/refresher training
Test & Evaluation-Related Cargo Airdrop
Disaster/Humanitarian Relief Cargo Airdrop
Duty Personnel Proficiency
Departure Airfield
Wing Flying Mission
Time of Jump Mission
     day
     night
     dawn
     dusk
Drop Altitude
     low
     high
Altitude of Parachute Opening
Jumper/Load Exit
     number of jumpers/loads per aircraft
     number of aircraft passes
     number of jumpers/loads per pass
Aircraft Speed
Aircraft Variables
     angle of aircraft approach
     exit location
       door
       ramp
     aircraft shape/aerodynamic flow
     static line hook-up capability
     oxygen prebreather for high altitude
     ease of communication among troops
     coordination of joint Army/Air Force responsibilities
     time-in-flight
       frequency of in-flight refueling

in-flight environment
    temperature/humidity
    illumination level
    seating capacity/crowding
    noise level
    flight pattern (e.g., nap of the earth)
    food service capability
    sanitary/waste manag   ilities
aircraft type
tail #

Environmental Conditions
    wind speed/wind shear
    wind direction
    winds aloft
    temperature
    barometric pressure
    precipitation/humidity
    visibility conditions/illumination level

Drop Zone Variables
    drop zone size
    drop zone elevation
    slope/grade
    terrain/topography
        blacktop
        rocks
        dirt/dirt road
        loose sand
        light brush
        heavy brush/trees
        hard packed snow
        soft snow
        swampy bog/mud
        water
    drop zone hazards/obstructions
        wires
        buildings
        vehicles
        other obstructions (lights, planes, poles, fences)
    troop assembly method
    assembly aids
    troop dispersion on DZ
    communications capability

Level of Risk
        unacceptable
        undesirable
        acceptable with review
        acceptable without review

3. Airdrop Tasks & Procedures

Maintaining Equipment
Rigging, Packing and Installing
        parachute inspection
        rigger checks
        time to complete tasks
        complexity of system
        familiarity with system
        similarity to other systems
        availability of rigging equipment
        parachute repacking cycle frequency
        repairs/maintenance procedures
        preparing automatic opening device
            main or reserve mounted
            accessibility
            placement on harness
            method of arming (e.g. pin)
            unit of measure to set altitude
            method/ease of calculating set altitude
            method of test chambering AOD prior to use
        preparing oxygen su,·ply system
            bottle placement
            hose routing
            protection from accidental ignition
        preparing cargo loads
            securing straps and webbing
            preparing skids
            load weight computations
            preparing platform
            positioning covers and honeycomb
            stowing the load
            marking the load

Pre-Exit Procedures
    computing airdrop release points
    jumpmaster inspection
      on ground vs. in-flight
        parachutes
        rucks/individual equipment
    static line inspection
    bundle inspection
    spotting the drop zone
    jump commands
Aircraft Exit
    location of exit door/ramp
    door/ramp configuration
    body posture/rigidity (including head-chin tuck)
    equipment/weapons container interference
    method retrieving hung/towed jumper
Free-Fall
    executing the count sequence
    tumbling/somersaulting/spinning upon exit
Main/Reserve Canopy Opening
    planned opening altitude
    method of canopy activation
      automatic activation
        static line
        automatic opening device
          familiarity with use
          mode of operation (how it is actuated)
          compatibility with altimeter
            altimeter display
      manual activation
        ripcord release
          ripcord handle type
          ripcord handle placement
          pullforce required
    method of canopy deployment
      sleeve
      bag
      diaper
    cutaway method for main canopy

Canopy Descent
    canopy control
        check canopy
        correcting suspension line twists
        steering the canopy
            performing slips
            performing turns
            collision/entanglement avoidance
            correcting body posture/rigidity/stability
                aerodynamic influence of equipment/weight
        use of oxygen
            on/off activation method
            mask fit
Landing Preparation
    equipment release
        method
        number of attachment points
    lowering equipment
        lowering time
    turning into the wind
    flaring
Landing
    parachute landing fall (PLF)
    attitude/body position
    impact speed
Post Landing
    canopy control
    collapsing the canopy
    releasing canopy
    recovering and stowing canopy
Derigging Cargo Loads
    securing drop zone
    recovery priorities
    recovery techniques
    evacuation method
Availability of Technical Manuals
Availability of Material Handling Equipment/Tools
    load preparation/assembly
    load recovery/derigging

4. Personnel Parachuting Malfunctions

Rigging/Packing Errors
Pre-Exit Errors
        unintentional parachute opening in airplane
        aircraft equipment contributing to accident/error
            airplane crash with parachutist aboard
            anchor cable/retriever system
            jump platform
            air deflector
            rails/rollers
            seats/stanchions
            space/mobility constraints
                inability to see/adjust equipment
                awkward movement to door
        miscalculated release point
Exiting Errors
        improper exit
            poor door position
            dragged equipment
        dangling static line
        misrouted static line
        jumper/load strikes aircraft
        hung/towed jumper/load
        midair collision with airplane
        poor body position during canopy deployment/opening
        spins
Free-Fall Errors
        collision
        air loss
Parachute Opening Malfunction
        premature brake release
        floating ripcord
        hard pull
        pack closure
        hard opening
        rips, tears and blown gores
        total main malfunction
            improper static line hook-up
            broken static line
            failure to pull ripcord or pull too late
                handle inoperable
                    breakaway/lost
                    hard pull

deployment device failure
            bag/sleeve lock
        pilot chute failure
            trapped
            in tow
            hesitation
        inaccurately armed automatic opening device
        malfunctioning automatic opening device
        release of harness connections in mid-air
    partial main malfunction
        streamer/cigarette roll
        snivel
        canopy partial inflation
        air steal
        canopy complete inversion
        canopy semi-inversion (Mae-West)
        slider hung up at canopy
        slider hung up halfway
        end cell closures
        blown/torn section of canopy
    riser separation
Descent Errors
    broken/tangled/twisted lines
        suspension lines
        skirt net
    entanglements/collisions
        jumper with other jumper (prior to canopy opening)
        jumpers' canopy with other jumpers' canopy
        "walking" on another jumpers' canopy
        main/reserve of same jumper
        reefing system entanglements
    broken steering line
Equipment Release Malfunction
    inadvertent jettison
    failure to release
Reserve Malfunction
    horseshoe
    inadvertent/accidental activation
    improper attachment
    broken ripcord handle
    broken reserve static line system

Landing Errors
    improper PLF
      legs apart
      one leg extended
      posture too loose
      posture too stiff
    dragged on drop zone
    boot failure
      heels
      laces
      soles
      worn-out condition
    obstacles, e.g., power lines
    unintentional water landing
Missed Drop Zone
Pilot Errors
Failure to Follow Regulations
Hazard Probability
    frequent
    probable
    occasional
    remote
    improbable
Reliability of Equipment/System
    mean time between failures

5. Cargo/Resupply Airdrop Malfunctions

Miscalculated Release Point
Missed Drop Zone
Low Velocity Platform Airdrop (LVAD) Incidents
    extraction phase
      extraction Parachute
        failed to deploy properly
        failed to fully inflate
      platform
        excessive tumble
        failed to exit
      main recovery parachutes
        partial main extraction
      extraction system
        delay in force transfer
          no force transfer

       restraint
          aft restraint not removed
          incorrect rail/lock settings
     deployment/recovery phase
       parachute(s)
          failed to properly inflate
          failed to properly disreef
          mid air release of chute(s)
       deployment line
          not properly attached
          line misrouted
       platform
          not properly oriented to ground
       suspension sling(s)
          filed
          misrouted
     release phase
       load was excessively dragged
       load failed to properly release
       load overturned
       upper suspension link did not reach critical angle
     prior to exit
       container
          load shifted
          cargo in container shifted
          load jammed in rail system
       skidboard and tubular nylon ties
          pulled through skidboard
          ties broke
          skidboard jammed
       release gate
          knife cut prematurely
          knife failed to cut
Container Delivery System (CDS) Incidents
     deployment phase
       static line
          tangled with load
          detached from anchor line
          cable stop failed
          breakaway type prematurely broke
       pilot parachute
          failed to deploy main chute
          became entangled with load
          detached from main chute

main parachute
        semi inversion
        cigarette roll
        deflated from air starvation
        torn by another container
    container
        adapter web failed
        sling assembly failed
        skidboard detached from load
after deployment
    percent of cargo damaged on impact
    percent of cargo damaged from being dragged on drop zone
Low Altitude Parachute Extraction System (LAPES) Incidents
    drogue/extraction phase
        drogue parachute
            did not deploy from D-bag
            failed to fully inflate
            semi inversion
            extraction parachute(s)
            did not deploy from D-bag
            failed to fully inflate
                semi inversion
                jettisoned
        platform
            incorrect lock setting
            left hand locks engaged
            tandem platforms improperly connected
        tow plate
            no force transfer to extraction link
            failed to properly jettison drogue
    post extraction
        platform
            excessive aircraft height
            improper load attitude
            load separated from platform
        damage to load
            no damage
            damaged - usable/operational
            damaged - unusable/non-operational
Reliability of Equipment/System
    mean time between failures

6. Aerospace Biomechanical Factors

Centrifugal Force
Velocity
    terminal velocity
Altitude Loss Rate
Opening Forces
    snatch force
    opening shock/G-forces
    onset rate
    rise time
    canopy inflation time
    peak opening force
Riser Force
Human Responses/Tolerances
    posture
    head/neck flexion
    eyeballs in/eyeballs out
    spinal headward/spinal tailward
    transverse
Torque
Oscillation
    rate
    system stabilization characteristics
Rate of Descent
    canopy size
    canopy porosity/fabric
    altitude
    environmental factors
      winds
      temperature
    reefing/disreefing method
Pull Forces Required
    mechanical advantages
    range of motion
    static vs. dynamic
    handle location/type
    one vs. two handed pull
Total System Load
    effects of load weight
    effects of body weight
    body/load position
    load lowering shock

Landing Force/Impact
        impact velocity
        deceleration distance
        body position
Component Compatibility
        parachutists' individual equipment
        harness/container
        equipment release system
        weapons (container)
        equipment configuration/aerodynamics
        fit of components
Reliability/Validity of Biomechanical Measurements
Biomechanical Modeling

7. Aerospace Physiological/Medical Factors

Medical History
        cardiovascular condition
        medication
        nutrition
        dehydration
        alcohol/drug abuse
        prior illnesses/injuries
Physical Fitness
Flexibility
Muscular Strength
        maximal static (isometric) forces
        weight lifting capacity
        dynamic working capacity
        rotary motion
        reciprocal motion
        grip strength
        range of movement/mobility
Fatigue
        sleep/rest cycle
           duration of cycle
             short
             long
           deprivation
        jet lag

Physiological Measurements
    heart rate/rhythm
      electrocardiogram
    skin/sweat response
    blood pressure
    aerobic capacity
      VO2 max
    oxygen uptake
    blood work
    temperature
    acclimation
    biofeedback
Reliability/Validity of Physiological Measurements
Physiological Modeling
Anthropometric Factors
    body build type
    static body dimensions vs. dynamic dimensions
      height
      weight
      arm dimensions
        reach
        span
      leg dimensions
      hand dimensions
      foot dimensions
      torso dimensions
      head dimensions
      eye height
    handedness
    height/stature
    weight

8. Injuries/Illnesses

Head & Neck Injuries
Back & Torso Injuries
Hand, Wrist & Arm Injuries
Foot, Ankle & Leg Injuries
Sprains/Strains
Fractures
Dislocations/Separations
Burns
Cuts/Abrasions

Serious Incidents
     electric shock
     drowning
     strangulation
     asphyxiation
     fatality
Temperature Related Injuries
     frostbite
     hypothermia
     loss of dexterity
     dehydration
Vibration Related Injuries
Noise Related Injuries
Multiple Injuries to Same Jumper
Post Landing Injuries
Acute vs. Chronic Injury
Severity of Incapacitation
     catastrophic
     critical
     marginal
     negligible
Injury Rate
Injury/Fatality Prevention
     clothing (e.g. cold weather/rough terrain)
     personnel amplification devices
       ankle brace
       knee brace
     helmet
     oxygen system/mask
Motion Sickness
Altitude Disorders
     hypoxia (oxygen depletion)
     momentary unconsciousness
     decompression sickness
     nitrogen narcosis (bends, creeps, or chokes)
Pressure Change Disorders
Loss of Sensorimotor Abilities
Loss of Cognitive/Perceptual Abilities
Treatment
     drug therapy
     physical therapy
     cognitive therapy
     biofeedback therapy

9. Psychological Factors

Situational Awareness
      altitude awareness
Visual/Spatial Perception
      visual acuity
      visual tracking
      visual field
      visual discrimination
         depth perception
         figure/ground discrimination
         pattern discrimination
         texture discrimination
         form/shape perception
      binocular vision
      monocular vision
      brightness perception
      dark adaptation
      color perception
Navigational Ability
Somesthetic/Kinesthetic Perception
      motion perception
      spatial orientation
      body awareness
      tactile perception
      pressure sensation
      comfort perception
      temperature perception
      weight perception
Time Perception
      disorientation
Auditory Perception
      signal detection
      noise interference
      auditory direction
      auditory acuity
Sensory Adaptation
      sensory integration
         cross-modal interference
      orienting responses
         equilibrium

Motor Processes
        reaction time
        dexterity
        agility
        motor coordination
Cognitive Processes
        workload factors
            cognitive capacity
            number of tasks
            priority of tasks
            relationship of tasks
            time available to complete task(s)
        attention level
            fatigue
            vigilance
            arousal
        memory skills
        recognition vs. recall ability
        comprehension ability
        decision making strategies
        problem solving/reasoning skills
        learning skills
            habits
            generalizations
Psychological Stress
        fear
Psychological Measurements
Reliability/Validity of Psychological Measurements
Psychological Modeling

10. Personnel Attributes

Personality Characteristics
        motivation
        risk taking
        emotions
            emotional responses
            flight or fight response
            stress behaviors
            mental state detractors
            marital status/security
            time away from home/family

confidence level
        equipment confidence
        self confidence
        communications skills
Demographic Variables
        gender
        age
Geographic Region of Upbringing
        language barriers
Military vs. Sport Parachutist
Sport Parachutist
        relative work
Training/Education
        formal courses taken
        fidelity
            transfer of training
        instructor credentials
        refresher/sustainment training required
Knowledge, Skills & Abilities
        vocational aptitude
        expertise level
            student
            novice
            expert
        special qualifications
            military free-fall (MFF)
            jumpmaster
            rigger
        jump status
            on
            off
            permissive

11. Load/Cargo Attributes

Cargo Type
Rigged Cargo Weight
Rigged Cargo Height
Rigged Cargo Length
Load Position Relative to Exit
Extraction System Type
Number of Canopies
Type of Canopies

Platform Type
Platform Length
Release Assembly Type
Container Type
CVR System Used
Breakaway Rigging
Delivery System
     high velocity
     low velocity
     HAARS

12. Other Airdrop Human Factors Issues

History of Parachuting

B. Taxonomy of Airdrop Systems/Components

1. Static Line Personnel Parachute Assembly

Round Pilot Chute
Round Main Canopy
    T-10B/C
    MC1-1B
    MC1-1C
      gores
      modification windows
Round Reserve Parachute
    pack tray
      pack opening spring bands
    pilot chute
    bridle
    canopy
    ripcord
      grip
      cable/housing
      carrying handle
    pins
    cones
    grommets
Reefing/Disreefing Device
Deployment Bag
Static Line Suspension Lines
    suspension line keepers
Static Line Risers
Static Line Bridle
Anti-Inversion Net
Stow Loops
Parachute Pack Harness
    main lift web
    canopy/quick release assembly
    back straps
    leg straps
    chest straps
    ejector snaps
    lift-dot fasteners
    sizing channels
    D-Rings
Pack Tray

Parachute Pack
>   pack opening spring bands
>   pins
>   cones

2. Military Free-Fall Personnel Parachute Assembly

Free-Fall Pilot Chute
Square Main (RAM Air) Canopy
>   MC-4
>   MT1XX
>   MC-5
Free-Fall Suspension Lines
>   steering lined/control lines
>   deployment brake loops
>   control line guide rings
Slider
Trim Tabs
Steering Toggles/Brakes
Free-Fall Risers
Free-Fall Bridle
Canopy Actuation Device
>   static line
>   manually or automatically deployed ripcord
>   pin
>   stiffener plate
>   grip
>   cable/housing
Deployment Device
>   pilot chute
>   reserve static line (Stevens system)
Parachute Harness and Container Assembly
>   base ring of 3-ring canopy release
>   cutaway handle for 3-ring canopy release
>   equipment attachment rings
>   chest strap
>   leg straps
>   waistband
>   weapon tie-down loop
>   equipment lowering line attachment V-rings
>   main ripcord pocket
>   reserve ripcord pocket
>   reserve parachute risers
>   automatic opening device pocket

>   securing flap for O2 system
>   O2 fitting block
> Square Reserve (RAM Air) Parachute
>   free bag
>   reserve parachute deployment system
>   deployment bag
>   pilot chute
>   bridle
> MC4 Reserve (RAM Air) Parachute
>   control lines
>   deployment free bag

3. Tandem Personnel Parachute System

Oversized Main Canopy
Passenger/Bundle Harnesses
>   connector links
Hand Deployed Pilot Chute

4. Individual Equipment & Weapons Containers

ALICE Pack
CWIE
Kit Bag
M-1950 Weapons Container
>   standard
>   S.A.W. modified
>   60mm mortar
Dragon Missile Jump Pack (DMJP)
Stinger Missile Jump Pack (SMJP)
All Purpose Weapons & Equipment Container (AIRPAC)
>   weapons container
>   equipment container

Container Components/Attachments
>   quick release link
>   quick release snap
>   side securing straps
>   quick fit adaptors
>   lowering line attachment strap
>   lowering line adaptor web
>   lowering line ejector snap
>   carrying handle
>   tape
>   nylon cord

5. Container Release Assemblies

H-Harness
>   release tabs
>   lower leg tie-downs
Harness Single Point Release (HSPR)
>   release handle assembly
>   harness attaching straps
>   lower leg tie-downs
Parachutists' Individual Equipment Rapid Release (PIER2)
>   release handle assembly
>   snap shackle with hook
>   upper attachment strap
Harness Components
>   connector parachute links
>   safety pins
>   snap hooks
>   V-rings
>   lowering line stowage pocket
>   carrying handles
>   securing straps
>   leg retaining straps
>   quick release assembly
>   release knob
>   strap lug assembly
>   friction adaptors
>   wire & lanyard

Lowering Devices
        hook, pile, tape (HPT) assembly
        lowering line
        lowering strap
        link assemblies
        lowering line adaptor web
        ejector snaphooks
        retainer bands

6. Individual Protective/Life Support Equipment

Helmet
        liner
        headband
        neckband
        chin strap
        camouflage cover
Gloves
Goggles
Boots
NBC Overgarments
NBC Mask
Cold Weather Garments
Parachutists' Rough Terrain System (PRïS)
Automatic Opening Device (AOD)
Oxygen System
        oxygen mask
        oxygen hose
        oxygen cylinders
        on/off valve
        prebreather
Floatation Devices
        life preserver
Scuba Gear
Ankle Braces
Knee Braces/Pads

7. Cargo/Resupply Parachute Assembly

Cargo/Resupply Main Canopies
- G-11B
- G-11C
- G-12D
- G-12E
- G-13
- G-14
- 26-ft
- T-10
- 12-ft high velocity

Cargo/Resupply Pilot Parachutes
- 68-inch

Cargo/Resupply Extraction Parachutes
- 15-foot
- 22-foot
- 26-foot
- 28-foot
- 35-foot

8. Cargo/Resupply Container Systems

A-7A Cargo Sling Assembly
- sling straps (4)
- parachute harness adapters/friction adapters
- D-rings

A-21 Cargo Bag Assembly
- sling assembly
  - scuff pad
  - fixed quick release strap/assembly
  - O-ring straps
  - quick release straps (3)
- cover

A-22 Cargo Bag Assembly
- sling assembly
  - scuff pad
  - support web
  - D-rings
  - tiedown straps
  - lateral straps

cover
        suspension Webs (4)
        skid
Double A-22 Cargo Bag
        special components
           plywood/reinforced skids
A-23 Cargo Bag
High Speed Aerial Delivery Containers
        high speed airdrop container (HISAC)
        CTU-2/A container
Aerial Resupply and Accompanying Bundle System (ARABS)
Steel Strapping
Commonly Used Container System Items
        textile items
           type III nylon cord
           1/2-Inch tubular nylon webbing
           80 pound cotton webbing/1/4-inch tape
           cotton thread (#: 8/4, 8/7, 5, 3)
        wood items
        miscellaneous items
           two-inch adhesive
           cellulose wadding and felt sheets
           energy dissipating materials
              honeycomb
Other Container System Components
        adhesive paste
        altitude sensor
           sensor with retention line
           cutter assembly
        clevis assembly, suspension
        clevis (shackle), suspension
        link assembly L-bar
        modular type-V Platform
        V-rings
        wedge kit

9. Cargo/Resupply Platform Systems

Platforms
        type V airdrop platform
        type II modular platform
        LAPE modular platform
Cargo Slings

Cargo Parachute Release Assemblies
    M-1 release
    M-2 release
Link Assemblies
    two-point links
    four point link
    extraction force transfer coupling (EFTC) link assembly
    type V link
        type V link cover
    articulating link
Clevis Assemblies
    large clevis
        large clevis cover
    medium clevis
    type V clevis
Modification Hardware Items
    load binder
    attitude control bar
    D-ring
Straps and Webbing
    60-inch connector strap
    120-inch connector strap
    shear strap
    15-foot tiedown assembly
    parachute release straps
        guillotine knife
        V-knife
        multi-cut
Commonly Used Platform System Items
    textile items
        type III nylon cord
        1/2-inch tubular nylon webbing
        80 pound cotton webbing/1/4-inch tape
        cotton thread (#: 8/4, 8/7, 5, 3)
    wood items
    miscellaneous items
        two-inch adhesive
        cellulose wadding and felt sheets
        energy dissipating materials
            honeycomb

Other Platform System Components
    adhesive paste
    altitude sensor
        sensor with retention line
        cutter assembly

10. Tools & Equipment for Rigging

Packing Tables
Line Separators
Stow Hooks
Parachute Shakeout/Drying Tower
Technical/Instructional Manuals
Sewing Machines
Stitchless/Ultrasonic Repair Equipment

11. Tools & Equipment for Derigging

Heavy Drop Derigging System (HDDS)
Knife
Screwdriver
Wrench
Impact Wrench
Tin Snips
Hammer

12. Aircraft Components

Jump Platforms
Jump Doors
Jump Lights
Static Line Anchor and Cable System
Air Deflectors
Troop Seats
Floor
Emergency Equipment
    hung/towed jumper retrieval system
    first-aid kit
Rollers

13. Training Devices

Lateral Drift Apparatus
Suspended Harness
Hand-Towed Drag Bar
Training Tower
      34-foot tower
      250-foot tower
Aircraft Mock-Up
Mock Door
PLF Platform
Swing Landing Trainer
Wind Machine/Tunnel

14. Other Airdrop Systems/Components

Guidance Systems
      transmitter
      receiver
      Global Positioning System (GPS)

Appendix B:
Suggestion and Comment Form

Appendix B. Suggestion and Comment Form

The space provided below may be used to inform database maintenance personnel of literature not presently included in the database that you feel should be. Please be sure to provide the <u>actual</u> article reprint or book being suggested. The space may also be used to report trouble you experienced while operating the system and/or suggestions for improving the system.

Completed forms can either be left at the PC designated as the AAIRS-HFD workstation, or if the system is being used on another PC, forms can be returned to personnel responsible for distributing the system software. Thank you for your time and cooperation.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name

_____

Organization and Phone #

Appendix C:

Installation Instructions

Appendix C. Installation Instructions

Hardware and software requirements, which are outlined in Section 2.2.1 and Section 2.2.2 of this manual, should be carefully adhered to.

Before installing the system, it is necessary to check the contents of a DOS file called config.sys. The file may contain files = xx and buffers = xx statements, where xx is a variable number. In order for AAIRS-HFD to run properly, the files statement should equal at least 100 and the buffers statement should equal at least 40. If the statements are already set for at least the recommended amounts, leave the file as is and continue with the following installation instructions. If the files statement is less than 100 or the buffers statement is less than 40, use a text editor to set them appropriately. If there are no files or buffers statements, add each statement on a new line of the config.sys file by using a text editor. Be sure not to delete or modify any other lines of the config.sys file (if any are present) -- they are there for a reason. It should be noted that setting either or both of these statements to a number higher than the recommended amounts, will not improve the efficiency of the system and may even decrease efficiency. Existing config.sys files with statements higher than the recommended amounts should be left as is, however, because the higher settings may be necessary for the proper operation of other applications. **DO NOT FORGET TO REBOOT YOUR SYSTEM IF YOU MODIFY YOUR CONFIG.SYS FILE**.

After all hardware and software requirements and configurations have been met, installation of the system may be initiated with the install.bat hatch file. Due to different hard and floppy drive configurations of various computer systems, it is necessary to enter the source and target drive designator after the "install" command.

To begin, insert the Utilities Diskette into the desired floppy drive and type the appropriate command as shown in Table C-1 (other drives may be substituted if necessary).

Table C-1. Installation Commands for AAIRS-HFD.

What To Type:	What Will Happen:
a:install a: c:	Installs system from floppy drive A: to hard drive C:
b:install b: c:	Installs system from floppy drive B: to hard drive C:
a:install a: d:	Installs system from floppy drive A: to hard drive D:
b:install b: d:	Installs system from floppy drive B: to hard drive D:

After entering the appropriate batch file command, the user will be prompted for each diskette that makes up the AAIRS-HFD System. At the time of publication, there was one Utilities Diskette containing installation, backup, and utility files, one Keywords Diskette containing keywords and keyword descriptions files, two System Diskettes containing the executable system file, one Source Diskette containing the source database and text file and one Relations Diskette containing keyword relations files. Note that, as the size of the database increases, so may the number of diskettes required to store the system. The installation batch file is designed to accommodate additional diskettes as the size of the system increases. The contents of each diskette are listed in Table C-2.

Table C-2. AAIRS-HFD Diskette Contents.

Diskette:	Contents:	
Utilities Diskette #1	install.bat	install2.bat
	airsys.dbf	hfi.dbf
	location.dbf	stype.dbf
	foxuser.dbf	foxuser.fpt
	foxswap.com	back.bat
	read.me	
Keywords Diskette	a1.dbf	a1.fpt
	a2.dbf	a2.fpt
	a3.dbf	a3.fpt
	a4.dbf	a4.fpt
	a5.dbf	a5.fpt
	a6.dbf	a6.fpt
	a7.dbf	a7.fpt
	a8.dbf	a8.fpt
	a9.dbf	a9.fpt
	a10.dbf	a10.fpt
	a11.dbf	a11.fpt
	a12.dbf	a12.fpt
	a13.dbf	a13.fpt
	a14.dbf	a14.fpt
	i1.dbf	i1.fpt
	i2.dbf	i2.fpt
	i3.dbf	i3.fpt
	i4.dbf	i4.fpt
	i5.dbf	i5.fpt
	i6.dbf	i6.fpt
	i7.dbf	i7.fpt
	i8.dbf	i8.fpt
	i9.dbf	i9.fpt
	i10.dbf	i10.fpt
	i11.dbf	i11.fpt
	i12.dbf	i12.fpt
	sidas.idx	sidhf.idx
System Diskette #1 *	backup.001	control.001
System Diskette #2 *	backup.002	control.002
Source Diskette #1 **	backup.001	control.001
Relations Diskette #1 ***	backup.001	control.001

*   When installed, these files are restored to aairs.exe on the hard drive.
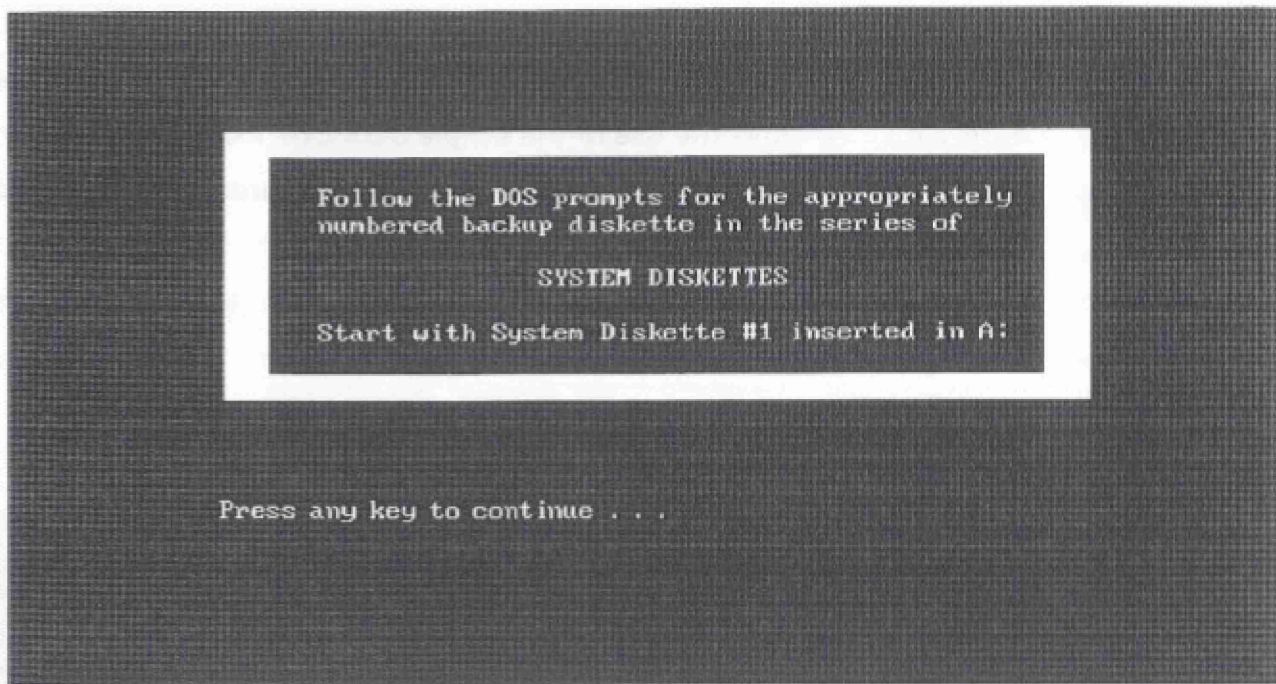**   When installed, these files are restored to sources.dbf and sources.fpt on the hard drive.
***   When installed, these files are restored to relateas.dbf and relatehf.dbf on the hard drive.

Installation of the Utilities Diskette occurs upon entry of the appropriate installation command found in Table C-1. Next, the user is prompted for the Keywords Diskette which employs the use of the simple DOS COPY command. Upon entering the correct diskette and pressing any key, the files are automatically copied onto the hard drive (see Figure C-1), and the system prompts the user for the next diskette in the series. If the user inserts an incorrect diskette, the prompt for the correct diskette is repeated. When the correct diskette is inserted, installation calls for the next diskette in the series.
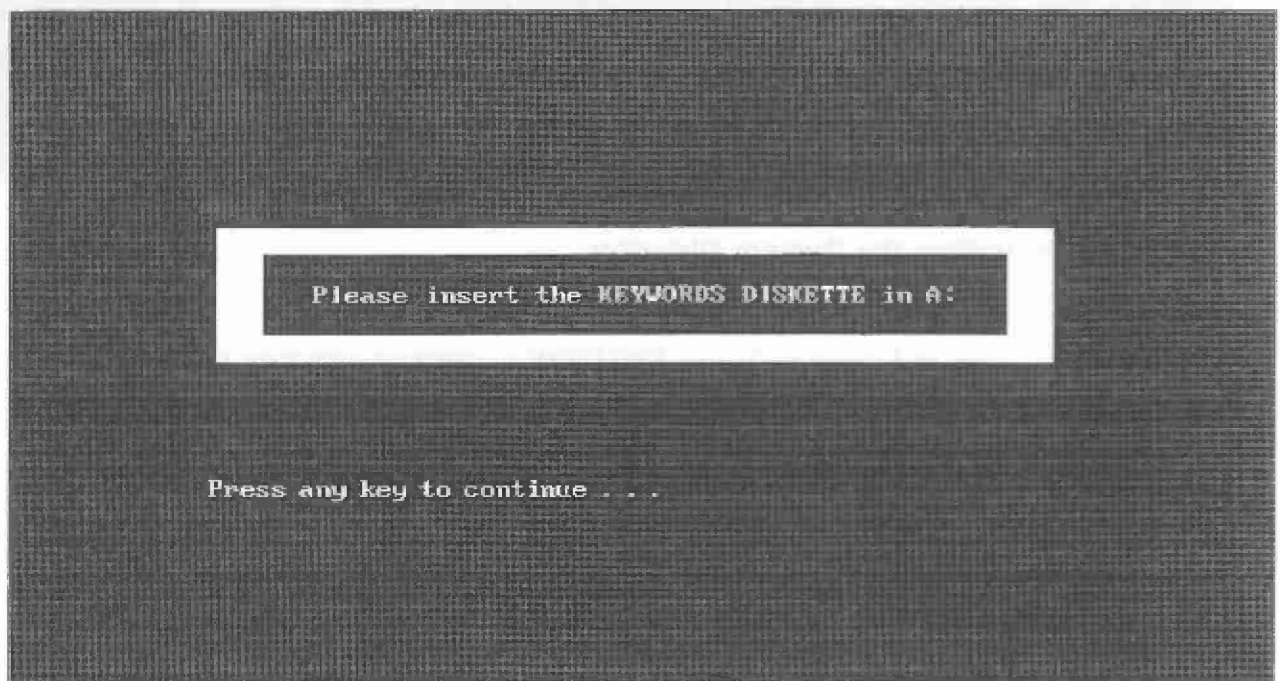
Figure C-1. Installing the Keywords Diskette.

Next, the user is prompted for the System, Source and Relations Diskettes which employ the use of the more involved DOS RESTORE command. Files installed with the DOS restore command are those that may eventually, if not already, occupy more than one floppy diskette. The System Diskettes are prompted for with a message similar to that displayed in Figure C-2.

```
Follow the DOS prompts for the appropriately
numbered backup diskette in the series of

          SYSTEM DISKETTES

Start with System Diskette #1 inserted in A:



Press any key to continue . . .
```

Figure C-2. Installing the System Diskettes.

As displayed in Figure C-2, the RESTORE command requires the user to start with the first diskette of the series being installed inserted in the designated floppy drive. After pressing any key, however, the restore command repeats the prompt to insert a diskette. This second prompt for inserting diskette # 1 can be ignored because the user has already inserted the first diskette. Upon inserting the correct diskette from the appropriate series and striking any key to continue, the file is automatically restored, and the user is prompted for the next diskette in the series (if any). If the user inserts an incorrect diskette, the prompt for the correct diskette is repeated. When the correct diskette is inserted, installation proceeds with the next diskette in the series. The Source and Relations Diskettes are installed similarly to the Source Diskettes. When the entire system has been loaded, DOS returns a message (see Figure C-3).
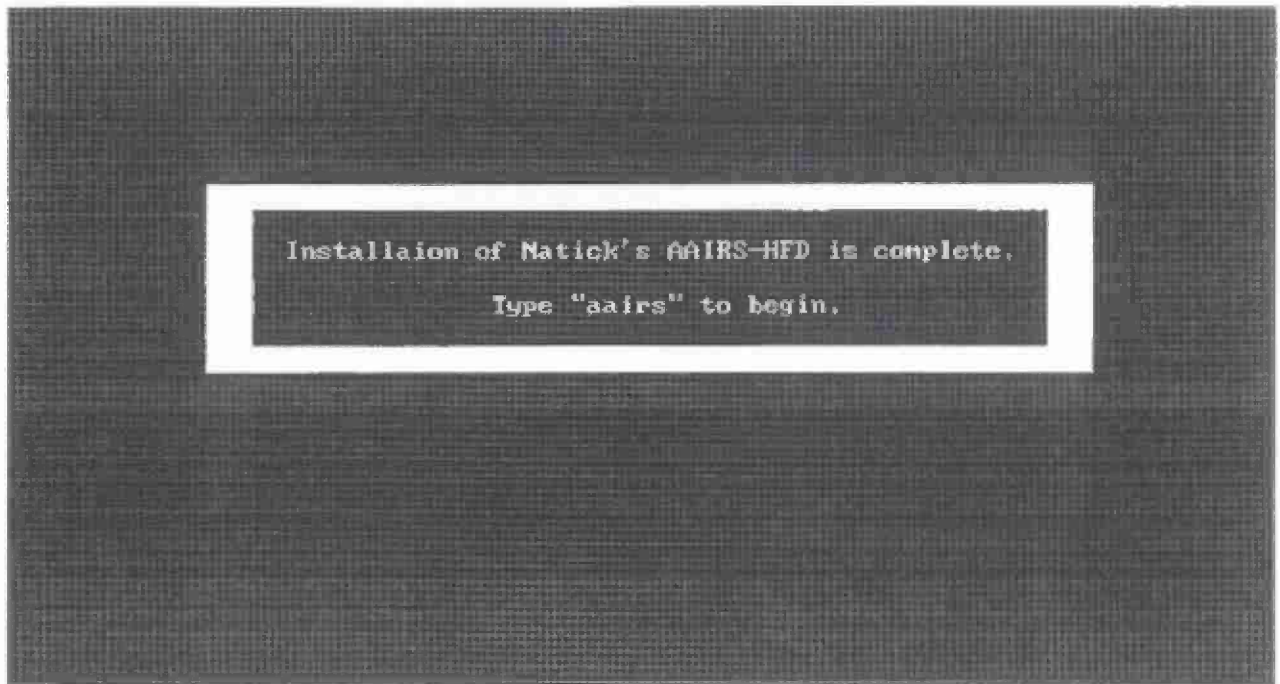
Figure C-3. A successful installation of AAIRS-HFD.

Appendix D:

Alphabetical Listing of Error Messages

Appendix D. Alphabetical Listing of Error Messages

The following messages are not covered in the body of the manual. Most will only occur if proper operating procedures are not followed, or if there is trouble with the hard disk or operating system of the host PC.

Bad command or filename

This is a DOS error that may occur when attempting to begin a working session with AAIRS-HFD. Check the AAIRS-HFD database directory for the executable file called aairs.exe. If not there, check for *.exe. If there is another .exe file, try typing it followed by a ←. If there are not other .exe files, follow instructions in Appendix C and reload the system. This error may also occur while trying to install the system on a computer that is supported by DOS version 3.3 or earlier.

C:\path\filename.ext already exists, overwrite?

This type of error is due to an improper shut down of the system. Note that the drive, path, file name and file extension will vary depending on the file in question. The user should respond "Yes" to the overwrite request. The files being overwritten are of a temporary nature and would have been deleted if the system had been shut down properly.

Cannot create file

The operating system has returned an error to FoxPro indicating that the new file cannot be created. The inability to create a new file is usually the result of a full disk or directory. You may receive this error while conducting either a text or a keyword search. Temporary files created by the system during searches are not obvious to the user because their creation is hidden. If this error occurs, cancel the operation and check the hard disk for available space.

Cannot update file

This error message is very unusual and only appears if a serious problem such as a full hard disk or total disk failure occurs while FoxPro is attempting to write to the hard disk. Choosing "ignore" in response to this error may be all it takes to get around this error message. Running the DOS utility CHKDSK with the /f option, may also reduce the chances of this error occurring.

File does not exist

The file you have specified does not exist. Try entering file again, being careful to include a path if the text file for import resides in a directory other than Natick's AAIRS-HFD directory. Also, be sure to include the file extension.

File read error

An error was returned by the operating system while FoxPro was attempting to read a file. System files that are unable to be read may reside on a bad sector of the hard disk. Consult DOS manual(s) for host PC.

File write error

An error was returned by the operating system while FoxPro was attempting to write a file. Most often, this error is the result of an attempt to write to a write-protected diskette, but may also be the result of a bad sector on the hard disk. Consult DOS manual(s) for host PC.

Index does not match database file

The index expression for the current index uses variables which are not contained within the current database. This error should not occur unless the system has been corrupted; try reloading system if error persists after canceling the operation and rebooting.

Insufficient memory

There was not enough memory for FoxPro to complete an operation. Cancel the operation and try rebooting and/or removing any memory-resident programs that may currently be installed on host PC.

Internal consistency error

An internal FoxPro table has been corrupted. If this error occurs, inform personnel responsible for maintaining the database; contacting the FoxPro Technical Support Line may be necessary.

Invalid character in command

A source line of code contains an invalid character. This is probably caused by corruption of the system files. Reloading of the system from uncorrupted disks is recommended.

Invalid drive specification

The floppy and/or hard drive specified during installation or backup of the system is not valid. Abort the operation and try again with correct drive designator.

Invalid or missing resource file

Either the FoxPro resource file (FOXPRORT.RSC) could not be found (in the system directory or along the DOS path), or the resource file found has been corrupted. Try reloading uncorrupted copies of the system disks.

Invalid directory

Check to be sure the system was in fact installed in the aairs directory. The system may have been installed in a directory other than aairs or it may have been removed from the host PC all together.

Memo file is missing/invalid

An attempt was made to use a database file whose associated memo file (.DBT or .FPT) has been deleted, corrupted or cannot be found. Try loading an uncorrupted copy of the system disks.

Menu is already in use

An attempt has been made to activate a menu that is already active. This occurs if the keys are quickly and erratically pressed. Choosing "ignore" when s error occurs will solve the problem.

No memory for buffer, file map, or filename

It is impossible to allocate memory for a buffer or a FoxPro internal resource. This message is very unusual and will occur only in situations where available memory is extremely limited. Consider adding memory to the host PC or removing some memory resident programs to give FoxPro more working memory.

Not enough memory to use database

There was not enough memory to open an additional database. Try removing some memory resident programs to give FoxPro more working memory.

Not ready error reading drive A

Abort, Retry, Fail?

DOS returns this error when a diskette is not inserted in the floppy drive specified during installation or backup of the system. To continue the operation, insert appropriate diskette in designated drive and press "R" for Retry. To cancel the operation, press "A" for Abort.

OS memory error

There is a problem with your DOS free memory chain. Consult DOS manual(s) for host PC.

Popup is already in use

An attempt has been made to activate a popup that is already active. This error occurs if the keys are quickly and erratically pressed. Choosing "ignore" when this error occurs will solve the problem.

Position is off the screen

A row or column number specified in the system is larger than the number of rows or columns on the screen, window or printer. Operation of the system on a PC that has a monitor smaller than standard size or a printer with width smaller than 8 1/2" may cause this error.

Printer not ready. Retry?

The printer device specified is currently not accessible or the printer may be off line. Be sure printer is on line and ready for data, and then choose to continue with the request. Please note that this error also occurs during the cancellation of a print job and should be treated as specified in the appropriate section of this report.

Record is not in index

A database for a keyword list in use has been modified without the index having been active or reindexed. Choosing "ignore" in response to this error should solve the problem.

Run/! command failed

Most often this error message is a result of insufficient free memory to support the execution of a DOS command from within FoxPro. This will likely occur while the system is resetting itself after a search or while the backup option of the development version is being run. It is suggested that the user cancel the operation and follow the guidelines below.

Firstly, the command.com file must be accessible via the DOS environment variable COMSPEC. Secondly, memory resident programs, such as shells loaded prior to start

up of the database, should be cleared from memory before trying the operation again. Due to canceling operation of the database during a search, a subsequent search may generate an error message that states: "C:\path\filename.ext already exists, overwrite?" Simply follow suggestions listed for this error message.

Too many files open

FoxPro has attempted to open more than its internal limit of files. This may be caused by the config.sys files statement not being set high enough. Choose to "cancel" the request and check DOS config.sys file (see Appendix C, Installation Instructions).

Unable to create temporary work file(s)

The database system has attempted to create temporary work files and was not permitted by the operating system. This is caused by a full directory or a permissions problem concerning access to the system directory.

Use of transgressed handle

If this error occurs, inform personnel responsible for maintaining the database; contacting the FoxPro Technical Support Line may be necessary. There may be a memory conflict; try cleaning up your autoexec.bat file of any memory management or memory resident programs or files and rebooting.