Special Report 23

Fort Bliss Field Unit
Fort Bliss, Texas
1974-1994

19970722 135

November 1995

United States Army Research Institute
for the Behavioral and Social Sciences

DISTRIBUTION STATEMENT A
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REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy) November 1995	2. REPORT TYPE Final	3. DATES COVERED (from. . . to) November 1974 - June 1994
4. TITLE AND SUBTITLE Fort Bliss Field Unit, Fort Bliss, Texas 1974 - 1994		5a. CONTRACT OR GRANT NUMBER 5b. PROGRAM ELEMENT NUMBER 0605803A
6. AUTHOR(S) (in alphabetical order) U.S. Army Research Institute		5c. PROJECT NUMBER D730 5d. TASK NUMBER 2131 5e. WORK UNIT NUMBER H08
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 5001 Eisenhower Avenue Alexandria, VA 22333-5600		8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 5001 Eisenhower Avenue Alexandria, VA 22333-5600		10. MONITOR ACRONYM ARI 11. MONITOR REPORT NUMBER Special Report 23

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT *(Maximum 200 words)*:

In 1974, the U.S. Army Research Institute for the Behavioral and Social Sciences established a research unit at Fort Bliss, Texas to perform training research for the U.S. Army Air Defense Artillery Center and School. For two decades, the Fort Bliss Research Unit made numerous contributions not only to training in the air defense environment but Army-wide. These contributions included application of the systems approach to a variety of training issues, cost and training effectiveness analysis methodology, and training effectiveness evaluation. This report summarizes the programs and accomplishments of the Fort Bliss Research Unit, and provides a reference list of documents reflecting those accomplishments.

15. SUBJECT TERMS

Training effectiveness evaluation Air defense artillery Cost and training effectiveness analysis RADES MOPADS

SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON (Name and Telephone Number)
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified	Unlimited	22	David Witter 703-617-0324

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FOREWORD

In 1974, the Army Research Institute established a research unit at Fort Bliss, Texas to perform training research for the U.S. Army Air Defense Artillery Center and School. In the ensuing twenty-year period, the Fort Bliss Research Unit made numerous contributions not only to training in the air defense environment but Army-wide. These contributions included application of the systems approach to a variety of training issues, cost and training effectiveness analysis methodology, and training effectiveness evaluation.

On 30 June 1994, as a result of downsizing, this research unit was closed and its functions transferred to other ARI research units.

In the tradition of military unit histories, this report summarizes the programs and accomplishments of the Fort Bliss Research Unit of the Army Research Institute, and provides a reference list of documents reflecting those accomplishments.

EDGAR M. JOHNSON
Director

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Background

The Fort Bliss Field Unit (FBFU) was established in November 1974 to fill the void created by the disestablishment of the HumRRO (Human Resources Research Office) Unit at Fort Bliss (due to congressional reductions of support contractors). While training was to be the major area of research, the Field Unit Chief believed that the FBFU mission should encompass relatively specific research requirements for the U.S. Army Air Defense Artillery Center & School as well as projects with broad applicability to the Army. This concept was implemented by the establishment of two research teams, one to focus on training research in support of Army air defense and the other to examine Army-wide training systems issues. The two-team concept persisted throughout the life of the FBFU.

The early years of the FBFU (1975-1983) featured a focus on developing a systems approach to training. Instructional System Development (ISD) was popular at the time, and personal computers (PCs) had not yet been developed. FBFU research investigated the applicability of computer-based support concepts to assist in such tasks as identifying (1) critical tasks for training, and (2) the most effective methods and media (Pieper, Guard, Michael, & Kordak, 1979). Some of the basic tenets of the systems approach to training also led to (1) a functional analysis of electronic maintenance to determine the value of teaching basic electronics, (2) a field-oriented training system called the Training Implementation Program (TIP) designed to train those skills which were essential for the conduct of the Battalion Training Management System, and (3) the development (Brett, Chapman, & Saunders, 1985) and demonstration (Winne, 1985) of a Collective Front-End Analysis methodology.

Much of the work during this period was supportive of Training and Doctrine Command (TRADOC) efforts to prepare cost and training effectiveness analyses (CTEA) which were to be an essential input to the required cost and operational effectiveness analysis (COEA) (Hanson & Purifoy, 1978; Jorgensen, 1978, 1979; Jorgensen & Hoffer, 1978; Matlick, Berger, Knerr, & Chiorini, 1980; Matlick, Berger, & Rosen, 1980). The FBFU, working closely with TRADOC Systems

Analysis Activity (TRASANA) at White Sands Missile Range, developed a methodology for conducting CTEAs which, while not officially adopted, was used as a basis for a TRASANA training course on conducting CTEAs.

In the mid-eighties, the FBFU initiated a major effort in support of TRADOC and the Operational Test and Evaluation Agency (OTEA). The project developed Training Effectiveness Evaluation methods for new system training in support of Operational Test IIs (Fishburne & Rolnick, 1985; Larsen, Rolnick, & Fishburne, 1985; Rolnick, Fishburne, & Nawrocki, 1985).

As an entity, FBFU was faithful to its mission of serving the Army and Air Defense Artillery by making the best use of its scientific resources and research and development funding. Over the years, the FBFU provided valuable Technical Advisory Service to the Air Defense School. Many human factors evaluation sections of major air defense system test and evaluation reports were prepared by FBFU scientists. Through presentations at professional meetings and technical publications, the scientists at FBFU communicated the results of projects which were both valuable to the Army and made important contributions to the research community.

While some of the FBFU exploratory research influenced advanced development projects, there were at least two major obstacles to more complete implementation. The first was a lack of training systems analysts and expertise within the combat development community. There was a major effort to develop such a capability at TRASANA, but, overall, training considerations did not have as much clout as other factors such as cost, scheduling, and performance. Thus, training did not fare well in the Program Objective Memorandum (POM) process. The lack of a standard CTEA methodology also hampered efforts to institutionalize the inclusion of training in the system acquisition process.

A second obstacle, again related to a lack of emphasis on training, was a difficulty in maintaining adequate in-house staffing within the TRADOC schoolhouses. Thus, for example, when it came time to meet the requirement for identifying critical training tasks for a given

system, the Army often turned to the system contractor who would extract some maintenance tasks from the Logistical Support Analysis Record (LSAR). Operator tasks seldom appeared. Much of the other training-related work was contracted. Thus, ISD tools, such as the Training Developers Decision Aid, did not have a sufficient in-house target audience to achieve widespread use.

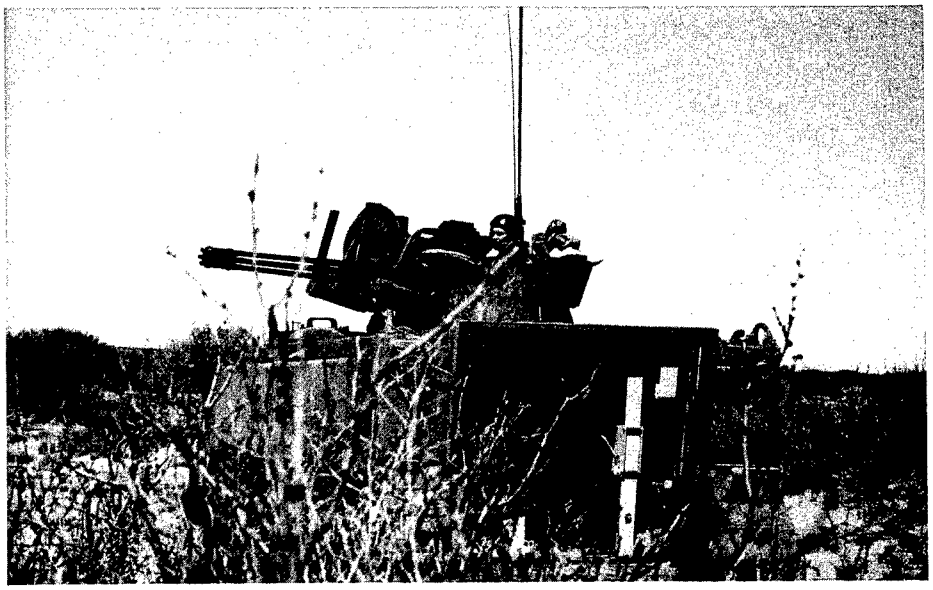
The public's demand for a smaller military establishment and the high degree of support of Army air defense systems by non-Army appropriations such as Ballistic Missile Defense contributed to the decision to close the FBFU. The Army establishes and disestablishes activities to meet its needs.

Research Products and Programs

ADA Test Beds

In the early seventies, HumRRO had collected data on soldier performance in the engagement of aircraft (e.g., Baldwin, Cliborn, & Foskett, 1976). These data resulted from many experiments which looked at individual tasks such as search, detection, identification, tracking, and firing. There was a lack of data on performance during the entire sequence of tasks from alert (of approaching hostile aircraft) to firing. The FBFU was successful in obtaining command support and outside funding to develop the Realistic Air Defense Engagement System (RADES) which used scale models of friendly and hostile aircraft in a simulation in which all critical air defense operator task performance was scored. Originally, it was hoped that a sophisticated transponder technology would permit several aircraft to be in the air simultaneously, but this turned out to be unachievable.

RADES was originally a single team assessment facility. Over the years, it expanded to permit data collection from four teams simultaneously. Other technological improvements led to the final version of RADES known as the Range Target System (RTS).



While the concept of a generic low-altitude air defense training system had merit in principle, in practice most training devices resulted from individual budget actions associated with individual air defense systems such as Stinger, Chaparral, Avenger, etc. The system acquisition way of doing business did not allow for a general purpose trainer except through Project Manager—Training Devices (PM TRADE) which assigned a relatively low priority to the generic air defense trainer.

In spite of the fact that the RTS did not find its way into the Army inventory of training devices, it nevertheless yielded very valuable operator performance data to assist in such key areas as assessing the likelihood of a friendly fire casualty. Key publications from the project include Barber, 1990(a), 1990(b); Barber & Drewfs, 1987; Berry, 1992(a), 1992(b), 1992(c); Berry & Barber, 1990(a), 1990(b); Drewfs & Barber, 1990; Drewfs, Barber, Johnson, & Frederickson, 1988; Frederickson & Dawdy, 1982; Gast & Johnson, 1990; Johnson, Barber, & Lockhart, 1988; Johnson & Silver, 1992; Silver & Lockhart, 1993; and Silver, Lockhart, Redmond, & Brawner, 1993.

Air defenders are faced with two engagement environments. The RTS was developed for the type of engagement in which the gunner searches the sky for the aircraft he may eventually engage. However, other air defenders are located in vans (e.g., Hawk, Patriot) and take actions based on computer-generated information displayed on a video screen. The desire to measure operator performance in this environment led to the development of a high to medium altitude (HIMAD) test bed. The major objective in this research program was to identify the parameters within which the fully automatic mode of operation was superior to the semiautomatic mode in which a human operator had to execute the recommendation made by the computer (Hawley, Howard, & Martello, 1982; Jorgensen & Strub, 1979).

One of the most useful products resulting from the HIMAD test bed research was the performance assessment capability (PAC) (Brett & Allender, 1990), which the Air Defense School recommended for incorporation into a future upgrade of the Patriot software. The PAC provided various levels of detail of analysis as required by the user.

Modeling and Simulation

Models, or more precisely, parametric equations of the behavior for phenomena of interest, represent a potentially valuable descriptive and predictive tool. While models do not invent data, they do help pinpoint areas where more exacting research investigations ought to yield fruitful results. Throughout FBFU's history, there has been an interest in developing operator models. Project models of operator performance in air defense systems (MOPADS) demonstrated the value of including the operator in the overall modeling equation (Polito, 1984; Wortman, Hixson, & Jorgensen, 1979). During the period 1988-1994, the FBFU was active in promoting this technology through the Military Operations Research Society's Working Group on Soft Factors in Military Modeling and Analysis.

Operator Workload

For models of human performance to be valid, they must reflect significant changes in operator performance occasioned by such phenomena as freedom, demand, and stress. This need led to the establishment of a program of research to identify the most promising operator workload tools or methods to use in modeling operator performance in Army systems. The project generated many valuable reports, including a comprehensive version of operator workload methods (Lysaght, 1989), manager's guide (Christ, 1993; Christ, Bulger, Hill, & Zaklad, 1990), and operator workload analyses on many different Army systems (Hill, Iavecchia, Bittner, Byers, Zaklad, & Christ, 1992).

Organizational Design

In recent years, the practice of organizing Army units around World War II and cold war scenarios has been questioned. The FBFU sensed that the need to be more flexible in designing units to meet modern missions could be addressed by exploiting the potential of PC-based job aids. Systematic Organizational Design (SORD) allowed force designers to use standard software to ensure that all resulting designs followed the same set of procedures (Kellner, Conroy, & Christ, 1992). SORD received high marks from TRADOC, which published a regulation (AR 71-17) directing its use.

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Fort Bliss Personnel History

Establishment

The Fort Bliss Field Unit was established November 24, 1974, to fill the void created by a congressionally mandated change in Human Resources Research Office's (HumRRO) status. This decision led to deactivation of HumRRO Unit 5 and the Training and Doctrine Command (TRADOC) Human Resource Unit (HRU) at Fort Bliss. The unit's mission was to conduct behavioral science research and development activities in support of the U.S. Army Air Defense Artillery School and Center at Fort Bliss, Texas.

Staff

Staffing of the new Army Research Institute Fort Bliss Field Unit was completed by mid-1975. Personnel and positions were as follows:

Dr. Michael Strub, Field Unit Chief
MAJ Jack Reilly, Research and Development Coordinator
Dr. John Lockhart, Senior Research Psychologist
Dr. Charles Jorgensen, Research Psychologist
Ms. Nancy Mosier, Administrative Assistant
Ms. Marie Manrique, Clerk Typist
SPC Christine Fischer, Behavioral Science Specialist (from HRU)
SPC Nadine Jones, Behavioral Science Specialist (from HRU)

By the early 1980s, the field unit had grown and consisted of:

Dr. Michael Strub, Field Unit Chief
MAJ William Hink, Research and Development Coordinator
Dr. John Lockhart, Team Leader
Dr. Charles Jorgensen, Senior Research Psychologist, Team Leader
Dr. Charles Howard, Research Psychologist
Dr. Bruce Taylor, Research Psychologist
Mr. Richard Carter, Research Psychologist

Mr. Gary Sarli, Research Psychologist
Ms. Jeri Price, Psychology Technician
Mr. Kenneth Reynolds, Psychology Technician
Mr. John Davis, Psychology Technician
Ms. Nancy Mosier, Administrative Assistant
Ms. Rheba Ward, Clerk Typist
Mr. James Mays, Clerk Typist
SPC Earl Davis, Behavioral Science Specialist

Over the years, with the exception of Drs. Strub and Lockhart, people came and went. They included:

MAJ Wayne Williams, Research and Development Coordinator
MAJ Terry Tipton, Research and Development Coordinator
MAJ Steve Waters, Research and Development Coordinator
MAJ Mark Levitt, Research and Development Coordinator
Dr. John Hawley, Team Leader
Dr. Richard Christ, Team Leader
Dr. David Johnson, Senior Research Psychologist
Dr. Rene DePontbriand, Senior Research Psychologist
Mr. Robert Schwalm, Research Psychologist
Mr. Edward Dawdy, Research Psychologist
Mr. Kenneth Reynolds, Research Psychologist
Dr. Laurel Allender, Research Psychologist
Mr. William Sanders, Research Psychologist
Dr. Michelle Sams, Research Psychologist
Dr. Joan Silver, Research Psychologist
Dr. Loren Wurzman, Research Psychologist
Mr. Steve Kubala, Computer Programmer
Mr. Robert Fulham, Psychology Technician
Mr. Alan Hunt, Psychology Technician
Mr. Donnice Carter, Psychology Technician
SP Glen Braden, Military Specialist
SPC Kenneth Thomas, Military Specialist
Ms. Bonnie MacDonald, Administrative Assistant
Ms. Marilyn Hart, Administrative Assistant
Ms. Norma Thomas, Administrative Assistant
Ms. Anita Peterson, Administrative Assistant
Ms. Nancy Crumley, Secretary

Ms. Rose Bethke, Secretary
Ms. Lavonne Halburton, Clerk Typist
Ms. Norma Torres, Clerk Typist
Ms. Sharon Luzadder, Clerk Typist
Ms. Estella Slaughter, Clerk Typist

Field Unit Awards

In 1985, Dr. Lockhart and Dr. Strub received a Department of the Army Research and Development Achievement Award for Technical Achievement. In 1988, the Fort Bliss Field Unit was listed by ARI as a Center of Excellence.

The Fort Bliss Field Unit was closed June 30, 1994.