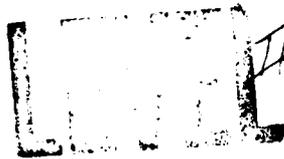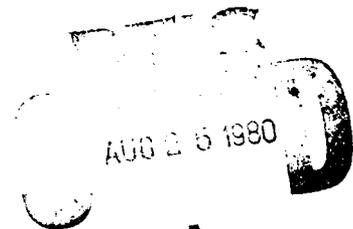Technical Report 456

ABSTRACTS OF ARI RESEARCH PUBLICATIONS, FY 1977

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U. S. Army

Research Institute for the Behavioral and Social Sciences

April 1980

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U. S. ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency under the Jurisdiction of the
Deputy Chief of Staff for Personnel

JOSEPH ZEIDNER
Technical Director

FRANKLIN A. HART
Colonel,   US Army
Commander

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Behavioral science	Organizational effectiveness
Individual training	Performance evaluation
Unit training	Manpower utilization
Information systems	Systems effectiveness

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Abstracts and bibliographic citations, including the Defense Technical Information Center (DTIC) accession number, are given for 28 Research Reports, Technical Papers, Utilization Reports, and Technical Reports published by the Army Research Institute (ARI) during Fiscal Year 1977. To complete the record of research accomplished by ARI in FY 77, abstracts or descriptions are included of 35 intra-agency Research Problem Reviews and Research Memorandums. All items are indexed by author and corporate author
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Item 20 (Continued)

and by research area. The Federal depository libraries where the published
reports may be obtained are also listed.

Technical Report 456

ABSTRACTS OF ARI RESEARCH PUBLICATIONS, FY 1977

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U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES
5001 Eisenhower Avenue, Alexandria, Virginia 22333

Office, Deputy Chief of Staff for Personnel
Department of the Army

April 1980

Abstracts

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The Army Research Institute for the Behavioral and Social Sciences
(ARI) publishes a series of abstracts that summarize the research on which
final or interim reports have been published during each fiscal year. The
series began in 1957. This Technical Report contains the abstracts for
research publications for FY 1977, October 1976 through September 1977.

During this period, ARI was the Army's developing agency for behavioral
and social science and a field operating agency under the Office of the
Deputy Chief of Staff for Personnel. Two laboratories and nine operational
field units provided a flexible research program on individual accession,
training and evaluation, productivity, and career development; and on team
effectiveness, unit proficiency, and information systems and training simu-
lation. The field units particularly emphasized providing responsive solu-
tions to operational problems.

Other ARI research has resulted over the years in instruments to aid
in the selection, classification, and utilization of Army personnel; these
instruments are indexed in ARI's "Psychological Testing Programs in the
U.S. Army" as well as Department of the Army Pamphlet 310-8, Index of Army
Personnel Tests and Measures, 23 December 1976.

JOSEPH ZEIDNER
Technical Director

INTRODUCTION

The present volume of abstracts, continuing the series begun in 1957, summarizes the research publications of the Army Research Institute for the Behavioral and Social Sciences (ARI) for fiscal year 1977. Each volume of the series provides a synopsis of research efforts which reached interim or final reporting stages during the period covered. The abstracts have been written, as far as possible, to describe the principal research findings in nontechnical terms; technical language is used to communicate efficiently the details of research analysis. Indexing by author and research area provides access to individual reports and topics.

Publication Categories

ARI Research publications are divided into separate, consecutively numbered categories appropriate to their intended audience and function. In FY 1977 the following categories were represented:

Research Reports. Operationally oriented, they describe completed research programs or projects which contribute directly to the solution of Army human factors problems in the broad areas of personnel management and enhancement of human performance, both of the individual and in the Army's manned systems.

Technical Papers. Research oriented, they present technical information on research methodology or basic psychological knowledge developed out of the ARI work program. They are primarily of interest to technically trained research workers in the Defense Department and other government agencies.

Research Problem Reviews. These are informal reports to military management, generally in response to questions raised by operating agencies requiring early answers. They may include presentations to military management, interim bases for changes in personnel operations, and bases for research decisions.

Research Memorandums. These are informal intra-agency reports on technical research problems. They may present details on the construction of experimental instruments, fragmentary or incidental data, or methodological developments related to in-house technical operations.

R&D Utilization Reports. Written by the ARI technical monitor of contract research projects, they document the ways in which the contract research results have been utilized.

Technical Reports. Prepared by a contractor or grantee on contract research developed and technically monitored by ARI, and approved by ARI as meeting professional standards, they are usually operationally oriented.

Distribution of ARI Publications

Initial distribution of these reports was made directly by ARI. Research Reports, R&D Utilization Reports, and Technical Reports were distributed primarily to operational and research facilities and their sponsors in the Defense Department, to other interested Government agencies, and to the Defense Technical Information Center (DTIC). Research Reports were also sent to the Library of Congress, which sends documents to Federal depository libraries. Technical Papers were distributed primarily to technically trained research workers, including those reached through DTIC and Library of Congress. Research Problem Reviews and Research Memorandums, as operating or intra-agency documents, seldom received general distribution; they are summarized here to provide a fuller record of ARI research. File copies may be maintained at ARI offices in Alexandria, Va., and record copies of many have been deposited in DTIC in accordance with the DTIC mission as an information center.

Qualified requesters may obtain copies of reports deposited in the Defense Technical Information Center directly from DTIC, Cameron Station, Alexandria, Va., 22314. Anyone may purchase documents from the National Technical Information Service (NTIS), Department of Commerce, Springfield, Va., 22151. The six-digit AD number given for each report is the accession number that should be used in requesting documents from DTIC or NTIS.

Research Reports and Technical Papers may also be obtained on loan from depository libraries in many metropolitan and university centers. A list of these libraries is given at the end of this publication.

ABSTRACTS OF RESEARCH PUBLICATIONS

Research Reports

RR 1191. Root, R. T., Epstein, K. I., Steinheiser, F. H., Hayes, J. F., Wood, S. E., Sulzen, R. H., Burgess, G. G., Mirabella, A., Erwin, D. E., & Johnson, E., III. *Initial validation of REALTRAIN with Army combat units in Europe.* October 1976. (AD A034 610)

ARI has developed a tactical engagement simulation training method, known as REALTRAIN, that provides realistic and motivating training for small combat arms units. REALTRAIN exercises use infantry combat techniques with simulated weapons effects and weapons signatures. This method effectively overcomes the shortcomings of both live-fire and blank-fire training, and it permits the conduct of two-sided, free-play exercises in a tactical environment. Simple but effective techniques of casualty assessment are used. This training is used up to the reinforced platoon level.

The REALTRAIN method was implemented by an Army Training and Doctrine Command (TRADOC) Mobile Training Team from November 1975 to March 1976 at four divisional training sites in the U.S. Army Europe (USAREUR). A team from ARI accompanied the TRADOC team. About 395 cadre personnel were trained as controllers, and 542 infantry and armor personnel were participants. The study was designed to measure the training effectiveness of REALTRAIN; to identify needs to refine the training techniques; and to assess the methodology used for unit evaluation.

The data collected was useful not only for a general evaluation of the method, but also for specific aspects of training such as individual battlefield skills, teamwork, use of cover and concealment, and effective use of all weapons available. Controller and leader responses to a questionnaire administered after the training were typically favorable to REALTRAIN; 77% of respondents reported REALTRAIN as more effective than live fire, 97% of respondents said it was more effective than field exercises, and 94% said it was more effective than battle drill. Of the 542 participants who compared REALTRAIN to normal unit training, 63% said REALTRAIN was much more effective, 21% said it was more effective, 10% said it was equally effective, and 5% said it was less effective.

REALTRAIN implementation in USAREUR provided a valuable empirical base and data source for the analysis of (a) tactical performance by participants in the exercises, (b) participant and controller reactions to the new method, and (c) cost of conducting such exercises.

Technical Papers

TP 277. Farrell, J. P., & Fineberg, M. L. *Specialized training versus experience in helicopter navigation at extremely low altitudes.* November 1976. (AD A034 732)

To improve the navigational performance of helicopter pilots flying at nap-of-the-earth (NOE) altitudes (tree-top level), an experiment was

conducted to find to what extent general navigation skills are transferred to NOE flight.

Two groups of pilots were compared on several aspects of NOE flight. One group consisted of 14 instructor pilots with 2,000 hours of flight experience; the other group was 7 recent Army Aviation School graduates with 200 hours of flight experience and 15 hours of special training in NOE navigation. The results showed that the only statistically significant difference between the two groups was that the instructor pilots were superior in flight planning. Therefore, either NOE navigation is a specific skill to which normal flight experience did not transfer, or the limited transfer that did occur was matched by 15 hours of special NOE navigation training. This paper appeared in Human Factors, 1976, 18(3), 305-308.

TP 278. Johnson, E. M. (ARI); & Spooner, R. L., & Jaarsma, D. (Planning Systems, Inc.). The perception of tactical intelligence indications by intelligence officers. April 1977. (AD A040 350)

As part of an effort to provide improved techniques for intelligence collection planning and analysis, an experiment was conducted to assess the effectiveness of traditional tactical indications in analyzing conventional military operations. Forty-six captains in the Intelligence Officers Advanced Course each assumed the role of an intelligence analyst in a G2 section of an infantry division conducting a mobile defense action. Each officer estimated the probability that each of 49 indications would occur, given the aggressor's known course of action. Each indication was evaluated with each of the four general courses of enemy action--Attack, Defend, Delay, and Withdraw. Eleven indications were evaluated twice with each course of action to provide an estimate of reliability.

The estimates of probability made by individual officers were highly reliable. However, the variability in the officers' estimates for the same indication was extremely high, with an average range of estimates greater than .7 on a zero to 1.0 scale. Only 19 of the 49 indications were perceived as effective discriminators of the course of enemy action with which they are doctrinally associated. The logic underlying clusters of related indications could not be clearly identified for any course of action.

The findings reveal that the traditional indications of enemy operations are either poorly understood or are intrinsically inadequate for use in contemporary intelligence operations. Two areas of improvement were suggested: development of an improved indications structure and development of baseline data representing the probability of occurrence of specific indications of enemy action.

TP 281. Edwards, L. R., & Rochford, D. S. (HRB-Singer, Inc.); & Shvern, U. (ARI). Comparison of four unattended ground sensor displays. April 1977. (AD A039 056)

One source of military surveillance information is remote monitoring by unattended ground sensors (UGS). When personnel or vehicle movements

activate a UGS in the vicinity, a monitor display elsewhere indicates the activation. This research compared the effectiveness of four UGS displays-- an XT plotter and three variations of a situation map display--in terms of their effect on monitor performance. The experiment was part of a continuing ARI program on factors affecting performance of operators monitoring remote sensing devices.

Sixteen U.S. Navy personnel (eight relatively experienced with UGS and eight inexperienced) were trained on the displays. Each operator then monitored each display for 2 hours and reported target information. The reports for the four UGS displays were compared to known ground truth and were scored on total detections, false alarms, detection accuracy, and direction of target movement.

The type of display did not affect operator performance. Operators were able to detect more targets during periods of low target activity than during periods of high target activity. However, accuracy of detection was greater during high target activity. Levels of experience, time effects, and scenarios did not have a significant effect on performance.

TP 282. Johnson, E. M. The perception of tactical intelligence indications: A replication. September 1977. (AD A041 954)

A previous ARI experiment showed that tactical intelligence indications as currently used are of doubtful effectiveness in intelligence analysis (TP 278, The perception of tactical intelligence indications by intelligence officers). In this replication of that experiment, 28 intelligence specialists (officers and enlisted men) participated. As in the first experiment, each assumed the role of an intelligence analyst in a G2 section of an infantry division conducting a mobile defense operation. Each participant estimated the probability that each of the 49 indications of conventional military operations would occur, given the aggressor's known course of action. Each indication was evaluated with four courses of action--Attack, Defend, Delay, Withdraw. Eleven indicators were evaluated twice with each course of action to provide an estimate of reliability.

In both experiments, the estimates made by individuals were highly reliable. However, the variability in the estimates made by different individuals for the same indication was extremely high, with an average range of estimates greater than .7 on a zero-to-10 scale. Only 12 of the 49 indications were perceived as effective discriminators of the enemy course of action with which they are doctrinally associated. In the previous study, 19 indicators were considered effective. There were no significant differences between estimates made by officers and enlisted men.

These findings confirmed the conclusion of the previous research: Either traditional indications of conventional military operations are poorly understood, or they are intrinsically inadequate for use in contemporary intelligence operations, or both. Development of a user-oriented structure of indications may be a way to improve the identification and utilization of indications. Two approaches to such a structure might be operational gaming and the Delphi procedure of pooled expertise.

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*Utilization Report 76-2.   Thomas, J. A.   Changes in black and white percep-
tions of the Army's race relations/equal opportunity programs--1972 to 1974.
November 1976.   (AD A037 209)*

In 1972, ARI began an Army-wide survey to determine how black and white
Army personnel perceived the nature and severity of the race relations prob-
lem and how they viewed the various equal opportunity and treatment programs.
In 1974, ARI conducted a followup survey, using essentially the same ques-
tionnaire, to find what changes had occurred in perceptions and attitudes.
The 1974 sample consisted of 2,246 white and 1,943 black enlisted personnel
at the same 13 installations surveyed in 1972--8 in the continental United
States; 3 in the U.S. Army, Pacific; and 2 in the U.S. Army, Europe.

The 1974 survey did not contradict the 1972 findings. The basic dif-
ference in perceptions persisted. Whites saw a favorable picture and blacks
saw basic inequities in all important aspects of Army life. Promotions and
military justice remained the primary sources of dissatisfaction for blacks,
although blacks perceived significant improvement in both areas. Less dis-
satisfaction with military justice was expressed in 1974 than in 1972. By
1974, the role of Equal Opportunity Officer had become clearly recognized
in the Army. Nevertheless, only a few enlisted personnel believed that most
of their leaders accepted equal opportunity as a leadership responsibility.

Although the perceptions of blacks and whites still differed sharply,
the small changes discernible in 1974 tended to be toward convergence of
opinion. In 1974, a few more blacks and whites believed that the state of
race relations in the Army was not too bad and was improving over time.
This finding was balanced, however, by signs of a growing "white backlash"
attitude. A small but increased percentage of white personnel felt that the
Army program gave black personnel unfair advantages.

The Director, Office of Equal Opportunity Programs, treated the 1974
report as an initial evaluation of the Army's race relations/equal oppor-
tunity program and used it to revise the program as well as to prepare
guidelines for the revision of the Unit Race Relations Training Program.

Research Problem Reviews

*RPR 76-7. Sulzen, R. H., Root, R. T., & Epstein, K. I. Development of an
evaluation model and training program for the Multiple Integrated Laser
Engagement System (MILES): Phase I. October 1976. (AD A076 645)*

Since 1972, ARI has conducted research on the development and evalua-
tion of new training techniques, particularly crew training and tactical
training in units. In 1973, ARI first demonstrated the training simulation
concept known as REALTRAIN, which uses simple, effective casualty assess-
ment techniques and provides motivating, realistic training for small com-
bat arms units.

To achieve tactical realism at company and battalion levels, ARI began developing the Multiple Integrated Laser Engagement System (MILES). Phase I, reported here, describes the preliminary development of an evaluation model and training program to be used with the MILES hardware to provide a complete engagement simulation system. Eight candidate ARTEP (Army Training and Evaluation Programs) models--four that evaluated all phases of a mission and four that scored only the results--were rated on 21 criteria in the categories of data base, validity, implementability, and availability. Raters were Army staff members from the Training and Doctrine Command (TRADOC), Forces Command (FORSCOM), and the Infantry and Armor Schools.

The Situational Dependent model decided upon provides detailed intermediate training objectives and gives diagnostic feedback for training; it is sensitive to the situation-specific nature of free-play engagement simulation exercises. Application requires a minimum amount of data--number, type, and location of the forces being evaluated and of the opposing forces; time; and team coordination. These data are analyzed organizationally and chronologically. The performance of each component, from squad/crew to battalion, is considered by itself and in relation to other team components.

RPR 76-8. Downey, R. G. *Associate nominations in the U.S. Army officer training environment: The Ranger course.* October 1976. (AD A076 646)

One way to predict and assess leadership potential in the Army is through associate evaluations, or peer ratings, which have long been used at the U.S. Military Academy and in officer candidate schools. In 1972, ARI began to investigate the value of associate evaluations in other officer schools. This report presents the results of the Ranger School's initial program, which is part of a larger program that has since become operational at other officer training schools. Associate evaluations were obtained from all members of three Ranger classes (N = 470) and from 148 additional officers and enlisted personnel attending the Ranger classes. Data were analyzed to yield measures of (a) suitability and feasibility of applying the necessary controls within the Ranger training environment, (b) stability over time and personnel shifts, (c) acceptability to Ranger staff and students, and (d) relationship to measures of training performance.

Scores were highly consistent across the three classes and across changes in rating group composition, indicating that an individual would receive a comparable evaluation under different but similar conditions. Ratings were also in substantial agreement with course grades. Although trainees recognized the value of the associate evaluations as a measure of leader potential, they showed some resistance to the use of these evaluations in the personnel management system.

RPR 76-9. Smutz, E. R. *An assessment of factors influencing gunnery performance in an Army National Guard Armor battalion.* October 1976. (AD A078 235)

To identify ways to improve Armor reserve unit training, ARI assessed the training program and gunnery performance of a National Guard Armor battalion that had done unusually well in its 2-week annual training period.

Data were obtained from four sources: gunnery records from Tank Table VIII, results of questionnaires administered to tank crewmen, personnel and medical records, and the battalion training schedule for the year preceding the test period. Of the training time available, 77% (96 hours) had been spent on tank gunnery and related subjects. Of the biographical variables examined, age of the tank commander and the gunner's grade showed a positive association with performance. There was no relationship between tank gunnery performance and the length of time a tank commander and a gunner had served together as a crew.

Similar analyses of other National Guard and Reserve units focused on identifying training programs, crew characteristics, and crew-related variables that lead to superior performance in tank gunnery.

RPR 76-10. Ton, W. H., Warnick, W. L., Kubala, A. L., & Maxey, J. L. (Human Resources Research Organization). *Study of air-to-ground and ground-to-air target handoff*. October 1976. (AD A076 647)

Because of differences in their perspectives, it is difficult for ground observers to handoff (designate) targets to air cavalry or tactical helicopter personnel. The ground observer may designate a target as being located among the tall trees in a certain grid measure, but the helicopter pilot may be unable to discern tree height. Thus, differences in perspective and the low likelihood that the ground and airborne observers will perceive these differences contribute to difficulties in designating a target. This initial effort in a study of target handoff procedure attempted to determine and describe the behaviors in task performance and the handoff conditions.

A questionnaire gathered information regarding the experience of individuals in the handoff process. About 50 persons who had either initiated or received a target handoff completed the questionnaire. Results reflected a wide variety of procedures. Another approach involved the design of a simple handoff simulator to allow closer access to task dimensions. A minimum set of aerial and ground photographs was specified for a simulation situation in which a pair of players--a ground observer and a helicopter pilot--communicated handoff directions. This paper suggests hypotheses for studies in which the simulator would be used.

RPR 76-11. Maxey, J. L., Ton, W. H., Warnick, W. L., & Kubala, A. L. (Human Resources Research Organization). *Target presentation methodology for tactical field evaluation*. October 1976. (AD A076 648)

The term "target acquisition" means the detection, identification, and location of a target in sufficient detail to permit effective weapons use. Recent concern in this area stemmed from several sources. First, weapon and fire control systems have been developed that can engage targets at ranges too far away for the unaided human observer to acquire them. Special sensor systems must be used to improve the human observer's capability. Second, personnel must be able to conduct tactical operations in jungle and other low-visibility environments. Third, future military operations

will probably take place 24 hours a day, with a premium on night operations. The goal of this research was to develop a standard, general purpose methodology of target presentation for testing acquisition systems designed for use in ground combat.

Analysis of target acquisition and threat literature revealed that it was possible only to describe generally a way to develop valid target situations for use in field tests of target acquisition systems. In fact, 24 well-defined variables are likely to affect the visual acquisition process for ground-to-ground target situations. Threat forces are basically armored and mechanized infantry, employing a wide variety of anti-armor weapons systems. They stress attack and rely on defense only as a temporary expedient; they plan to operate on a 24-hour battlefield. Field tests of target acquisition systems should use the targets and study the operational situations that correspond to the threat targets and situations. Test planners should account for each of the 24 factors mentioned above. The guidelines and base information are presented to enable the military test officer to develop more valid target situations for a particular test problem and to obtain better estimates of the operational capabilities of the systems tested.

RPR 76-12. Kubala, A. L., Maxey, J. L., Ton, W. H., & Warnick, W. L. (Human Resources Research Organization). *A study of the psychological (and associated physiological) factors to be considered when constructing field fortifications.* October 1976. (AD A076 690)

This report examines requirements for field fortifications designed to protect friendly forces from a sophisticated enemy using both conventional and nonconventional weapons. The effort focused on the psychological and associated physiological factors to be considered in the design and construction of field fortifications; the research also examined architectural and structural factors that could limit the habitability of a fortification.

From information gathered on "habitability" in a literature review, a list was compiled of factors to be considered in the design of field fortifications. The factors most related to physical wellbeing were nutrition, liquid intake, ventilation, temperature, and work/rest cycles. The most important factors related to psychological wellbeing were space availability/utilization and leadership/management. The most fruitful areas for research were (a) human engineering in the use of space, (b) systems of techniques for provisioning and reprovisioning, and (c) leadership/management of shelter living.

RPR 76-13. Warnick, W. L., Kubala, A. L., Maxey, J. L., & Ton, W. H. (Human Resources Research Organization). *Study of psychological (and associated physiological) effects on a tank crew resulting from being buttoned up.* October 1976. (AD A084 252)

In any future conflict, tank crews may be required to operate with hatches closed (buttoned up) for various periods of time. Changes in tank designs have resulted in decreased space for movement within the tank, which could affect combat crew performance. This report describes work completed

during the first year of research on improved procedures and equipment modification to minimize performance degradation.

This report summarizes findings of a literature review on the psychological and physiological factors presumed to affect tank crew performance under buttoned-up conditions. Evidence was found that crews can operate in the closed environment for up to 48 hours with little adverse effect on performance; however, inadequate heating and ventilation and the wearing of protective equipment may induce physiological changes that could hurt performance.

Recommendations are suggested for changes to be considered in tank design. In the one area of research at the time of this report, preliminary findings indicate that tank commanders' difficulty in target acquisition under buttoned-up conditions may be due to lack of procedural guidance and of experience in the buttoned-up condition.

RPR 76-14. Nordlie, P. G. (Human Sciences Research, Inc.); & Carroll, R. M. (ARI). Differences in speed of promotion of blacks and whites with education and AFQT score as control variables. December 1976. (AD A076 691)

A previous ARI report (TP 270) described results of a study comparing rate of promotion of blacks and whites in the Army. To further examine the sources of the differences reported, data from that report and additional data for 1971-75 were analyzed separately by rank (E4 through E9).

In each of the 5 years and at each level, whites were promoted more rapidly than were blacks. In general, the higher the rank, the greater the discrepancy. Neither educational level nor Armed Forces Qualifications Test (AFQT) category appeared to account for the difference in time to promotion. For high-AFQT categories, differences in speed of promotion declined from 1971 to 1975. No corresponding change was noted in the lower AFQT categories. In fact, although high-AFQT whites were promoted faster than were low-AFQT whites, low-AFQT blacks were promoted faster than were high-AFQT blacks. Some indication of change in this relationship for blacks in the later years of this analysis was noted. Educational level seems to have a curvilinear relationship with time to promotion. Both blacks and whites of low education have been promoted faster than blacks and whites of medium education, but not faster than blacks and whites of high education.

RPR 76-15. Drucker, A. J. Military research product utilization. October 1976. (AD A031 265)

Generalizations were sought that could help the research and development (R&D) community determine and describe how research results and products are used to support Army training and operations.

A 16-item open-ended questionnaire was circulated informally among 79 Department of Defense users and military sponsors of research and among 104 researchers in the Army, the Navy, the Air Force, universities, and contractor

firms. Responses were received from 19 users and military sponsors and from 48 researchers.

The results showed that researchers tended to define utilization in terms of use and change, whereas users defined utilization in terms of cost savings and improved effectiveness. Both agreed that research products consist of more than publications and reports. There was general agreement that the researcher should assume partial responsibility for product utilization; respondents also agreed that the most successful method of insuring that the user utilizes a product is to "stick around and see that he does." Cost effectiveness evaluation was considered important, but it was not used widely by R&D activities in the human resources area.

The survey's findings were the subject of the presidential address to the Military Psychology Division of the American Psychological Association, September 1976.

RPR 76-16. *Stewart, S. R., Christie, C. I., & Jacobs, T. O. (Human Resources Research Organization).* *Leadership tasks performed by U.S. Army company commanders in Europe.* *November 1976. (AD A076 649)*

This report describes an analysis of the company commander's job in terms of significant tasks performed in garrison in Europe. A job task inventory of 402 task statements was administered to 267 U.S. Army company commanders in Europe. They rated each statement in terms of (a) the extent to which it was a significant part of the job and (b) the amount of preparation needed.

Excluding technical skill specialty activities, the jobs of company commanders in garrison in Europe were found to be quite similar across all types of units. The data showed moderate agreement as to which tasks constituted the most significant parts of the jobs and which tasks most commanders felt required the most preparation. Company commanders reported spending an average of 62 hours a week in their duty positions, yet they were able to accomplish to their satisfaction only about half their job requirements. More than 75% indicated they were spending 10% or less of their time conducting unit missions.

RPR 77-1. *Bauer, R. G., & Stout, R. (Bendix Applied Sciences Division); & Holz, R. F. (ARI).* *Measures of military attitudes.* *April 1977.*
(AD A076 692)

This report describes a series of 13 diagnostic attitude scales designed to measure perceptions that enlisted personnel have of their leaders, their unit's performance, their esprit de corps, and their satisfaction with their jobs. Preliminary forms of the scales had been developed in an ARI program on military discipline (RPRs 76-4 and 76-5). This report presents the results of the analysis to refine and validate the measures.

The sample for the experimental administration of the scales consisted of 1,564 enlisted men and noncommissioned officers from Army commands in

the continental United States, Alaska, and West Germany. The measures were designed to be used by behavioral scientists and staff officers to assess attitudes and predispositions of Army personnel on a broad range of organizational issues.

RPR 77-2. *Holmes, D. S., Strasel, H. C., & Consentino, C. (ARI); & Leader, G. C., Daltas, A. J., & Brimm, M. (Cambridge Communications Group, Inc.). Survey feedback in combat units in the U.S. Army in Europe: A pilot project. July 1977. (AD A076 693)*

In June 1972, the Army initiated a program to test the operational potential of organization development techniques of survey feedback, management of objectives, job enrichment, team building/awareness training, and assessment center. This report describes the survey feedback pilot project, which was conducted in U.S. Army combat units in Europe from 1973 through 1975 to (a) determine the effectiveness, feasibility, and acceptability of feedback and (b) develop suitable materials and procedures for an operational survey feedback system.

A moderately favorable outlook for feasibility can be deduced from the results: Troops willingly completed a quarterly survey questionnaire, and commanders paid attention to the results and considered the process useful in promoting insight and communication. Some commanders and their subordinates and some enlisted men reported that survey feedback was valuable to unit operations during the project. However, there was no evidence that survey feedback resulted in more than slight improvements during the survey period. Although they claimed no major results, some commanders indicated that some changes during the project and some actions taken extended beyond the period of the research. This normal process of adjustment and change could be expected to continue if survey feedback practices were conducted over a longer term and in conjunction with other techniques.

RPR 77-4. *Griffith, D. Fort Knox One Station Unit Training (OSUT) attitudinal survey. September 1977. (AD A076 695)*

One Station Unit Training (OSUT) integrates basic combat training (BCT) and advanced individual training (AIT) into a single shorter cycle. Trainees complete integrated training under one cadre and at one station. Following experimental institution of OSUT at selected locations, ARI conducted a survey to compare the attitudes of personnel completing training under the integrated program and those completing training in the separate cycles. This report discusses the results obtained in two courses at Fort Knox, Ky.: Armor Reconnaissance Specialist (MOS 11D) and Armor Crewman (MOS 11E). Independent groups of trainees who had completed BCT, AIT, or OSUT answered a questionnaire about their attitudes on several background and training-related topics. For each topic two comparisons were made: BCT versus AIT and AIT versus OSUT.

Of the three groups, the OSUT trainees were most favorably disposed toward the OSUT training cycle. It was noted that trainees tended to prefer the type of training they themselves had experienced. Training was perceived as more intense by OSUT trainees than by AIT trainees. BCT

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trainees also saw their training as more intense than did AIT trainees. None of the groups indicated that training was overly intense.

In comparison with AIT trainees, OSUT trainees perceived their company commander as empathic. BCT trainees tended to perceive their cadre as more knowledgeable than did AIT trainees. No differences emerged between OSUT and AIT trainees with regard to career or reenlistment intention. No major differences in morale were noted among the three groups.

Survey results of the other four MOS included in the evaluation appear in Research Problem Reviews 77-5, 77-6, 77-7, and 77-8.

RPR 77-5. Griffith, D. Fort Leonard Wood One Station Unit Training (OSUT) attitudinal survey. September 1977. (AD A076 696)

The One Station Unit Training (OSUT) integrates basic combat training (BCT) and advanced individual training (AIT) into a single shorter training cycle. The trainee completes the integrated training under one cadre and at one station. Following experimental institution of OSUT, ARI conducted a survey to assess trainee attitudes toward OSUT and to compare the attitudes of personnel completing training under OSUT and under the conventional BCT/AIT program. This report describes the 13-week Combat Engineer (MOS 12B) course at Fort Leonard Wood, Mo.

Independent groups of trainees who had completed OSUT or the BCT/AIT two-cycle training were administered questionnaires concerning their attitudes on a variety of biographical and training-related topics, including intensity of training, ancillary training, morale, reenlistment, and opinion of OSUT. Policies related to OSUT were favorably perceived by both OSUT and AIT trainees. No overall difference in opinion of training intensity appeared, nor was there any major difference in the way the two groups perceived their cadre. Morale of the two groups appeared comparable and generally satisfactory. OSUT trainees tended to be somewhat more serious than AIT trainees about making the Army a career.

Survey results of the other five MOS included in the evaluation were described in Research Problem Reviews 77-4, 77-6, 77-7, and 77-8.

RPR 77-6. Griffith, D. Fort Sill One Station Unit Training (OSUT) attitudinal survey. September 1977. (AD 076 697)

One Station Unit Training (OSUT) integrates basic combat training (BCT) and advanced individual training (AIT) into a single shorter training cycle. The trainee completes the integrated training under one cadre and at one station. Following experimental institution of OSUT, ARI conducted a survey to compare the attitudes of personnel completing training under the integrated program and the conventional two-cycle program. This report describes the results obtained in the Field Artillery (MOS 13B) course at Fort Sill, Okla.

Independent groups of trainees who had completed BCT, AIT, or OSUT were administered a questionnaire concerning their attitudes on a variety

of background and training-related topics. For each topic, two comparisons were made: BCT versus AIT and AIT versus OSUT. There was general accep- tance of OSUT policies, particularly among the OSUT trainees. Although the morale of all groups was judged satisfactory, the BCT and OSUT groups re- vealed higher morale than the AIT group. The trainees judged training dur- ing BCT and in OSUT to be more intense than training during AIT. None of the groups, however, considered training to be overly intense. OSUT re- spondents were more satisfied with the pace and redundancy of their training than were the AIT respondents. No significant differences were found among the groups regarding reenlistment.

The individual trainee's preference for type of training usually re- flected the type of training experienced. Thus, acceptance of the OSUT cycle was pronounced among the OSUT trainees. Survey results of the other five MOS included in the evaluation appear in Research Problem Reviews 77-4, 77-5, 77-7, and 77-8.

RPR 77-7. Griffith, D. Fort Bliss One Station Unit Training (OSUT) atti- tudinal survey. September 1977. (AD A076 698)

The One Station Unit Training (OSUT) program integrates basic combat training (BCT) and advanced individual training (AIT) into a single shorter training cycle conducted at one station with generally the same cadre throughout. ARI conducted an attitude survey of trainees in six training programs to assess trainee attitudes toward OSUT and to compare the atti- tudes of trainees completing training under OSUT and under the two-cycle program. This report describes results obtained in the Chaparral Crewman (MOS 16P) course at Fort Bliss, Tex.

Independent groups of trainees who had completed either BCT and AIT or OSUT were administered a questionnaire concerning their attitudes on a variety of background and training-related topics, including intensity of training, ancillary training, morale, reenlistment, and opinion of OSUT. Although the OSUT and AIT trainees had comparable backgrounds, the BCT and AIT groups differed significantly in their backgrounds, and results for BCT and AIT groups may reflect in part the effects of background differences.

OSUT trainees seemed to be somewhat more likely to reenlist than did the AIT trainees. BCT trainees indicated a somewhat more serious career intention than did the AIT trainees. Morale appeared to be satisfactory in all groups. With respect to intensity, OSUT and AIT groups were similar. BCT trainees viewed training as more intense than did AIT trainees. No differences emerged between OSUT and AIT trainees with respect to ancillary training. BCT trainees tended to view both their drill instructors and company commanders as more empathic than did AIT trainees. Survey results of the other five MOS included in the evaluation appear in Research Problem Reviews 77-4, 77-5, 77-6, and 77-8.

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RPR 77-8. Griffith, D. *Fort Gordon One Station Unit Training (OSUT) atti-tudinal survey.* September 1977. (AD A076 699)

One Station Unit Training (OSUT) integrates basic combat training (BCT) and advanced individual training (AIT) into a single shorter cycle. The trainee completes the integrated training under one cadre and at one station. Following experimental institution of OSUT at selected locations, ARI conducted a survey to compare the attitudes of personnel completing training under the integrated program and in the separate cycles. This report describes the results obtained in the Telephone Lineman (MOS 36C) course at Fort Gordon, Ga.

Independent groups who had completed OSUT or BCT were administered a questionnaire concerning their attitudes on training-related topics. The BCT and OSUT groups were not comparable with respect to background. Because the BCT trainees could not be regarded as an appropriate control group, no comparisons between BCT and OSUT results were reported. The following conclusions were reached on the OSUT group: (a) No serious problem emerged with regard to intensity of training; (b) the OSUT trainees perceived their cadre as satisfactory; (c) 58% of the OSUT trainees expressed intentions of reenlisting; and (d) there was general acceptance of the OSUT cycle.

Survey results for the other five MOS included in the evaluation appear in Research Problem Reviews 77-4, 77-5, 77-6, and 77-7.

Research Memorandums

RM 76-20. Powers, T. R., & McCluskey, M. R. (Human Resources Research Organization). *Task analysis of three selected weapons systems.* October 1976.

This is the second of three reports on the contribution of live firing to weapons proficiency. Job analyses were conducted to identify the critical performance requirements of three weapons systems. Task inventories were developed for the M60A1 tank, the 155mm howitzer, and the 81mm mortar, checked by job incumbents using the weapons systems, and also applied to six comparable weapons systems. A comparison of the task inventories identified commonalities and differences in task requirements for critical crew members of the different weapons systems. Leader positions were found to have more generalizable skills across systems than the more technical crew jobs. (See also RM 76-8, A survey of Army weapons training and weapons training devices; and TR-75-A1, Determination of the contribution of live firing to weapons proficiency.)

RM 76-22. Mohr, E. S. (ARI); & Reidy, R. F. (U.S. Army). *Racial bias in peer ratings at ROTC Advanced Summer Camp, Fort Bragg, 1975.* October 1976. (AD A076 821)

Peer rating techniques, in which each member of a group evaluates all other members of that group on a specified criterion, are used by several elements of the Army--the U.S. Military Academy, Officer Candidate Schools, and ROTC--to assess leadership potential or ability. This study assessed

the influence of race on stated preferences in peer ratings. ROTC cadets were asked to select other cadets they would like as leaders and to select cadets they would not like as leaders. These positive and negative ratings were made during the 1975 annual summer camp, a 6-week simulated military training exercise.

Bias was found to influence cadets' preferences. This was especially marked in black cadets, who consistently preferred other blacks as their leaders. White cadets also tended to prefer same-race cadets as leaders, but to a lesser extent.

RM 76-24. Epstein, K. I., & Steinheiser, F. H., Jr. *Empirical comparison of criterion-referenced measurement models*. October 1976. (AD A076 822)

To estimate how well a person can perform job tasks, the Army uses a "criterion-referenced test" that sorts individuals into two groups, those who perform their jobs satisfactorily and those who do not. The test results can also estimate a person's "true" capability.

Several psychometric models are available for grouping individuals or for estimating true scores. The proportion of items correctly answered may be used as an estimate of true capability. Alternatively, a binomial error model can be used to derive the regression of true score on observed score, and a true score can then be calculated for each person. A Bayesian Model II approach or a latent trait model such as the Rasch one-parameter logistic model can also be used.

This report describes the technical details of the four alternatives and projects the development of an appropriate statistic for comparing each model against the others; it was reprinted from the Proceedings of the 21st Conference on the Design of Experiments in Army Research and Testing, 22-24 October 1975.

RM 76-25. Lombardo, J. F., Jr., & Goldberg, S. L. *Predicting peer evaluations from biographical information*. October 1976. (AD A076 823)

Data were obtained on 79 National Guardsmen as a basis for analyzing the relationship of biographic data to peer evaluations. Significant correlation was found between the peer evaluation score and every biographic variable obtained--age, level of education, military rank, length of time in the National Guard, length of time in present unit, and whether or not a squad leader. However, partialing out rank and time in unit reduced the correlation to nonsignificance.

In a multiple regression analysis, rank, length of time in unit, and education accounted for 51% of the variance in peer evaluation scores. Leveling and social indicator effects may be the source of bias (the higher the rank, the higher the rating). Where such bias effects are found, the bias-producing variables (such as rank) should be used to define the true peer groups. (See also RM 76-29.)

RM 76-26.   Fineberg, M. L., Meister, D., & Farrell, J. P.   NOE navigation--
An overview of ARI experiments.   November 1976.   (AD A076 824)

Thirty-five Army rotary wing aviators with different levels of flight experience were tested in three field experiments.   They flew simulated operational missions in a UH-1H aircraft in nap-of-the-earth (NOE) navigation.   The mission was to navigate a specified route and to identify all landing zones while staying within 250 meters of the course line.

Pilots who, by the design of the study, had been given additional training in terrain analysis performed their missions more effectively than the group that had not received this training.   Pilots with more flight experience performed slightly less effectively than pilots who were less experienced but who were recent graduates of the Aviation School.   (See also TP 277.)

RM 76-27.   Trexler, R. C., & Braden, H. F. (Human Resources Research Organization).   A method for determining common core personnel and training requirements.   December 1976.   (AD A076 825)

Researchers developed a method of defining the "core" tasks common to several related jobs, using the context of telecommunication operations.   To use this method: (a) Describe tasks by developing sets of job element statements; (b) develop a questionnaire on frequency of task performance; (c) administer the questionnaire to a representative population; and (d) select tasks reported to be performed at a chosen frequency.   Managers and planners can thus choose a basic set of tasks to be taught a group of trainees who will learn machine-specific skills later on the job.

RM 76-28.   Eastman, R. F., & McMullen, R. L.   Reliability of associate ratings of performance potential by Army aviators.   November 1976.   (AD A076 826)

This research evaluated an associate rating form designed to select pilot trainees for transition assignment as attack helicopter pilots.   Ratees were qualified regular helicopter aviators.   Raters were qualified attack helicopter aviators.

The raters demonstrated a high degree of interpreter reliability when rating attack helicopter candidates in their units.   The majority (58%) of the raters sampled felt that ratings by fellow aviators should be used in selecting candidates for transition training.   About 20% had reservations about using such ratings in personnel actions because of the influence of friendship and other personal biases.

RM 76-29.   Goldberg, S. L., & Lombardo, J. F., Jr.   Acceptability of associate evaluation in National Guard units.   December 1976.   (AD A076 827)

This study assessed the acceptability of a peer evaluation technique among enlisted men in combat and combat support units.   National Guardsmen (N = 79) were asked to rate members of their platoon who were best and worst

at getting their jobs done. The raters then completed the Unit Associate Rating Questionnaire on their attitudes about the value and acceptability of the associate rating procedure.

The guardsmen expressed generally favorable attitudes about associate evaluation; this result was in contrast to previous findings in officer samples. The guardsmen believed the ratings were based on enough and sufficiently varied experiences with other members of the platoon to be valuable for predicting future performance. Although they were willing to accept associate ratings as part of their records, the guardsmen were neutral about specific uses of the ratings in career decisions.

Results from this small sample do not permit wide generalization. Also, the age and education characteristics of the sample, as well as the nature of National Guard service, impose caution in inferring similar attitudes for a Regular Army sample. (See also RM 76-25.)

RM 76-30. Mohr, E. S. *Peer evaluations: Are women officers rated differently?* December 1976. (AD A076 828)

In peer ratings, each member of a predefined group estimates, by rating, ranking, or nomination, the leadership potential of every other group member. Although peer ratings have a long tradition of use in the Army, certain factors may affect the validity of the ratings. One such factor is the sex of the rater or the ratee. A preliminary investigation was conducted to find whether there were indications of sex bias in the ratings. Data were collected on 10 female and 30 male newly commissioned officers attending the 12-week Adjutant General Officer Basic Course. Peer ratings, Officer Evaluation Battery scores, and final course grades were obtained.

Both men and women raters rated women lower on leadership potential than men. The women also scored lower on the Officer Evaluation Battery. This investigation could not determine if the difference in perceived leadership ability was due to real differences or to bias.

RM 77-2. Fields, A. F. *Description of the assignment algorithm.* March 1977. (AD A077 922)

This paper describes a job assignment module designed to allocate Army officers to suitable job categories by calculating job utility scores from background information and then optimizing total scores for jobs across all jobs and all individuals. The assignment algorithm is flexible and can reflect changes in Army policy. It was developed with two potential users in mind: (a) the individual officer, who could use it to make decisions concerning assignment preferences; and (b) Officer Personnel Directorate management, particularly assignment officers, who could use it as an aid in making assignments.

RM 77-3. Fields, A. F. Application of the assignment algorithm to Quar-termaster captains. March 1977. (AD A077 923)

Previous research on officer career progression developed an assign-ment algorithm designed to allocate individuals to suitable job categories (RM 77-2). In this experiment, the computer program covering assignment policies and procedures for Infantry Branch captains was applied to Quarter-master captains.

The algorithm was used to simulate the assignment of 57 captains; the computer-generated assignments were compared to actual assignments given by experienced branch personnel. The match of computer-generated assign-ments with actual assignments was 79% to 82%. If assignments made outside the normal career progression were handled separately (as they are in cur-rent practice), the match was 96%. Thus, this experiment demonstrated feasibility of transferring the assignment algorithm to other assignment situations.

RM 77-4. Weitzman, D. O. A survey of some human factor problems in night operations. August 1977. (AD A077 924)

Current military doctrine stresses nighttime access to the battlefield and night operations. Using new precision-guided weapons, units of three or four persons can affect the course of battle. In view of this emphasis, a brief review of behavioral problems in night military operations was undertaken.

The principal concerns of this discussion were (a) to identify beha-vioral problems peculiar to night operations, (b) to review the state of knowledge on the behavioral or human factor aspects of military night oper-ations, and (c) to suggest guidelines for future research leading to better understanding of the behavioral skills of the individual soldier in night operations performance. Physical and biological factors that affect night operation performance include sensory, motor, and cognitive factors; the role of night vision; and the effects of fatigue and stress in night operations.

RM 77-6. Mohr, E. S. ROTC cadets: Attitudes toward women in the Army. August 1977. (AD A077 926)

A seven-item questionnaire dealing with the attitudes toward women in the Army was administered in 1975 to men and women ROTC cadets attending Advanced Summer Camp at Fort Riley, Kans. A total of 865 usable question-naires was obtained.

Preliminary results showed consistent differences between men and women in response patterns. Women were less traditional in their atti-tudes. Men responded in a more conservative way. Significantly more men than women felt that female commanders would not get respect from the men in their units and would not make as good frontline soldiers as men.

White and black cadets appeared to agree on the role of women in the Army. Any trends that emerged showed blacks as less traditionally oriented than whites toward the role of women.

RM 77-8. Ryan, T. G. *Expert Infantryman Squad and Platoon Evaluation (EISPE) II concept: Report of exercise observations.* September 1977. (AD A077 928)

This paper describes an evaluation of a second version of the Expert Infantry Squad and Platoon Evaluation (EISPE), using a scenario incorporating individual and squad tests within a 7-to-9-day platoon operation. ARI personnel participating in the exercise and observing the tests concluded that individual and squad evaluations could be conducted during a platoon exercise without compromising the evaluation process at any of the three echelons. Strengths and weaknesses noted are the basis for recommendations for refining both concept and implementation.

RM 77-12. Barton, H. D. *Instrument for a survey of Army linguists.* August 1977. (AD A077 931)

In January 1976, the ad hoc Army Linguist Personnel Study (ALPS) group issued a staff study on the Army's linguist needs and programs. The major issue reported was the need to increase both initial and subsequent enlistment rate of linguists and to insure that linguists have--or retain--the language proficiency to meet job performance requirements. The staff study was followed by a survey of Army enlisted linguists, using the instrument described in this report.

The instrument, based on data obtained from staff sources, included manpower figures, extracts from staff studies, and personnel management information. A personnel team from ARI and the Office of the Assistant Chief of Staff for Intelligence analyzed the materials, conducted developmental interviews, and developed questions for the survey. The questionnaire was field tested on linguists at a post in the Continental United States. Target issues included career plans and factors that influence initial or subsequent enlistment, characteristics of the linguist's training and work, personal background, time in service, and military occupational specialty.

RM 77-13. Oliver, L. W. *An overview of career development theory.* September 1977. (AD A077 932)

Several in-house studies basic to ARI's Officer Career research revealed the need for improved career counseling and a greater understanding by officers of the Army's career progression system. This report summarizes career development theory and is intended for persons involved in studying, planning, or implementing officer career progression. The general characteristics of several types of career development theories and their applicability to career progression are discussed. Although ARI research in this field has focused on the Officer Personnel Management System, the concepts presented also apply to enlisted personnel.

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*RM 77-14. Seeley, L. C. Preparation of the ASVAB information pamphlet.
September 1977. (AD A077 933)*

The information pamphlet for the Armed Services Vocational Aptitude
Battery (ASVAB) provides authorized and controlled practice in taking the
tests of the battery. The pamphlet explains the purpose of the ASVAB, its
nature and makeup, the names of the battery's 13 tests, and the time limits
for and number of questions in each test. Sample sets of seven questions
for each test are presented with general information on how to take the
test. A sample answer sheet similar to the answer sheet used in the ASVAB
is provided; a scoring key showing the correct answers is also included.

*RM 77-21. Boycan, G. G. (ARI); & Rose, A. M. (American Institutes for Re-
search). An analytic approach to estimating the generalizability of tank
crew performance objectives. September 1977. (AD A077 939)*

In an effort to improve tank crew training and evaluation, a long-
range research program was undertaken to investigate methods of defining
and measuring tank gunnery performance, the use of simulation devices,
and practice schedules for developing and maintaining required levels of
proficiency.

Looking toward the development of a more efficient Table VIII test
for M60A1AOS tank crews, this report describes performance objectives in
terms of potential generalizability, that is, the extent to which per-
formance on one item predicts performance on others. Analytic means were
used to estimate the generalizability of prospective objectives. Through
cluster analysis, subsets of objectives were identified that were homoge-
neous within a domain. Indexes of generalizability were then computed to
describe the applicability of a given objective to others in its subset.

Technical Reports (A Series)

*TR-76-A2. Wheaton, G. R., Rose, A. M., Fingerman, P. W., & Leonard, R. L.,
Jr. (American Institutes for Research); & Boycan, G. G. (ARI). Evaluation
of the effectiveness of training devices: Validation of the predictive
model. October 1976. (AD A040 911)*

Because of the practical limitations to using operational hardware for
training purposes, the Army has turned to using training devices that simu-
late operational requirements. The research culminating in this report
developed a conceptual framework to provide guidelines for predicting and
evaluating the effectiveness of such devices under development (RM 76-6).
A conceptual model was developed that considered the tasks to be trained,
the persons who will use the device, and how a device will be used (see
RM 76-16).

To validate the effectiveness of the model, two field experiments were
conducted using training devices of the Armor Branch of the Combat Arms.
One experiment assessed the effectiveness of three burst-on-target training
devices in preparing trainees for action (RM 76-18). The second experiment

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compared the effectiveness of two devices and three levels of training proficiency in preparing trainees to perform a live-fire tracking task using the main gun of the M60A1 tank (RM 76-19). The model was used to generate predictions of effectiveness for the training devices used in both experiments. These predictions were then compared to the effectiveness data obtained from the actual field experiments.

These applications demonstrated that it was feasible to develop stable estimates of device effectiveness if some form of task description or task analysis was available for both operational equipment and training devices. The chief value of the model is that it directs attention to the consideration of important issues during all stages of development and evaluation; it also shows the need to consider the interactive effects of different conditions on training effectiveness and is a formal way to pursue the systems engineering approach to Army training. Technical Report 76-A2 summarizes development and evaluation of the model. Details of the preliminary efforts and the experimental applications were reported in Research Memorandums 76-6, 76-16, 76-18, and 76-19.

TR-76-A3. *Leonard, R. L., Jr., Wheaton, G. R., & Cohen, F. P. (American Institutes for Research).* Transfer of training and skill retention. *October 1976. (AD A036 059)*

Two primary concerns in using training devices are how well learned skills will transfer to operating conditions and how well skills are retained. This report explores the relationship between these two concerns in a continuation of the training device research reported in Technical Report 76-A2.

A three-phase experiment was conducted over a 17-week period with 106 Army enlisted personnel divided into six groups. Training Extension Course (TEC) materials on the selection, maintenance, and use of hand grenades were used. Three groups were given refresher training at various intervals. Retention was measured by a written posttest based on TEC materials. Transfer of training was measured by a criterion performance test administered individually at intervals following initial training. Posttest and criterion performance test had four parts: selection of grenades, maintenance, arming the grenade, and throwing positions. The performance test included a fifth part, identifying grenade components.

Patterns of retention and transfer effects among the subjects varied considerably by subtest. After a 6-week delay, subjects who had refresher training outperformed those without training in hand grenade selection and maintenance but not on arming the grenade or throwing positions. After 17 weeks, refresher-trained subjects outperformed unrefreshed subjects on selection and maintenance and on throwing positions.

Retention of criterion transfer levels was not affected by time. Repeated criterion testing (immediately after training and at 6- and 17-week intervals) revealed no decline in proficiency. However, retention of training content showed a consistent decline over time. The relatively short period (17 weeks) during which all data were collected may have limited conclusions about retention.

The pattern of results provided empirical support for the Army's policy of evaluating training programs by means of performance-oriented criterion tests rather than by measures of content retention.

TR-76-A4. Baldwin, R. D., Cliborn, R. E., & Foskett, R. J. (Human Resources Research Organization). The acquisition and retention of visual aircraft recognition skills. November 1976. (AD A035 863)

Visual aircraft recognition (VAR) is a critical skill required for all forward-area air defense gunners. In this research, two methods of train-ing in VAR skills were compared--self-paced individualized instruction and an instructor-oriented classroom program geared to Army documentation and "lock-stepped" by means of achievement tests. Although the overall average gains in training were the same for the two training methods, personnel with lower aptitudes learned faster under the lock-stepped instruction, and higher aptitude personnel learned faster under self-paced instruction. Proficiency acquired through training on static imagery transferred to dynamic testing conditions. Performance in the dynamic presentations of model aircraft was not affected by training method.

TR-76-A5. Dapra, R. A., & Byham, W. C. (Development Dimensions, Inc.); & Castelnovo, A. E., & Rumsey, M. G. (ARI). Development of the Army ROTC management simulation program. November 1976. (AD A034 540)

As part of an effort to develop new and more effective ways to train officer leaders, this research developed a performance-based program to improve the basic management skills of Army ROTC cadets. Researchers con-sidered both the techniques and methodology of the assessment center process developed to evaluate officers and research on the psychological components of officer leadership. The assessment center method of identifying and de-veloping military management potential uses a system of simulated situa-tional problems designed to elicit behavior related to specific management skills.

Four instructional evaluational modules were developed: Management Problem Analysis and Decision-Making (five exercises); Management Planning and Organizing (three exercises); Management Delegation and Control (three exercises); and Interpersonal Skills Required for Effective Management (four exercises). These exercises were used to instruct the cadets and to evaluate their performance. Both cadets and instructors reported that they liked the course materials.

TR-76-A7. Motowidlo, S. J., Dowell, B. E., Hopp, M. A., Borman, W. C., Johnson, P. D., & Dunnette, M. D. (Personnel Decisions, Inc.). Motiva-tion, satisfaction, and morale in Army careers: A review of theory and measurement. December 1976. (AD A036 390)

A literature review was undertaken to search for, develop, evaluate, and refine ways of understanding and measuring work motivation, job satis-faction, and productivity. This report addresses (a) the need to understand

the concepts of motivation, satisfaction, and morale and (b) the question of how to measure these constructs in the Army.

Concepts of motivation are divided into theories on what motivates people and on how environmental factors and individual needs determine behavior. Job satisfaction is conceptualized in terms of need fulfillment, equity, and frame of reference models. Morale is so complex that it is best conceptualized in terms of its components.

This report also describes and summarizes instruments and methods for measuring the concepts of motivation and the potential of these methods for Army use, particularly measures that provided evidence of reliability, validity, or other psychometric properties indicative of quality of conception and construction. An extensive list of references is included.

TR-76-A8. Card, J. J. (American Institutes for Research). Subgroup differences in ROTC/Army career commitment and in commitment-related attitudes. July 1976. (AD A036 373)

Survey data gathered in a previous investigation of ROTC/Army career commitment and attitudes toward commitment (see TR-7 -A) were analyzed by respondent subgroup: ROTC versus non-ROTC students, males versus females, blacks versus whites, low versus high socioeconomic status, low versus high academic achievers in general and in ROTC courses, ROTC-scholarship versus nonscholarship Army officers. The survey respondents were 1,089 high school seniors, 754 ROTC and 879 non-ROTC college students, and 634 ROTC-graduate Army officers in their period of obligated service, chosen by nationwide stratified random sampling.

As a whole, ROTC students, females, blacks, and those of low socioeconomic status, low grades, and high ROTC grades held the more favorable opinions about ROTC and the Army; ROTC scholarships made no significant difference. However, female and black ROTC college cadets were significantly less committed to an Army career than male and white cadets. Among Army officers, blacks and those with lower academic grades and higher ROTC grades were significantly more committed to an Army career; socioeconomic status and ROTC scholarships made no difference. At the time of the survey, too few women Army officers were ROTC graduates to be included in the sample. Generally, ROTC and the Army seem to appeal most to young people with fewer career opportunities. The less dedicated drop out. ROTC scholarships do not seem to increase commitment to an Army career effectively.

TR-76-A9. Card, J. J. (American Institutes for Research). ROTC-program determinants of cadets' career commitment. July 1976. (AD A036 376)

Forty instructors from 11 Army Senior ROTC programs were surveyed in a pilot study aimed at exploring the nature and extent of ROTC program influences on cadets' career commitment. The commitment of cadets in each program had been assessed in an earlier research (see TR-7 -A) using several indicators of commitment (intention to remain in ROTC, intention to remain in the Army beyond the period of obligated Army service, and intention to make a career of the Army).

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The following ROTC programs were found to have relatively committed enrolled cadets: new programs; small programs; programs in which instructors reported spending time outside class time with cadets; programs fostering self-discovery and independence; programs in which instructors were not burdened by excessive administrative responsibilities; and programs offering innovative extracurricular enrichment activities and minicourses. Results were interpreted in the context of the quantity versus quality tension facing many ROTC programs.

TR-77-A1. *Cairo, P. C. (Teachers College, Columbia University). Annotated bibliography on computer-assisted counseling and guidance. March 1977. (AD A038 741)*

This annotated bibliography has four sections. Section I combines two earlier bibliographies on the same subject:

Bailey, L. (ed.). Facilitating career development. An annotated bibliography. Springfield, Ill.: Division of Vocational and Technical Education, 1970.

Friesen, J. Computer based systems in guidance and counseling. An annotated bibliography. Vancouver: British Columbia University, Faculty of Education, 1970. (ERIC-ED 046 006)

Section II lists references to specific computer-assisted counseling systems. Most of these systems, although designed to be used with other counseling services, are self-contained.

Section III summarizes publications which survey computer-assisted counseling and compare various operational systems.

Section IV provides references that are more generally related to computer-assisted counseling; these references either discuss the use of computers in counseling and guidance or pertain to computer support functions related to counseling.

TR-77-A2. *Levit, R. A., Alden, D. G., Erickson, J. M., & Heaton, B. J. (Honeywell Systems and Research Center). Development and application of a decision aid for tactical control of battlefield operations: A conceptual structure for decision support in tactical operations systems. March 1977. (AD A040 606)*

Future automated tactical data systems will proliferate data for decisionmakers to organize and analyze. This research was undertaken to help field officers use computer systems in obtaining, organizing, and analyzing tactical data. A comprehensive review of decision-aiding technology emphasized decision-aiding principles and concepts that could lead to specific aids for ARI's simulated tactical operations system (SIMTOS).

A derived taxonomy showed two basic types of decision aids: normative and adaptive. The normative aid fits the general decisionmaker; the adaptive aid responds to individual differences in decisionmaking. A single

decision-aiding technique was found to be inadequate to realize the best capabilities of the human-computer combination. The best approach was a decision support system in which several techniques of mixed methodologies were available and were directed to different levels of the decisionmaking process and system operation. A decision support system, designed for use within the context of a G3 exercise in SIMTOS, emphasized normative aiding to help estimate the situation in the planning stage and to allocate resources in the combat stage. Adaptive aiding was used to help estimate the precombat tactical situation and to allocate fire resources during combat.

This subject is discussed further in Technical Reports 77-A3 and 77-A13.

TR-77-A3. *Levit, R. A., Alden, D. G., Erickson, J. M., & Heaton, B. J. (Honeywell Systems and Research Center). Development and application of a decision aid for tactical control of battlefield operations: A preliminary evaluation of a decision support complex in SIMTOS. March 1977.* (AD A040 563)

This is part of a series of reports on the development and application of a decision aid for tactical control of battlefield operations. Volume I (TR-77-A2) described the development of a conceptual structure for decision support to be used in a simulated tactical operations system (SIMTOS). The support system is designed to help a G3 officer acquire information and make decisions within the SIMTOS environment. This report describes the preliminary evaluation of the decision support complex in a practical exercise.

Two groups of experienced tactical decisionmakers were compared in the performance of typical planning and combat activities. The aided group received the "estimate of the situation" in both planning and combat phases of the exercise; the other group did not. The aided group was found to use significantly more of the available resources than the unaided group. The estimate aid was most effective early in the task, and enabled the aided group to use resources more efficiently and to monitor better the course of play. The aided group showed a trend, but no significant superiority, toward better tactical performance in terms of friendly and enemy force attrition and of distance surrendered from the forward edge of battle.

The results support the soundness of the concept of the decision support complex, and further studies of tactical decisionmaking continued to use this concept.

TR-77-A4. *Kribs, H. D., Thurmond, P., & Mark, L. (Sensors, Data Decisions, Inc.). Computerized collective training for teams. February 1977.* (AD A038 748)

A review and evaluation were conducted of state-of-the-art findings and instructional theory directly applicable to the problem of developing instructional strategies for computer-assisted team training. Two conclusions

were drawn: (a) A conceptual framework for a general-purpose set of instruction strategies for team training does not exist and (b) an Instructional Systems Development (ISD) approach must be developed for team training.

Work in deriving team training instructional strategies was begun. Three elements were identified and integrated into a framework that will be refined in subsequent efforts: (a) team task dimensions and team training objectives, (b) learner characteristics and strategies, and (c) characteristics of the training delivery system used to implement the strategies.

TR-77-A5. Borman, W. C., Toquam, J. L., & Rosse, R. L. (Personnel Decisions Research Institute). _Dimensions of the Army recruiter and guidance counselor job_. March 1977. (AD A040 372)

To improve the selection of Army personnel for recruiter and job counselor assignments, this research defined task dimensions underlying the two jobs (MOS OOE). A judgmentally refined list of 150 tasks was sorted by multidimensional scaling and a clustering technique. The multidimensional scaling procedure provided four broad task dimensions--identifying and contacting qualified prospects, publicizing the Army, selling the Army, and administration. The cluster analysis differentiated 26 task clusters subsumed by the four dimensions. Because of the close correspondence between the two solutions, both procedures were used to describe the task domain; this provided for specific dimensions under each of the four general task categories. This job analysis suggests the personal attributes of successful recruiters and provides a basis for performance evaluation.

TR-77-A6. Erwin, F. W., & Herring, J. W. (Richardson, Bellows, Henry and Company, Inc.). _The feasibility of the use of autobiographical information as a predictor of early Army attrition_. August 1977. (AD A040 622)

As part of the Army's program to enlist quality personnel, this research sought a way to identify, as early as possible, those enlistees who will not complete their first 6 months of service successfully.

Four experimental autobiographical questionnaires were administered in 1975 to samples of incoming Army enlistees at Fort Dix, N.J., and Fort Jackson, S.C. The number of persons completing one form of the questionnaire for whom performance data were available ranged from 2,197 to 2,269. Basic Combat Training (BCT) and 180-day success and attrition data were collected, and questionnaire items were item analyzed using the attrition criterion.

Enlistees who were discharged before completing BCT responded much like those discharged after BCT but before completing 180 days of service. Those who completed 180 days responded differently on two-thirds of the items from those discharged before 180 days. Standardized autobiographical instruments, refined and validated, could aid in the early identification of enlistees who would not be likely to become good soldiers or remain in service for a full term.

TR-77-A7. Newtson, D. (University of Virginia). *Task and observer skill factors in accuracy of assessment of performance*. April 1977. (AD A038 679)

The least costly and most efficient way to assess job performance may be the use of skilled observers to evaluate the competence of trainees. The goal of this research was to develop a theoretical model of the observer with specific implications for the nature of observer skill. Twelve experiments were conducted on the nature of behavior perception and processes. Early evidence indicated that these observationa units were products of low-level perceptual attentive processes. Further studies showed that the phenomenal reality of the units discriminated at the perceptual level were subjectively real units of experience of ongoing behavior. Of critical importance was the implication that the perceptual structure of comprehension of behavior rests upon the discrimination of intermittently occurring points of definition in the behavior stream. On the basis of these data, a conceptual model of observation was proposed with specific, testable implications for the study of observer skill.

Application of the model showed that two independent components of observer accuracy exist--stereotypic and differential. Stereotypic accuracy refers to the ability of the observers to judge the absolute skill level of the group of persons judged; differential accuracy refers to observers' abilities to correctly rank persons on the skill dimension. It was determined that differences in observer accuracy are due in part to differences in the skill of the observer in the perceptual organization of task performance. In general, skilled perception of performance is a necessary, but not completely sufficient, condition for accuracy of observer judgment.

TR-77-A8. Taylor, J. E., Suchman, J. R., Melching, W. H., & Bialek, H. M. (Human Resources Research Organization). *Development of an individual extension training system for managing and conducting training in the Army unit*. October 1977. (AD A047 500)

The implementation of the Enlisted Personnel Management System shifted the emphasis of the Army training program from schools to operational units. This change required a comprehensive training system that based enlisted career progression on individualized and job-related training and testing. This report summarizes the first year's work to develop a performance-based training and evaluation system for the combat arms.

The key objective was to develop a system for training individuals to successfully perform their required skills at all levels, from the entry-level skills of Advanced Individual Training (AIT) to skill learning and maintenance needed to perform additional tasks at the assigned unit, and finally in varied skills and leadership functions.

A major step in this direction was the design of a prototype in individualized extension training system that included the following activities: training management, recordkeeping and information processing, task training packages (including instructional resource materials and techniques for their use), and screening and evaluation instruments and methods. The prototype was developed for Light Weapons Infantryman (MOS 11B) and Indirect Fire Infantryman (MOS 11C). The model program provides explicit guidance in

managing and implementing the system elements. Training is decentralized down to squad leader level and is highly individualized (formal classroom instruction is eliminated), job-performance oriented, and self-paced.

To support the overall objectives of the program, two additional research studies were undertaken: (a) to explore the relationship between personnel turbulence and the structure of the individualized extension training system, and (b) to devise screening methods to discriminate between persons already skilled and those who need specific levels of training. An index of stability applicable to units varying in size from squad to division was developed; it reflects monthly manpower stability, daily personnel stability, and availability and daily utilization of potential training time.

In anticipation of the essential field testing of the system, which constitutes a major part of the entire project, comprehensive plans were made to determine the operational feasibility of the program.

TR-77-A9. Eitelberg, M. J. (Human Resources Research Organization).
Evaluation of Army representation. August 1977. (AD A041 073)

A conceptual framework to analyze the representational character of the Army was developed from data gathered in an extensive literature review. Based on that information, a convergence/divergence model was developed that compares the military in an approximate and overlapping way to the composition of civilian society, using three general areas of national policy: military effectiveness, social equity, and political legitimacy as standard criteria of representation.

The data analyzed were drawn from several recent studies of Army demographic information. The general conclusion was that Army entrants are not exceptionally divergent from their civilian counterparts. Where divergence extends beyond the zone of approximate representation, the Army still maintains a balance of national policy objectives.

The all-volunteer Army system appears to favor the enlistment of "average" young men and women--those from the middle range of socioeconomic achievement, those from the rural south and southwest areas, those whose fathers hold working-class jobs, and those whose attitudes and feelings are in the range sometimes categorized as "middle American."

Results of the 1974-75 administration of the Armed Services Vocational Aptitude Battery (ASVAB) to high school juniors and seniors were examined to determine whether the ASVAB sample represented the age-specific population. Individuals favorably predisposed toward the military were overrepresented; students who elected to take the ASVAB were evidently not representative of the high school population.

TR-77-A10. Showel, M., Brennan, M. F., & Melching, W. H. (Human Resources Research Organization). Motor transport operator training: An approach to preparing training managers and instructors to design, conduct, and evaluate performance-oriented training. September 1977. (AD A042 585)

This report describes research to develop programs to train officers and NCOs of a newly activated division to design, conduct, and evaluate performance-oriented training. A related report is Technical Report 77-A12, The development and trial evaluation of alternate programs for unit training managers and trainers.

The objective of the first phase of the research was to train officers and NCOs in the division's support command in skill proficiency training techniques. Training personnel were given guided practice in developing, implementing, and evaluating a prototype training program for a combat support MOS.

Work was performed in the Transportation Company of the support command's Supply and Transportation Battalion; the focus was on MOS 64C, Motor Transport Operator. Training personnel worked with researchers to develop the tests.

Products of the research include (a) a tactical mission-oriented task list for the motor transport operator MOS, stratified by skill level and type of vehicle; (b) a draft performance test to measure the basic skill level of motor transport operators of the 2½- and 5-ton cargo trucks performing a tactical mission; and (c) a field course simulating the conditions of a tactical situation in an infantry division's transportation company.

TR-77-A11. Siegel, A. I., Pfeiffer, M. G., & Warms, T. M. (Applied Psychological Services, Inc.). Development and evaluation of a content analytic approach in Army field system data organization. August 1977. (AD A042 075)

Computer-based Army tactical intelligence systems must consider a wide variety of message types involving many content areas. This information must be entered accurately into a data information bank in a form that allows the information to be retrieved quickly. A standard scheme was needed to allow both data entry and recovery to satisfy tactical intelligence requirements. The research described in this report constructed a system to classify and retrieve battlefield messages. The system was based on linguistic principles and language perceptions of the user.

The basic linguistic logic of this approach was that a classification method must be based on a substrate that mimics intelligence analyst language processing and understanding in the tactical intelligence situation. The program's first steps involved a linguistic analysis of a set of battlefield messages and multidimensional scaling analysis of a sample of messages representing all classes of information derived from the analysis. Four multidimensional scaling analyses were completed, each based on the perceptions of linguistic similarity of one of four experienced analysts. High agreement was found among the factorial structures yielded by the data from each analyst. Accordingly, an overall analysis was completed, and 15 factors were identified as representative of the perceptual substrate of

the Army field information linguistic system. On the basis of the derived factors, the researchers developed a taxonomy of battlefield language.

The taxonomy was tested in two field-oriented experiments. Results indicated that intelligence analysts can classify messages reliably within the taxonomy and that they can reliably use the taxonomy for inquiry purposes.

This report includes a computer system for the automatic classification of battlefield messages.

TR-77-A12. *Melching, M. H., Brennan, W. F., Hungerland, J. E., Showel, M., & Taylor, J. E. (Human Resources Research Organization). The development and trial evaluation of alternate programs for unit training managers and trainers. September 1977. (AD A042 586)*

This report describes a project to develop training programs that would enable unit training managers and trainers to use performance-based practices in training and evaluating individual performance. An earlier report describes an informal procedure used to help unit training personnel in these tasks (TR-77-A10, Motor transport operator training: An approach to preparing training managers and instructors to design, conduct, and evaluate performance-oriented training). The research also examined the feasibility of implementing the programs in field units and evaluated the relative effectiveness of the programs.

Two training approaches were used--directed practice and guided self-study. The programs, developed for both manager and trainer, involved face-to-face interaction between managers/trainers and training experts and gave the learner a chance to practice the desired training procedures. Preliminary versions of the programs were administered to 98 unit managers, and final programs were tested on 19 division personnel. The programs were considered effective and useful to division personnel.

This report contains descriptions of the self-contained programs developed. The following adjunct volumes contain discussions of procedures and products and reproduce the programs developed. All are considered a part of TR-77-A12.

AD A042 587.   Appendix A.   Performance objectives

                  Appendix B.   Comprehensive performance tests

                  Appendix C.   Miniaturized performance/knowledge tests

AD A042 572.   Appendix D.   Directed practice program for the TO&E unit
                                training manager course

AD A042 588.   Appendix E.   Guided self study program for TO&E unit training
                                manager course

                  Appendix F.   Book solutions for self study program

AD A042 573. Appendix G. Directed practice program for TO&E unit in-
                          structor/trainer course

AD A042 574. Appendix H. Guided self study program for TO&E unit in-
                          structor/trainer course

             Appendix I. Book solutions for self study program

*TR-77-A13. Levit, R. A., Heaton, B. J., & Alden, D. G. (Honeywell Systems
and Research Center). Development and application of decision aids for
tactical control of battlefield operations: Decision support in a simu-
lated tactical operations system (SIMTOS). December 1977. (AD A050 889)*

     This research continued ARI's efforts to learn more about the nature
of tactical decisionmaking and to develop automated systems responsive to
the Army decisionmaking environment. Emphasis was on assessing the effec-
tiveness of various automated decision-aiding techniques in tactical per-
formance and user satisfaction.

     The concept of a decision support system was developed in a previous
study on ARI's SIMTOS program, which serves as a test bed for the study of
tactical information requirements and decisionmaking. The concept recog-
nizes that a single technique is inadequate for realizing the best decision-
making capabilities of the human/computer dyad. Several techniques directed
at different levels of the decisionmaking process and system operation are
required. A decision support complex consisting of adaptive estimates of
the situation and resource allocation decision aids was developed and inte-
grated into SIMTOS. This experiment compared the effects of the various
types of decision support on tactical information processing and decision-
making performance. In the environment of a simulated defensive scenario,
25 experienced Army officers played the role of Division G3s. The concept
of decision support was demonstrated to be sound, although specific measures
of tactical performance were insensitive to player actions. The decision
support system increased players' ability to interact effectively with
SIMTOS and increased their satisfaction with the system. (See also
TR-77-A2, A conceptual structure for decision support in TOS; and TR-77-A3,
A preliminary evaluation of a decision support complex in SIMTOS.)

*TR-77-A14. Harris, J. H., Osborn, W. C., & Boldovici, J. A. (Human Resources
Research Organization). Reserve Component training for operating and main-
taining the M48A5 tank. August 1977. (AD A043 057)*

     To satisfy new training needs in Armor and Cavalry Reserve Components,
this research identified constraints to be considered in planning a crew-
level training program for the M48A5 tank. The plan was designed to use
existing training materials such as the Training Extension Course. Soldiers
were assumed to have completed Advanced Individual Training.

     Selection of priority tasks for inclusion in the training program was
based on previous research and Army training literature. These tasks were
grouped functionally and incorporated in the Crew Interaction Performance
Test to serve as a crew-level performance criterion (Appendix A). Readiness

tests were developed for the four duty positions of tank driver, loader, gunner, and commander (Appendixes B through E). These tests serve as (a) pretests to determine existing skill level, (b) end-of-course mastery tests, and (c) diagnosis throughout training. Outlines for training modules comprise functional groupings of tasks for each duty position (Appendixes F through I). The evaluation plan (Appendix J) for training programs based on the module outlines focuses on three stages of program development: planning, operating decisions, and evaluation. (See also TR-77-A-16, Armor and Cavalry National Guard training constraints.)

TR-77-A16. *O'Brien, R. E., Ford, J. P., & Boldovici, J. A. (Human Resources Research Organization). Armor and Cavalry National Guard training constraints. July 1977. (AD A044 633)*

This report describes work to identify constraints within the National Guard and the training resources available that might affect the design and delivery of training program plans for Armor and Cavalry Reserve components, the only groups scheduled to use the M48A5 tank. This groundwork was done in anticipation of the development of a training program for the M48A5 tank. (See TR-77-A14, Reserve Component training for operating and maintaining the M48A5 tank.)

Data obtained from 201 Armor and Cavalry units included unit identification; numbers and kinds of tanks at armories; weekend and annual training sites; unit travel to these sites; amounts and kinds of practice at the sites, including frequency of subcaliber and service practice firing; and availability of means for firing gunnery tables and support from central organizations.

Analysis of the data and additional studies showed that the new training program for the M48A5 tank should (a) be deliverable at armories as much as possible, (b) capitalize on similarities between the M48A5 and materiel previously in use, (c) increase the use of subcaliber devices at armories, and (d) not include central roles for the Training Aids Services Office (TASO) and Mobile Training Units. This report also summarizes general studies on Reserve Component problems (Appendix B).

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National Library of Medicine
ATTN: RSD-Documents
8600 Rockville Pike
Bethesda, Maryland 20014

University of Maryland,
McKeldin Library
Social Science Department
College Park, Maryland 20742

MASSACHUSETTS

Harvard College Library
ATTN: Government Documents Section
Cambridge, Massachusetts 02138

Boston Public Library
ATTN: Serials Receipts
Boston, Massachusetts 02117

University of Massachusetts
ATTN: Government Documents Collection
Amherst, Massachusetts 01002

Mount Holyoke College
Williston Memorial Library
South Hadley, Massachusetts 01075

Tufts University
ATTN: Donald Altschiller
Fletcher School of Law and Diplomacy
Edwin Ginn Library
Medford, Massachustees 02155

MICHIGAN

Central Michigan University
ATTN: Library
Documents Section
Mt. Pleasant, Michigan 48859

MICHIGAN (continued)

Detroit Public Library
5201 Woodward Avenue
Detroit, Michigan 48202

Gale Research Company
ATTN: Annie Brewer
Bok Tower
Detroit, Michigan 48226

University of Michigan Library
ATTN: Documents Librarian
Ann Arbor, Michigan 48104

Wayne State University Library
Documents Librarian
Detroit, Michigan 48202

MINNESOTA

Minneapolis Public Library
ATTN: Documents Expediting Project
300 Nicollet Mall
Minneapolis Minnesota 55401

University of Minnesota Library
ATTN: Documents Division
Minneapolis, Minnesota 55455

MISSOURI

University of Missouri Library
ATTN: Serials Department
Columbia, Missouri 65202

NEBRASKA

University of Nebraska Library
ATTN: Documents Librarian
Lincoln, Nebraska 68508

NEW HAMPSHIRE

Dartmouth College Librarya
ATTN: Reference Department
Hanover, New Hampshire 03775

University of New Hampshire
ATTN: Library Serial Department
Durham, New Hampshire 03824

NEW JERSEY

Princeton University Library
ATTN: Documents Librarian
Princeton, New Jersey 08540

Rutgers University Library
ATTN: Government Publications Department
New Brunswick, New Jersey 08901

NEW YORK

New York City Association of the Bar
ATTN: Library
42 West 44th Street
New York, New York 10036

Brooklyn College Library
ATTN: Prof. E. Svuksts
Documents Division
Bedford Avenue and Avenue H
Brooklyn, New York 11210

Brooklyn Public Library
ATTN: Social Science - Documents Division
Grand Army Plaza
Brooklyn, New York 11238

Cornell University Library
ATTN: Government Documents
Ithaca, New York 14850

New York Public Library
ATTN: Government Documents
Fifth Avenue & 42d Street
New York, New York 10018

Columbia University Libraries
ATTN: Documents Service Center, Rm 327
420 West 118th St. Rm. 327
New York, New York 10027

Paul, Weiss, Rifkind, Wharton & Garrison
ATTN: Library
345 Park Avenue
New York, New York 10022

Readex Microprint Corporation
101 5th Avenue
New York, New York 10003

NEW YORK (continued)

State University of New York
at Binghampton
ATTN: Library
Director of Technical Processes
Binghampton, New York 13901

State University of New York
at Buffalo
ATTN: Lockwood Memorial Library
Documents Division
Buffalo, New York 14214

Syracuse University
ATTN: Serials Division
Syracuse, New York 13210

State University of New York
at Stony Brook
ATTN: Main Library, Documents Section
Stony Brook, New York 11790

United Nations
ATTN: Dag Hammarskjold Library
New York, New York 10017

Lehman College Library
ATTN: Peggy Adams, Chief
Serials Section
Bedford Park Blvd. West
Bronx, New York 10468

New York Public Library
ATTN: Mid-Manhattan CC4
8 E. 40th Street
New York, New York 10016

NORTH CAROLINA

Duke University
ATTN: Documents Librarian
Durham, North Carolina 27706

Appalachian State University Library
ATTN: John Heaton
Boone, North Carolina 28608

North Carolina State University
D. H. Hill Library
ATTN: Per Ser Center
PO Box 5007
Raleigh, North Carolina 27607

NORTH CAROLINA (continued)

University of North Carolina -
Chapel Hill
ATTN: Serials Department
Pubs to BA/SS DW Docs.
Wilson Library 024-A
Chapel Hill, North Carolina 27514

OHIO

University of Cincinnati
ATTN: Main Campus Library
Serials Department (Documents)
Cincinnati, Ohio 45521

Kent State University
ATTN: Documents Librarian
Kent, Ohio 44240

Miami University Library
ATTN: Jean Sears, Documents Librarian
Oxford, Ohio 45056

Ohio State University Libraries
ATTN: Serial Division
Main Library
1858 Neil Avenue
Columbus, Ohio 43210

OKLAHOMA

Oklahoma State University Library
ATTN: Documents Librarian
Stillwater, Oklahoma 74075

PENNSYLVANIA

Carnegie Library of Pittsburgh
ATTN: Reference Department
4400 Forbes Avenue
Pittsburgh, Pennsylvania 15213

Free Library of Philadelphia
ATTN: Public Documents Department
Logan Square
Philadelphia, Pennsylvania 19103

Pennsylvania State University Library
ATTN: Documents
205 Pattee Library
University Park, Pennsylvania 16802

PENNSYLVANIA (continued)

Temple University
ATTN: Documents Room
Samuel Paley Library
Philadelphia, Pennsylvania 19122

RHODE ISLAND

Brown University
ATTN: Library
Documents Division
Providence, Rhode Island 02912

SOUTH CAROLINA

University of South Carolina
McKissick Memorial Library
Columbia, South Carolina 29208

TENNESSEE

University of Tennessee
ATTN: Documents Librarian
Knoxville, Tennessee 37816

TEXAS

Baylor University
Library - Serials Department
PO Box 6307
Waco, Texas 76706

University of Texas
ATTN: Documents Librarian
Law Library
2500 Red River
Austin, Texas 78705

Dallas Public Library
ATTN: Documents Librarian
Dallas, Texas 75201

University of Texas Library
ATTN: Documents Acquisitions
Austin, Texas 78712

UTAH

Brigham Young University
ATTN: Library
Documents Section
Provo, Utah 84601

University of Utah
ATTN: Serials Order Department
Documents Section
Salt Lake City, Utah 84112

Utah State University UMC-30
ATTN: Leona K. Pisarz
Merrill Library
Logan, Utah 84322

VERMONT

University of Vermont
ATTN: Director of Libraries
Guy W. Bailey Library
Burlington, Vermont 05401

VIRGINIA

George Mason University
ATTN: Fenwick Library
4400 University Drive
Fairfax, Virginia 22030

University of Virginia Library
ATTN: Public Documents
Charlottesville, Virginia 22903

College of William & Mary
ATTN: Documents Department
Swem Library
Williamsburg, Virginia 23815

WASHINGTON

Washington State Library
ATTN: Serial Section
Library Building
Olympia, Washington 98504

WASHINGTON (continued)

Washington State University
ATTN: Social Science Library
Pullman, Washington 99164

University of Washington Libraries
ATTN: Serials Division
Seattle, Washington 98195

WISCONSIN

Milwaukee Public Library
ATTN: Documents Division
814 West Wisconsin Avenue
Milwaukee, Wisconsin 53233

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1 Dir, Army Stf Studies Ofc, ATTN: OAVCSA (DSP)	1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: ATCASA
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1 Intelligence Material Dev Ofc, EWL, Ft Holabird	1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI—CTD—CS
1 USA SE Signal Sch, Ft Gordon, ATTN: ATSO-EA	1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: DAS/SRD
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1 USA Armor Sch, Ft Knox, ATTN: ATSB-DI-E	1 USCG Training Ctr, NY, ATTN: Educ Svc Ofc
1 USA Armor Sch, Ft Knox, ATTN: ATSB-DT-TP	1 USCG, Psychol Res Br, DC, ATTN: GP 1/62
1 USA Armor Sch, Ft Knox, ATTN: ATSB-CD-AD	1 HQ Mid-Range Br, MC Det, Quantico, ATTN: P&S Div