

HumRRO

AD701289

Fiscal Year 1970

Work Program

for

The Department of the Army

Contract DAHC 19-70-C-0012

December 1969

HUMAN RESOURCES RESEARCH ORGANIZATION



DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT
WASHINGTON, D.C. 20310

CRDBES

24 September 1969

SUBJECT: Approved FY 70 Work Program, Human Resources Research
Organization, Inc. (HumRRO)

SEE DISTRIBUTION

1. Forwarded for your information and retention is the subject program. The program will be conducted by HumRRO subject to the availability of funds.
2. HumRRO conducts behavioral sciences research in the fields of training methods, requirements for training devices, motivation and leadership. Ideas and suggestions for additional research in these fields may be submitted by an Army staff agency, command or individual under the procedures outlined in paragraph 5, AR 70-8. Informal, direct communication with the President of HumRRO is authorized.

FOR THE CHIEF OF RESEARCH AND DEVELOPMENT:

A handwritten signature in black ink, appearing to read "G. M. Snead, Jr.", written over a horizontal line.

GEORGE M. SNEAD, JR.
Brigadier General, GS
Director of Army Research

1 Incl
as

Fiscal Year 1970
Work Program

for

The Department of the Army

**Research and Development in
Training, Motivation, and Leadership**

December 1969

HUMAN RESOURCES RESEARCH ORGANIZATION (HumRRO)

The contents of this publication are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

Published

December 1969

by

HUMAN RESOURCES RESEARCH ORGANIZATION (HumRRO)

300 North Washington Street
Alexandria, Virginia 22314

Distributed under the authority of the
Chief of Research and Development

Department of the Army
Washington, D.C. 20310

FOREWORD

I. THE HumRRO PROGRAM OF RESEARCH for the Department of the Army

A. Purposes and Origins of the Research Program

The Human Resources Research Organization (HumRRO) is a nonprofit corporation established in 1969 to conduct research in the field of training and education. It is a continuation of The George Washington University Human Resources Research Office which was established in 1951. HumRRO's general purpose is to improve human performance, particularly in organizational settings, through behavioral and social science research, development, and consultation. HumRRO's mission in work performed under contract with the Department of the Army is to conduct research in the fields of training, motivation, and leadership.

The Department of the Army Work Program of the Human Resources Research Organization (HumRRO) for FY 1970 is prepared in furtherance of Contract DAHC 19-70-C-0012 between the Department of the Army and Human Resources Research Organization (HumRRO) to conduct research in training methods, requirements for training devices, motivation, and leadership as jointly agreed by HumRRO and the Office of the Chief of Research and Development, Department of the Army. The first two months (July and August 1969) of activity under this Work Program were conducted under Contract DAHC 19-69-C-0018 between the Department of the Army and The George Washington University, while HumRRO was part of the university.

The general goal of HumRRO research for the Department of the Army is to discover, develop, and apply human factors and social science principles and techniques to enhance the efficiency of both training and operational performance of military personnel. The objectives are to develop, for individuals and groups, (1) means for efficient acquisition of required military knowledges and skills, (2) procedures to insure retention of required knowledges and skills, and (3) ways to permit maximum utilization of acquired knowledges and skills in performing military duties.

HumRRO performs its research either at its offices in Alexandria, Virginia, or at such military installations as may be appropriate in view of the nature of the research. At present, HumRRO consists of the corporate and executive offices and supporting facilities, located at Alexandria, Virginia, and seven research divisions: Division No. 1 (System Operations), Alexandria, Virginia; Division No. 2, Fort Knox, Kentucky; Division No. 3, Presidio of Monterey, California; Division No. 4, Fort Benning, Georgia; Division No. 5, Fort Bliss, Texas; Division No. 6 (Aviation), Fort Rucker, Alabama; Division No. 7 (Social Sciences), Alexandria, Virginia. Divisions No. 2 through 6 are collocated with U.S. Army Human Research Units.

The Chief of Research and Development (CRD), through the Behavioral Sciences Division of the Army Research Office, approves and supervises the HumRRO Army Work Program. The primary Army Regulations related to matters of funding and supervision of the research program are AR 70-6, AR 70-8, and AR 705-5. Proposals for HumRRO research to meet Army human factors needs may be made by any Army agency to CRD.

Commands and agencies that sponsor HumRRO's program include the U.S. Continental Army Command, U.S. Combat Developments Command, Deputy Chief of Staff for Personnel, and Deputy Chief of Staff for Military Operations. A sponsor provides advice, guidance, and background data and information applicable to the research effort when requested to do so. The sponsor also designates a point of contact for purposes of coordination and information exchange.

The FY 1970 Work Program is predicated on funding guidance from the Behavioral Sciences Division, Army Research Office.

B. Present Status

HumRRO's program for FY 1970 consists primarily of exploratory development and advanced development, divided into three categories of effort: Exploratory Research activities, Work Units, and Technical Advisory Service. A small percentage of the whole effort is allocated to Basic Research.

An Exploratory Research effort (ER) is an evaluation of the feasibility of engaging in a major research activity on a particular Army problem. In essence, such an effort is a problem-defining activity in response to a military requirement. It entails a careful exploration of areas likely to contain significant problems on which research is possible, and of related work that may be under way. The product of the ER may be Technical Advisory Service or a Work Unit, or the exploration may indicate that the problem is not suitable or not profitable for further study under HumRRO's mission or facilities. Exploratory research accounts for 8% of the FY 1970 Work Program.

The major portion of the HumRRO program consists of the research efforts known as Work Units, which are usually initiated as a result of exploratory research. Work Units are full-scale research projects designed to produce specific information or products aimed directly at an Army problem. They account for 79% of the total FY 1970 program, not including two of the Work Units which are listed as Basic Research efforts.

In addition to the exploration of problem areas in Exploratory Research and the conduct of research in Work Units, 4% of the HumRRO effort in FY 1970 is scheduled for Technical Advisory Service (TAS) performed on request. TAS activities are primarily of a consultative nature, and are undertaken either when sufficient information can readily be attained to provide a sound answer to a military problem or when, because of time pressures, the Army urgently needs a "best available" answer. The work of assisting Army personnel in implementing research findings and recommendations is carried on in some instances as part of programmed Work Units or Exploratory Research and in some instances as TAS, depending on the stage of the research.

The Basic Research program (BR), which comprises 9% of the FY 1970 effort, deals with selected problems in the psychological and social sciences in which an increase in knowledge would (1) have special application to human factors problems in the military environment, and (2) contribute to the present body of facts and principles bearing upon training.

Certain of the research efforts are identified as Institutional Research. These studies do not require prior Department of the Army approval, but are included for informational purposes.

II. SUMMARY OF THE FY 1970 ARMY WORK PROGRAM

Activities in the HumRRO Work Program for the Department of the Army for FY 1970 have been grouped into six major Research Areas. These groupings, though not definitive or mutually exclusive, serve to indicate the nature of HumRRO work in relation to needs arising in major Army activities; they also serve to emphasize the interrelationships among HumRRO studies.

A tabular summary of the Work Program showing the location, category, and amount of effort in each Research Area is presented in Section III, pages vi-vii. Work Units are indicated by code names, and Exploratory Research and Basic Research problems are identified by descriptive phrases and numbers. A total of 75.1 "basic man-years" has been allocated to the activities shown in the chart. The 6.5 man-years allocated to the seven Division Directors bring the total level of effort to 81.6 basic man-years.

The general scope of each Research Area and approximate amount of effort allocated to each are described in the following paragraphs.

Summary of Research Areas

Research Area 1—Individual Training and Performance

Approximately 17% of HumRRO's total effort for the Army Work Program for FY 1970 is allocated to individual training and performance.

Research activities in this Research Area are directed toward the improvement of training of the individual soldier and toward determination of performance requirements for the individual soldier in various military systems. Research on training for the individual soldier includes research relating to Basic Combat Training, Advanced Individual Training, and training for operation and maintenance of equipment. While development or improvement of a particular training program is the type of research frequently performed, the Research Area also includes a variety of related activities such as study of abilities and skills required of the individual soldier in a particular military system, study of performance under field conditions, capabilities of soldiers of limited aptitude, and research on basic rifle marksmanship.

Research Area 2—Unit Training and Performance

Approximately 6% of HumRRO's total effort for the Army Work Program for FY 1970 is allocated to unit training and performance.

The main emphasis of the research activities in unit training is upon training groups of men to work together effectively in order to attain a designated objective. While training of the group member in individual skills will be given attention as necessary, research efforts in this Research Area will concentrate on selected Army activities that require coordinated group behavior. In addition to work directly related to team-type training, the research will explore ways in which group organization and interpersonal relations contribute to group effectiveness.

Research Area 3—Training for Leadership, Command, and Control

Approximately 10% of HumRRO's total effort for the Army Work Program for FY 1970 is allocated to training for leadership, command, and control.

Research activities in this Research Area are directed toward increasing understanding of human factors aspects of leadership and command, and exploring approaches to officer training. The field of interest includes Infantry and Air Defense leadership at company and battalion levels, and command and control in air defense systems.

Research Area 4—Language and Area Training

Approximately 8% of HumRRO's total effort for the Army Work Program for FY 1970 is allocated to language and area training.

The general objectives of efforts in this Research Area are to identify and improve training in skills that are important to success in stability operations in underdeveloped non-Western countries. Research will be conducted to determine the skills, knowledges, and attitudes that are most likely to contribute significantly to success in stability operations. Training techniques to teach these cross-cultural attributes will be designed and tested, problems of supervising foreign civilian employees will be studied. All research in this Research Area is conducted by Division No. 7 (Social Science).

Research Area 5—Training Technology

Approximately 40% of HumRRO's total effort for the Army Work Program for FY 1970 is allocated to training technology.

Many HumRRO research activities make contributions, direct or indirect, to the development of a technology of training, but in this Research Area the Work Units and other research efforts are specifically concerned with the subject of technology. Their objective is to develop

III. Category and Amount of Effort by Research Area and Location

Research Area	HumRRO Division		
	No. 1 (System Operations)	No. 2	No. 3
Area 1 Individual Training and Performance		Work Unit: (BMY) MBT 1.0 NIGHTSIGHTS 2.5	Work Unit: (BMY) TYPETRAIN 1.8 UTILITY 1.5
Area 2 Unit Training and Performance	Work Unit: (BMY) JOBGOAL 2.5 ER-79: Reducing Errors in Logistics ADP 1.0	Work Unit: (BMY) ENDURE 1.0	
Area 3 Training for Leadership, Command, and Control			
Area 4 Language and Area Training			
Area 5 Training Technology	Work Unit: (BMY) ACCOUNT 1.4 IMPACT 15.0		Work Unit: (BMY) REALISTIC 2.7 SPECTRUM (BR) 3.3
Area 6 Training Management	Work Unit: (BMY) STOCK 2.4	(BMY) ER-74: Soldier Esprit 2.0 ER-75: Methodology for Training Systems Engineering 1.0	Work Unit: (BMY) APSTRAT 3.8
Technical Advisory Service		TAS (BMY) 0.5	
Percent of Total Effort	30%	11%	17%

ER—Esperatory Research

TAS—Technical Advisory Service

BR—Basic Research (includes both Work Units FORGE and SPECTRUM in addition to the ER-ic Research efforts)

HumRRO Division					Percent of Total Effort
No. 4	No. 5	No. 6 (Aviation)	No. 7 (Social Science)		
Work Unit: MARKSMAN (BMY) 2.0	Work Unit: SKYFIRE 0.7 STAR 1.3 ER-76: Army Personnel Management Technicians 1.0	Work Unit: MANPROBE (BMY) 0.8			Area 1 17%
					Area 2 5%
Work Unit: CAMBCOM (BMY) 1.5 ↑FORGE (BR) 2.0 INGROUP 0.5 OC LEADER 0.5	Work Unit: MANICON (BMY) 2.0 ER-77: AD Officer Career Course 1.2				Area 3 10%
			Work Unit: AUTOSPAN (BMY) 1.5 COPE 2.0 DEBRIEF 0.5 EDGE 2.0		Area 4 8%
	(BMY) BR-16: Improving Ability to See Military Targets 1.3	Work Unit: SYNTRAIN (BMY) 3.7 UPGRADE 2.5			Area 5 40%
		Work Unit: PREDICT (BMY) 2.5			Area 6 15%
TAS (BMY) 1.0	TAS (BMY) 0.5	TAS (BMY) 0.7			TAS 4%
10%	11%	14%	8%		Work Units 79% ER 8% BR 9% TAS 6%

BMY - Basic man-years

↑ indicates Institutional Research

*Excludes Work Units FORGE and SPECTRUM; they are included in Basic Research.

general methods for training individuals and groups and for maintaining desired performance, methods that would be applicable for a wide range of subject matter and training circumstances. The research deals with both instructor-administered and instructor-free training, and there is special interest in techniques—such as simulation and automated, computer-administered instruction—that might lead to more efficient training, in terms of both time and money. There is also interest in ways of improving training effectiveness through improved motivation. The research includes not only the development of techniques suitable for immediate implementation, but also more basic explorations into the learning processes that might lead to marked improvements in future training efforts.

Research Area 6--Training Management

Approximately 16% of HumRRO's total effort for the Army Work Program for FY 1970 is allocated to training management.

Research in this area goes beyond improvements in training content and instructional methods. Activities in this area include research relating to administrative and organizational problems within the training organization. The Research Area includes efforts directed toward necessary modification of training administrative procedures and organizational structure to allow effective introduction of improved instructional procedures.

Technical Advisory Service

Approximately 4% of the work effort for the Army Work Program for FY 1970 has been allocated to Technical Advisory Service.

III. CATEGORY AND AMOUNT OF EFFORT BY RESEARCH AREA AND LOCATION (pp. vi, vii)

IV. WORK PROGRAM ELEMENTS BY TASK ORDER (p. ix)

The new contract between HumRRO and the Department of the Army is a Task Order contract—that is, there is an overall contract and then a specification of the work to be done in a series of Task Orders. There are nine Task Order categories, seven focused on programs of the Divisions, the eighth on Computer-Administered Instruction, and the ninth on Basic Research.

The chart on the facing page shows Task Orders in relation to the work program elements.

V. SUMMARY OF MAJOR CHANGES FROM FY 1969 ARMY WORK PROGRAM

A. Level of Effort

The FY 1970 HumRRO Work Program for the Department of the Army calls for 81.6 basic man-years; this includes an allocation of 75.1 basic man-years to specific research activities and 6.5 basic man-years for the Division Directors.

B. Research Completed in FY 1969

Eleven Work Units that were in the FY 1969 Work Program do not appear in this year's program. Research in eight Work Units (ACTION, AREA, CONSERVE, JOBTST, LEAD, REFOCUS, SKILLCON, SUPPORT) was completed. Three Work Units were terminated (ATCSYSTEM, REFRACT, SOJOURN).

V. FY 1970 Work Program by Task Orders

	Division No. 1 (System Operations)	Division No. 2	Division No. 3	Division No. 4	Division No. 5	Division No. 6 (Aviation)	Division No. 7 (Social Science)	Total BMY
Task Order 1 Combat Services Support Training Research	(BMY) ACCOUNT 1.4 JAGGUAL 2.5 STOCK 2.4 ER-79 1.0		TYPETRAIN 1.8					9.1
Task Order 2 Combat Training Research		(BMY) MBT 1.0 ENDURE 1.0 HIGHTSIGHTS 2.5 TER-76 2.0 ER-75 1.0 YAS 0.5						8.0
Task Order 3 Individual Training Research			APSTRAT 3.8 REALISTIC 2.7 UTILITY 1.5					8.0
Task Order 4 Leader and Individual Training Research				(BMY) CAMBICOM 1.5 HIGROUP 0.5 MARKSMAN 2.0 CC LEADER 0.5 TAS 1.0				5.5
Task Order 5 Combat Support Training Research					(BMY) MANHICON 2.0 SKYFIRE 0.7 STAR 1.3 ER-76 1.0 ER-77 1.2 TAS 0.5			6.7
Task Order 6 Aviation Training						(BMY) MANPROBE 0.8 PREDICT 2.5 SYNTRAIN 3.7 UPGRADE 2.5 TAS 0.7		10.2
Task Order 7 Language and Area Training Research							(BMY) AUTOSPAN 1.5 COPE 2.0 DEBRIEF 0.5 EDGE 2.0	6.0
Task Order 8 Computer-Administrative Instruction	(BMY) IMPACT 15.0							15.0
Task Order 9 Basic Research			SPECTRUM 3.3	(BMY) †FORGE (BR) 2.0 BR-16 1.3				6.6
Total	(BMY) 22.3	(BMY) 8.0	(BMY) 13.1	(BMY) 7.5	(BMY) 8.0	(BMY) 10.2	(BMY) 6.0	75.1

ER-Expository Research YAS-Technical Advisory Service BMY-Basic Man Years †Indicates Institutional Research BR-Basic Research (includes both Work Units FORGE and SPECTRUM in addition to the Basic Research efforts)

Five Exploratory research studies that were in the FY 1969 Work Program do not appear in this year's program. Two resulted in Work Units (ES-58 to ACCOUNT and ES-63 to JOBGOAL). ES-73 was completed. ES-54 and ES-60 were terminated.

C. Research Scheduled for Completion in FY 1970

Four Work Units are scheduled for completion during FY 1970--(MARKSMAN, OC LEADER, REALISTIC, UTILITY).

D. Research to be Initiated in FY 1970

Six new Work Units (ACCOUNT, EDGE, JOBGOAL, MARKSMAN, OC LEADER, TYPETRAIN) and five new exploratory research efforts (ER-74, ER-75, ER-76, ER-77, ER-79) are in the FY 1970 Work Program.

FORMAT OF THE ARMY WORK PROGRAM

Each of the six sections of the FY 1970 Work Program for the Department of the Army describes one Research Area. An introduction (on buff pages) names the Work Units, Exploratory Research efforts, and Basic Research efforts, describes the Research Area in general terms, and states the level of effort for FY 1970.

Indexes (on buff pages) at the end of the report list Work Units, Exploratory Research efforts, Basic Research efforts, and the location of these activities according to the Research Division conducting the research.

Further information in regard to HumRRO research efforts may be obtained from the Division Directors.

Dr. J. Daniel Lyons . . . Division No. 1 (System Operations)
300 N. Washington St., Alexandria, Va. 22314

Dr. Donald F. Haggard . . . Division No. 2
Fort Knox, Ky. 40121

Dr. Howard H. McFann . . . Division No. 3
P.O. Box 5787, Presidio of Monterey, Calif. 93940

Dr. T. Owen Jacobs . . . Division No. 4
P.O. Box 2086, Fort Benning, Ga. 31905

Dr. Robert D. Baldwin . . . Division No. 5
P.O. Box 6057, Fort Bliss, Tex. 79916

Dr. Wallace W. Prophet . . . Division No. 6 (Aviation)
P.O. Box 428, Fort Rucker, Ala. 36360

Dr. Arthur J. Hoehn . . . Division No. 7 (Social Science)
300 N. Washington St., Alexandria, Va. 22314

CONTENTS

	Page
FOREWORD	iii
EXPLANATORY NOTES	xiii
Research Area 1: INDIVIDUAL TRAINING AND PERFORMANCE	3
Work Units	
MANPROBE Human Information-Processing Requirements in Manned Aerial Reconnaissance and Surveillance Tasks	5
MARKSMAN Combat Marksmanship	7
MBT Training Guidelines for the US/FRG Main Battle Tank	9
NIGHT SIGHTS Training Techniques for New Night Vision Devices	11
SKYFIRE Training Methods for Forward Area Air Defense Weapons	13
STAR Aircraft Recognition Training	15
TYPETRAIN Development of Improved Army Typing Training Program and Materials	17
UTILITY Study of Soldiers in Lower Mental Categories: Job Performance and the Identification of Potentially Successful and Potentially Unsuccessful Men	19
Exploratory Research	
Army Personnel Management Technicians (ER-76)	21
Research Area 2: UNIT TRAINING AND PERFORMANCE	25
Work Units	
ENDURE Tank Crew Performance During Periods of Extended Combat	27
JOBGOAL Improved on-the-Job Training for Logistics Personnel	29
Exploratory Research	
Reducing Errors in Logistics ADP (ER-79)	33
Research Area 3: TRAINING FOR LEADERSHIP, COMMAND, AND CONTROL	37
Work Units	
CAMBCOM Knowledges, Skills, and Thought Processes of the Battalion Commander and Primary Staff	39
FORGE Factors in Military Organizational Effectiveness	41
INGROUP Small-Group Instructional Methods for Military Training	43
MANICON Determination of Performance Capabilities and Training Requirements for Manual Command and Control Functions of Automated Air Defense Systems	45
OC LEADER Systems Engineering of Leadership Training for Officer Candidate Programs	47

	Page
Exploratory Research	
AD Office Career Course (ER-77)	49
 Research Area 4: LANGUAGE AND AREA TRAINING	 53
Work Units	
AUTOSPAN Development of a Generalized Method for: Preparing Self- Instructional Foreign Language Courses for Military Personnel . .	55
COPE Development of a Method for Training Military Personnel for Interaction With Foreign Nationals	57
DEBRIEF Feasibility Study of a System for Debriefing MAAG Advisors	59
EDGE Studies of Effective Intercultural Supervision	61
 Research Area 5: TRAINING TECHNOLOGY	 65
Work Units	
ACCOUNT Analysis of Army Experience in Implementing a Mechanized Stock Accounting System	67
IMPACT Prototypes of Computerized Training for Army Personnel	69
REALISTIC Determination of Reading, Listening, and Arithmetic Skills Required for Major Military Occupational Specialties	73
SPECTRUM Development of Efficient Training for Soldiers of All Aptitude Levels	75
SYNTRAIN Modernization of Synthetic Training in Army Aviation	77
UPGRADE Improving Aviation Maintenance Training Through Task and Instructional Analysis	79
 Basic Research	
Improving Ability to See Military Targets (BR-16)	83
 Research Area 6: TRAINING MANAGEMENT	 87
Work Units	
APSTRAT Training Strategies and Incentives Appropriate to Different Aptitude Levels for Selected Army Training Courses	89
PREDICT Predicting Aviator Success in Training and Operational Assignments	91
STOCK Development of Training Management Procedures for Different Ability Groups	93
 Exploratory Research	
Soldier Esprit (ER-74)	95
Methodology for Training Systems Engineering (ER-75)	97
 INDEXES	
Work Units	99
Exploratory Research, by Title	100
Exploratory Research, by Number	100
Basic Research, by Title	101
Basic Research, by Number	101
Research Division Programs	101

EXPLANATORY NOTES

1. Each Research Area is introduced by a summary statement including the scope of the research in the area, amount of effort to be expended in professional, or basic, man-years (BMY), and listings of the various research efforts.

2. Each Work Unit Statement includes in paragraph 3 the title of the military agency sponsoring that Work Unit. The sponsor provides advice, guidance, and background data and information applicable to the research effort when requested to do so. The sponsor also designates a point of contact for purposes of coordination and information exchange.

3. Each Work Unit Statement includes a Work Sub-Unit summary chart in which the progress of the Work Unit is forecast. Symbols used to indicate the status of work in given fiscal year quarters are:

P = Planning and research design

C = Collection of data or conduct of experiment

A = Analysis of data

D = Draft report preparation and preparation of final report

S = Submission of report to OCRD

An asterisk (*) in the first block of the chart indicates that phases have occurred prior to the beginning of Fiscal Year 1970.

4. Each Exploratory Research statement, in addition to summarizing the military problem area for which feasibility of research will be assessed, indicates the military agencies most directly concerned and the BMY level assigned to the research. Each Basic Research statement gives the psychological or social science problem under study and indicates the BMY level of effort. Technical Advisory Service activities that are anticipated are summarized in the Foreword.

Research Area 1:
INDIVIDUAL TRAINING AND PERFORMANCE

Research Area 1:
Individual Training and Performance

Title:

Work Units

Human Information-Processing Requirements in Manned Aerial
Reconnaissance and Surveillance Tasks (MANPROBE)
Combat Marksmanship (MARKSMAN)
Training Guidelines for the US/FRG Main Battle Tank (MBT)
Training Techniques for New Night Vision Devices (NIGHTSIGHTS)
Training Methods for Forward Area Air Defense Weapons (SKYFIRE)
Aircraft Recognition Training (STAR)
Development of Improved Army Typing Training Program and
Materials (TYPETRAIN)
Study of Soldiers in Lower Mental Categories: Job Performance and
the Identification of Potentially Successful and Potentially Unsuccessful Men (UTILITY)

Exploratory Research

Army Personnel Management Technicians (ER-76)

Description:

Research activities in this area are directed toward the improvement of training and performance of the individual soldier, and toward determination of performance requirements for the individual soldier in various military systems. Research on training for the individual soldier includes studies relating to Basic Combat Training, Advanced Individual Training, and training for the operation and maintenance of equipment. Specific efforts include the development of training objectives for the Main Battle Tank, studies of the use of night vision devices, research on the relative performance of soldiers at different aptitude levels, development of improved training in typing and aircraft recognition, studies of performance under field conditions and basic rifle marksmanship, as well as research on a system for training personnel management technicians.

Level of Effort in FY 1970: 12.6 BMVs.

WORK UNIT STATEMENT

1. **Human Information-Processing Requirements in Manned Aerial Reconnaissance and Surveillance Tasks—MANPROBE (Continuing)**
2. **Location:** HumRRO Division No. 6 (Aviation)
3. **Sponsors:** U.S. Army Combat Developments Command Aviation Agency
U.S. Continental Army Command
4. **Scope:**
 - a. **Objective of Research.** To identify and assess perceptual-cognitive functions associated with manned aerial reconnaissance and surveillance (R&S) tasks important to the success of operational R&S missions.
 - b. **Potential Military Research End-Result.** The results should provide Army system planners with better means of predicting the man-machine interactions in future manned aerial R&S systems, as well as providing guidance for training. Army planners trying to estimate the effect of new airborne R&S equipments on operational effectiveness do not have data on man's functional relationship with other system components, and hence do not have a base for estimating man's capability in proposed future systems. In the research, man's primary roles in aerial R&S systems will be examined within the framework of an information-processing model, to obtain data that may be extrapolated from present to future requirements.
 - c. **Background and Summary.** The Tactical Aerial Reconnaissance and Surveillance 75 (TARS-75) Study Group of the U.S. Combat Developments Command Aviation Agency requested research on human factors aspects of future aerial R&S systems. A literature survey indicated that data on the operational capabilities of personnel in present aerial R&S systems are not generally available, so, in lieu of hard data, crew member behavior during simulated operational missions was analyzed. Expert military opinion was obtained on the activities performed by each aircrew member during important segments of the flight mission, taking into consideration the various information sources the individual used to accomplish the objective. The results permitted a crude comparison among operational capabilities of crew members in a wide variety of R&S aerial systems. In a follow-up study on the problems of evaluating aerial R&S system performance and improving crew performance (ES-61), this simple information-processing model was expanded to create a broad outline appropriate for analyzing crew member activities.

Work Unit MANPROBE was undertaken to relate the expanded information-processing model to operational R&S tasks and experiences of combat personnel, in order to specify the critical perceptual-cognitive functions. Then, the information-handling capabilities of aerial personnel for selected R&S tasks are to be assessed to provide a data base for future system planning.

MANPROBE

In MANPROBE I, as the first step toward identifying and assessing R&S tasks, using the information-processing model, Vietnam returnees who had participated in operational missions, and who had held staff positions, were asked to identify the concepts of operation, develop mission diagrams and profiles, identify R&S equipment, and determine the mode of equipment utilization. From this information a structured R&S interview was developed. Using operational personnel, the interview was pre-tested and administered. Interview results were analyzed and evaluated to determine the human information-processing requirements for events significant to mission success.

- d. FY 70 Projection. In MANPROBE II, the information-processing capabilities of aircrew members in selected R&S tasks will be assessed. Tasks will be derived from the significant events identified in the interview. To the extent feasible, these events will be simulated in laboratory studies designed to provide substantive data.

5. Estimated Professional Man-Years Required:

FY 70: 0.8

FY 71: 1.0

6. Interested Agencies:

Office of the Assistant Chief of Staff for Intelligence,
Department of the Army
U.S. Army Combat Developments Command
U.S. Army Security Agency
U.S. Army Behavioral Science Research Laboratory
U.S. Army Combat Surveillance School/Training Center

7. Work Sub-Unit Summary and Forecast:

- I. Identification of crew member information-processing requirements in serial R&S missions:

FY 70			
1	2	3	4
*D	D	S	

- II. Assessment of crew member performance during information-processing for selected R&S tasks:

FY 70				FY 71			
1	2	3	4	1	2	3	4
		P	PC	CA	CAD	D	S

WORK UNIT STATEMENT

1. Combat Marksmanship—MARKSMAN (New)
2. Location: HumRRO Division No. 4
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To identify methods of improving marksmanship training.
 - b. Potential Military Research End-Result. The results of this research should provide information that will assist in improving marksmanship training doctrine, methodology, and procedures.
 - c. Background. The U.S. Army Infantry School (USAIS) is undertaking a review of marksmanship training throughout Basic Combat Training/Advanced Individual Training, with dual objectives. The first is to apply the principles of systems engineering to marksmanship training, as a preliminary to USAIS systems engineering of the entire BCT/AIT training cycle, and the second is to identify specific means of improving marksmanship training at clearly defined points within the overall training cycle. USAIS has requested HumRRO assistance with both efforts, particularly in the second area with emphasis on three subareas:
 - (1) The identification of conditions under which rapid pointing fire (Quick Kill) can best be used, as contrasted with coarse aimed fire, and the optimum training sequence for producing rapid pointing fire skill.
 - (2) Establishment of definitive guidance for proper employment of semi-automatic and automatic fire.
 - (3) Development of higher levels of marksmanship skill under conditions of limited visibility.
 - d. Method of Attack. The work load will be shared between USAIS and HumRRO Division No. 4. Experimental data will be generated to permit resolution of the three specific subareas listed above. Assistance will be provided in the systems engineering work to an extent determined by USAIS. At the same time, work will begin to conceptualize the basic psychomotor skills involved in marksmanship, and to plan subsequent experimental work in these skill areas to permit possible long-term improvements to the marksmanship training program. This phase of the work will include study of the potential of miniature ranges and sub-caliber devices for more economical and rapid acquisition of basic marksmanship skills.
5. Estimated Professional Man-Years Required:

FY 70: 2.0

MARKSMAN

6. Interested Agency:

U.S. Army Infantry School

7. Work Sub-Unit Forecast:

I. Combat rifle marksmanship:

FY 70			
1	2	3	4
PCAD	PCADS	CADS	DS

WORK UNIT STATEMENT

1. Training Guidelines for the US/FRG Main Battle Tank—MBT (Continuing)
2. Location: HumRRO Division No. 2
3. Sponsors: U.S. Army Materiel Command (Program Manager, US/FRG MBT)
U.S. Continental Army Command

4. Scope:

- a. Objective of Research. To outline the training methods and concepts for training materials that will be required by the personnel responsible for the development of programs for operator training and user maintenance training on the US/FRG Main Battle Tank.
- b. Potential Military Research End-Result. This Work Unit will:
 - (1) Provide a human performance data base for evaluating weapon system performance requirements and specifying required MOS structures.
 - (2) Provide training objectives and standards for School, Center, and Unit training program planning.
 - (3) Identify unique training requirements and additional training methods necessary for Schools, Centers, and Units to accomplish training.
 - (4) Provide materials and methodology for evaluating the effectiveness of new training programs (methods and devices).
- c. Background and Summary. The developmental program for the US/FRG Main Battle Tank is being directed towards markedly new equipment concepts, so the training demands imposed cannot be estimated from experience with existing equipment. Research into the job and training requirements for the MBT was therefore undertaken in order to determine the skill requirements, provide the training methods, and identify the materials necessary for timely training program development.

Preliminary task descriptions for crew operation and maintenance were completed and submitted to the Program Manager. Descriptions of crew operations tasks for the M-60A1E1/E2 and the M-551 vehicles were completed for use in determining the unique tasks and training objectives for MBT. Task identification and description for organizational maintenance of MBT were completed for the available MBT hardware systems. Crew task descriptions were integrated into functional procedures for the weapon system, and the job of determining human performance standards for the system procedures was begun. Training objectives were written for tasks for which performance conditions and standards were available.

In the second quarter FY 1969 the emphasis of this Work Unit was directed to the two combat vehicles that will be in the Army inventory with the MBT-70—the M-551 vehicle and the M-60A1 tank. This change in emphasis was brought about by three events. First, until the MBT-70 system standards which are prerequisite to the derivation of crew performance conditions and standards are established, complete training objectives cannot be drafted. Second, continuing design changes in certain MBT-70 hardware components have curtailed the completion of organizational maintenance task descriptions; plans to conduct training studies

on the operation of new and critical vehicle subsystems have also been delayed by engineering design changes. Third, there has been an increasing demand for immediate assistance in analysis and evaluation of training for the M-551 and M-60A1 track vehicles.

- d. FY 70 Projection. Training objectives for crew gunnery operations will be determined for the MBT-70 and M-551 armor vehicles. Unique training problems will be identified and study of remedial solutions proposed. Unique training objectives for remaining MBT-70 crew operations will continue to be prepared as standards data are made available.

5. **Estimated Professional Man-Years Required:**

FY 70: 1.0
 FY 71: 1.0

6. **Interested Agencies:**

Office of the Deputy Chief of Staff for Personnel, Department of the Army
 Office of the Assistant Chief of Staff for Force Development,
 Department of the Army
 U.S. Army Logistics Doctrine Systems and Readiness Agency
 U.S. Army, Europe
 U.S. Army Combat Developments Command
 U.S. Continental Army Command
 U.S. Army Human Engineering Laboratories
 U.S. Naval Training Device Center

7. **Work Sub-Unit Summary and Forecast:**

- I. Job analysis for operation and organizational maintenance:
 - a. Operation: Completed.
 - b. Organizational maintenance: To be determined.
- II. Identification of training objectives, techniques, and materials:
 - a. Crew training:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*CA	DS	C	DS	PC	C	CA	CA

- b. Organizational maintenance training: To be determined.
 - III. Assistance in training, program planning, and evaluation:
 To be determined.

WORK UNIT STATEMENT

1. **Training Techniques for New Night Vision Devices--NIGHTSIGHTS**
(Continuing)
2. **Location:** HumRRO Division No. 2
3. **Sponsors:** U.S. Continental Army Command
U.S. Army Combat Developments Command
4. **Scope:**
 - a. **Objectives of Research.** To identify critical human factors problems in the use of new night operations devices, and to develop effective techniques of training in the use of the devices.
 - b. **Potential Military Research End-Result.** Although the advent of night vision devices has given the Army additional operational scope, it has raised many problems. The research should:
 - (1) Yield a firmer knowledge of target acquisition and engagement methods under darkness with night operations devices.
 - (2) Produce realistic training programs for night operations devices.
 - (3) Develop increased mobility at night through the use of night operations devices.
 - (4) Engender specific techniques for employing night vision devices in conjunction with artificial illuminants.
 - (5) Provide more specific data on the relationship between use of night operations devices and loss of dark adaptation.
 - c. **Background and Summary.** Attention has been directed toward (1) broadly assessing the impact of image intensifiers from a human factors standpoint, and (2) specifically measuring some behavioral effects associated with the loss of dark adaptation. In NIGHTSIGHTS I, information was obtained on the dark adaptation recovery time needed for effective cross-country movement after use of an intensifier, and on the ability to return fire on a silhouette target after using an intensifier.

In NIGHTSIGHTS II the effects of factors that influence the course of dark adaptation were studied in a further attempt to identify factors that affect performance under conditions of dark adaptation in the operational situation. Two general areas requiring further study were identified in NIGHTSIGHTS III: the viewing problems arising from the optical characteristics of image intensifiers, and the problems found during tactical employment of the devices.

In NIGHTSIGHTS IV experimental training programs are being developed for specific categories of devices in the SEA NITEOPS program.
 - d. **FY 70 Projection.** For NIGHTSIGHTS IV, training programs for five representative night operations devices will be developed and tested to meet SEA NITEOPS schedules. These experimental programs will be used, and revised as necessary, during the NOTTS training phase of SNOE I. The resulting programs will be provided to USCONARC for use in SNOE II.

NIGHTSIGHTS

NIGHTSIGHTS V studies of the cost/effectiveness of the experimental programs for SEA NITEOPS will be initiated, with emphasis on the rate of acquisition of skills and the comparative efficiency with reference to other programs and to other particular training methods. It is expected that planning, only, will occur before the beginning of SNOE II, and that studies will not be undertaken until after SNOE II has begun.

5. Estimated Professional Man-Years Required:

FY 70: 2.5
 FY 71: 3.0

6. Interested Agencies:

- Office of the Deputy Chief of Staff for Personnel,
 Department of the Army
- Office of the Assistant Chief of Staff for Force Development,
 Department of the Army
- U.S. Army Combat Developments Command Experimentation Command
- U.S. Army Armor School
- U.S. Army Behavioral Science Research Laboratory
- U.S. Army Mobility Equipment Research and Development Center
- U.S. Army Human Engineering Laboratories
- U.S. Army Medical Research Laboratory
- Frankford Arsenal

7. Work Sub-Unit Summary and Forecast:

- I. Effects of loss of dark adaptation on performance in representative field situations: Completed.
- II. Determination of the relationship between conditions of dark adaptation and (a) duration, configuration, and intensity of stimulation, (b) performance requirements, and (c) modification of perception through training: Completed.
- III. Survey of problems in the tactical employment of night viewing devices: Completed.
- IV. Training program development for specific devices in SEA NITEOPS:

FY 70			
1	2	3	4
*CA	CA	CAD	DS

V. Experimental studies of training programs:

FY 70				FY 71			
1	2	3	4	1	2	3	4
P	PC	CA	CAD	CAD	CAD	CAD	CAD

WORK UNIT STATEMENT

1. **Training Methods for Forward Area Air Defense Weapons—SKYFIRE (Continuing)**
2. **Location:** HumRRO Division No. 5
3. **Sponsor:** U.S. Army Combat Developments Command
4. **Scope:**
 - a. **Objectives of Research.** To determine man's capabilities to perform the operator skills required by forward area air defense weapons, and to identify effective training concepts for developing the required skills.
 - b. **Potential Military Research End-Result.** The Redeye, Chaparral, and Vulcan forward area air defense weapons either wholly or in part depend on an operator's judgments of the identification, distance, target speed, and altitude of a penetrating aircraft. In addition, the tracking accuracy of these weapons varies with the skill level of the gunner. Training that produces operators who are more accurate and consistent in their judgments will add to the overall effectiveness of the weapon system by increasing hit probabilities and decreasing the expenditure of munitions in inaccurate firing. The research also has produced objective data concerning human performance capabilities that have been used in computer simulation studies by Army agencies.
 - c. **Background and Summary.** In previous years field tests to determine man's ability to visually detect, identify, and estimate the distance to low-flying aircraft have been conducted under this research. Several field and laboratory studies comparing alternative methods for training distance estimation were also conducted. During FY 1969 the perceptual skills research was focused on the development of methods for range estimation using stadiametric (occlusion) aids. Field test data also were obtained concerning the visual and communication skills required by gunners and forward observers of the Chaparral system. Tracking accuracy studies were conducted to obtain preliminary data regarding the error levels associated with various angular rates of target movement. Related research on Work Unit TESTAID, sponsored by the Joint Chiefs of Staff, Joint Task Force Two (JTF-2), was completed, and the results of visual detection and ranging tests were reported.
 - d. **FY 70 Projection.** Due to a reduction in funds, SKYFIRE I studies concerning estimation of open- and cease-fire distances will be terminated. A limited amount of research on tracking skills and alternative engagement techniques will be performed under SKYFIRE II, as part of the Department of the Army Confirmatory Test of the Vulcan System. Under SKYFIRE III, preliminary studies will be made of visual search and target acquisition techniques, including comparison of training approaches and operational procedures that may increase distances at which aircraft are visually acquired by gunners.

SKYFIRE

5. Estimated Professional Man-Years Required:

FY 70: 0.7

FY 71: To be determined

6. Interested Agencies:

Office of the Assistant Chief of Staff for Force Development,
Department of the Army
U.S. Continental Army Command
U.S. Army Combat Developments Command Air Defense Agency
U.S. Army Air Defense School
U.S. Army Human Engineering Laboratories
Weapon System Evaluation Group

7. Work Sub-Unit Summary and Forecast:

I. Perceptual performance skills: Terminated.

II. Tracking accuracy:

FY 70				FY 71			
1	2	3	4	1	2	3	4
P	P	C	CA	D	D	S	

III. Visual search:

FY 70				FY 71			
1	2	3	4	1	2	3	4
		P	C	A	D	D	S

WORK UNIT STATEMENT

1. Aircraft Recognition Training--STAR (Continuing)

2. Location: HumRRO Division No. 5

3. Sponsor: U.S. Continental Army Command

4. Scope:

- a. Objective of Research. To develop concepts of aircraft recognition training suitable for personnel manning all forward area air defense weapons.
- b. Potential Military Research End-Result. All crews of forward area air defense weapons use visual recognition as either a primary or a secondary method of aircraft identification. Since the costs of identification errors are extreme, it is essential that training given for aircraft recognition be optimally effective in minimizing judgmental errors.

This research was initiated in response to research requirements expressed by both the U.S. Continental Army Command and the U.S. Army Combat Developments Command. An interim approach to classroom training, developed and evaluated under STAR I, served in FY 1969 as a basis for a revision by the U.S. Army Air Defense School of Field Manual 44-30, Visual Aircraft Recognition. In addition, the Air Defense School and the U.S. Army Combat Developments Command Air Defense Agency recommended Army adoption of the type of training aids that were developed under STAR I.

- c. Background and Summary. In FY 1969, two studies dealt with the effectiveness of teaching either friendly or hostile aircraft recognition, but not both. Efforts were continued to obtain sponsorship for an aircraft recognition field test. Since these efforts have been unsuccessful for the past two years, the field test phase of STAR II has been suspended, and the scope of the research has been reduced to tests using scale model aircraft and simulation of the full-scale environment. In FY 1969, personnel reassignments delayed progress under STAR III in developing a self-study method of training recognition, and permitted only a preliminary test of retention of recognition skills.
- d. FY 70 Projection. The work previously planned concerning skill retention will be incorporated in the research on self-study methods. Training methods will be evaluated in the self-study research. Depending on staff availability, additional miniaturized field studies may be conducted to assess the effects of various deployments of observers on recognition range.

5. Estimated Professional Man-Years Required:

FY 70: 1.3

FY 71: To be determined

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel,
 Department of the Army
 Office of the Assistant Chief of Staff for Force Development,
 Department of the Army
 U.S. Army Forces Southern Command
 U.S. Army Combat Developments Command Air Defense Agency
 U.S. Army Air Defense Center
 U.S. Army Air Defense School
 U.S. Naval Training Device Center

7. Work Sub-Unit Summary and Forecast:

I. An interim aircraft recognition training program: Completed.

II. Miniaturized field test:

FY 70				FY 71			
1	2	3	4	1	2	3	4
	P	P	C	A	D	S	

III. Self-study program:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*PC	CA	CA	D	D	S		

WORK UNIT STATEMENT

1. Development of Improved Army Typing Training Program and Materials—**TYPETRAIN (New)**
2. Location: HumRRO Division No. 3
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objectives of Research. To develop an improved Army typing training program, to develop manuals for training instructional personnel in the use of methods for presenting this program, and to develop training materials
 - b. Potential Military Research End-Result. The typing training program and accompanying training materials will increase the typing proficiency of graduates beyond current training standards, or reduce the training time required to reach current standards.
 - c. Background. The proponent agency for typing training in the U.S. Army is the Adjutant General School. This training is presently given to approximately 35,000 enlisted personnel annually in courses at seven Army Training Centers. A considerable amount of additional typing training is being conducted by the Army in its education centers and for enlisted supply courses. The present volume of training is expected to continue in the foreseeable future.

The Adjutant General School has long been interested in improving the effectiveness of typing instruction and/or increasing the quality of the training product. With this in mind, the School recently completed an evaluation of a self-paced course of instruction for MOS 70A, 71B, and 71H at Fort Knox, Kentucky. During the field test of this course, questions concerning the conduct of the training by instructor personnel and the design of training materials, were raised in a paper by Leonard J. West, who is a research specialist, City College, City University of New York. A typing training questionnaire was developed and administered to instructional cadre. Responses indicated that typing training practices being used at various ATCs vary considerably from those recommended by Dr. West. There is an indication that much more information must be generated on the relationships of a number of variables to typing skills.
 - d. Method of Attack. Developing improved methods and materials for training typing skills will involve a determination of the skills essential to effective typing, the training variables that affect these skills, and the most effective methods for training. In addition to the available typing training research, information would have to be generated in laboratory studies on the following variables: (1) the relationship between form and accuracy during the various stages of learning, (2) the development of a "rhythm" of typing for different materials, (3) the use of mediating behaviors during acquisition of fundamentals, (4) the best time to begin touch typing, (5) the importance of emphasizing typing at a rate faster

than an individual's present rate, (6) the emphasis on whole vs. part practice of skills during training, (7) the relation of types of training materials to on-the-job performance, (8) the effectiveness of massed vs. distributed practice on acquisition of typing skill, and (9) the retention of typing skills. Using the results of laboratory research, a typing training program and accompanying training materials will be developed and field-tested against current programs.

5. Estimated Professional Man-Years Required:

FY 70: 1.8
 FY 71: 2.0

6. Interested Agencies:

- U.S. Army Security Agency
- U.S. Army Adjutant General School
- U.S. Army Quartermaster School
- Office of Economic Opportunity

7. Work Sub-Unit Forecast:

I. Development of an improved typing training program and materials:

FY 70				FY 71			
1	2	3	4	1	2	3	4
P	PCA	PCA	CA	CA	D	D	DS

WORK UNIT STATEMENT

1. **Study of Soldiers in Lower Mental Categories: Job Performance and the Identification of Potentially Successful and Potentially Unsuccessful Men—UTILITY (Continuing)**
2. **Location: HumRRO Division No. 3**
3. **Sponsors: Assistant Secretary of Defense (Manpower)
Deputy Chief of Staff for Personnel, Department of the Army**
4. **Scope:**
 - a. **Objectives of Research.** Using selected MOSs, to determine how men in Mental Category IV and men in other mental categories compare both in the performance of their jobs and in their overall suitability for military service; to identify characteristics of men in Category IV that are associated with successful performance on the job; and to determine what background and other non-intellectual measures might prove useful in screening, classifying, and assigning such men.
 - b. **Potential Military Research End-Result.** One product will be an evaluation of the relative effectiveness in job performances of men in Category IV. Selection and assignment policies, as well as any future consideration of the wider utilization of these men, depend upon getting satisfactory, objective information about how well soldiers of lower mental ability actually perform on the jobs to which they are assigned, and how their performances compare with those of other men. To the extent that the variables used in this study discriminate successful from unsuccessful men in Category IV, they will be useful in future selection and assignment.
 - c. **Background and Summary.** Currently, the Army's means for selecting and assigning men in lower mental categories to jobs are almost wholly through aptitude test scores and school achievement. There is evidence, however, that such characteristics are of secondary significance where cognitive and intellectual demands are low. In those jobs that make few verbal and abstract demands upon the worker—jobs to which men of low mental level tend to gravitate—success may depend far more on motivational, attitudinal, and other noncognitive characteristics than upon their abstract verbal abilities.

Prior research under this Work Unit has consisted of:

- (1) Studies of the nature of successful and unsuccessful performance in jobs that utilize men of lower mental ability.
- (2) Analysis of job requirements and input characteristics of a variety of high-density MOSs, to select specific MOSs for study.
- (3) Development of job sample tests, job knowledge tests, and other criterion instruments for assessing job and overall military proficiency.
- (4) Exploratory studies of background variables and the development of experimental instruments for predicting job and military effectiveness.
- (5) Data collections on men in Mental Category IV and similarly assigned men in other mental categories performing in the following MOSs: 11E.

UTILITY

Armor Crewman; 63C, General Vehicle Repairman; 76Y, Unit and Organization Supply Specialist; 91B, Medical Specialist; 94B, Cook. For men in both groups, information was obtained from military records, tests, questionnaires, and checklists. Comparative data were gathered on cognitive and noncognitive characteristics; on personal, familial, and work histories; and on adaptation to military life. Job sample tests and job knowledge tests were used to provide information on comparative effectiveness. Supervisor evaluations were also used to provide data on comparative job effectiveness, and to provide further information on social, motivational, and military characteristics.

Because of troop commitments data collection was delayed until FY 1969. Data collection for MOSs 63C, 91B, and 94B was completed in CONUS. Collection of data on MOSs 11E and 76Y was completed in USAREUR in last quarter of FY 1969.

- d. FY 70 Projection. FY 1970 will be devoted to data analysis and report preparation. Interim briefings will be given to the sponsors.

5. Estimated Professional Man-Years Required:

FY 70: 1.5

6. Interested Agencies:

Office of the Deputy Under Secretary of the Army for Manpower
Office of Personnel Operations, Department of the Army
Office of the Provost Marshal General, Department of the Army
U.S. Continental Army Command
U.S. Army Behavioral Science Research Laboratory
Department of Labor
Department of Health, Education, and Welfare
Office of Economic Opportunity

7. Work Sub-Unit Summary and Forecast:

- I. Men in lower mental categories: Job performance and identification of potentially successful and unsuccessful men:

FY 70			
1	2	3	4
*A	AD	D	DS

EXPLORATORY RESEARCH

1. Title: Army Personnel Management Technicians—ER-76 (New)
2. Location: HumRRO Division No. 5
3. Sponsor: Office of the Deputy Chief of Staff for Personnel,
Department of the Army
4. Scope:
 - a. Objective of Research. To determine the feasibility of conducting a research program directed toward developing an improved system for providing personnel management technicians at various levels within the Army.
 - b. Military Problem. The current methods of training and utilization of military personnel management staff officers, supervisors, and specialists are not adequate to meet the demands imposed on the system by new personnel management processes and requirements. A serious shortage exists in both quality and quantity of personnel management technicians.
 - c. Approach. This study was included in the FY 1969 Work Program, but funding was not available. An attempt will be made to arrive at a precise and generally acceptable definition of the role and functions of personnel management technicians, based on a number of Army studies that have been conducted within the Army. From this information there will be developed a research plan for developing an improved system for training and utilization of personnel in these positions.
5. Estimated Professional Man-Years Required:
FY 70: 1.0
6. Interested Agencies:
Office of Personnel Operations, Department of the Army
U.S. Army Security Agency
U.S. Continental Army Command

Research Area 2:

UNIT TRAINING AND PERFORMANCE

Research Area 2:
Unit Training and Performance

Title:

Work Units

Tank Crew Performance During Periods of Extended Combat (ENDURE)
Improved on-the-Job Training for Logistics Personnel (JOBGOAL)

Exploratory Research

Reducing Errors in Logistics ADP (ER-79)

Description:

The main emphasis of the research activities in unit training and performance is in training groups of men to work together effectively in order to attain a designated objective. While training of group members in individual skills will be given attention as necessary, research efforts in this area will concentrate on selected Army activities that require coordinated group performance. In addition to work directly related to team-type training, the research will explore ways in which group organization and interpersonal relations contribute to group effectiveness.

Level of Effort in FY 1970: 4.5 BMYs.

WORK UNIT STATEMENT

1. Tank Crew Performance During Periods of Extended Combat—ENDURE (Continuing)
2. Location: HumRRO Division No. 2
3. Sponsors: U.S. Army Combat Developments Command Armor Agency
U.S. Army Combat Developments Command Institute of
Advanced Studies
4. Scope:
 - a. Objectives of Research. To determine the endurance of troops using combat equipment with a 48-hour capability, and, as necessary, to establish ways of extending the endurance of troops so that the effectiveness of the equipment will not be limited by the user.
 - b. Potential Military Research End-Result. Because personnel participating in these studies engage in essentially all activities found in combat, the Work Unit will produce performance-deterioration data closely related to what might be expected in actual combat. If performance does not deteriorate in the study, it is reasonable to conclude that it will not deteriorate during periods of continuous combat. If deterioration does occur, the activities in which it is observed and the time and degree of occurrence will all be specified. If significant deterioration is found, effort can then be directed toward determining what can be done—for example, changes in unit organization or tactical doctrine—to reduce or eliminate the factors responsible for the loss of efficiency.
 - c. Background and Summary. Improvements in equipment durability and reliability, and in night vision devices, are expected to provide the potential for around-the-clock fighting capability. When equipment with such capabilities is developed, personnel able to utilize the potential will be needed. Exploratory Study 24 was conducted to conceptualize the problem area of performance decrement as a function of extended operations. A review of literature and military records relating to performance over extended periods of time yielded no direct evidence to either support or deny the thesis that full combat effectiveness can be sustained for 48 hours or longer.

ENDURE I, a laboratory study of the effects of continuous performance on vigilance and tracking (driving), has been completed. ENDURE II is a field study of the effects of continuous 48-hour operations on gunnery, surveillance, driving, maintenance, and communications, in the context of a tactical exercise that includes offensive, defensive, and retrograde activities, both day and night. Plans for a field study of the effects of confinement on continuous operations, ENDURE III, have evolved primarily from requests by U.S. Army Combat Developments Command and from findings in an earlier consulting report on the status of research on

ENDURE

problems of crew fatigue. ENDURE IV is a study of the effects of leadership style on tank crew performance during 48-hour periods of continuous operations. ENDURE V will extend the findings of the previous ENDURE Sub-Units to a broad spectrum of MOSSs.

- d. FY 70 Projection. ENDURE II and ENDURE IV will be completed. Analysis of results of ENDURE III will be completed. Planning and exploratory work for ENDURE V will be initiated as time allows.

5. Estimated Professional Man-Years Required:

FY 70: 1.0
FY 71: 2.0

6. Interested Agencies:

- Office of the Deputy Chief of Staff for Personnel, Department of the Army
- Office of the Assistant Chief of Staff for Force Development, Department of the Army
- U.S. Continental Army Command
- U.S. Army, Europe
- U.S. Army Medical Research Laboratory
- U.S. Army Human Engineering Laboratories
- U.S. Army Research Institute of Environmental Medicine
- Defence Research Board, Canada
- Ministry of Defence, United Kingdom

7. Work Sub-Unit Summary and Forecast:

- I. Laboratory studies of performance for extended periods: Completed.
- II. Field studies of performance of combat duties for extended periods:

FY 70			
1	2	3	4
*A	D	D	S

- III. Field studies of effects of confinement for extended periods: To be determined.
- IV. Optimum work-rest cycles for individual combat arms MOSSs: To be determined.

WORK UNIT STATEMENT

1. Improved on-the-Job Training for Logistics Personnel—JOBGOAL (New)
2. Location: HumRRO Division No. 1 (System Operations)
3. Sponsors: Deputy Chief of Staff for Logistics, Department of the Army
U.S. Army Materiel Command
4. Scope:
 - a. Objective of Research. To determine and develop means for improving on-the-job training (OJT) for enlisted logistics personnel.
 - b. Potential Military Research End-Result. (1) Improved ability to conduct OJT in the unit. (2) An evaluation of the feasibility of formal OJT as an alternative to training in the unit. (3) Identification of factors influencing unit-level OJT and development of methodology to assess and quantify such factors. (4) As a result of (3), improvement of the allocation of training requirements between schools and OJT, resulting in increased effectiveness of the total training system. (5) Guidance for preparing OJT programs within units. (6) Guidance for managing OJT programs within units.
 - c. Background. One means the Army uses to develop required manpower resources is on-the-job training, including at the present time over 60% of all enlisted occupational specialties. Within the context of the total Army training system, OJT has five purposes:
 - (1) For MOSs in which there is no USCONARC school or Army Training Center course, OJT provides the fundamental core of skills and knowledges to prepare men for assignment either in the unit where they are receiving OJT, or for future assignment to a different unit.
 - (2) For MOSs acquired through a USCONARC school or Army Training Center course, graduates assigned to a unit undertake OJT to learn the specific characteristics of the job positions they will occupy, and to develop proficiency in the skills and strengthen the knowledges acquired in school.
 - (3) OJT is the means by which men acquire the additional skills and knowledges required by changes in jobs and systems, hardware, or policies.
 - (4) OJT is the means by which men trained in one MOS learn a different MOS if, upon their arrival at a unit, the authorized slots for which they were requisitioned have been filled.
 - (5) OJT enables men to develop supervisory potential and acquire experience for senior positions.

Previous HumRRO training research has largely concentrated on improving school training. Research conducted under ES-63 identified several specific OJT problem areas including the loss of critical skills among logistics personnel during CONUS assignments, the lack of capability of

JOB GOAL.

overseas commanders to fulfill their currently assigned OJT mission, and the inadequacy of resources to conduct OJT among CONUS units. Factors that contribute to these problems include: conversion of many jobs from military to civilian, narrowing the working environment in which enlisted men may practice and improve their skills; lack of experienced supervisors to conduct OJT in the field; malassignment and training shortfalls, increasing OJT training requirements on field commanders.

- d. Method of Attack. The initial effort will be to develop methods for identifying and quantifying OJT training resources and the factors which influence their availability. The methods will then be tried out in several CONUS units of various types.

A world-wide survey of OJT resources would be the next logical step. However, this will be deferred to address a specific OJT problem for which research has been requested. This involves evaluation of formal OJT as an alternative to training in units that have inadequate training resources. The formal OJT program conducted at the Atlanta Army Depot (Depot/NICPs) is an example. On the basis of an analysis of OJT requirements and resources in overseas military and in CONUS civilian port or ICC operations, a formal OJT program will be constructed. Experience gained will have implications for improvement of the Depot/NICPs program. The survey of OJT resources will then be scheduled.

A specific MOS will then be selected for study. The OJT resources of a unit having a training mission for that MOS and the specific requirements of the job position will be determined. OJT training objectives will be established. This activity will have implications for improving the allocation of training requirements between schools and OJT. An experimental training program will then be constructed and conducted. Guidance for applying the methods for determining and conducting OJT unit training programs will also be prepared. The effectiveness of the experimental program will be determined. A field test of the methods will then be conducted in which selected units will use the prepared guidance.

5. Estimated Professional Man-Years Required:

FY 70: 2.5

FY 71: To be determined

6. Interested Agencies:

Deputy Chief of Staff for Personnel, Department of the Army
Office of Personnel Operations, Department of the Army
U.S. Army, Pacific
U.S. Army, Europe
U.S. Continental Army Command
U.S. Army Quartermaster School

7. Work Sub-Unit Forecast:

I. OJT resources analysis methods:

FY 70				FY 71			
1	2	3	4	1	2	3	4
P	P	PC				CA	CA

II. Formal OJT:

FY 70				FY 71			
1	2	3	4	1	2	3	4
		P	PC	C	C	CA	AD

III. Unit OJT guidance:

FY 70				FY 71			
1	2	3	4	1	2	3	4
						P	P

EXPLORATORY RESEARCH

1. Title: Reducing Errors in Logistics ADP-ER-79 (New)
2. Location: HumRRO Division No. 1 (System Operations)
3. Sponsor: U.S. Army Logistics Doctrine, Systems and Readiness Agency
4. Scope:
 - a. Objective of Research. To assess the feasibility of research aimed at determining the factors in the working environment that are associated with high error rates in automatic data processing (ADP) operations in logistic systems.
 - b. Military Problem. There continues to be a high error rate in ADP operations within logistic systems. These errors occur at various steps in the operation, particularly in programing, keypunching, and whatever verification process follows. These high error rates are costly, lower logistics responsiveness, and ultimately have an adverse effect on materiel readiness.
 - c. Approach. A preliminary survey of ADP operations in Army logistic systems will be conducted to determine the feasibility of a major research effort to attempt to correlate ADP errors and factors in the working environment. Observation of the initial implementation efforts of Division Logistics Systems (DLOGS) will be made to determine whether DLOGS can serve as a suitable vehicle for the investigation of ADP errors. DLOGS is to implement those automated division-level logistic activities which were tested successfully during the Division Logistic System Tests (DLST). In DLOGS, the UNIVAC 1005 is used to automate various supply activities.
5. Estimated Professional Man-Years Required:

FY 70: 1.0

Research Area 3:

**TRAINING FOR LEADERSHIP,
COMMAND, AND CONTROL**

3

Research Area 3:

Training for Leadership, Command, and Control

Title:

Work Units

**Knowledges, Skills, and Thought Processes of the Battalion
Commander and Primary Staff (CAMBCOM)**
Factors in Military Organizational Effectiveness (FORGE)
Small-Group Instructional Methods for Military Training (INGROUP)
**Determination of Performance Capabilities and Training Requirements
for Manual Command and Control Functions of Automated Air Defense
Systems (MANICON)**
**Systems Engineering of Leadership Training for Officer Candidate
Programs (OC LEADER)**

Exploratory Research

AD Officer Career Course (ER-77)

Description:

Research activities in this area are directed toward increasing understanding of human factors aspects of leadership, command, and control, and studying approaches to officer training. The field of interest covers a range of command, from company and battalion levels in Air Defense and Infantry to command and control in Nike-X. The research efforts deal with command and control functions and problems, information requirements and other factors that enter into decision making by the commander, determination of the content for particular courses, and studies of organizational effectiveness.

Level of Effort in FY 1970: 7.7 BMVs.

WORK UNIT STATEMENT

1. **Knowledges, Skills, and Thought Processes of the Battalion Commander and Primary Staff—CAMBCOM (Continuing)**
2. **Location:** HumRRO Division No. 4
3. **Sponsor:** U.S. Continental Army Command
4. **Scope:**
 - a. **Objective of Research.** To identify the knowledges, skills, and thought processes of the battalion commander and primary staff officers of a combat arms maneuver battalion.
 - b. **Potential Military Research End-Result.** Information developed by this Work Unit will enable the U.S. Army Infantry School to:
 - (1) Validate that portion of the Infantry Officer Advanced Course curriculum (2-7-C22) that is currently devoted to battalion commander and staff procedures.
 - (2) Develop a basis for the derivation of Student Performance Objectives for Advanced Course subject matter.
 - (3) Revise Infantry School doctrinal literature.
 - c. **Background and Summary:** During the past several years the Infantry School has developed a master plan directed primarily toward improving instructional content and procedures. The plan includes the introduction of innovations in technology of instruction, and emphasizes the systematic derivation of training content as a critical first step in establishing an instruction system. As a part of implementing the plan, the Infantry School asked HumRRO to assist in identifying the knowledges, skills, and thought processes of the battalion commander and his primary staff.

In Exploratory Study 64 the feasibility of conducting research in this area was indicated. Specific methods of identifying knowledges, skills, and thought processes were selected and data on the operation of the battalion staff were collected from the continental United States (CONUS), Europe, Alaska, Panama, and Vietnam during FY 1969.

The knowledges and skills of the primary battalion staff are being identified in CAMBCOM I by using a modified job analysis procedure originally developed by the U.S. Air Force. The terminal step in this process will be the development of task inventories for the S-1, S-2, S-3, and S-4 staff positions. Concurrently, the thought processes of the battalion staff are being studied by the use of data from the simulated command post exercises conducted in Work Unit FORGE. In CAMBCOM II, similar procedures will be used to identify the knowledges, skills, and thought processes of battalion commanders.
 - d. **FY 70 Projection:** Identification of the knowledges, skills, and thought processes of the primary battalion staff will be completed. Planning for CAMBCOM II will be initiated.

5. Estimated Professional Man-Years Required:

FY 70: 1.5
 FY 71: 2.0

6. Interested Agencies:

Office of Deputy Chief of Staff for Personnel, Department of the Army
 Office of the Assistant Chief of Staff for Force Development,
 Department of the Army
 U.S. Army Infantry School
 U.S. Army Armor School
 U.S. Army Command and General Staff College

7. Work Sub-Unit Summary and Forecast:

I. Identification of the knowledges, skills, and thought processes of the primary battalion staff:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*CA	A	AD	D	D	D	DS	

II. Identification of the knowledges, skills, and thought processes of the battalion commander:

FY 70				FY 71			
1	2	3	4	1	2	3	4
			P	CA	CA	AF	D

WORK UNIT STATEMENT

1. **Factors in Military Organizational Effectiveness—FORGE (Continuing)**
(Basic Research)
2. **Location:** HumPRO Division No. 4
3. **Sponsor:** (Institutional Research)
4. **Scope:**
 - a. **Objective of Research.** To identify and discover ways of controlling human factors that influence the effectiveness of military organizations.
 - b. **Potential Military Research End-Result.** Specific knowledge will be obtained on the human factors involved in command and control activities and their contribution to organizational effectiveness. Such knowledge will enable commanders to better control their units and will permit improved training in command and control activities. Additional benefits will be improved techniques for assessing organizational functioning and for evaluating the performance of command and control activities.
 - c. **Background and Summary.** Military organizations must be able to search out, accurately perceive, and correctly interpret the properties of operational situations, to solve relevant problems, and to react flexibly to changing situational demands. In addition to the need for technically competent personnel, effectiveness has been found to depend upon the efficient functioning of certain organizational processes for coordinating activities and integrating information and decisions. Whether these processes are effectively handled depends greatly upon certain social-psychological factors that operate to some degree in all organizations.

In FORGE, social-psychological factors that impede or enhance performance of certain processes are being identified and studied. The approach is to simulate an infantry battalion engaged in internal defense operations so as to identify and study the organizational processes used in solving problems and taking actions, and the human factors that influence these processes.

Organizational processes identified in previous research are being studied in FORGE I to determine how they contribute to unit effectiveness in accomplishing concrete missions, how they function in military organizations, and how they are affected by the external pressures of combat. Data collection techniques and a standard simulation were developed, and the data collected are being reduced and analyzed. Based on pilot studies conducted in connection with FORGE I, preliminary planning for FORGE II was begun.
 - d. **FY 70 Projection.** The data reduction and analysis in FORGE I will be completed. In FORGE II, those organizational processes that have been identified as major determinants of effectiveness will be studied intensively to isolate social-psychological factors that influence their performance. Final planning and execution of FORGE II will be dependent upon

FORGE

outcomes in FORGE I and will occur in the last two quarters of FY 1970. Planning will begin on FORGE III.

5. Estimated Professional Man-Years Required:

FY 70: 2.0

FY 71: 2.0

6. Interested Agencies:

- U.S. Army Infantry School
- U.S. Army Command and General Staff College
- U.S. Army War College
- U.S. Army Management School
- Industrial College of the Armed Forces

7. Work Sub-Unit Summary and Forecast:

I. Identification of functions critical to organizational effectiveness:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*A	A	D	D	DS			

II. Human factors affecting performance of critical functions:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*P	P	C	A	A	A	D	DS

III. Control of factors influencing effectiveness:

FY 70				FY 71			
1	2	3	4	1	2	3	4
			P	P	P	C	C

WORK UNIT STATEMENT

1. Small-Group Instructional Methods for Military Training—INGROUP
 (Continuing)

2. Location: HumRRO Division No. 4

3. Sponsor: U.S. Continental Army Command

4. Scope:

- a. Objectives of Research. To evaluate the effectiveness of small-group instructional techniques, and to identify ways to best exploit these techniques for military instruction.
- b. Potential Military Research End-Result. As a result of this research, specific information will be available concerning the use of small-group methods within a military instructional context. This information will be in terms of advantages, disadvantages, potential uses, procedures for implementation, requirements for instructors, and relative effectiveness of small-group techniques in comparison with other teaching methods.
- c. Background and Summary. At the request of the U.S. Army Infantry School, HumRRO began research to develop information on ways small-group techniques may be used to improve the effectiveness of instruction. In FY 1969, a survey of the literature and an analysis of the "state of the art" were completed.
- d. FY 70 Projection. Small-group techniques will be compared with other teaching methods in an experiment, a handbook of small-group instructional techniques will be prepared, and materials will be developed to train potential instructors to use small-group methods.

5. Estimated Professional Man-Years Required:

FY 70: 0.5
 FY 71: To be determined

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department
 of the Army
 U.S. Army Security Agency
 U.S. Army Infantry School
 U.S. Army Armor School
 U.S. Army Command and General Staff College
 U.S. Army War College
 U.S. Army Management School
 Industrial College of the Armed Forces

7. Work Sub-Unit Summary and Forecast:

I. Research on small-group instructional methods:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*CA	CA	D	D	D	DS		

WORK UNIT STATEMENT

1. **Determination of Performance Capabilities and Training Requirements for Manual Command and Control Functions of Automated Air Defense Systems—MANICON (Continuing)**
2. **Location:** HumRRO Division No. 5
3. **Sponsor:** U.S. Army Research Office
4. **Scope:**
 - a. **Objective of Research.** To identify and evaluate manual performance capabilities and training requirements for command and control functions of automated air defense weapon systems.
 - b. **Potential Military Research End-Result.** This research effort has continued to have an impact on Army decisions concerning allocation of man/machine functions, command positions, and the characteristics of display consoles for the Safeguard system. The Safeguard System Evaluation Agency has contracted for a command and control simulation facility at White Sands Missile Range that will contain displays and consoles based on design concepts and specifications prepared under the MANICON research. It is anticipated that command and control measurement concepts and methods will be produced to be used by the Army in its system evaluation studies.
 - c. **Background and Summary.** In previous years researchers under this Work Unit performed analyses and prepared descriptions of potential command and control tasks, postulated job positions, and prepared functional specifications and artist's concepts of command displays and consoles for the Sentinel ABM system. During FY 1969 technical advice was given to the Army during the review of contractor's proposals for the development of the command and control simulation facility. Also, additional and more detailed descriptions were prepared for the command tasks postulated for two command centers to be simulated. Extensive planning was accomplished for the conduct of experimentation on representative command functions. A set of procedures for selecting representative functions was prepared and preliminary scenarios for exercising the functions were developed.
 - d. **FY 70 Projection.** Development of plans will continue for uses of Safeguard's simulation facility. The simulator will be assembled and installed at White Sands Missile Range. Pilot studies of selected command tasks will be conducted using low-fidelity simulation at Fort Bliss, Texas.
5. **Estimated Professional Man-Years Required:**
 - FY 70: 2.0
 - FY 71: To be determined

MANICON

6. Interested Agencies:

U.S. Continental Army Command
U.S. Army Air Defense Command
U.S. Army Human Engineering Laboratories
U.S. Army Air Defense School
Riverside Research Institute
Safeguard System Evaluation Agency, White Sands Missile
Range, New Mexico

7. Work Sub-Unit Summary and Forecast:

I. Low-fidelity simulation of Safeguard manual functions:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*C	CA	CAD	D	S			

WORK UNIT STATEMENT

1. **Systems Engineering of Leadership Training for Officer Candidate Programs--
OC LEADER (New)**
2. **Location:** HumRRO Division No. 4
3. **Sponsor:** U.S. Continental Army Command
4. **Scope:**
 - a. **Objective of Research.** To identify potentially productive approaches to the systems engineering of leadership training programs in the Infantry Officer Candidate School.
 - b. **Potential Military Research End-Result.** Validated objectives and training packages that would have wide application in leadership training for noncommissioned officers as well as for officers should result from the systems engineering approach to training development.
 - c. **Background.** Although effective, leadership training within current Officer Candidate programs has evolved more or less unsystematically over a long period of time. Further significant improvements will require a more systematic approach, both to leadership concepts and to leadership training, in terms of identifiable objectives and methods for attaining them. Previous leadership research under HumRRO Work Units OFFTRAIN, LEAD, CAMBCOM, and HIGHLEAD, as well as HumRRO Technical Advisory Service efforts related to Officer Candidate Schools, is relevant to these goals and will provide the basis for the present research effort.
 - d. **Method of Attack.** The research will include the following:
 - (1) Identify knowledges and skills required in leadership positions.
 - (2) Define behavioral objectives to provide a basis for organizing and conducting leadership training.
 - (3) Identify, describe, or develop appropriate training methods for achieving the objectives.
5. **Estimated Professional Man-Years Required:**

FY 70: 0.5
6. **Interested Agency:**

U.S. Army Infantry School

OC LEADER

7. Work Sub-Unit Forecast:

I. Systems engineering of leadership training for Officer Candidate programs:

FY 70			
1	2	3	4
PC	CA	AD	DS

EXPLORATORY RESEARCH

1. Title: AD Officer Career Course—ER-77 (New)
2. Location: HumRRO Division No. 5
3. Sponsor: U.S. Army Continental Army Command
4. Scope:
 - a. Objective of Research. To determine the feasibility of developing an improved Career Course (C-22) for U.S. Army Air Defense Officers.
 - b. Military Problem. The recent separation of the artillery into two career branches—air defense and field artillery—has created a need for the development of a new Program of Instruction (POI) at the U.S. Army Air Defense School for the Air Defense Officer's Career Course. Because of the diversity of both previous duty assignments and subsequent job assignments, the POI must possess the flexibility to accommodate a wide divergence of the officers' prior skills and knowledges, as well as their subsequent learning requirements. New developments in methods and media in the field of training technology can provide highly flexible instructional systems that can be more closely tailored to the educational needs of individual students. These developments will be evaluated as to their applicability to the USAADS career course.
 - c. Approach. Interviews and surveys of incoming student officers for the C-22 Course will be conducted in order to identify previously acquired knowledges and skills. The current learning objectives for the Course will be analyzed, and a preliminary determination will be made of the job requirements characteristic of duty assignments of course graduates. The feasibility of broadening the scope of the elective program for the C-22 Course will be determined with a view to increasing the flexibility of the POI. New devices, techniques, and educational media will be examined as to their applicability for use in career training. Working in conjunction with the Air Defense School, the research staff will design a program of research and exploratory development to permit gradual revision of the course in administratively feasible stages of evaluation.
5. Estimated Professional Man-Years Required:

FY 70: 1.2
6. Interested Agency: U.S. Army Air Defense School

Research Area 4:

LANGUAGE AND AREA TRAINING

4

Research Area 4:
Language and Area Training

Title:

Work Units

Development of a Generalized Method for Preparing Self-Instructional Foreign Language Courses for Military Personnel (AUTOSPAN)
Development of a Method for Training Military Personnel for Interaction With Foreign Nationals (COPE)
Feasibility Study of a System for Debriefing MAAG Advisors (DEBRIEF)
Studies of Effective Intercultural Supervision (EDGE)

Description:

The general objectives of efforts in this Research Area are to identify and improve training in cross-cultural skills that are important to stability operations in underdeveloped non-Western countries. Studies will be made to determine the cross-cultural skills, knowledges, and attitudes that are most likely to contribute significantly to success in stability operations. Training techniques to teach these cross-cultural attributes will be designed and tested. Research on problems of supervision of foreign civilian employees will begin. All research in this Research Area is conducted by Division No. 7 (Social Science)

Level of Effort in FY 1970: 6.0 BMYs.

WORK UNIT STATEMENT

1. Development of a Generalized Method for Preparing Self-Instructional Foreign Language Courses for Military Personnel—AUTOSPAN (Continuing)
2. Location: HumRRO Division No. 7 (Social Science)
3. Sponsor: Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:
 - a. Objective of Research. To develop a generalized method for preparing self-instructional, introductory level, foreign language courses. The effort is organized in large part around the development and evaluation of a prototype course in Spanish.
 - b. Potential Military Research End-Result. The prototype course in Spanish to be developed in this Work Unit will be useful in reducing training costs and in providing language training to individuals who cannot be assigned to school courses. The self-teaching methods developed and reflected in the materials will make it easier to construct similar courses in other languages and thus contribute to widespread economies in military language training.
 - c. Background and Summary. The U.S. military services each year provide intensive training in a variety of languages to many men; virtually all of this training is given by instructors in classrooms. The Army would like to reduce the cost of language training, provided that quality can be retained. Another problem arises because many persons who should receive language training to be better prepared for assignments cannot, for various administrative reasons, take lengthy, full-time courses. There is a need to provide language training in a manner and in amounts consistent with the time available for study.

In AUTOSPAN I, a tentative set of design specifications for a prototype course was prepared. The objective in AUTOSPAN II was to construct the first half of the prototype course, which would permit evaluating, revising, and finalizing the course design specifications. These activities would facilitate the development of the remainder of the course in AUTOSPAN III, and would also provide the basis for preparing a how-to-do-it document.

Phase I of the prototype course, designed to produce language proficiency comparable to the S-1, R-1 levels on the Defense Language Institute rating scale, has been completed. The course consists of 106 lessons and associated tapes, and embodies what are believed to be the best features of programmed instruction, modern classroom methods, and tutorial instruction. A computer program for describing the lexical content of the course was developed. A tryout of Phase I, using nine military subjects at Fort Bragg, was completed with satisfactory results. In the last quarter of FY 1969, actual course construction work on the second half of the course was begun (AUTOSPAN III).

AUTOSPAN

d. FY 70 Projection. Slight modifications of Phase I of the course will be made on the basis of the evaluation data obtained at Fort Bragg. A technical report describing the development and evaluation of Phase I of the course will be prepared and submitted for formal review. Work on Phase II of the course will be suspended but, funds permitting, will be resumed in FY 71.

5. Estimated Professional Man-Years Required:

FY 70: 1.5
FY 71: To be determined

6. Interested Agencies:

Deputy Chief of Staff for Military Operations, Department of the Army
U.S. Continental Army Command
U.S. Army Behavioral Science Research Laboratory
U.S. Army Security Agency
Defense Language Institute
Foreign Service Institute
Office of Education

7. Work Sub-Unit Summary and Forecast:

I. Formulation of the design for a self-instructional language course:
Completed.

II. Construction and evaluation of Phase I of the prototype course:

FY 70

1 2 3 4

*AD	D	D	DS
-----	---	---	----

III. Construction of Phase II of the prototype course and evaluation of the entire course: To be determined.

WORK UNIT STATEMENT

1. Development of a Method for Training Military Personnel for Interaction With Foreign Nationals—COPE (Continuing)
2. Location: HumRRO Division No. 7 (Social Science)
3. Sponsor: Deputy Chief of Staff for Military Operations,
Department of the Army
4. Scope:
 - a. Objective of Research. To design, produce, and evaluate a program of audio-visual instruction for effective working with personnel of other cultures.
 - b. Potential Military Research End-Result. The inclusion of this process in stateside area training programs or in orientation programs of overseas missions should increase the potential effectiveness of mission officers.
 - c. Background and Summary. Officers serving in U.S. military missions overseas play a variety of roles (advisors, consultants, change agents, trainers, monitors) requiring effective communication with host-country personnel. In Latin America, Asia, and Africa, this is difficult to achieve because many of the assumptions of Americans are not shared by host-country personnel. Cultural self-awareness (i.e., a person's awareness of how his thought processes and actions are influenced by his own cultural background) would remove one of the major obstacles to communication—the unwarranted culturally determined assumptions mission officers make (usually unwittingly) about the ways of thinking of host-country nationals.

The instructional process to be developed will involve trainees in observing and reacting to video recordings of the spontaneous behavior of Americans (including military officers) in simulated intercultural encounters. These are make-believe, on-the-job meetings between individual Americans and a host-country national. COPE I deals with the design and production of the process, COPE II with its evaluation. During FY 1969, the program plan was developed and a trial instructional unit was designed and produced. The development of a method for evaluating the instructional program was begun.
 - d. FY 70 Projection. In COPE I, additional instructional units will be designed and produced. In COPE II, work on developing the method of evaluation will continue. The aim will be to design criterion situations that test the trainee's ability to recognize the influence of cultural factors on his own thinking and behavior, particularly in intercultural work situations.
5. Estimated Professional Man-Years Required:
FY 70: 2.0
FY 71: 3.0

COPE

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel,
Department of the Army
U.S. Continental Army Command
Foreign Service Institute
Center for Research in Social Systems
Agency for International Development
U.S. Information Agency
Peace Corps

7. Work Sub-Unit Summary and Forecast:

I. Design and production of the instructional program:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*CA	CA	CA	CA	CA	CA	AD	D

II. Evaluation of the instructional program:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*P	P	P	P	CA	CA	CA	AD

WORK UNIT STATEMENT

1. Feasibility Study of a System for Debriefing MAAG Advisors—DEBRIEF (Continuing)
2. Locations: Overseas locations (to be determined)
HumRRO Division No. 7 (Social Science)
3. Sponsor: Deputy Chief of Staff for Operations, Department of the Army
4. Scope:
 - a. Objective of Research. To develop and evaluate techniques, instruments, and systematic procedures for debriefing U.S. military personnel who have served overseas with the Military Assistance Program, in order to (1) obtain information relevant to improving standards and methods of advisor training, and (2) develop and evaluate procedures for processing, packaging, and disseminating the information obtained.
 - b. Potential Military Research End-Result. Advisor debriefing programs in a small sample of two to four strategically important countries will be developed and implemented. These programs will (1) systematically collect and evaluate information from U.S. military advisors concerning their problems, attitudes, perceptions, and interactions with counterparts, and (2) respond to research interests in the areas of advisor utilization, training, and in-country orientation. Considered collectively, the programs will provide a basis for considering whether a wide-ranging, generally standardized advisor debriefing system is feasible, and how it might contribute to Army-wide advisor assignment and utilization, training, program planning and management, and related doctrine.
 - c. Background and Summary. Initial development included a literature survey; a survey of existing procedures for advisor debriefing; identification of U.S. military and other organizations having interest in the subject; and the provision of Technical Advisory Service on debriefing procedures to U.S. Army Forces Southern Command.

An Advisor Debriefing Program, established in the U.S. Military Assistance Command Thailand (USMACT) in FY 1967, continues to provide DEBRIEF data input, as well as information relevant to advisor attitudes and perceptions. The collection instrument was modified by the addition of a country-specific (Thai) annex, and a test of mail-out data collection has been initiated. Plans were made to introduce a similar program in another country, and discussion was initiated with U.S. Strike Command to obtain approval to introduce an advisor debriefing program into a country in the Middle East, Southern Asia and Africa South of the Sahara (MEAFSA) area.

Field work accomplished during FY 1968-69 has established (1) the feasibility of systematic advisor debriefing within a single military assistance command (USMACT), and (2) the capability of a debriefing system to generate data relevant to advisor attitudes, perceptions, and problems in that

DEBRIEF

command. A similar effort carried out in a second military assistance command would provide a firm base for DEBRIEF II, the objective of which is the design and evaluation of a multi-country debriefing system.

- d. FY 70 Projection. Further analysis will be made of data in Thailand. Results will be summarized and transmitted to USMACT. Staff papers summarizing what has been done and what has been learned in the Work Unit to date will be prepared. The effort will then be suspended and will be resumed in FY 1971 if available resources permit.

5. Estimated Professional Man-Years Required:

FY 70: 0.5

FY 71: To be determined

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department of the Army
U.S. Military Assistance Command, Thailand
U.S. Continental Army Command
U.S. Army Combat Developments Command
Directorate of International and Civil Affairs, Office of the Deputy Chief
of Staff for Military Operations, Department of the Army
U.S. Army Behavioral Science Research Laboratory
Center for Research in Social Systems

7. Work Sub-Unit Summary and Forecast:

I. Debriefing studies within selected commands:

FY 70			
1	2	3	4
*CA	D	S	

II. Feasibility of a debriefing system: To be determined

WORK UNIT STATEMENT

1. **Studies of Effective Supervision of Foreign Civilian Employees of the Army--EDGE (New)**
2. **Locations:** HumRRO Division No. 7 (Social Science)
U.S. Army Research Unit, Republic of Korea
3. **Sponsors:** Chief of Research and Development, Department of the Army
Headquarters, Eighth U.S. Army
4. **Scope:**
 - a. **Objective of Research.** To identify sociocultural factors contributing to the productivity and morale of local national civilians employed by U.S. military units overseas. Implications that sociocultural factors have for management policies, training programs, and supervisory practices, will be examined.
 - b. **Potential Military Research End-Result.** The research will provide information relevant to appraising the appropriateness and effectiveness of current policies, programs, and practices, and will help identify specific changes that may be needed. Special attention will be given to assessing the need to develop and incorporate into current training programs additional treatment of those factors that appear to influence the quality and the effectiveness of the supervisor-employee relationship in mission accomplishment. Where indicated, additional work will be directed toward developing guidance and training materials.
 - c. **Background.** The operations of the Eighth U.S. Army depend heavily on the support of large numbers of Korean civilian employees. Of the direct-hire appropriated fund supervisors of personnel, approximately half are U.S. personnel and half are Korean. The intercultural components in such a setting have significant implications for management, in its effort to establish and maintain patterns of supervision leading to supervisor-employee relations that will benefit productivity, morale, and communication with the larger community. The Assistant Chief of Staff, G-1, Eighth Army, and the Civilian Personnel Director have requested the Behavioral Sciences Division, Office of the Chief of Research and Development, U.S. Army, to undertake research to determine the optimum personnel management practices appropriate to local national employees.
 - d. **Method of Attack.** EDGE I will initially involve an examination of administrative policies and supervisory structures within which local national civilians are employed. In collaboration with the Civilian Personnel Office, Eighth Army, a limited number of work groups that differ importantly in effectiveness (in terms of productivity or work load accomplishment) will be selected. Groups of employees supervised predominantly by Korean nationals will be included, as well as those supervised by U.S. personnel. Samples of supervisors and employees from these groups will be interviewed, with modified critical incident techniques

used to collect descriptions of supervisor and employee behaviors judged by individuals to be either constructive or detrimental.

Based on this and other information, inventories to collect data regarding supervisor-employee behaviors and other pertinent topics will be constructed and administered to members of work groups. These data will be analyzed to provide comparisons of more and less effective work groups with regard to specific role behaviors, leadership orientation, attitudes of supervisors, and reactions of employees to those behaviors and attitudes. The findings of EDGE I will provide a partial basis for specifying needed modifications of or supplements to management practices and guiding inputs to supervisor training programs. Findings of immediate relevance, where supported by observations and analyses of data, will be made available to user agencies.

EDGE II will be designed to check the preliminary identifications of factors affecting supervisor-employee relations and to further determine, by means of empirical studies, their implications for productivity and morale. It will also incorporate, as feasible, efforts to evaluate the effectiveness of inputs to training programs and materials.

5. Estimated Professional Man-Years Required:

FY 70: 2.0
 FY 71: 2.0

6. Interested Agencies:

Deputy Chief of Staff for Personnel, Department of the Army
 U.S. Continental Army Command
 Civilian Personnel Office, Eighth U.S. Army

7. Work Sub-Unit Summary and Forecast:

I. Identification of intercultural factors in supervisor-employee relations:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*PC	PC	C	CA	A	A	D	DS

II. Factors promoting work group productivity and morale:

FY 70				FY 71			
1	2	3	4	1	2	3	4
			P	PC	PC	CA	CA

Research Area 5:
TRAINING TECHNOLOGY

**Research Area 5:
Training Technology**

Title:

Work Units

Analysis of Army Experience in Implementing a Mechanized Stock Accounting System—(ACCOUNT)
Prototypes of Computerized Training for Army Personnel (IMPACT)
Determination of Reading, Listening, and Arithmetic Skills Required for Major Military Occupational Specialties (REALISTIC)
Development of Efficient Training for Soldiers of All Aptitude Levels (SPECTRUM)
Modernization of Synthetic Training in Army Aviation (SYNTRAIN)
Improving Aviation Maintenance Training Through Task and Instructional Analysis (UPGRADE)

Basic Research

Improving Ability to See Military Targets (BR-16)

Description:

Many HUMPRO research activities make contributions, direct or indirect, to the development of a technology of training, but in this Research Area the Work Units and other research efforts are specifically concerned with the subject of technology. Their objective is to develop general methods for training individuals and groups and for maintaining desired performance, methods that would be applicable for a wide range of subject matter and training circumstances. The research deals with both instructor-administered and instructor-free training, and there is special interest in techniques—such as simulation and automated instruction—that might lead to more efficient training, in terms of both time and money. There is also interest in ways of improving training effectiveness through improved motivation. The research includes not only the development of techniques suitable for immediate implementation, but also more basic explorations into the learning processes that might lead to marked improvements in future training efforts.

Level of Effort in FY 1970: 29.9 BMYs.

WORK UNIT STATEMENT

1. Analysis of Army Experience in Implementing a Mechanized Stock Accounting System—ACCOUNT (New)
2. Location: HumRRO Division No. 1 (System Operations)
3. Sponsor: Deputy Chief of Staff for Logistics, Department of the Army
4. Scope:
 - a. Objectives of Research. To analyze the Army's experience with the implementation of a logistics computer system at the DSU/GSU level, the NCR 500. To determine the nature of techniques and devices for aiding performance and/or on-the-job training for use with this system.
 - b. Potential Military Research End-Result. The results will provide the Army with information to develop guidelines for training for the NCR 500 and for training and implementation of oncoming computer systems, such as the CS3. The NCR 500 system was introduced in the field in Southeast Asia on very short notice, precluding adequate training. As a result, key managerial personnel, both in the NCR 500 system and at the system interfaces, knew little or nothing about the system, and it has not been used correctly or to its capacity. Because of the training situation and the high turnover rate, there is a need for performance and on-the-job training aids for NCR 500 system personnel. This research will develop prototype performance or training aids to enable personnel to function effectively in the system and its interfaces with a minimum of formal training.
 - c. Background. Reports made by the Army and the Research Analysis Corporation on Army readiness and logistical support have indicated that maintenance of stock accounting records for repair parts under manual procedures was an important factor in the low level of effectiveness of repair parts supply. A U.S. Army Materiel Command task group conducted a test of automation of the repair parts accounting function, and the resulting favorable report led the Department of the Army to automate this function in Southeast Asia.

In response to several requests, HumRRO initiated an exploratory study (ES-58) to conduct research on the design of field and technical manuals for maintenance and supply to improve their utility for the average soldier. Since HumRRO and others had conducted extensive research on maintenance manuals, and since a literature review indicated that little or no research had been done on supply documentation, ES-58 was initially concerned with supply. Shortly after work began on supply documentation, the study was focused on the NCR 500 system.

Data collection during the exploratory study has consisted of open-ended interviews, all held in CONUS, with officers and enlisted men who had been closely associated with the NCR 500 system in Southeast Asia, as system operators or managers. The great majority of problems mentioned were associated with the management of the system. It seemed evident that the management had been (and still is) deficient because of the lack

ACCOUNT

of management training courses, although newly constructed blocks of NCR 500 training are being developed for inclusion in ongoing courses.

- d. Method of Attack. Discussions with representatives of the Automatic Data Field Systems Command and DCSLOG resulted in a decision to begin an intensive analysis of Army experience with the implementation of the NCR 500 so that guidelines could be developed for NCR 500 training and for implementation for oncoming systems. The study will also consider techniques for aiding job performance and on-the-job training.

Research personnel will attend NCR 500 training sessions at the U.S. Army Quartermaster School and will conduct a field study of the NCR 500 systems in Korea, Thailand, and Vietnam. Field data will be collected from NCR 500 system "crew" personnel, from DSU/GSU managers and management echelons, and from personnel at all system interfaces. A survey instrument is being developed. Military personnel will be needed to assist in the instrument design and in data collection and analysis.

CONUS and overseas training courses will be reviewed and/or attended. A report based on the field and training studies describing Army experience in implementing the NCR 500 is planned. Requirements for the development of performance and on-the-job training techniques will be determined and work will begin on development of prototype aids.

5. Estimated Professional Man-Years Required:

FY 70: 1.4
 FY 71: To be determined

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel,
 Department of the Army
 Office of Personnel Operations, Department of the Army
 U.S. Army Combat Developments Command
 U.S. Army Materiel Command
 U.S. Continental Army Command
 U.S. Army Computer Systems Command
 U.S. Army Quartermaster School
 U.S. Army Ordnance Center and School

7. Work Sub-Unit Forecast:

I. Analysis of the Army's implementation experience with the NCR 500

FY 70			
1	2	3	4
*CA	A	D	DS

II. The nature of performance and/or on-the-job training techniques

FY 70				FY 71			
1	2	3	4	1	2	3	4
		A	P	C	A	AD	DS

WORK UNIT STATEMENT

1. Prototypes of Computerized Training for Army Personnel—IMPACT (Continuing)
2. Location: HumRRO Division No. 1 (System Operations)
3. Sponsor: Chief of Research and Development, Department of the Army
4. Scope:
 - a. Objective of Research. To develop (1) a prototype computer-administered instructional system with (2) accompanying prototype multiple-track (branching), individualized programs of instruction. To be selected for prototype development, each course must be (1) critical for the Army, and (2) representative of a particular kind of behavior.
 - b. Potential Military Research End-Result. Work will be directed toward developing a mature, effective computer-administered instruction (CAI) system through a coordinated evolution of the various facets—decision model, hardware, and software. In the process, prototypes of instructional programs in areas critical to the Army will be prepared. Development is planned over six years, through at least two generations of CAI systems, in order to give the Army an operationally useful (although still quite limited) system as early as possible, and also to benefit from experience with wide operational evaluation. Ultimately, the effort will give the Army its own capability for developing sound, effective CAI materials. The programs will be designed and documented for use by instructors, lesson designers, or subject matter experts, so that the courses may be modified.
 - c. Background and Summary. The essence of CAI is the instructional decision model—a set of rules for matching presentation of specific content (selecting and sequencing) with trainee capabilities (student characteristics and responses to earlier material). While the computer is merely the implement for gaining a range and precision of control over the learning environment that cannot be attained by any other instructional agent, the capabilities of the computer's hardware and software do constrain the decision model.

An integrated, interdisciplinary approach is being used in four phased development cycles. In IMPACT I, "raw" hardware, software, job-relevant instructional content information, student capability information, and an a priori decision model are being integrated into a provisional CAI system with an attendant prototype course. COBOL computer programming was chosen because of (1) subject matter expertise gained under Work Unit METHOD, and (2) the recognized need for greater informed use of computers within the Army and the DoD. This formulation is to be completed in FY 1970.

In IMPACT II, the "breadboard" model will be tested for effectiveness and revised into a first-generation prototype of a CAI system that will be operationally implementable. In IMPACT III, a second-generation CAI

IMPACT

system will be developed. During IMPACT IV, effectiveness tests for the second-generation system will be used to assess long-range effects of CAI. Simultaneously, a third-generation CAI system of upgraded and expanded capability will be designed, continuing to focus on unique and critical job-task situations and field applications.

During FY 1969, developmental activities on the CAI system included:

Hardware—The first 12 student stations were constructed and the terminal hardware received. The hardware includes 12 cathode ray tubes with typewriter keyboards, light pens, and related communications buffers and control units. Twelve auxiliary display devices (Perceptoscopes) were installed in a rear projection configuration. One Sylvania Electronic Tablet was installed. Negotiations were completed for the Digital Device Controller that will allow the Perceptoscopes to be controlled by the computer. The IBM System 360 was upgraded to 256 bytes of core, 2314 Disk Pack.

Software—Instructional material was analyzed with a view of meeting the requirements of the cathode ray tube. Of the seven course levels, Levels 0 (Introduction), 1, 2, and 3 of the COBOL course were coded, assembled, and debugged, as input to the computer for use in a tutorial role. The preliminary data collected with students during the summer of 1968 were processed. The statistical and data manipulation needs of Project IMPACT were analyzed, and a statistical package and a storage/retrieval package were acquired and implemented. A machine scoring system for entrance tests was designed, entrance tests were scored, and analysis was begun. Necessary changes to Coursewriter were completed and implementation was begun. The software team designed and implemented response pass routine, queued I/O buffers, comment record routine, and a stand-alone author program.

Instructional Content—The preliminary COBOL course material was revised, based on the performance of students tested in 1968. Other revisions were made to accommodate the branching decisions that stem from the use of Valid Confidence Testing. Also, the preliminary course material was greatly expanded in scope, coded in the modified Coursewriter language, and put on the computer. Students were tested on line with the computer during the fourth quarter. The course was revised, refined, and expanded.

Instructional Decision Model—Work continued on the applications of multi-dimensional, multi-leveled nets and graphs to the representation of subject matter structure and/or knowledge space. A preliminary set of decision rules was developed, relating stages of subject problem comprehension—solution, response confidence, response accuracy, and number of response attempts—to a set of differential instructional options. These were integrated with software and hardware. The "breadboard" model was implemented through a total system shakedown and subsequently in the First Evaluation Run. Procedures for formally stating relations between key words were developed and the computational methods for hierarchical level analysis were formulated. Student and course evaluation data provided the basis for revising the decision rules.

- d. FY 70 Projection. Work on the provisional CAI system in IMPACT I will be completed; the work will phase into the system development that will continue with IMPACT II work on the first generation CAI prototype. Activities on the various facets of the system in IMPACT I will include:

Hardware—The Digital Device Controller, which allows various auxiliary audio-visual devices to be under computer control will be installed. The Sylvania Tablet will be tested to determine if additional procurement is desirable. An audio device will be obtained for experimental work. The area of speech input-output devices will be studied. Modifications will be made so as to render Light Pens addressable.

Software—Routines to retrieve, analyze, and summarize data to meet the requirements of the Instructional Decision Model will be designed and programed. Work will begin on natural language and on-line statistical language for research use. The author-mode program will be extended to allow Coursewriter instruction input. A new version will be designed and implementation will begin.

Instructional Content—The preliminary course will continue to be refined, tested, and further expanded. Additional visuals for the Perceptoscopes will be prepared and incorporated into the course. Additional subjects for CAI will be explored.

Instructional Decision Model—Based on the analysis of student and course data gathered in continuing iterations of the model, it will be revised, reorganized, refined, and considerably expanded.

5. Estimated Professional Man-Years Required:

FY 70: 15.0

FY 71: 20.0

6. Interested Agencies:

Office of the Assistant Chief of Staff for Force Development,
Department of the Army
Office of the Deputy Chief of Staff for Personnel,
Department of the Army
U.S. Army Materiel Command
U.S. Continental Army Command
U.S. Army Security Agency
U.S. Army Adjutant General School
Personnel and Training Research Division, Office of Naval Research
Training Research Division, Air Force Human Resources Laboratories
Technical Training Division, Air Force Human Resources Laboratories
Defense Weapons Systems Management Center
Technology Directorate, Systems Development Corporation
Institute for Mathematical Studies in the Social Sciences,
Stanford University
Coordinated Science Laboratory, University of Illinois
Center for Research on Learning and Teaching, University of Michigan
College of Education, Pennsylvania State University
Computer Center, Graduate Division, University of California at Irvine

IMPACT

7. Work Sub-Unit Summary and Forecast:

I. Development of the provisional CAI system and prototype course (Cycle I):

	FY 70			
	1	2	3	4
Hardware				
Software	X	X	X	X
Instructional Content	X	X	X	X
Decision Model	X	X		

II. Evaluation of the first-generation operational CAI system (Cycle II):

	FY 70				FY 71			
	1	2	3	4	1	2	3	4
Hardware				X	X	X	X	
Software		X	X	X	X	X	X	X
Instructional Content				X	X	X	X	X
Decision Model					X	X	X	X

III. Development of the second-generation CAI system and additional prototype courses (Cycle III):

FY 71-72

IV. Evaluation of the second-generation CAI system, and design of the third-generation system (Cycle IV):

FY 73-74

WORK UNIT STATEMENT

1. Determination of Reading, Listening, and Arithmetic Skills Required for Major Military Occupational Specialties—REALISTIC (Continuing)
2. Location: HumRRO Division No. 3
3. Sponsors: Assistant Secretary of Defense (Manpower)
Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:
 - a. Objectives of Research. To determine the levels of reading, listening, and arithmetic skills required for the satisfactory performance of essential job duties in major military occupational specialties (MOSs), and to develop guidelines and methodologies for reducing discrepancies between personnel skill levels in reading, listening, and arithmetic, and levels of these skills required by the job.
 - b. Potential Military Research End-Result. Information from this research effort may help reduce school attrition rates and improve job performance by (1) providing guidelines and methodologies for more precisely matching personnel skill levels with training and job requirements in these skills, and (2) providing methodologies for reducing the difficulty levels of reading, listening, and arithmetic materials used in training and in assignments.
 - c. Background and Summary. At the request of the Chief of Research and Development, Department of the Army, HumRRO proposed that Work Unit REALISTIC be sponsored by the Office of the Assistant Secretary of Defense (Manpower). A problem exists because many of the men in the lower aptitude levels are deficient in basic literacy and arithmetic skills. The impact of their deficiency for the Army depends on the importance of these skills for the job to which they are assigned. Deficiencies are not likely to hinder performance if high levels of these skills are not needed for a particular job.

During FY 1969 literacy skills of personnel in five combat and combat support MOSs were assessed. Additional data on job-performance tests, paper-and-pencil job-knowledge tests, supervisor ratings, and other criterion data were obtained for these men so that relations between literacy skill levels and military performance can be determined. On-the-job and in-the-class observations and interviews were initiated to determine literacy skills demanded by job and training materials. The development of taxonomies for describing literacy materials was initiated.
 - d. FY 70 Projection. Analysis of the data concerning job performance and literacy skills will be completed. On-the-job and in-the-class observations will be completed, and data analysis and report preparation will be accomplished. Guidelines for reducing the difficulty level of printed

REALISTIC

material will be developed. Planning and execution of studies of the perceptual and cognitive factors in reading and listening will be completed. Reports of these studies will be prepared.

5. Estimated Professional Man-Years Required:

FY 70: 2.7

6. Interested Agencies:

Office of Chief of Staff for Logistics, U.S. Army Logistics Doctrine,
Systems and Readiness Agency
U.S. Army Security Agency
U.S. Continental Army Command
United States Armed Forces Institute (USAFI)
Department of Labor
Office of Economic Opportunity
Department of Health, Education, and Welfare

7. Work Sub-Unit Summary and Forecast:

I. Assessment of personnel literacy skills in relation to job performance:

FY 70			
1	2	3	4
*A	A	AD	DS

II. Evaluation and modification of literacy materials for selected MOSs:

FY 70			
1	2	3	4
*CA	CA	AD	DS

III. Experimental studies of basic perceptual and cognitive processes in reading and listening:

FY 70			
1	2	3	4
PCAD	PCAD	PCAD	DS

WORK UNIT STATEMENT

1. Development of Efficient Training for Soldiers of All Aptitude Levels—SPECTRUM (Continuing) (Basic Research)
2. Location: HumRRO Division No. 3
3. Sponsor: Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:
 - a. Objective of Research. To develop procedures for selecting and organizing training content and training methods for high-density combat and combat support MOSs in order to achieve more efficient training at all aptitude levels.
 - b. Potential Military Research End-Result. SPECTRUM studies will provide information on how training should be designed for men of differing aptitude levels. With the Army's training population now spread so widely across the spectrum of aptitude, there is growing evidence that differential training is necessary for the efficient production of relatively standard MOS-qualified soldiers.
 - c. Background and Summary. Since the Department of Defense instituted Project 100,000 in October 1966, the Army has been accepting recruits with AFQT scores ranging from 10 (the statutory minimum) to 100 (the highest possible). The Army now has a greater concentration of trainees at the lower levels of aptitude. These trainees are being assigned to the MOSs where advanced training or school requirements present the least barriers—primarily the combat and combat support rather than the technical MOSs. Approximately two-thirds of the graduates of Basic Combat Training (BCT) enter Advanced Individual Training (AIT) to be trained in the combat or combat support MOSs. There has been considerable research and development in the combat MOS training context, but little on the design of training for men at particular aptitude levels, especially the lowest. Research is also needed on both routine and special training problems that may arise as a result of lowering mental standards.

In a study of combat support MOS school courses in SPECTRUM I, it was found that the wide range of input aptitude is putting serious strain on the system, and that efficiency is being reduced with the input of low mental level trainees. In SPECTRUM II, the performance of trainees of high, middle, and low aptitude in learning a variety of military tasks was assessed in a series of controlled laboratory studies. Learning was found to be highly related to aptitude, with low-aptitude trainees requiring an average of two to four times as long to learn as high-aptitude trainees.

Utilizing a miniaturized four-day training sequence, studies are being run in SPECTRUM III to determine the relationships of a variety of training method variables with selected combinations of aptitude level and type of task. These studies will provide information on selecting content and method for training men of all aptitude levels. The miniaturized

SPECTRUM

training sequence was constructed of selected tasks, representing a broad range of task complexity, from the high-density combat and combat MOS training programs.

- 4. FY 70 Projection. The series of studies will be continued, with each study determining the effects of manipulating a particular set of training methods variables. These variables include pace of instruction, lecture/practice ratios, role of the instructor, self-instruction, and language level of content. Data will be collected on the performance of trainees of high, middle, and low aptitude as they learn to perform the different tasks under the various training methods. The collected data will be analyzed on a continuing basis as the series of studies progresses. Interim reports of findings will be submitted as significant generalizations emerge.

5. Estimated Professional Man-Years Required:

FY 70: 3.3
FY 71: 4.0

6. Interested Agencies:

Office of Personnel Operations, Department of the Army
U.S. Army Security Agency
U.S. Continental Army Command
Deputy Chief of Staff for Individual Training, U.S. Continental Army Command
U.S. Army Training Centers
U.S. Army, Europe
U.S. Army Forces Southern Command
Office of the Provost Marshal General, Department of the Army
Department of Labor
Office of Economic Opportunity
Department of Health, Education, and Welfare

7. Work Sub-Unit Summary and Forecast:

- I. AIT school training for combat support MOSs: Completed.
- II. Laboratory studies of the relationship of aptitude to learning performance: Completed.
- III. Relationships of training methods variables with trainee aptitude and task complexity:

FY 70				FY 71			
1	2	3	4	1	2	3	4
PCA	CAD	CAD	CAD	CAD	CAD	CAD	DS

WORK UNIT STATEMENT

1. **Modernization of Synthetic Training in Army Aviation—SYNTRAIN (Continuing)**
2. **Location:** HumRRO Division No. 6 (Aviation)
3. **Sponsor:** U.S. Continental Army Command
4. **Scope:**
 - a. **Objective of Research.** To expedite the application of advances in training technology to the design and utilization of Army aviation synthetic training equipment, through surveys of training device design requirements and technology and by human factors and training research.
 - b. **Potential Military Research End-Result.** This Work Unit should facilitate the acquisition and utilization of modern synthetic aviation training equipment, thus increasing the efficiency of flight training programs and the responsiveness of the aviation training base.
 - c. **Background and Summary.** The lag which typically exists between developments in training technology and their application in the design and utilization of Army synthetic flight training equipment is of concern to OCRD, the U.S. Continental Army Command, and the U.S. Army Aviation School. At present, a Synthetic Flight Training System (SFTS) is being developed to apply advanced concepts to rotary wing synthetic training equipment. HumRRO research helped initiate the SFTS, and the SYNTRAIN staff has provided human factors and training assistance to the SFTS developing and reviewing commands and contractors.

A commercially available device to help modernize Army fixed wing synthetic training was identified by the research staff and procured by the Aviation School for evaluation. Research toward its utilization is under way. The School requested inclusion of research on the optimum scheduling of flight and synthetic flight training in the FY 1970 program.

Paper procedures trainers, by-products of SYNTRAIN, have been adopted by the Aviation School for use in one of its courses; such trainers are being developed for additional courses.

To expedite application of modern training concepts to major synthetic trainer design, SYNTRAIN will follow six steps: (1) study of training requirements to identify areas for use of such trainers; (2) familiarization with training, training management, and engineering technologies relevant to trainer design; (3) specification of characteristics of required devices; (4) technical assistance to assure that advanced concepts for the proposed trainers are preserved; (5) identification of gaps in the human factors and training data, and development of data; (6) evaluation of prototype training devices.

Five Sub-Units are planned, dealing respectively with training in rotary wing, fixed wing, tactics, maintenance, and air traffic control. The six developmental steps will be followed in each Sub-Unit if needed.

SYNTRAIN

- d. FY 70 Projection. Manufacture of an SFTS developmental model will continue with delivery scheduled for early FY 1971. Human factors assistance to the developing agency will be provided, and development of training materials for SFTS evaluation will be initiated. Development of optimum programs of instruction for use with commercially available fixed wing devices will be completed. Assistance will be provided in the development of functional characteristics and performance specifications for AH-56 training equipment. Planning for Sub-Units III, IV, and V will be initiated, depending upon personnel availability.

5. Estimated Professional Man-Years Required:

FY 70: 3.7
 FY 71: 4.5

3. Interested Agencies:

- U S. Army Aviation School
- U.S. Army Human Engineering Laboratories
- U.S. Army Avionics Laboratory
- U.S. Army Aeromedical Research Laboratory
- U.S. Naval Training Device Center
- U.S. Air Force Aerospace Medical Research Laboratory
- U.S. Air Force Air Training Command
- U.S. Coast Guard
- Federal Aviation Administration
- National Aeronautics and Space Administration

Various nongovernment research agencies and industries where research and development related to synthetic trainer design and utilization are under way.

7. Work Sub-Unit Summary and Forecast:

I. Synthetic rotary wing training:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*CA	CA	CA	CA	CA	CA	CA	CA

II. Synthetic fixed wing training:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*CA	CA	CA	CA	D	D	S	

III. Synthetic tactics training: To be determined.

IV. Synthetic maintenance training: To be determined.

V. Synthetic air traffic control training: To be determined.

WORK UNIT STATEMENT

1. Improving Aviation Maintenance Training Through Task and Instructional Analysis—UPGRADE (Continuing)
2. Location: HumRRO Division No. 6 (Aviation)
3. Sponsors: U.S. Continental Army Command
U.S. Army Logistics Doctrine, Systems and Readiness Agency
4. Scope:
 - a. Objectives of Research. To study the relationships among job requirements, training, and manpower considerations for aviation maintenance. Specifically, to develop techniques for gathering task data and procedures for translating the data into effective training programs; to develop techniques to assist in the definition of school and unit training responsibilities; and to study the effect of non-use of training on morale, retention in service, and proficiency of aviation maintenance personnel.
 - b. Potential Military Research End-Result. UPGRADE will provide general techniques for increasing the job relevance of aviation maintenance training and will apply those techniques within the high-density MOS 67N20. In view of the fact that (1) the reenlistment rate for aviation mechanics is low, (2) a major portion of the Army's aviation maintenance in Vietnam is performed by newly trained personnel, and (3) the imbalance between CONUS and overseas aviation maintenance personnel requirements is likely to continue, it is critical that school and unit training be maximally responsive to major job requirements. Also, methods are needed for maintaining proficiency during periods of non-use of training.
 - c. Background and Summary. Aircraft maintenance effectiveness is largely determined by the effectiveness of the training given and the extent to which the training relates to the field requirements. It is also essential that the trained MOS holder be able to maintain his proficiency. Non-use of training, a frequent occurrence during CONUS assignment, reduces proficiency and may adversely affect morale and retention in the service.

Research on techniques to make aviation maintenance training more job relevant was requested by the U.S. Army Aviation School, which recommended that MOS 67N20 be used as the vehicle for study because of its importance to operations in Vietnam. The research was coordinated with the U.S. Army Transportation School, the proponent agency for 67N20 curriculum development, and with the Military Occupational Information (MOI) Data Bank, Office of Personnel Operations, Department of the Army. The research will be of assistance to the Aviation and Transportation Schools in their systems engineering of aviation maintenance curricula, as outlined in USCONARC Regulation 350-100-1, Systems Engineering of Training. The phase of the research concerned with the effect of imbalance between CONUS and overseas personnel requirements on morale and loss in maintenance skill was requested by the U.S. Army Logistics Doctrine, Systems and Readiness Agency (USALDSRA).

UPGRADE

In UPGRADE I, techniques were developed for collecting and utilizing detailed aviation maintenance job data. Data collection for a world-wide survey of job incumbents and supervisors of MOS 67N20, by mail and on-site questionnaires, was completed in FY 1969. Also, field returnees were surveyed, and ongoing maintenance was observed on-site. Mathematical models to assist in the allocation of task training responsibilities between schools and field units were developed.

In the initial plan, UPGRADE II was to be concentrated on developing a unit training package for MOS 67N20, employing the capabilities of operational units to conduct training as part of the overall aviation maintenance training system. However, the information requested by USALDSRA, concerning the effect on morale and skill of imbalance between CONUS and overseas personnel requirements, will be of value in development of unit training, since a significant function may be maintaining skill levels of mechanics who, assigned to units that lack aircraft, have little opportunity to exercise maintenance skills. Therefore, it is proposed that UPGRADE II be reoriented to determine (1) the extent of imbalance in personnel requirements between CONUS and overseas and the resultant degree of non-use of aviation maintenance skills; (2) the effects of such factors on retention in service; (3) the effects of non-use of skills on proficiency; and (4) possible remedial actions, including unit training programs and assignment procedures. Pursuit of the latter two objectives will be contingent on findings as to the magnitude and dimensions of the problem. The development of unit training packages would then be undertaken in UPGRADE III.

The data and techniques developed in UPGRADE will be useful in producing a systems-engineered program of instruction for MOS 67N20 and for the development of Army logistics doctrine and systems. Equally important, the data will provide information for evaluation and modification of job data acquisition procedures by the MOI Data Bank. Also, the data will be of use in the development of supporting guidance documents for systems engineering of training.

- d. FY 70 Projection. Techniques for developing and utilizing aviation maintenance job description data will be documented. A CONUS field survey to determine the extent of imbalance between CONUS and overseas personnel requirements and its effect will be conducted. The measurement of loss of aviation maintenance proficiency due to non-use of training will begin if the initial results support the need.

5. Estimated Professional Man-Years Required:

FY 70: 2.5

FY 71: To be determined

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department of the Army
Office of the Deputy Chief of Staff for Logistics, Department of the Army
Office of Personnel Operations, Department of the Army
U.S. Army Materiel Command
U.S. Army Combat Developments Command

U.S. Army Aviation School
 U.S. Army Transportation School
 U.S. Air Force Air Training Command
 U.S. Naval Air Technical Training Command

7. Work Sub-Unit Summary and Forecast:

I. Techniques for development and utilization of aviation maintenance job description data:

FY 70			
1	2	3	4
*A	D	D	S

II. The effects of non-use of maintenance skills on the proficiency and retention in service of aviation maintenance personnel:

FY 70				FY 71			
1	2	3	4	1	2	3	4
	P	PC	CA	CAD	D	S	

III. Development of unit training for MOS 67N20: To be determined.

BASIC RESEARCH

1. Title: Improving Ability to See Military Targets--BR-16 (Continuing)
2. Location: HumRRO Division No. 5
3. Sponsor: U.S. Army Combat Developments Command
4. Estimated Professional Man-Years Required:
FY 70: 1.3
5. Many military tasks involve visual recognition or identification of objects or shapes. A few examples of such tasks are: visual aircraft and land vehicle identification; map reading and land navigation; air-to-ground reconnaissance and navigation; and photographic radar and infrared image interpretation. In each of these visual tasks, observers must be trained to discriminate between similar shapes and to accurately classify (or identify) shapes that have a wide variety of spatial or geographical orientations.

During FY 1969, sets of experiments were conducted to study the following problems:

- (a) The ability of observers to detect cue similarities and differences among a set of shapes having common or redundant characteristics.
- (b) The relationship between concept attainment and the relative probabilities that distinguishing cues are present for viewing.
- (c) The effect of prior familiarity with an object on the accuracy of classifying the object.
- (d) The development of a preliminary computer simulation of pattern recognition behavior.
- (e) The accuracy of object recognition as influenced by its physical orientation to the observer.
- (f) The accuracy of object recognition when viewed against various types of backgrounds.
- (g) The relationship between contour deformation and judgments of shape, size, and distance.

During FY 1970 work will be conducted in the following areas:

- (a) Additional analyses of the effects of visual backgrounds on object identification.
- (b) Additional studies of the effect on identification accuracy of the physical location of an object

6. Interested Agencies:

U.S. Army Security Agency
U.S. Continental Army Command

Research Area 6:
TRAINING MANAGEMENT

Research Area 6:
Training Management

Title:

Work Units

Training Strategies and Incentives Appropriate to Different Aptitude
Level for Selected Army Training Courses (APSTRAT)
Predicting Aviator Success in Training and Operations
Assignments (PREDICT)
Development of Training Management Procedures for Different
Ability Groups (STOCK)

Exploratory Research

Soldier Esprit (ER-74)
Methodology for Training Systems Engineering (ER-75)

Description:

Research in this area goes beyond improvements in training content and instructional methods. Efforts include analysis of the Army training organization and its place in the Army structure, as well as activities relating to administrative and organizational problems within the training system. The Research Area includes activities directed toward necessary modification of training administrative procedures and organizational structure to allow effective introduction of improved instructional procedures.

Level of Effort in FY 1970: 11.7 BMYS.

WORK UNIT STATEMENT

1. Training Strategies and Incentives Appropriate to Different Aptitude Levels for Selected Army Training Courses—APSTRAT (Continuing)
2. Location: HumRRO Division No. 3
3. Sponsors: Assistant Secretary of Defense (Manpower)
Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:
 - a. Objective of Research. To develop and test, in an operational course, instructional systems appropriate for multi-aptitude populations.
 - b. Potential Military Research End-Result. The practical products will be system-engineered courses of instruction based on the latest principles of individualization and incentive management. Since these courses will be developed and modified in ongoing operational settings, they should be readily and easily incorporated into the existing Army training system. Data clearly showing the benefits in terms of material mastered and/or time saved will be available for decision-making functions.
 - c. Background and Summary. At the request of the Chief of Research and Development, Department of the Army, HumRRO proposed this Work Unit for sponsorship by the Office of the Assistant Secretary of Defense (Manpower). The Work Unit was approved and funded in the last quarter of FY 1968.

During FY 1969 an entire high-density course, Field Wireman, was selected for the field testing of experimental or prototype training strategies. This course was chosen because it was (1) representative of the high-density combat and combat support MOSs, (2) representative across Services, (3) relevant to civilian occupations, and (4) representative of both individual and team performance.

The course has been completely system engineered consistent with CONARC Reg 350-100-1. Instructional media and material designed for multi-aptitude levels are being developed and organized in a way to optimize learning for all aptitude levels according to the findings of related research being conducted on training of men of varying aptitude levels and the findings of HumRRO's Work Unit SPECTRUM.
 - d. FY 70 Projection. Trial runs and then full-scale runs of the newly organized courses will be conducted. Various incentive systems now being conceptualized will be superimposed in a systematic fashion to determine their effects on learning and performance under actual operational conditions.

APSTRAT

5. Estimated Professional Man-Years Required:

FY 70: 3.8

FY 71: 3.5

6. Interested Agencies:

Deputy Chief of Staff for Individual Training, U.S. Continental
Army Command

U.S. Army Security Agency

U.S. Army Training Centers

Department of Health, Education, and Welfare

Department of Labor

Office of Economic Opportunity

7. Work Sub-Unit Summary and Forecast:

I. Development of an individualized alternate media curriculum:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*PC	C	PCA	PCA	CAD	CAD	ADS	DS

WORK UNIT STATEMENT

1. Predicting Aviator Success in Training and Operational Assignments—
PREDICT (Continuing)
2. Location: HumRRO Division No. 6 (Aviation)
3. Sponsor: Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:
 - a. Objective of Research. To develop operational systems for predicting performance of Army aviators during training and operational assignments by means of computerized multiple regression equations and probability tables. The initial system will be designed for use in secondary selection in the aviation training program.
 - b. Potential Military Research End-Result. The products of this research will be operational systems designed to enhance the effectiveness and efficiency with which personnel decisions pertaining to Army aviator selection, training, and assignment are made. The result should be better utilization and management of the Army aviator—an important and costly Army personnel resource.
 - c. Background and Summary. Army aviation managers can benefit from rapidly available summaries of data describing the relative potential of individuals and groups for important military performances including (1) successful completion of training, (2) differential transition and advanced training assignments, (3) continuance in service after expiration of obligation, and (4) avoidance of accidents.

The U.S. Naval Aviation Training School maintains an operational system for predicting successful completion of flight training. Ongoing HumRRO research indicates that the establishment and expansion of similar systems for Army aviation are feasible. The initial system will build on the primary selection instrument of the U.S. Army Behavioral Science Research Laboratory (BESRL), the FAST battery. It will also use attitudinal, motivational, and other evaluative data developed in previous HumRRO research on (1) training requirements for aviation Warrant Officers and (2) aviator performance under stress, in addition to standard Army records of performance as part of aviator development.

The basic product of each predictor system will be a continuously updated set of computerized multiple regression equations and prediction tables showing odds for and against success of individuals or groups in specific situations. The equations will be based on empirically developed optimum combinations of the best predictors available. Initial efforts will be aimed at development of two operational predictor systems, one for use in the secondary selection process of pass-fail rotary wing primary flight training, the other in the secondary selection of individuals for helicopter gunnery training.

FY 1969 work has provided lists of existing information on Army aviators and their performance. Work is being accomplished toward centralizing

PREDICT

these data in a computerized Army aviator data bank. Several variables have been shown to bear a significant relationship to the criterion of successful completion of training.

- d. FY 70 Projection. Work Unit PREDICT will continue to evaluate various data sets and integrate those that prove valid into a predictor system based on multiple correlation matrices and their derivative multiple regression equations. Close coordination will be maintained with BESRL to continue agreed division of effort.

Construction of the two training predictor systems in PREDICT I will involve (1) comparing each set of available quantitative information against every other set to obtain an intercorrelation matrix, (2) quantifying criterion variables in cases where no quantification exists, (3) deriving regression equations for prediction of success and failure in initial and advanced flight training assignments, and (4) cross-validating the system using a new group of aviators. It is planned that the cross-validated system for pass-fail rotary wing primary training be ready for operational use on Army automatic data processing equipment by the end of FY 1970. The system for helicopter gunnery training should be operational in early FY 1971. However, portions of both systems may become operational at earlier dates.

5. Estimated Professional Man-Years Required:

FY 70: 2.5
 FY 71: To be determined

6. Interested Agencies:

- Office of Personnel Operations, Department of the Army
- U.S. Continental Army Command
- U.S. Army Combat Developments Command
- U.S. Army Board for Aviation Accident Research
- U.S. Army Aeromedical Research Laboratory
- U.S. Army Behavioral Science Research Laboratory
- U.S. Human Engineering Laboratories
- U.S. Army Medical Research Laboratory
- U.S. Navy Aerospace Medical Institute
- U.S. Naval Air Technical Training Command

7. Work Sub-Unit Summary and Forecast:

- I. Development of operational predictor systems for rotary wing initial and advanced flight training:

FY 70				FY 71			
1	2	3	4	1	2	3	4
•PCADS	PCALS	PCADS	PCADS		To be determined		

WORK UNIT STATEMENT

1. **Development of Training Management Procedures for Different Ability Groups—STOCK (Continuing)**
2. **Location:** HumRRO Division No. 1 (System Operations)
3. **Sponsor:** U.S. Continental Army Command
4. **Scope:**
 - a. **Objective of Research.** To develop practical techniques for the management of entry-MOS training programs in order that they may more effectively use individualized instruction for students at all aptitude levels.
 - b. **Potential Military Research End-Result.** Research in this area should provide information that will enable the Army to:
 - (1) Effectively utilize task analysis procedures during curriculum development.
 - (2) Utilize individualized instructional techniques more effectively.
 - (3) Make better use of training resources through the use of self-instructional materials.
 - (4) Provide more effective training situations for personnel at all aptitude levels.
 - (5) Provide more effective field utilization of personnel with different abilities.
 - c. **Background and Summary.** With the increased input of lower ability personnel into the Army, training problems have arisen due to the wider range of aptitudes within the classroom. While individualized instruction alleviates these problems, its application has been hampered by managerial difficulties such as the need to identify individual requirements and to develop personnel/training management procedures to accommodate differences in student progress and achievement.

HumRRO assisted the U.S. Army Quartermaster School in revising the Supplyman (MOS 76A10) course. A task analysis technique amenable to computer processing was developed in STOCK I to identify all relevant tasks, skills, knowledges, and performance standards required of the Supplyman. Analysis results were used in a further revision of the pilot course as well as in construction of the end-of-course performance test. STOCK I was completed with the submission of a consulting report to the Quartermaster School describing the task analysis technique and its application to the Supplyman curriculum.

STOCK II is concerned with the application of individualized instruction techniques to selected supply courses to provide for the study of related management problems. In FY 1969, the Stock Control and Accounting Specialist Course (MOS 76P20) was selected for study. The task analysis technique developed under STOCK I was revised and applied to the duties of the MOS 76P20. One STOCK staff member was assigned to Fort Lee, Virginia, to assist the Quartermaster School in its task analytic and other curriculum revision activities.

STOCK

- d. FY 70 Projection. Under STOCK II, HumRRO and the Quartermaster School will continue to identify and analyze the supply tasks of the 76P20 and other supply MOSS to be selected. Appropriate training objectives and performance standards will be established. Assistance will be provided in developing individualized instructional materials.

STOCK III will be directed toward the development of effective techniques for managing individualized instructional programs. In the first phase there will be an attempt to identify specific problems resulting from the use of individualized instruction at various military schools and training centers. Based on this information, alternative approaches to the management of individualized instruction will be formulated. These approaches will be applied to the Stock Control and Accounting course and to other selected courses on an experimental basis during FY 1971.

5. Estimated Professional Man-Years Required:

FY 70: 2.4
 FY 71: 3.5

6. Interested Agencies:

- Office of the Assistant Secretary of Defense (Manpower)
- Office of the Deputy Chief of Staff for Personnel,
 Department of the Army
- Office of the Deputy Chief of Staff for Logistics,
 Department of the Army
- Office of Personnel Operations, Department of the Army
- U.S. Army Security Agency
- U.S. Army Quartermaster School
- U.S. Army Schools and Training Centers

7. Work Sub-Unit Summary and Forecast:

- I. Evaluation of the supplyman training program: Completed.
- II. Development and application of a task analysis technique:

FY 70				FY 71			
1	2	3	4	1	2	3	4
*CA	CA	CA	A	D	D	D	S

- III. Development and evaluation of training management procedures:

FY 70				FY 71			
1	2	3	4	1	2	3	4
P	P	PC	PC	CA	CA	CA	CA

EXPLORATORY RESEARCH

1. Title: Soldier Esprit—ER-74 (New)
2. Location: HumRRO Division No. 2
3. Sponsors: Deputy Chief of Staff for Personnel, Department of the Army
U.S. Continental Army Command
(Institutional Research)
4. Scope:
 - a. Objectives of Research. To evaluate the feasibility of the development of a set of attitude and personality scales to measure soldiers' basic motivational needs, identification with the Army, and perceptions of the extent to which membership in the Army satisfies their individual needs; to determine the feasibility of developing training methods for use in modifying needs and achieving closer correspondence between satisfaction of needs and accomplishments of Army goals.
 - b. Military Problem. The Army trainee needs to develop and demonstrate such qualities as deference to organizational authority, acceptance of group goals, and physical and emotional endurance. In the enlisted ranks, a man is evaluated periodically on an 11-item form, two of the items being concerned with job performance and knowledge, the remainder with the measurement of such qualities of character and personality as "responsibility," "drive," "initiative," "development of potential," and "ability to work effectively with others." The feasibility of measuring traits during the first year of recruits' service to identify men in need of counseling or special training, and testing again during later stages of their service in an attempt to identify and retain career soldiers, will also be considered.
 - c. Approach. Research will be conducted in three phases. In the first, there will be development and evaluation of measurement instruments and extensive testing of men before entry into BCT; the second phase will be an exploration of methods for achieving attitudinal change; in the third phase methods for implementing measurement and training programs within the Army's personnel management structure will be considered.
5. Estimated Professional Man-Years Required:
 - FY 70: 2.0
 - FY 71: To be determined
6. Interested Agencies:

Office of Personnel Operations, Department of the Army
U.S. Army Behavioral Science Research Laboratory
U.S. Army Schools and Training Centers

EXPLORATORY RESEARCH

1. Title: Methodology for Training Systems Engineering--ER-75 (New)
2. Location: HumRRO Division No. 2
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To determine the requirement for further development and validation of proceduralized techniques for implementing the major phases of training systems engineering.
 - b. Military Problem. The development and evaluation of training programs is a technical activity that requires much more than experience with the training subject matter. As in any highly technical field, expertise in training analysis is the result of both extensive schooling and experience. At the present time, military personnel schooled in training analysis are not available to the Army, as is evidenced by the lack of a relevant MOS. Also, the relatively short time spent in the average Army assignment precludes the development of expertise on-the-job. Army personnel, faced with the requirements for training program development, must rely largely on the guidance provided by training engineering documents. Thus the Army alternative to training analysis has been training engineering, which necessitates only the provision of procedures manuals. With such a manual, the training engineer can follow a well-defined, step-by-step method to develop a given training program.

Some guidance for training engineering is already available in USCONARC Regulation 350-100-1 and supporting pamphlets, and in various HumRRO reports. However, this literature does not cover all aspects of the training development cycle and some steps may still be rather poorly defined. Moreover, none of this material has been organized into the type of "cook-book" procedures manual necessary for use in the engineering of military training programs. This shortage of how-to-do-it information limits the military in its efforts to develop efficient training systems.

- c. Approach. The study will be conducted in two related, sequential phases. The first phase will consist of the collection and collation of available procedural information pertaining to the three major steps in training systems engineering: establishing training objectives, developing the training program, and evaluating the program product. Much of the necessary information has been obtained during activities on HumRRO Work Units TRAINMAN and MBT, and on Basic Research Study 8, Common Job Elements. The immediate product will be preliminary manuals containing the available procedures for accomplishing each of the three engineering steps. While these manuals are not expected to be definitive, they will provide some bases for training engineering by the military, as well as indicate those areas where sufficient technology is now lacking.

The second phase of the study will be concerned with this latter aspect, the determination of training technology needs. Some specific needs already recognized within each of the engineering steps are:

- (1) Development of training objectives—Methods for fractionating conditions and standards from system functions in order to produce the minimal set necessary for defining training objectives.
- (2) Development of training program—Cataloguing job (training) performances in terms of effective training methods; where a method consists of the technique and the media.
- (3) Evaluation of training program—Classifying training performance objectives in terms of efficient test method, efficiency of test method defined as maintenance of test relevance, and minimization of administration cost.

The specific needs in each of these areas will be delineated on the basis of the completeness of the manuals. The requirements for further research can then be specified, clearly defined, and attacked.

5. Estimated Professional Man-Years Required:

FY 70: 1.0

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel,
Department of the Army
U.S. Army Security Agency
U.S. Army Training Centers

INDEXES

WORK UNITS

Code Name	Title	Page
ACCOUNT	Analysis of Army Experience in Implementing a Mechanized Stock Accounting System	67
APSTRAT	Training Strategies Appropriate to Different Aptitude Levels for Selected Training Courses	89
AUTOSPAN	Development of a Generalized Method for Preparing Self-Instructional Foreign Language Courses for Military Personnel	55
CAMBCOM	Knowledges, Skills, and Thought Processes of the Battalion Commander and Primary Staff	39
COPE	Development of a Method for Training Military Personnel for Interaction With Foreign Nationals	57
DEBRIEF	Feasibility Study of a System for Debriefing MAAG Advisors	59
EDGE	Studies of Effective Intercultural Supervision	61
ENDURE	Tank Crew Performance During Periods of Extended Combat	27
FORGE	Factors in Military Organizational Effectiveness	41
IMPACT	Prototypes of Computerized Training for Army Personnel	69
INGROUP	Small-Group Instructional Methods for Military Training	43
JOBGOAL	Improved on-the-Job Training for Logistics Personnel	29
MARKSMAN	Combat Marksmanship	7
MANICON	Determination of Performance Capabilities and Training Requirements for Manual Command and Control Functions of Automated Air Defense Systems	45
MANPROBE	Human Information-Processing Requirements in Manned Aerial Reconnaissance and Surveillance Tasks	5
MBT	Training Guidelines for the US/FRG Main Battle Tank	9
NIGHTSIGHTS	Training Techniques for New Night Vision Devices	11
OC LEADER	Systems Engineering of Leadership Training for Officer Candidate Programs	47
PREDICT	Predicting Aviator Success in Training and Operational Assignments	91
REALISTIC	Determination of Reading, Listening, and Arithmetic Skills Required for Major Military Occupational Specialties	73

Code Name	Title	Page
SKYFIRE	Training Methods for Forward Area Air Defense Weapons	13
SPECTRUM	Development of Efficient Training for Soldiers of All Aptitude Levels	75
STAR	Aircraft Recognition Training	15
STOCK	Development of Training Management Procedures for Different Ability Groups	93
SYNTRAIN	Modernization of Synthetic Training in Army Aviation	77
TYPETRAIN	Development of Improved Army Typing Training Program and Materials .	17
UPGRADE	Improving Aviation Maintenance Training Through Task and Instructional Analysis	81
UTILITY	Study of Soldiers in Lower Mental Categories: Job Performance and the Identification of Potentially Successful and Potentially Unsuccessful Men	19

EXPLORATORY RESEARCH, BY TITLE

Title	Number	Page
AD Officer Career Course	ER-77	49
Army Personnel Management Technicians	ER-76	21
Methodology for Training Systems Engineering	ER-75	97
Reducing Errors in Logistics ADP	ER-79	33
Soldier Esprit	ER-74	95

EXPLORATORY RESEARCH, BY NUMBER

Number	Title	Page
ER-74	Commitment	95
ER-75	Methodology for Training Systems Engineering	97
ER-76	Army Personnel Management Technicians	21
ER-77	AD Officer Career Course	49
ER-79	Reducing Errors in Logistics ADP	33

BASIC RESEARCH, BY TITLE

Title	Number	Page
Improving Ability to See Military Targets	BR-16	83

BASIC RESEARCH, BY NUMBER

Number	Title	Page
BR-16	Improving Ability to See Military Targets	83

RESEARCH DIVISION PROGRAMS

Title	Page
Division No. 1 (System Operations)	
ACCOUNT	67
IMPACT	69
JOBGOAL	29
STOCK	93
Reducing Errors in Logistics ADP (ER-79)	33
Division No. 2	
ENDURE	27
MBT	9
NIGHTSIGHTS	11
Soldier Esprit (ER-74)	95
Methodology for Training Systems Engineering (ER-75)	97
Division No. 3	
ABSTRACT	89
REALISTIC	73
SPECTRUM	75
SYNTHESIS	17
UTILITY	19

	Title	Page
Division No. 4		
	CAMBCOM	39
	FORGE	41
	INGROUP	43
	MARKSMAN	7
	OC LEADER	47
Division No. 5		
	MANICON	45
	SKYFIRE	13
	STAR	15
	AD Officer Career Course (ER-77)	49
	Army Personnel Management Technicians (ER-76)	21
	Improving Ability to See Military Targets (BR-16)	83
Division No. 6 (Aviation)		
	MANPBROBE	5
	PREDICT	91
	SYNTRAIN	77
	UPGRADE	79
Division No. 7 (Social Science)		
	AUTOSPAN	55
	COPE	57
	DEBRIEF	59
	EDGE	61