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INSTRUCTIONAL MICROFICHE SYSTEM PROJECT.(U)
SEP 79 J P KOTTENSTETTE , A S WEST
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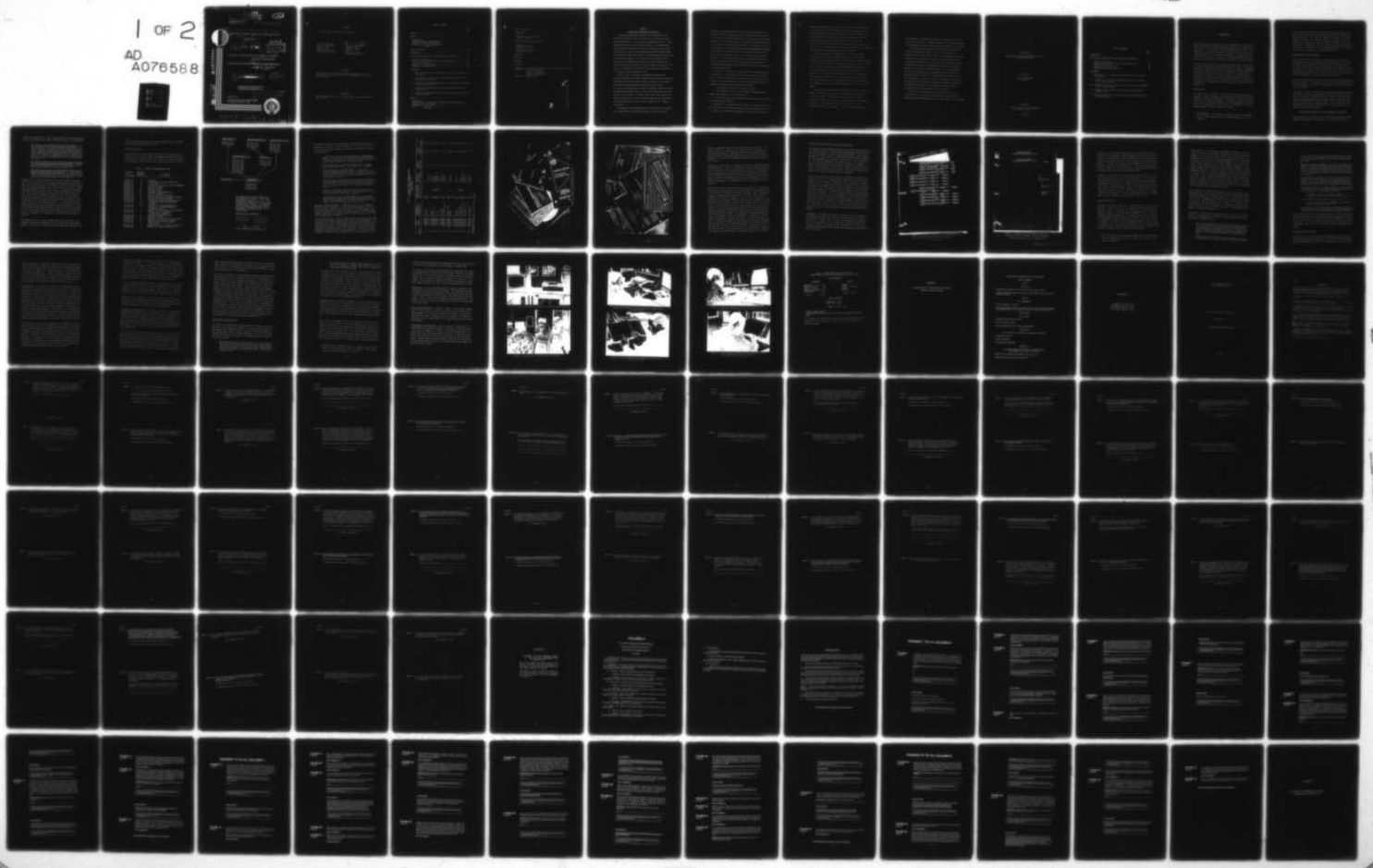

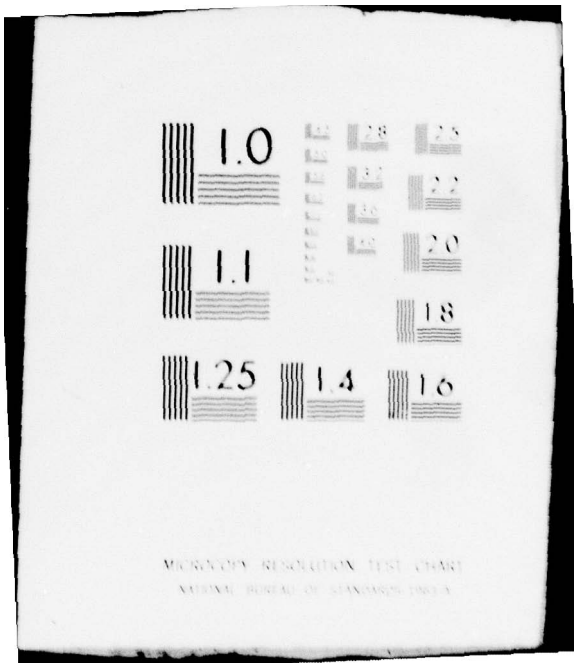
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INSTRUCTIONAL MICROFICHE SYSTEM PROJECT.

(9) FINAL REPORT.

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The Plan for the Conversion of Course Material to Microfiche

By: James P. Kottenstette

(10)

Evaluation of an Instructional Microfische Syster Demonstration:

By: Anita S. West, Ph.D.

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Prepared for:

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NOTICES

This report has been reviewed and is approved.

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Prepared by: James P. Kottenstette,
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Prepared by: Dr. Anita S. West, Ph. D,
Consultant

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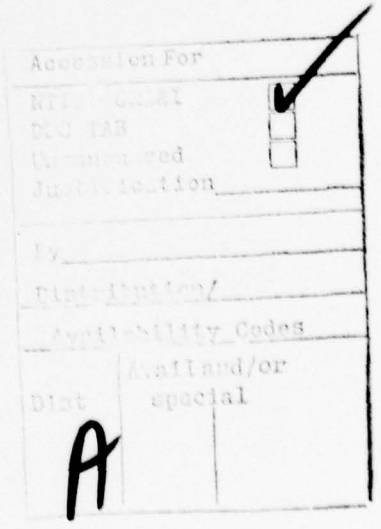

PREFACE

INSTRUCTIONAL MICROFICHE SYSTEM (IMS)

The Training Development Institute (TDI) implemented a pilot program to evaluate the use of microfiche in an institutional, self-paced training course. This program was implemented at the U. S. Army Transportation School at Fort Eustis, Virginia. The Transportation School personnel nominated two courses for conversion to microfiche, and in February of 1978, the participants selected the Traffic Management Coordinator Course (MOS 71N10) as the experimental prototype course for microfiche evaluation. The 71N10 course is designed to train specialists for expediting the transport of cargo, passengers, and personal property both in the U. S. and in Theatres of Operations. The course is classified as "Soft Skill" and was originally converted to a self-paced mode of instruction in 1976.

In May of 1978, the Training Developments Institute (TDI) contracted through the Scientific Services Program (SSP) two educational authorities from the University of Denver in the area of the usage of microfiche in an instructional, self-paced training setting. Mr. James P. Kottenstette was contracted to prepare a report describing the experiment and steps taken to convert the paperbased instructional materials to microfiche. Dr. Anita S. West, Ph. D. was contracted to conduct the evaluation. This final report represents the compilation of both James Kottenstette's and Dr. Anita S. West's, Ph. D. reports, respectively.

The objective of the experiment from an implementation standpoint was to determine the training effectiveness of the microfiche in

comparison to printed materials. From an evaluative standpoint, the objectives of this experiment were to design and develop an evaluation plan to assess the training effectiveness, training efficiency and user acceptance of microfiche as a format for presenting institutional, self-paced training. To achieve these objectives, an Instructional Microfiche System (IMS) Project was designed by the Training Developments Institute and the purpose of the IMS Project was to determine the feasibility of replacing printed materials with microfiche in an ongoing course of instruction. The instructional media for the course included 32 self-paced lesson booklets (1,487 pages, total) employing an elementary programmed text presentation mode. The 71N10 course is also exportable to US Army Reserve School.

The plan for conversion of course materials to microfiche required the development of an approach that balanced a host of different and often conflicting considerations. These considerations were arbitrated through a set of principles that were used to guide the design of the experiment. These principles included the following:

1. Maintaining the structure of the 71N10 course.

2. The essential factors of the self-paced, programmed learning materials were perserved in the fiche version.

3. The fiche material was produced using technologies and procedures that promised ease-of-updating.

Implementation of these principles achieved two important objectives. The evaluation of the prototype instructional microfiche experiment could be designed using the performance measure of students trained with the

paper-based materials as a control for evaluation; and the introduction of the microfiche materials and their use over an extended period (4 months) was expected to create problems in the routine revisions of the training materials by choosing to link the fiche design concept with an appropriate production technology, not only was control over instructional materials passed to the course supervisor, but the 71N10 course could be continued using the microfiche version after the experiment was completed (if the Transportation School so desired).

It was recognized that the conditions for a true experimental evaluation design (requiring random selection of subjects, control groups with all independent variables held constant and normal population distribution assumptions) were not present for this test. Further, there was no control over the path of instruction through the material, and finally, alternatives test forms in use had not been validated for equivalence. For all of these reasons and on the basis of discussions with personnel from TDI, et. al., an overall evaluation approach was developed that did not require "experimental" description and permitted the assessment of the fiche utilization within a real-world Army Training context.

The comparative and demonstration information data was collected to measure the efficiency of the use of microfiche in an individual-pace training environment. Variable such as coordination and suitable arrangement of hard and fiche copy, classroom noise level, illumination, readability of text and graphics were examined both directly by questionnaire and attitude response. In order to measure differences

in achievement, 75 students were chosen as the comparison hard copy group and the subsequent 47 students entering the course were selected as the demonstrative group to receive parallel information on microfiche.

It was observed that students could and did learn the material presented to them on microfiche. However, the fiche group took somewhat longer than the control group but still finished in less time than the historic average for the course. Baseline measures on the comparison and demonstrative groups were collected in order to relate any observed differences in achievement to differences in ability or education. The slight differences observed in all of these measures show that neither group had any advantage and that differences in performance were not likely to be attributable to differences in any of these measures. A number of subjective measures were collected to complement performance data and to enhance the amount of learning the participants could derive from this experience and the students attitudes toward the fiche material were very positive.

The results of the IMS project do not conclusively rule out microfiche as a training delivery medium but does suggest areas for further study and experimentation to clarify the causes of the difference.

FINAL REPORT

IMPLEMENTATION OF THE INSTRUCTIONAL MICROFICHE SYSTEM DEMONSTRATION

-Prepared by-

James P. Kottenstette
Consultant

-Submitted to-

The U.S. Army Training Support Center
Fort Eustis, Virginia 23604

May 1979

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I. Responsibilities of Organizations and Persons Involved in the IMS Project

II. An Example of a Self-Paced Programmed Text Used in the 71N10 Course (Lesson 621-658)

III. An Example of the Microfiche Version of the Self-Paced Programmed Text for Lesson 621-658

IV. An Example of the Worksheets and Questions Coordinated With Lesson 621-658

V. Instructions Developed to Convert the Paper-Based Lessons to the Microfiche Format

INTRODUCTION

This report describes the preparation for a demonstration in which microfiche were used as the primary instructional medium in a resident, self-paced course. The objectives of the experiment were threefold: (1) to determine the training effectiveness of the microfiche in comparison to printed material; (2) to establish a framework for assessing costs and benefits and potential savings; and (3) to provide experience and information for efficient and appropriate use of microfiche in Army training.

To achieve these objectives, an Instructional Microfiche System (IMS) Project was organized by the Army Training Support Center. The Project involved the Transportation School at Fort Eustis, TRADOC, and TAGCEN.* The purpose of the IMS Project was to determine the feasibility of replacing printed materials with microfiche in an ongoing course of instruction. Transportation School personnel nominated two courses for conversion to microfiche and, in February 1978, the participants selected the MOS 71N10 as the experimental prototype course for the microfiche evaluation.

Course Profile

The 71N10 course is designed to train specialists for expediting the transport of cargo, passengers, and personal property both in the United States and in Theaters of Operations. The course is classified as "soft skill" and was originally converted to a self-paced mode of instruction in 1976. The average daily student load is approximately 30, and the average completion time for trainees is 22 days.

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*See Attachment I for information about the respective responsibilities of these organizations and other participants in the IMS Project.

The instructional media for the course includes 32 self-paced lesson booklets (1,487 pages, total) employing an elementary programmed text presentation mode. The volume of supplementary materials, including practical exercises, test exercises, forms, etc., equals that of the lessons. In addition, an extensive library of reference materials, (regulations, schedules, AR's etc.) is routinely employed in the training and it forms an integral part of the instructional material. The 71N10 course is also exportable to U.S. Army Reserve Schools.

Implementation of the Experiment

The approach taken to implement the conversion of course materials, design the experiment, and evaluate student performance, was to engage two specialists through the Scientific Services Program (SSP). Dr. Anita S. West and Mr. James P. Kottenstette, both employed by the Denver Research Institute, University of Denver, were responsible for the experimental design (jointly); the plan for conversion of course materials (Mr. Kottenstette); and the evaluation plan, (Dr. West).

ATSC was given the project proponency for the conduct of the experiment and data acquisition (in cooperation with the Transportation School), and for the production of microfiche and equipment acquisition (in cooperation with TAGCEN).

This report, prepared by Kottenstette, describes the experiment and the steps taken to convert the paper-based instructional materials to microfiche. The evaluation approach and the results of the evaluation, including student performance, participant attitudes, and other observations are presented in a separate report. The implications of this demonstration for further microfiche usage in Army training are also discussed as part of the evaluation.

THE PLAN FOR CONVERSION OF COURSE MATERIALS TO MICROFICHE

The introduction of microfiche into the 71N10 course required the development of an approach that balanced a host of different and often

conflicting considerations. These considerations were arbitrated through a set of principles that were used to guide the design of the experiment:

- The structure of the 71N10 course should be maintained: i.e., the instructor's role should not change; the patterns in student-instructor interactions should be the same for microfiche or the printed medium; the current student options for course completion (lesson progression) should be preserved; the course content should be unchanged (except for the routine updating of content); the Student Directives, presented in the Letter of Instruction (621-600) should not be compromised by fiche usage.

- The essential features of the self-paced, programmed learning materials should be preserved in the fiche version: The media-mix, involving paper-based and microfilmed materials should prompt similar behaviors and student usage patterns.

- The fiche material should be produced using technologies and procedures that promise ease-of-updating: i.e., The microfiche production system should ensure that the course supervisor has a means for accomplishing course revisions and course updating without further design assistance by the consultant.

Implementation of these principles achieved two important objectives. First, the evaluation of the prototype instructional microfiche experiment could be designed using the performance measures of students trained with the paper-based materials as a control for the evaluation. Student performance measures associated with classes using paper-based materials and classes using microfiche materials could be compared because the basic instructional environment remained the same for both groups. Second, the introduction of the microfiche materials and their use over an extended period (4 months) was expected to create problems in the routine revision of the training materials. By choosing to link the fiche design concept with an appropriate production technology, not only was control over instructional materials passed to the course supervisor, but the 71N10 course could be continued using the microfiche version after the experiment was completed (if the Transportation School so desired).

The remainder of this report, together with the instructional text examples contained in Attachments II-IV, describes the original course materials, the design of microfiche version of the course materials, the

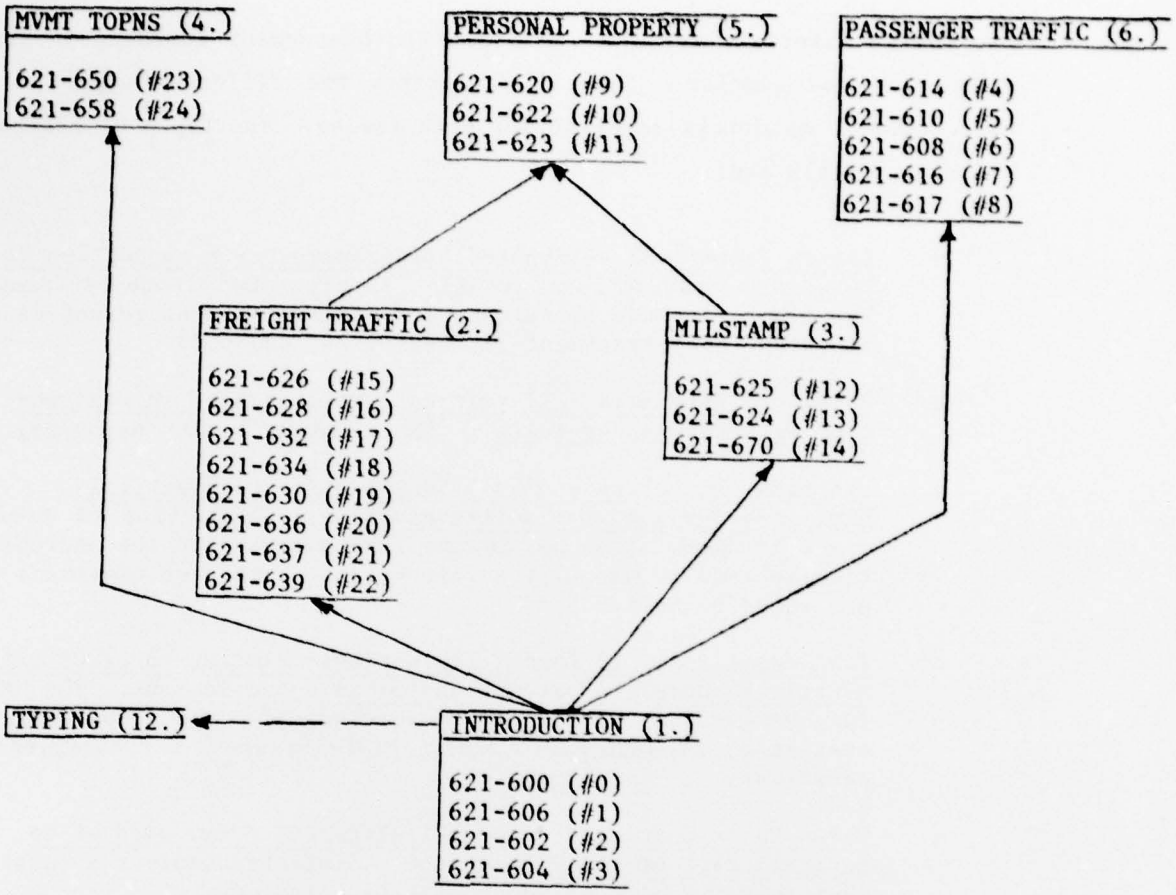
production techniques employed, and the arrangements made to implement the microfiche version of the 71N10 course.

71N10 Course Materials

The course consists of six modules of instruction in addition to a "typing" proficiency module that was unchanged by the planned experiment. The Course Map is shown in Figure 1, and Table 1 associates the average lesson completion time with the lessons identified in the Course Map.

TABLE 1. AVERAGE LESSON COMPLETION TIME

Unit Number and Lesson Number	Average Completion Time (hours)	Title of Unit (lesson)
621-600 (0)	3	Orientation
621-606 (1)	4	Introduction to Military Regulations
621-604 (2)	2	Travel Orders
621-602 (3)	2	Introduction of Military Traffic Management
621-614 (4)	4	Travel Entitlements
621-610 (5)	14	Routing of Groups
621-608 (6)	12	Scheduling Travel
621-616 (7)	12	Passenger Travel Documentation
621-617 (8)	12	Port Call Procedures
621-620 (9)	11	Personal Property Entitlements
621-622 (10)	4	Application for Personal Property Shipment
621-623 (11)	4	Private Owned Vehicle Shipment
621-624 (12)	2	Introduction to DOD Regulation 4500.32-R
621-624 (13)	18	Transportation Control and Movement Document
621-670 (14)	18	Preparation of Ocean Documentation
621-626 (15)	1	Introduction to Freight Movement by Commercial Carrier
621-628 (16)	7	Commercial Freight Classification and Rates
621-632 (17)	2	Characteristics of Commercial Transportation Equipment
621-634 (18)	2	Hazardous and Dangerous Cargo
621-630 (19)	6	Routing of Freight
621-636 (20)	12	Preparation of Government Bills of Lading
621-637 (21)	3	Preparation of Freight for Shipment
621-639 (22)	2	Reporting Handling and Packaging Deficiencies
621-650 (23)	1	Movement Control in a Theatre of Operations
621-658 (24)	2	Routing in a Theatre of Operations



THE STUDENT MUST BEGIN WITH MODULE NO. 1. UPON COMPLETION OF MODULE 1, THE STUDENT MAY PROCEED TO MODULE 4, 2, 3 OR 6. THE STUDENT MUST COMPLETE MODULE 2 AND 3 PRIOR TO PROCEEDING TO MODULE 5. UPON STARTING ANY ONE OF THE SIX MODULES, THE STUDENT MUST COMPLETE THE ENTIRE MODULE PRIOR TO PROCEEDING TO THE NEXT SECTION. (#__)= LESSON NUMBERS.

SAMPLE SEQUENCE COMBINATIONS

1, 6, 3, 2, 4, 5	1, 2, 3, 5, 6, 4
1, 4, 2, 3, 6, 5	1, 3, 6, 4, 2, 5
1, 2, 3, 5, 4, 6	1, 2, 4, 6, 3, 5
	1, 4, 6, 2, 3, 5

Figure 1. Course Map

Traffic Management Coordinator 71N10

The course materials for the 71N10 Traffic Management Coordinator are voluminous and complex. Table 2 summarizes the different types of instructional materials required for each lesson. The types of instructional materials are:

- Lesson Texts: 32 self-paced, programmed texts supporting 24 lessons. Instructional content is presented frame-by-frame. The frames include questions, and written student responses are expected (See Attachment II, lesson 24, 621-658).

- Reference Materials: 37 reference volumes used in conjunction with the lesson texts. (See Figure 2 for examples).

- Practical Exercises and Solution Sheets: 67 Practical Exercises designed for self-evaluation. Completion of exercises is normally paced by the lesson texts and the exercises usually require use of the references. Completed exercises are critiqued by instructors.

- Test Exercises: 15 formal evaluations--similar to practical exercises--completed at the end of selected lessons. The "time for completion" of the test exercises was one comparative measure of student performance. (See Figure 3 for examples of exercises).

- Forms to be Completed: some 25 different forms used as an integral part of the instruction. Students complete a total of 79 forms as a part of the course progression.

- Student Guides: one or two page summaries of the objectives procedures and instructional resources associated with each lesson. (See Attachment III, Self-Paced Student Guide, formatted for the Microfiche Version of lesson 621-658).

Microfiche Conversion Options. Examination of Lesson 20 (Module 2, 621-636) in Table 2 provides a "worst case" example of the comlexity of the instructional materials that are used in the 71N10 course. The module has two volumes of self-paced text and a 38-page supplement to guide the completion of 13 practical exercises (PE's). The PE's require student completion of forms using specific situational data derived from six different reference volumes.

Microfiche conversion options for such lessons were found to be limited to the self-paced texts, student guides, and the lesson supplements. The introduction of filmed reference materials would require the use of a second reader or viewer in the student carrel because the "frames" of the self-paced texts must be continuously displayed on the first reader in order to guide student actions involving the PE's and the use of the references. Filming the PE's was not considered an option because the student typically must "fill-out" the forms that are the heart of the exercises. Serious filming problems would also be encountered due to

TABLE 2. TYPES OF INSTRUCTIONAL MATERIALS REQUIRED FOR EACH LESSON 71N10 COURSE

Module	Lesson and Unit No.'s	References (designated by Reference No.)	Number of Frames (lesson texts) Vol. I - Vol. II	Practical Exercises (No. of Pages)	Test Exercises (Evaluation)	Forms to be Completed	Graphics
1	1 621-606	4, 1, 5	48	0	0	0	0
1	2 621-602	4, 1, 22	37	0	0	0	0
1	3 621-604	28	41	1-10 pp.	0	0	0
6	4 621-614	8, 18, 4, 1	30	1-4 pp.	0	0	0
6	5 621-610	1, 36	35 54	3-12 pp.	X	6	X
6	6 621-608	5, 1, 7, 6	73 30	2-4 pp	X	0	X
6	7 621-616	1	90 60	5-14 pp; S*	X	15	X
6	8 621-617	16, 20	93 17 p.	3-7 pp.	X	2	X
5	9 621-620	18, 34, 4	31	2-8 pp; S*	X	0	0
5	10 621-622	4, 9, 34	30	3-18 pp.	X	4	X
5	11 621-623	4, 34, 18, 28, 10	35	4-14 pp.	X	8	X
3	12 621-625	22-Vol. I, II	48	0	0	0	0
3	13 621-624	22-Vol. I, II	70 84	17-54 pp.	X	22	X
3	14 621-670	22, 14	27 p.	0; S*	X	12	X
2	15 621-626	2	10	0	0	0	0
2	16 621-628	30, 26	35	1-2 pp.	0	0	X
2	17 621-632	33, 25	41	0	0	0	X
2	18 621-634	35, 21, 22	17 19	0	0	2	X
2	19 621-630	1, 26, 5, 22	33 38	3-8 pp.	X	5	X
2	20 621-636	1, 5, 26, 22, 34, 7	38 78	13-64 pp; S*	X	14	X
2	21 621-637	24, 23, 1	47	2-4 pp.	X	1	X
2	22 621-639	37, 24, 12, 13	57	2-4 pp.	X	4	X
4	23 621-650	37, 24, 12, 13	29	2-6 pp.	0	0	0
4	24 621-658	32, FM 55-11	44	3-20 pp.	X	0	0

*S Designates "Supplements" of four to forty pages.

Figure 2. Examples of the Reference Materials Used in Conjunction with the 71N10 Course.

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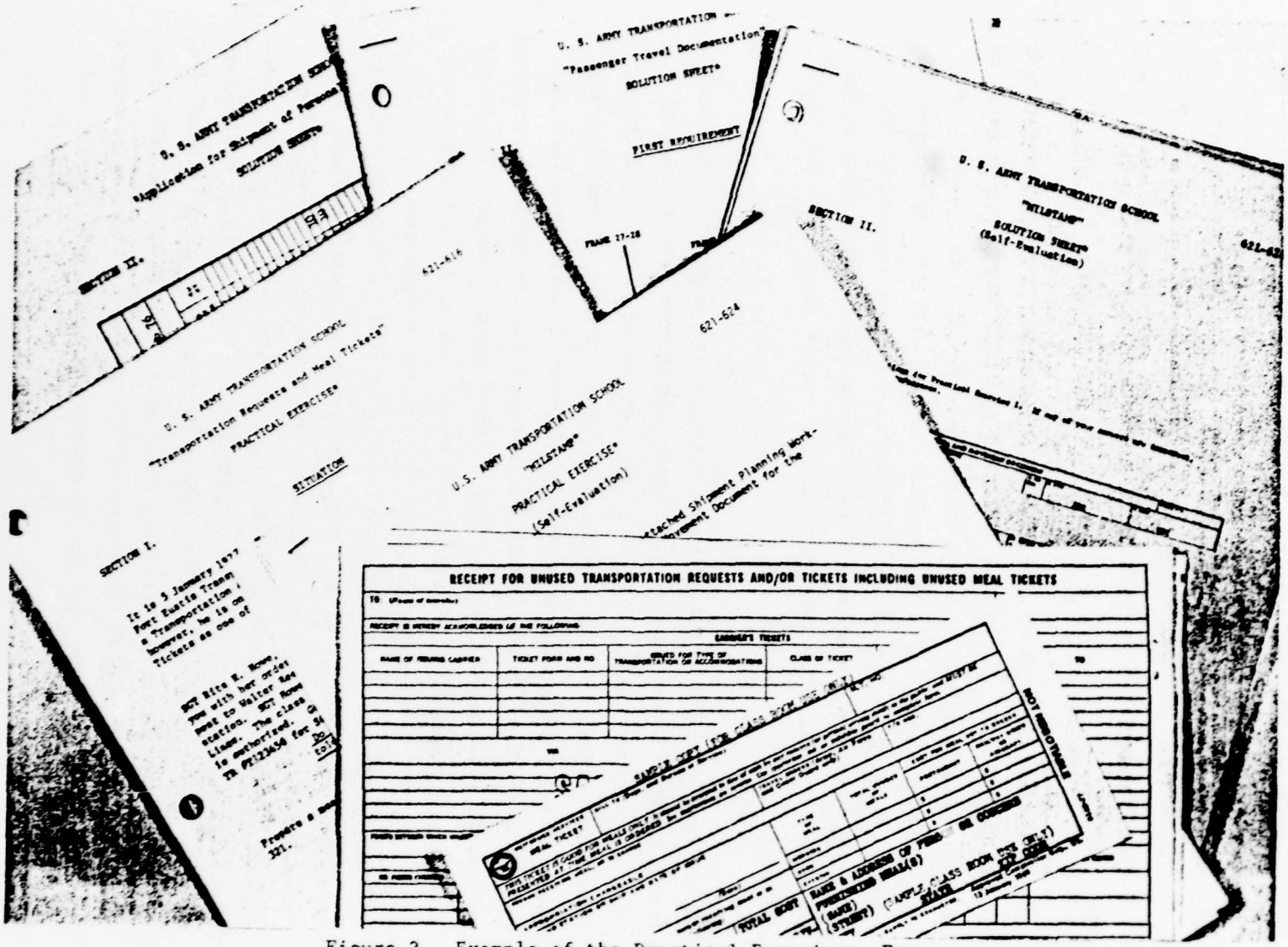

Figure 3. Example of the Practical Exercises, Forms and Solution Sheets Used in Course Evaluation.

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type-size limitations and the use of oversize forms in the PE's. The "Solution Sheets" for PE's were not considered to be candidates for filming again because of typography and form size problems--further, these "solutions" are usually obtained from the instructor after a PE is completed to ensure that the student prepares the PE without the aid of the solution.

Filming the solution sheets for display on an instructor-monitored viewer was not found to be a practical alternative because a student is expected to rework each portion of an exercise where problems are encountered. Such an arrangement also implied administrative problems for instructors. Finally, filming of evaluation test exercises was not considered since it would confound the comparisons between performance measures due to differences that might be introduced by the use of microfiche for test delivery.

While the microfiche conversion was actually limited to the self-paced lesson texts, student guides, and lesson supplements, the filming of some of the reference volumes was seriously considered. Some 15 different documents, primarily Army Regulations, were found to be suitable for filming from a technical standpoint. The use of these materials in a microfiche version, however, would introduce a serious problem: a second microfiche viewer would be required in the student carrels. The second viewer is necessitated because the reference materials are used in conjunction with the information presented in the lesson texts and this information should be continuously displayed while reference materials are consulted by the student. The deployment of additional micrifiche viewers was thought to make the experiment too complicated, and no further consideration was given the option. The point to be made, however, is that the introduction of microfiche in the training environment must be sensitive to the relationships between instructional resources that are used to achieve training objectives: The situation will often arise when a single microfiche display will preclude effective communication because the relationships in resource material use are altered.

Design of the Microfiche Version of the Lesson Texts

The packaging for the microfiche version of the 71N10 course materials is illustrated in Figure 4. The Microfiche Housing Frame shown contains 15 microfiche grouped into the six instructional modules. Each student beginning the course received a three-ring (notebook) binder containing the full complement of microfiche, a printed copy of the orientation to the 71N10 Traffic Management Coordination Course, and an envelope or packet conatining paper-based materials for completion of Module I. A student completing Module I would receive additional packets for inclusion in the notebook from the instructor: the particular packet would depend on the progression path chosen by the student.

The hard copy version of the Orientation (621-600) was included in the notebook because of its administrative orientation and its potential usefulness to the student on an unplanned basis. The packet for Module I (shown in Figure 5) contains three sets of worksheets, one for each of the lessons in the module, and one Practical Exercise for lesson 621-604. All module packets were labled as shown in Figure 5 to indicate the contents of each packet. These labels were coordinated with the Student Guides to each lesson to aid in the management of instructional materials and to ensure that the trainee could check and see if the materials required to complete a lesson were properly assembled. Thus, the notebook contained the printed course orientation, the microfiche stored in the frame holder, and the coordinated lesson packets. These materials comprised the basic building blocks for the Instructional Microfiche System.

Worksheets. The worksheets referred to previously are a collection of the questions posed to the student during the self-paced lessons. Questions are routinely used to provide a mechanism for the students to make written responses to the instructional content presented in the lessons--a behavior encouraged in the programmed mode of self-paced instruction using paper-based materials, and something to be preserved in the fiche version.

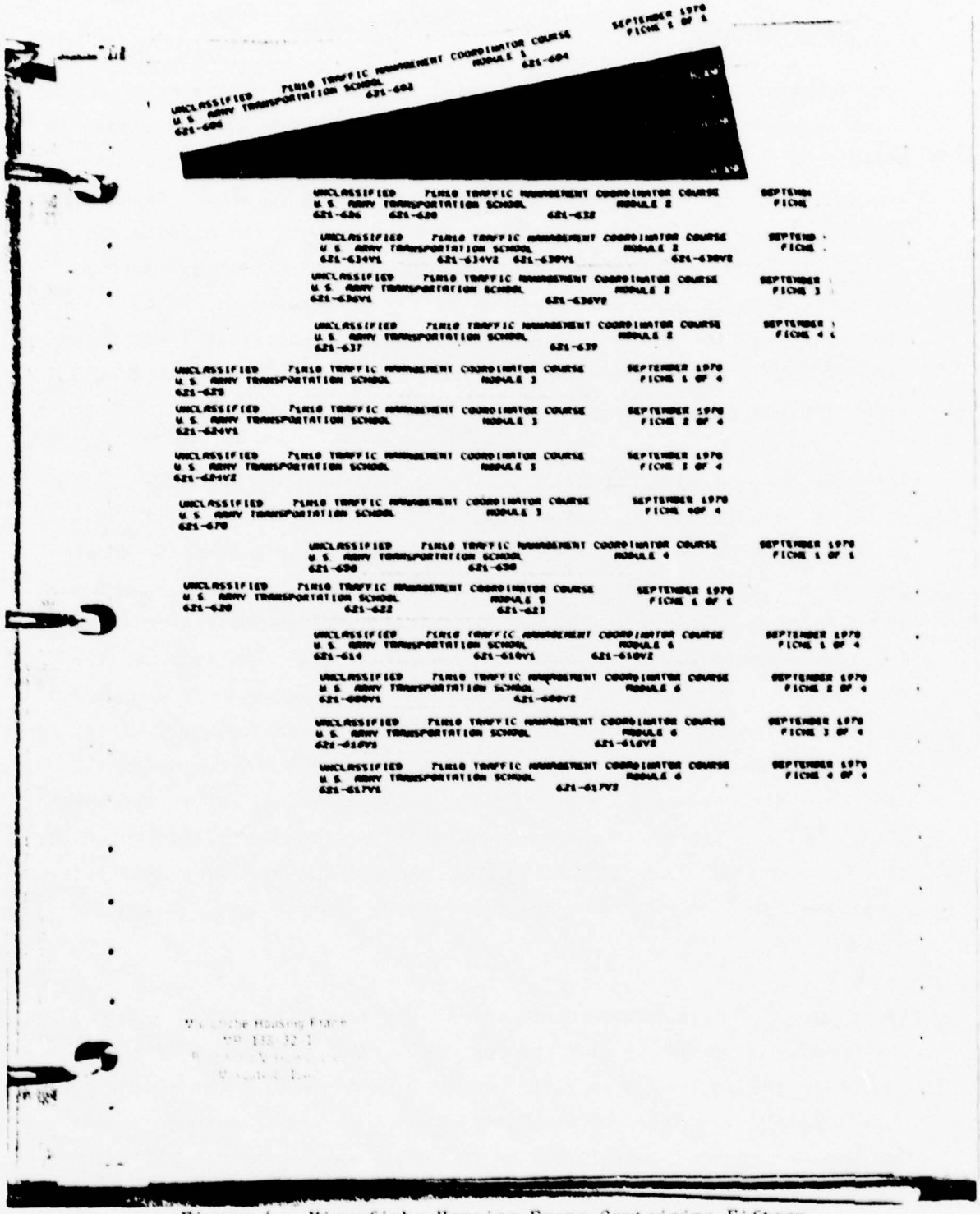

Figure 4. Microfiche Housing Frame Containing Fifteen Microfiche Grouped in Six Instructional Modules of One to Four Fiche.

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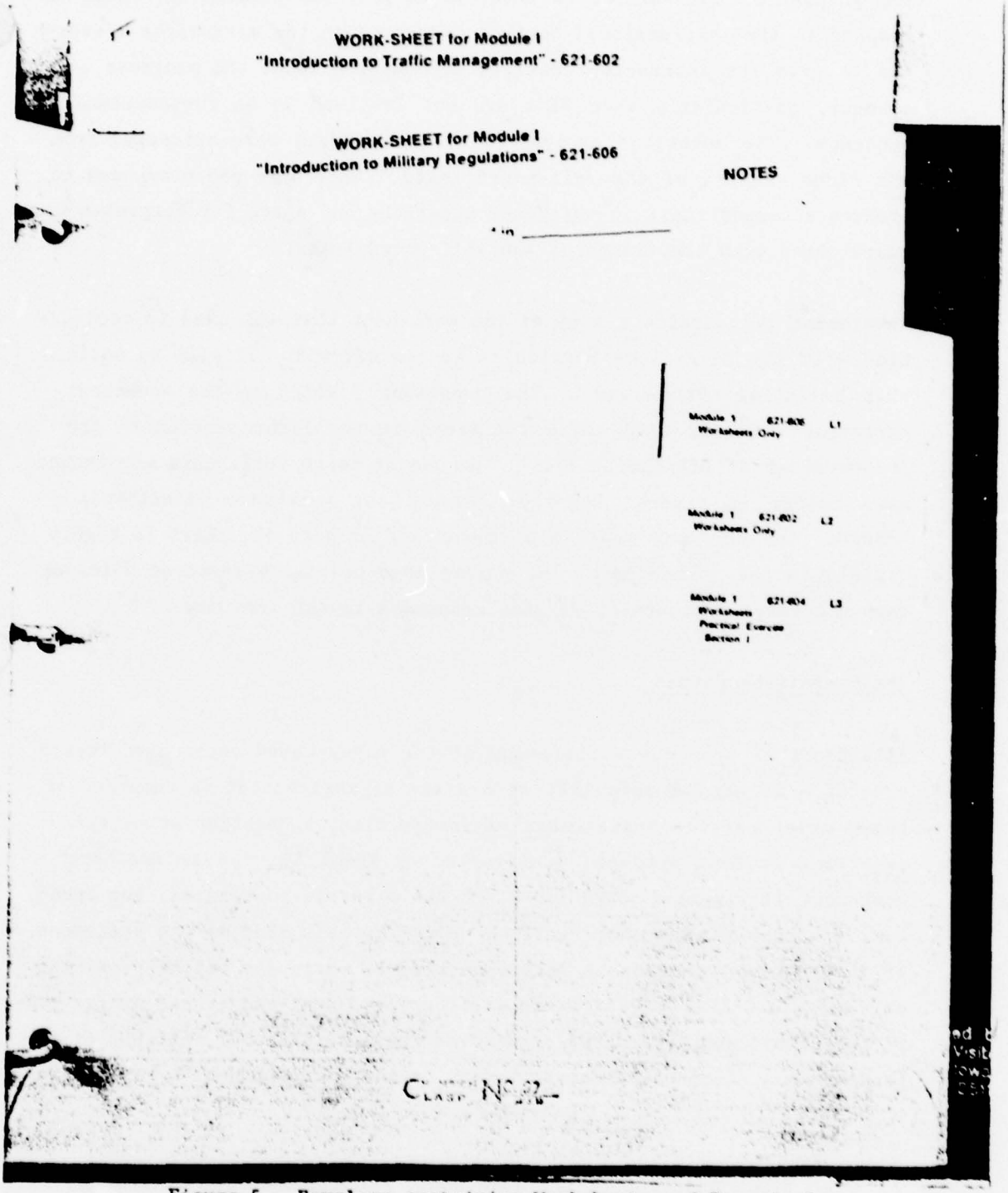

Figure 5. Envelope containing Worksheets and Practical Exercise for Module 1 Lessons. Additional Envelopes were Prepared (with Indices) for Modules 2-6.

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The purpose of the worksheets then, is to give the student the means to respond to the instructional content presented on the microfiche viewer--and to give the instructor concrete information about the progress of a student, particularly when PE's are not involved in on instructional sequence. The questions arrayed on the worksheets were extracted from the fiche version of the self-paced texts. They were photocomposed to produce a compact unit in which the questions and space for responses are coordinated with the frames of the self-paced texts.

Attachment IV contains a copy of the worksheet that was used in conjunction with the Microfiche Version of Lesson 621-658. It will be noticed that beginning with Frame 3, the questions printed on the worksheet correspond exactly with those contained in the fiche version of the lesson shown in Attachment III.* The use of these worksheets may induce some change in student behavior because the worksheet effectively "charts" the progress made in a lesson and as such the chart is highly visible to the instructor. The paper-based booklet version of a lesson does not chart a student's written responses in the same way.

The Microfiche Format

Attachment II presents a photocopy of the paper-based version of lesson 621-658. It may be seen that each frame of instruction is composed of three major parts: a statement of instruction; a question or directive requiring student response (designated by FRAME X); and a "feedback" component (designated FRAME Xa). In the paper-based version, the feedback component is normally printed on the reverse side of the statement of instruction in order to encourage student responses before provision of feedback. This is a feature of programmed text and it was preserved in the microfiche version by organizing the instructional contents of the lessons in a column or vertical format on the microfiche.

---

*The first question on the worksheet, FRAME 1 does not correspond to the microfiche version: this error occurred as a result of the revision of FRAME 1.

When viewed on the fiche reader, both FRAME X and FRAME Xa can be projected on the screen with FRAME X displayed above and separated from FRAME Xa. As the fiche is advanced from frame to frame, however, the statement of instruction and the question (FRAME X) can be displayed at the bottom of the screen with feedback (FRAME Xa) not shown until the student makes a response on the lesson worksheet. In the microfiche version of the 71N10 lessons the feedback component (FRAME Xa) is designated as EVALUATION. By formatting the instructional contents so that an EVALUATION component can either be displayed together with the statement of instruction and its associated QUESTION, or it can be positioned off the screen. Thus, a student using microfiche has the same behavioral option as a student using the paper-based version. That is, a student using the microfiche can choose to make written responses with or without benefit of feedback just as a student using hard copy can "turn the page" and view FRAME Xa before attempting a response.

Each column on the fiche typically contains from 12 to 20 frames of the paper-based text. The first 14 frames of instruction presented in lesson 621-658 (Attachment II) were photocomposed as one column in the microfiche version. Attachment III shows the layout of these frames beginning with the page entitled "FRAMES 1 to 14: Column 6." The pages of text that make up Column 6 (seven pages of the Attachment) were filmed one above the other to create a continuous "scroll" of frames beginning with Number 1 and ending with Number 14.

In addition to preserving the programmed character of the original text, several other advantages were captured using the column format. These advantages are summarized below:

- The "frame" designation for instructional contents of a lesson in the original text was also preserved on the microfiche. This ensured that text references to frames within the lesson remained unchanged--avoiding the potential for confusion and editorial errors--and avoiding the problem of changing references to particular frames contained in the practical exercises.

- Usually more than one lesson frame was displayed on the viewing screen regardless of where the fiche was positioned within a

column. This multiple frame display enhances the user's sense of continuity in the presentation, particularly when a frame just completed remains on the screen as work is begun on the next frame.

- Indexing was greatly simplified: the index to frames that comprise a lesson was presented at the top of each column; the index to each lesson was presented in eye-readable form within the fiche "header" and directly above each lesson; and, the index to each module was provided by grouping of fiche within the fiche frame holder (coupled with the information presented in the header).

- The column format systematically places new information for the student to read and respond to in the lower portion of the viewing screen. This characteristic improves the physical (spacial) relationship between the information displayed and the paper-based materials used in conjunction with the display.

- The student directives used in the original text were standardized and simplified. For example the feedback component in the original text would include statements such as:

  "If answered correctly, go to Frame 2, page 5."
  "If answered incorrectly, go back to Frame 1, page 3."

  These statements were replaced by the single directive:

  "If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this frame." ↑↑↑↑

- In principle, the format simplified the photocomposition of the lessons (keystroking), text editing, and text proofing by omitting detail (e.g., page numbers) and redundant information.

The full potential of the fiche format developed for the IMS project can be best demonstrated by a frame-by-frame comparison between the hardcopy and fiche versions of lesson 600-658 presented in Attachments II and III respectively. This lesson involves some 43 frames of instruction and it illustrates a wide variety of situations routinely accommodated by the format.

Production of the Microfiche

The production of the Microfiche was accomplished by having the text materials photocomposed according to a set of detailed editorial rules. The photocomposed materials were then arranged on individual pages (as

shown in Attachment III) and then filmed using a source document microfiche camera modified slightly to produce continuous columns of images rather than the familiar individual page images. The photocomposition was completed by COMARCO Inc., (Oxnard, California), a firm specializing in the word processing field. The microfiche were prepared by the Navy Publications and Printing Service Branch Office (Point Mugu, California) and this office also printed the worksheets, procured all components of the IMS package, and coordinated the overall production effort.

Photocomposition. Originally the production of filmed materials was planned for two different reduction ratios: 24x and 48x. The experiment offered the opportunity to assess the relative merits of two significant approaches to the delivery of instruction via microform. The 24x version was selected in order to capture the benefits of a photocomposed fiche presentation. These benefits include the use of selected type fonts and customized graphics design to enhance the visual characteristics of text when converted to microfiche. The 48x version was planned because it ultimately represents the most economical approach to the routine production of instructional materials on microfiche. It was thought that the 48x version could be produced using the same magnetic tapes originally created to photocompose the 24x version. These data tapes would be merged with digitized records of figures and forms in order to achieve a computer output microfilm (COM) version of the lessons at 48x reduction.

The production of the 48x version required a developmental effort while the production of 24x version, although unique, was within the state-of-the-art. TAGCEN supported development of the 48x production capability at COMARCO on a limited and independent basis, but the effort did not result in a capability to produce the 48x version of the 71N10 course material. As a result, only the 24x version was used in the classroom experiment. In retrospect, it is clear that introduction of the two versions of the microfiche was overly ambitious considering the time constraints on the experiment and the difficulties associated with coordinating and evaluating the results of such a change.

Each of the 32 booklets used in the 24 lessons to be filmed required frame-by-frame analysis: (1) to provide instructions for photocomposition input, (2) to complete the editorial changes associated with student directives and, (3) to obtain a consistent format for all frames, from lesson to lesson. These instructions were reduced to a set of codes that guided the preparation of the photocomposed lessons. Attachment V shows the instructions and presents examples that were given to COMARCO to guide the preparation of the camera-ready copies of the lessons.

As a part of the photocomposition process, the QUESTIONS to be reproduced on the worksheets for each lesson could be machine extracted from the aggregate lesson text materials and in a format identical to that appearing on the fiche. Using this technique, the preparation of the worksheets was reduced to a minor part of the overall production effort.

Continuous tone illustrations and illustrations involving completed forms, etc., were merged with text using "cut and paste" methods. The photocomposed text was "stripped" into camera-ready pages and illustrations were incorporated as a routine part of the procedure.

Filming the Photocomposed Text. The fiche were filmed on a high volume, automated step-and-repeat camera (The DocuMate II). The camera was adjusted so that photoready pages of text (as shown in Attachment III) could be filmed in the standard 24x mode without the appearance of borders around each of the 98 page positions on the microfiche master. Removal of these borders effectively established the column format sought and allowed a frame of instruction to be split between two pages of photocomposed text.

In order to ensure that splitting a frame of instruction across two page positions on the fiche would not cause any confusion to the student user, vertical lines were placed at each side of a photocomposed lesson frame. The heavy lines not only provide a border for each column, but visually delimited the text associated with each frame of instruction. It should be noted that the placement of these lines and the "boxes" around the student directives used in the microfiche version were "hand operations"

rather than being machine produced. While this was a labor-intensive step in terms of this experiment, other options for achieving the similar visual effects were not investigated because new photocomposition equipment has the desired "line" capability.

As may be seen on Figure 4, the distribution copies of the microfiche have negative polarity. The negative polarity was chosen because it is less fatiguing to use over extended viewing periods: the projection of a negative image more nearly balances the illumination on the viewing screen with ambient light levels. The fiche partially visible on Figure 4 also shows that portions of the fiche were labled "Blank." Blank pages, so labled, were filmed so that no confusion would arise when a student encountered a blank portion of the fiche. Since one of the fiche design decisions dictated that no lesson would be split between two fiche (to avoid student confusion and reduced problems associated with packaging the worksheets, PE's etc.), extensive portions of some fiche have blank areas. If the lessons were filmed with no requirement for unitizing modules and lessons, only nine fiche would be required instead of the 15 actually produced. This statistic also comments on the efficiency of the microfiche format developed for the experiment: that is, the 1,484 pages of instruction found in the hard copy booklets were consolidated to less than 900 pages of photocomposed text.

Implementing the Demonstration

The first step in implementing the experiment was to prepare a production prototype of the IMS package. Module I, containing three lessons, was photocomposed and filmed according to specifications (see Attachment V). The prototype IMS package, including worksheets was reviewed by 71N10 personnel and IMS project personnel. The changes made as a result of this review included:

1. Substitution of san-serif type styles for all text, Helvetica Star and Helvetica Star Bold type styles (12 point) replaced the Gothic styles used in the prototype because some breakup in the serif were found in the microfiche images. (The serif type styles have variable line widths--when a line is too narrow, breakup occurs.)

2. The column indexes were removed from the header portion of the microfiche and made an integral part of each column. The header was redesigned to include administrative information. (See Figure 4 for header design).

The preparation of the prototype also led to improvements in the filming techniques, which in turn produced better visual continuity from frame-to-frame down each column. The prototype effort demonstrated the feasibility of the IMS package design and it served well in orienting 71N10 personnel to the experiment. After completion of the prototype fiche, the remaining lessons were prepared and filmed. During this production period, one lesson was rewritten and introduced in the 71N10 course. The microfiche version was revised to accommodate this change and to complete editorial changes to bring the lessons up to specifications. Two hundred copies of the revised IMS package were made available to the Transportation School prior to the classroom demonstration.

Equipment Selection. The Bell and Howell 3/4-size microfiche reader was selected for classroom use (Model SR1010). Selection of the reader was aided by the results of an equipment evaluation sponsored by TAGCEN.* The three "top-rated" viewers determined by the evaluation were examined and the model selected that most nearly met the experimental requirements for variable magnification, noise level, image quality and maintainability.

The readers were equipped with dual-lens controls so that microfiche images could be projected at 20x or 24x magnifications: and with an appropriate projection lens substitution, 48x COM images could be projected. Sixty viewers were acquired for classroom use along with one reader/printer for instructor use. The reader/printer also served as a means of identifying and modifying frames requiring updating or editing. By providing a method for creating paper copy of the lessons in the microfiche format, editorial and doctrine changes could be specified by

*"Microfiche User Equipment Evaluation: Portable Viewers, Viewer/Printers, 3/4-size Viewers, Full Size Viewers." The Planning Research Corporation, Mclean, VA., May 1978.

71N10 personnel and the appropriate changes made during a lesson revision cycle before the experiment was formally begun in November 1978.

In addition to providing variable magnification capability, each viewer was equipped with a custom-made fiche index plate. The plate was designed to guide the use of fiche formatted in columns rather than individual frames, and it included information relating to the operation of the reader. The design of the custom fiche index plate completed the equipment adaptation needed in order to utilize the IMS microfiche format.

Orientation. A video taped orientation for students involved in the experiment was developed by ATSC personnel. The information presented included such topics as the operation of the microfiche viewer; the use of the IMS instructional package; proper fiche handling; and the fiche format. Figure 6 shows the station setup for student orientation. Each student was given the 5-minute orientation to the IMS as a prerequisite to using the system.

The Classroom Environment. Figures 7 through 11 provide some insight into the classroom environment during the microfiche demonstration. Taken together, the figures show how selected students interacted with the microfiche reader, completed PE's and worksheets, and otherwise coordinated the microfiche display with reference materials used in the 71N10 course.

A Preliminary Cost Comparison. Table 3 presents a preliminary cost comparison for producing microfiche and paper-based instructional materials using the assumptions indicated. No attempt has been made here to compare the costs associated with differences in training time or cost/benefit that might be associated with production of course materials using a computer output microfilm system as the means for production. The comparison assumes that the cost of preparing the camera-ready copy for each version is equal.

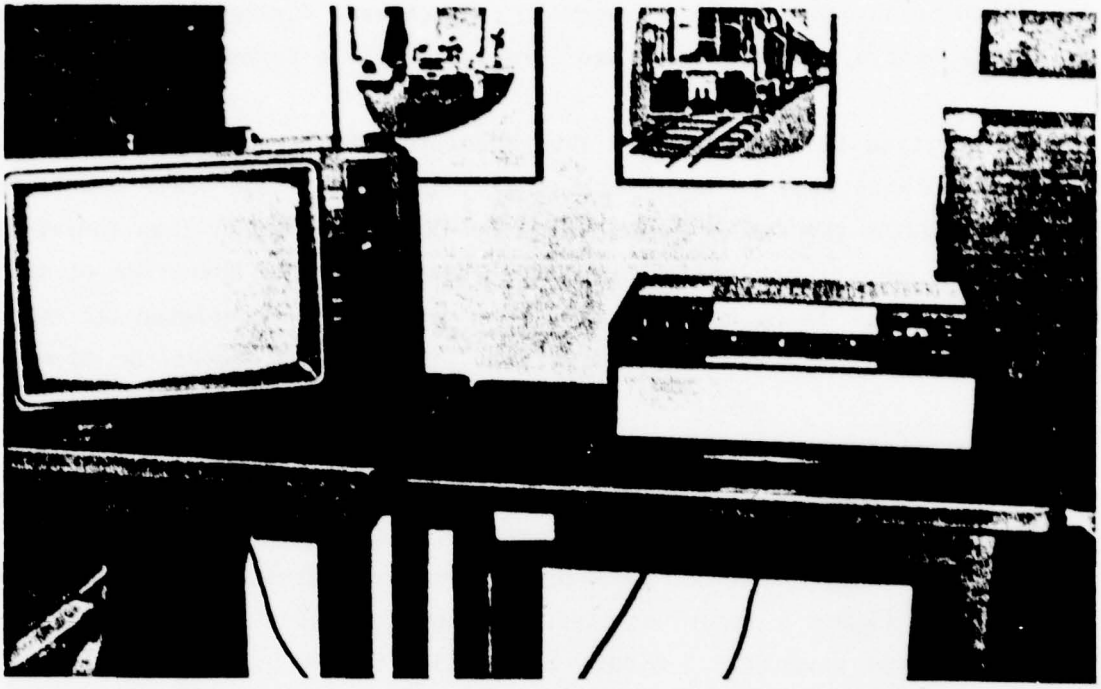

Figure 6. Video Station Used to Present Prerecorded Microfiche Orientation

Figure 7. Study Carrels Equipped with Microfiche Readers

Figure 8. Student Completing a Practical Exercise. (Note reference materials, microfiche notebook and the fiche index on the Microfiche Reader.)

Figure 9. Student Completing a "Worksheet" Coordinated with the Microfiche Display

Figure 10. Study Carrel Showing the "Reference" Shelf--Some of the 37 Reference Documents Used in the 71N10 Course.

Figure 11. Student Demonstrating The Coordinated Use of the Lesson Text and Reference Document (in notebook) to Complete Self-Evaluation Exercise.

TABLE 3. PRELIMINARY COST COMPARISONS FOR INSTRUCTIONAL MICROFICHE SYSTEM PROJECT (Prepared by ATSC)

COST COMPARISON[1]

MICROFICHE		PAPER	
MASTERS ($3.75 ea)	$ 56	FILMING	
DUPES ($0.10 ea)	150	PLATES	$0.005/pg
LABOR ($0.32/min)	117	PRINTING	
PRINTING ($0.005/pg)	294	BINDING	
EQUIP/MAINT[2]	2,415		
TOTAL	$3,032	TOTAL	$4,452

SAVINGS ESTIMATE

PAPER COST	$4,452
FICHE COST	3,032
SAVINGS	$1,420 (32%)

[1] COMPLETE ANNUAL REPRINT
[2] EQUIPMENT DEPRECIATED 10 YEARS, 40% LIFETIME MAINTENANCE PERCENTAGE ADDED

This completes the description of how the microfiche demonstration was implemented. The evaluation of the demonstration is reported in a separate document.

ATTACHMENT I

RESPONSIBILITIES OF ORGANIZATIONS AND PERSONS
INVOLVED IN THE IMS PROJECT

INSTRUCTIONAL MICROFICHE SYSTEM (IMS) PROJECT

PROJECT MANAGERS

ATSC

(MR. MAITZ)

* COORDINATE AND PROVIDE POINT OF CONTACT FOR OVERALL PROJECT

* PROVIDE FUNDS AND CONTRACT FOR DESIGN, DEVELOPMENT, AND EVALUATION OF MICROFICHE SYSTEM

TAGCEN

(MR. GREENHALGH)

* MONITOR PROGRESS OF PROJECT

* PROVIDE FUNDS AND CONTRACT FOR PRODUCING MICROFICHE, PURCHASING READERS AND READER/PRINTER, AND TECHNICAL SUPPORT FOR EVALUATION OF PROJECT

TRANSP SCHOOL

(MR. VASSOS)

* COORDINATE ACTIONS WITHIN SCHOOL

* SELECT PROTOTYPE COURSE

* PROVIDE RESOURCES FOR AND MANAGE DEMONSTRATION

CONSULTANTS

(DR. WEST AND MR. KOTTENSTETTE, UNIVERSITY OF DENVER)

* EXPERIMENTAL DESIGN

* COURSE CONVERSION

* EVALUATION AND REPORTING

PRODUCTION

(MR. STEVE BROWN, NAVY PUBLICATIONS AND PRINTING SERVICE BRANCH POINT MUGU, CALIFORNIA)

* MONITOR PHOTO COMPOSITION CONTRACT WITH COMARCO INC.

* PRODUCE MICROFICHE AND PRINTED MATERIALS

ATTACHMENT II

AN EXAMPLE OF A SELF-PACED
PROGRAMMED TEXT USED IN THE
71N10 COURSE (LESSON 621-658).

621-658

U. S. ARMY TRANSPORTATION SCHOOL
FORT EUSTIS, VIRGINIA

ROUTING IN THEATER OF OPERATIONS

SELF-PACED TEXT

TRANSPORTATION MANAGEMENT BRANCH

JULY 1977

II-1

621-658

INTRODUCTION

This text is an exercise in programed learning during which you will be guided toward previously determined objectives. To obtain maximum benefit from this exercise, this approach requires emphasis on logical thought and analysis, student self-discipline, and independent learning.

1. This is a self-taught programed course designed to assist you in learning.

2. As you go through this book you will observe that it is systematically arranged in small simple learning steps called frames.

3. Because the purpose is to teach rather than merely present information, a single point may be repeated several times in different ways. What may seem to you like needless repetition in any other kind of reading is done here to reinforce learning.

4. Each individual instructional unit or bit of information is called a frame. Each frame requires you to do something. Read the frame as information then fill in required response. After completing the required response follow instructions in bold face type at the end of each frame.

NOTE: Frames are successively numbered 1, 1a, 2, 2a, etc. Instructions guiding you to the next frame are printed at the bottom of each frame. Example: GO TO FRAME_____, PAGE_____.

5. Student self-discipline is essential to the success of this program. Carefully and completely read all the information in each frame. Previous experience has shown that you will only get out of a self-paced text what you are willing to put into it.

6. Turn the page and begin the self-paced text.

FRAME 1: To obtain transportation within a theater of operations, the installation transportation office prepares a transport request. A transport request is submitted through movement channels to obtain allocation of the required transportation mode to complete a move. Read paragraph 5-4, FM 55-10 w/Appendix C, STANAG 2156.

A transport request will be prepared by either:

a.

b.

GO TO FRAME 1a, PAGE 4

FRAME 23: The Installation Capacity Report is used by transportation movement activities to determine the flow of supplies that can be shipped into and out of an installation to prevent overloading the installation and to adjust tonnages among the various modes to transport. Read paragraph 7-8, FM 55-10

When is the Installation Capacity Report prepared and how often?_____

_____

_____

GO TO FRAME 23a, PAGE 4

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FRAME 1a: A transport request will be prepared by either:

a. by the unit formation requiring transport; or

b. in urgent cases by the military commander ordering the movement or transport.

If answered correctly go the Frame 2, page 5.

If answered incorrectly go back to Frame 1, Page 3.

FRAME 23a: The Installation Capacity Report is a one-time report prepared whenever a new installation is activated. When a major permanent change takes place, the Installation Transportation Officer submits a new report.

If answered correctly go to Frame 24, page 5.

If answered incorrectly go back to Frame 23, page 3.

FRAME 2: The Request for Transportation makes reference to the movement program line number for programed shipments. A programed shipment is one in which the material to be shipped has been included in the movements program, and allocated a mode of transportation.

GO TO FRAME 3, PAGE 6

FRAME 24: Probably the most significant report installation transportation officers make is the Daily Installation Situation Report. All installations which load and unload cargo submit this report each day through the local TMO to the movements control center. This report is used to report the status of rail, barge, commercial highway and military equipment and containers: loaded; empty; being loaded/unloaded; awaiting loading or unloading.

GO TO FRAME 25, PAGE 6

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FRAME 3: The movement program is a command directive prepared by the Movement Control Center and issued in the name of the commander. It allocates the available transportation mode capability to satisfy the movement requirements in accordance with priorities established by the commander. Read paragraph 1-6d, FM 55-10.

What information does the movement program normally contain?

_____

_____

GO TO FRAME 3a, PAGE 7

FRAME 25: TMO's use the Daily Installation Situation Report to analyze daily transportation activities at each installation. From it they can see whether conveyances are being unloaded expeditiously to make them available for reuse in the transportation system; or are they being detained for unduly long periods. The report also shows the backlog of transportation equipment, either to be loaded or unloaded, and the status of equipment and facilities. Read paragraph 7-9, FM 55-10 and Appendix B.

Who prepares the Daily Installation Situation Report?_____

_____

GO TO FRAME 25a, PAGE 7

FRAME 3a: The movement program normally contains detailed information concerning origins, destinations, and weight and cube of cargo or type and number of personnel to be moved.

If answered correctly go to frame 4, page 8.

If answered incorrectly go back to Frame 3, page 6.

FRAME 25a: The Installation Transportation Officer prepares the Daily Installation Situation Report.

If answered correctly go to Frame 26, page 8.

If answered incorrectly go back to Frame 25, page 6.

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FRAME 4: Look at Annex A of the supplement to 621-658 and review this annex.

GO TO FRAME 5, PAGE 9

FRAME 26: Look at Annex C of the supplement to 621-658 and study the Daily Installation Report. Be sure to read the instructions on the back.

How is the number of inbound loaded conveyances on hand in the installation at the end of the period determined?_____

_____

_____

_____

FRAME 5: Look at item one in Annex A of the supplement. The movement program usually forecast movement requirements for a 14-day period. A firm forecast of requirements is shown for the initial 7 days and a tentative forecast for the succeeding 7 days. Annex A does not show a tentative forecast. Read paragraph 4-6, FM 55-10.

How often is a new planning cycle initiated?_____

_____

GO TO FRAME 5a, PAGE 10

FRAME 26a: The number of inbound loaded conveyances on hand in the installation at the end of the period is determined by adding columns i + j + k.

If answered correctly go to Frame 27, page 10.

If answered incorrectly go back to Frame 26, page 8.

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FRAME 5a: A new planning cycle is intialed every 7 days for the following 14-day period.

If answered correctly go to Frame 6, page 11.

If answered incorrectly go back to Frame 5, page 9.

FRAME 27: By comparing the Daily Installation Situation Report against the Installation Capacity Report, the destination TMO can determine the consignees capability to receive the shipment.

GO TO FRAME 28, PAGE 11

FRAME 6: Look at item two in Annex A of the supplement. The alphabetical code preceding each line number gives the name of the shipper and the mode of transport to be used. The 'T' indicates the US Army, Thailand, and 'A' that the shipment will be made by air; the last three digits indicate the line number of the movement program.

What is the mode of transport for line entry number 7 in the Command Movements Program?_____

_____

GO TO FRAME 6a, PAGE 12

FRAME 28: After the consignees ability to receive the shipment has been determined, the destination TMO issues a Transportation Movement Release (TMR) to the origin TMO. A Transportation Movement Release is the authority for moving a shipment.

GO TO FRAME 29, PAGE 12

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FRAME 6a: The mode of transportation for line entry number 7 in the Command Movement Program is air.

If answered correctly go to Frame 7, page 13.

If answered incorrectly go back to frame 6, page 11.

FRAME 29: The Transportation Movement Release is the authority for moving a shipment. It authorizes the dispatch of transport equipment, verifies that the consignee is able to accept and handle the shipment, and identifies the specific shipment during its movement. Read paragraph 4-20, FM 55-10.

What is the authority for moving a shipment?_____

_____

GO TO FRAME 29a, PAGE 13

FRAME 7: Look at items three and four in Annex A of the supplement. Origins and destinations are shown by the use of codes.

Go to section XIV, MILSTAMP, Volume 1 and look up the origin and destination codes for line number TA001 and write them in the clear._____

_____

_____

GO TO FRAME 71, PAGE 14

FRAME 29a: The Transportation Movement Release (TMR) is the authority for moving a shipment.

If answered correctly go to Frame 30, page 14.

If answered incorrectly go back to Frame 29, page 12.

FRAME 7a: The origin and destinations codes for line number TA001 written in the clear are BAO-Udorn Airfield Thailand and BKK - Bangkok Thailand (Don Muang Airport).

If answered correctly go to Frame 8, page 15.

If answered incorrectly go back to Frame 7, page 13.

FRAME 30: The TMR identifies the destination TMO, the mode of transport to be used, and the movement priority and delivery date, and notes on special handling requirements. Look at Annex D of the supplement to 621-658 and study the example that illustrates the construction of a TMR.

What mode indicator is used for highway?_____

_____

GO TO FRAME 30a, PAGE 15

FRAME 8: Look at item five in Annex A of the supplement. The material being shipped is normally expressed in terms of short tons (or measurement tons when appropriate) of the shipment. Read paragraph 5-51, 1, n, FM 55-15.

How many pounds are there in one short ton?_____

GO TO FRAME 8a, PAGE 16

FRAME 30a: The mode indicator used for highway is H.

If answered correctly go to Frame 31, page 16.

If answered incorrectly go back to Frame 30, page 14.

FRAME 8a: There are 2,000 pounds in one short ton.

If answered correctly go to Frame 9, page 17.

If answered incorrectly go back to Frame 8, page 15.

FRAME 31: Remove Practical Exercise Section III, 621-658 from your packet and complete it.

FRAME 9: Look at item six in Annex A of the supplement. The movement program lists the number of passengers to be moved, it does not give a description of the kind to be moved.

GO TO FRAME 10, PAGE 18

FRAME 32: When the origin TMO receives the TMR, the TMO notifies the mode operator to release the transport capability to the shipper for loading.

GO TO FRAME 33, PAGE 18

FRAME 10: Look at item seven in Annex A of the supplement. The movements program gives a description of cargo to be moved in terms of class of supply. Supplies are all items necessary for the equipment, maintenance and operation of a command. For planning and administrative purposes, supplies are divided into ten major classes. Look at Annex B of the supplement ot 621-658 and study this annex.

What is the description for class of supply number VI?_____

GO TO FRAME 10a, PAGE 19

FRAME 33: The origin TMO then informs the shipper so that he may make preparations for the movement. When the shipment is loaded, the shipper notifies the origin TMO and releases the transport for movement.

GO TO FRAME 34, PAGE 19

FRAME 10a: The description for class of supply number VI is personal demand items (nonmilitary sales items).

If answered correctly go to Frame 11, page 20.

If answered incorrectly go back to Frame 10, page 18.

FRAME 34: To complete the record of shipments maintained by the Transportation Movement Officer for reference purposes, the TMR should be recorded with its corresponding Transportation Control and Movement Document (TCMD). Read paragraph 7-18, 7-19, FM 55-10.

When is the TMR number entered on the TCMD document register?

_____

_____

GO TO FRAME 34a, PAGE 20

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FRAME 11: Although the movement program allocates movement requirements to available movement capabilities and reflects priorities established by the commander, detailed information is limited. On receipt of the movement program, the local TMO, in coordination with the shipper and the mode operation, issues movement instructions to cover specific information not contained in the program and to furnish details pertinent to the area or to the particular shipment. Read paragraph 4-21, FM 55-10.

Why is it necessary to issue movement instructions?_____

_____

GO TO FRAME 11a, PAGE 21

FRAME 34a: The TMR number is entered on the TCMD register when the shipment is released for movement.

If answered correctly go to Frame 35, page 21.

If answered incorrectly go back to Frame 34, page 19.

FRAME 11a: It is necessary to issue movement instructions to cover specific information not contained in the movement program and to give details applying to the area or to the particular shipment.

If answered correctly go to Frame 12, page 22.

If answered incorrectly go back to Frame 11, page 20.

FRAME 35: The Transportation Control and Movement Document (TCMD) register is a day-to-day record of all TCMD's originating within the area of responsibility of the transportation movement office.

Describe the TCMD register._____

_____

_____

GO TO FRAME 35a, PAGE 22

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FRAME 12: The movement program is a source document of information that is required on the Request for Transportation. It does not contain all the information that is needed on the request. The movement control activities need additional information to make all the necessary arrangements for shipment.

GO TO FRAME 13, PAGE 23

FRAME 35a: The TCMD register is a day-to-day record of all TCMD's originating within the area of responsibility of the TMO.

If answered correctly go to Frame 36, page 23.

If answered incorrectly go back to Frame 35, page 21.

FRAME 13: The Request for Transportation also contains the shipping and receiving activity address codes and locations by name. The activity address code is a six digit code (example - AT0064) assigned to identify units, activities, or organizations. This code also identifies the location and name of installations. The location and name will be written "in-the-clear" on the request.

How many digits does the activity address contain and what does it identify?_____

_____

GO TO FRAME 13a, PAGE 24

FRAME 36: A suggested method for keeping this record is to divide a ledger type book into vertical columns for data entries.

GO TO FRAME 37, PAGE 24

FRAME 13a: There are six positions in the activity address code, and it identifies units, activities, or organizations.

If answered correctly go to Frame 14, page 25.

If answered incorrectly go to Frame 13, page 23.

FRAME 37: Headings for the columns should include, as a minimum, the date TCN, consignor, consignee, mode (include vehicle identification numbers), cargo cube, weight, number of pieces in the shipment, and TMR number. Look at Annex E of the supplement to 621-658 and study the example of a TCMD register.

What information does the TCMD register contain?_____

_____

FRAME 14: If personnel are to be moved, the Request for Transportation will include a description of the kind of personnel to be moved (medical evacuees, troops, prisoners of war, civilians). The Request for Transportation will also include the date of start of loading operation and of arrival at destination.

GO TO FRAME 15, PAGE 26

FRAME 37a: The TCMD register contains information concerning the date, TCN, consignor, consignee, mode (to include vehicle identification), pieces, weight, cube, and TMR number.

If answered correctly go to Frame 38, page 26.

If answered incorrectly go back to Frame 37, page 24.

FRAME 15: The movement program gives the description of the cargo to be moved in terms of class of supply. The Request for Transportation must contain information on any items that require special handling so that their characteristics can be readily identified. For example, heavy lifts should be expressed in units, dimensions, and short tons of each lift. Read paragraph 4-9, FM 55-10.

Should items requiring controlled temperature or environment be identified on the Request for Transportation?_____

_____

_____

_____

GO TO FRAME 15a, PAGE 27

FRAME 38: Remove Practical Exercise 621-658 Section V to this self-pace text from your packet and complete it.

FRAME 15a: Items requiring controlled temperature or environment should be identified on the Request for Transportation.

If answered correctly go to Frame 16, page 28.

If answered incorrectly go back to Frame 15, page 26.

FRAME 39: During the period that programed shipments are taking place, there will be a significant number of nonprogramed shipments which the TMO's will be required to coordinate. A nonprogramed shipment is one that has not been programed for movement and is not included in the movements program. This results from the fact that it is not feasible to program all shipments for movement.

A shipment that was not included in the movement program is known as a _____

_____

GO TO FRAME 39a, PAGE 28

FRAME 16: The movement control center specifies the formats for the Request and Reply and the documents must be capable of transmission, in code form, by message or telephone.

Remove Practical Exercise 621-658, Section I to this self-paced text from your packet and complete it.

FRAME 39a: A shipment which was not included in the movement program is known as a nonprogramed shipment.

If answered correctly go to Frame 40, pag 29.

If answered incorrectly go back to Frame 39, page 27.

FRAME 17: After the Request for Transportation has been prepared, the Installation Transportation Officer submits it to the origin TMO for approval for movement.

GO TO FRAME 18, PAGE 30

FRAME 40: When the origin TMO receives a Request for Transportation for a nonprogramed shipment, the request is forwarded to the next higher TMO. Normally the next higher TMO is allocated some transport capability in excess of that provided by the movement program and he may further allocate this to TMO's for decentralized use in processing request for transportation for nonprogramed shipments.

Why is the Request for Transportation forwarded to the next higher TMO?_____

_____

GO TO FRAME 40a, PAGE 30

621-658

FRAME 18: Upon receiving a Request for Transportation for a programed movement, the TMO verifies the request for accuracy and checks it against the movements program.

GO TO FRAME 19, PAGE 31

FRAME 40a: The Request for Transportation is forwarded to the next higher TMO because normally the next higher TMO is allocated some transport capability in excess of that provided by the movements program. The higher TMO may allocate this to TMO's for decentralized use in processing Requests for Transportation for nonprogramed shipments.

If answered correctly go to Frame 41, page 31.

If answered incorrectly go back to Frame 40, page 29.

FRAME 19: The origin TMO then confirms with the mode operator that the transport capability is available and adequate. Read paragraph 4-20, FM 55-10.

Why is it necessary for the origin TMO to confirm transport capability with the mode operator?_____

_____

_____

GO TO FRAME 19a, PAGE 32

FRAME 41: If the next higher TMO cannot provide the transport capability, it forwards the Request for Transportation to the Movement Control Center (MCC).

GO TO FRAME 42, PAGE 32

621-658

FRAME 19a: It is necessary for the origin TMO to confirm transport capability with the mode operator because the movement program is not self-implementing. The movement program although a command directive, is simple a reservation of space for forecasted movements and enables the planners, coordinators, and operators to plan ahead for the overall use of transportation.

If answered correctly go the Frame 20, page 33.

If answered incorrectly go back to Frame 19, page 31.

FRAME 42: If the MCC cannot provide the transport capability and the request is of any emergency nature, the Request for Transportation goes to the command headquarters for a determination of priority and the possibility of deferment of a programed movement to permit satisfaction of the emergency movement requirement.

If the MCC cannot provided the transport capability and the request is of any emergency nature, to who does the request go to?_____

_____

_____

FRAME 20: After transport capability has been confirmed, the origin TMO forwards the Request for Transportation to the destination TMO.

GO TO FRAME 21, PAGE 34

FRAME 42a: If the MCC cannot provide the transport capability and the request is of an emergency nature, the request goes to the command headquarters.

If answered correctly go to Frame 43, page 34.

If answered incorrectly go back to Frame 42, page 32.

621-658

FRAME 21: When the destination TMO receives the Request for Transportation, the TMO must determine the consignee's ability to receive the shipment.

GO TO FRAME 22, PAGE 35

FRAME 43: The installation transportation officers and TMO's are informed of any changes to the movement program. Once transportation has been arranged for, the remaining procedures parallel those for programed movement.

GO TO FRAME 44, PAGE 35

FRAME 22: To determine the consignee's ability to receive a shipment, the TMO uses the Installation Copacity Report and the Daily Installation Situation Report.

GO TO FRAME 23, PAGE 3

FRAME 44: If you are satisfied in your knowledge of this lesson, as your supervisor for the final examination for this unit of instruction.

ATTACHMENT III

AN EXAMPLE OF THE MICROFICHE VERSION
OF THE SELF-PACED PROGRAMMED TEXT
FOR LESSON 621-658

The lesson includes the Student Guide to the lesson. These materials are photocopies of the "Pages" that were filmed in producing the microfiche version of the lesson.

The lesson is shown to begin in column five of the microfiche: lesson 621-650 proceeds this lesson in Module 4, and it is formatted in columns 1-4.

COLUMN 5

U.S. ARMY TRANSPORTATION SCHOOL

"Routing In Theater Of Operations"

SELF-PACED STUDENT GUIDE

621-658

I. INTRODUCTION: This is your guide to the performance required for this lesson. This guide will give you step-by-step procedures to be followed. Your first step is to read the objective.

II. OBJECTIVE: The student will be able to process Requests for Transportation, issue Transportation Movement Releases, assign tasks to mode operators, and coordinate movement of cleared materiel.

A. First Task: Prepare and submit Request for Transportation.

1. Method: Given Self-Paced Text 621-658, and FM 55-10.

2. Standard: The student will be able to prepare Requests for Transportation, submit requests, and obtain clearance, without error.

B. Second Task: Construct and issue Transportation Movement Releases.

1. Method: Given Self-Paced Text 621-658 and FM 55-10.

2. Standard: The student will be able to construct and issue Transportation Movement Releases without error.

C. Third Task: Task mode operator for transport equipment, coordinate placement, and issue release for shipment.

1. Method: Given the Self-Paced Text 621-658, and FM 55-10.

2. Standard: The student will be able to task mode operators for transport equipment, coordinate placement, and issue release.

D. Fourth Task: Record Transportation Movements release number on the TCMD register.

1. Method: Given self-paced text 621-658.

2. Standard: The student will be able to record the Transportation Movement Release on the TCMD register, without error.

III. PROCEDURES:

A. Check contents of lesson packet against contents list. Notify your supervisor of any missing items.

B. Begin instructions in Self-Paced Text 621-658.

C. Work the exercises in order. After completing each exercise, check your work with the solutions.

D. Take notes.

E. When you have completed the Self-Paced Text and practical exercise and are confident of your proficiency in this lesson, ask your supervisor for the graded evaluation.

INTRODUCTION

This text is an exercise in programed learning during which you will be guided toward previously determined objectives. To obtain maximum benefit from this exercise, this approach requires emphasis on logical thought and analysis, student self-discipline, and independent learning.

1. This is a self-taught programed course designed to assist you in learning.

2. As you go through this microfiche you will observe that it is systematically arranged in small simple learning steps called frames.

3. Because the purpose is to teach rather than merely present information, a single point may be repeated several times in different ways. What may seem to you like needless repetition in any other kind of reading is done here to reinforce learning.

4. Each individual instructional unit or bit of information is called a frame. Each frame requires you to do something. Read the frame as information then fill in required response. After completing the required response follow instructions in bold face type at the end of each frame.

NOTE: Frames are successively numbered 1, 1a, 2, 2a, etc. Instructions guiding you to the next frame are printed at the bottom of each frame. Example: GO TO FRAME_____.

5. Student self-discipline is essential to the success of this program. Carefully and completely read all the information in each frame. Previous experience has shown that you will only get out of a programed text what you are willing to put into it.

6. Turn the page and begin the self-paced text.

THIS COMPLETES COLUMN 5. GO TO COLUMN 6.

FRAMES 1 TO 14: COLUMN 6

FRAME 1:
621-658-V1

To obtain transportation within a theater of operations, the installation transportation officer prepares a transport request. A transport request is submitted through movement channels to obtain allocation of the required transportation mode to complete a move. Read paragraph 5-4, FM 55-10 w/Appendix C, STANAG 2156.

QUESTION, Frame 1: A transport request will be prepared by either:

(a)

(b)

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

A Transport request will be prepared:

(a) by the unit formation requiring transport; or

(b) in urgent cases by the military commander ordering the movement or transport.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 2:
621-658-V1

The Request for Transportation makes reference to the movement program line number for programed shipments. A programed shipment is one in which the material is to be shipped has been included in the movements program, and allocated a mode of transportation.

GO TO FRAME 3.

FRAME 3:
621-658-V1

The movement program is a command directive prepared by the Movement Control Center and issued in the name of the commander. It allocates the available transportation mode capability to satisfy the movement requirements in accordance with priorities established by the commander. Read paragraph 1-6d, FM 55-10.

QUESTION, Frame 3: What information does the movement program normally contain?

Answer:_____

_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The movement program normally contains detailed information concerning origins, destinations, and weight and cube of cargo or type and number of personnel to be moved.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 4:
621-658-V1

Look at Annex A of the supplement to 621-658 and review this annex.

GO TO FRAME 5.

FRAME 5:
621-658-V1

Look at item one in Annex A of the supplement. The movement program usually forecast movement requirements for a 14-day period. A firm forecast of requirements is shown for the initial 7 days and a tentative forecast for the succeeding 7 days. Annex A *does not show a tentative forecast.* Read paragraph 4-6 FM 55-10.

QUESTION, Frame 5: How often is a new planning cycle initiated?

Answer:_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

A new planning cycle is initialed every 7 days for the following 14-day period.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 6:
621-658-V1

Look at item two in Annex A of the supplement. The alphabetical code preceding each line number gives the name of the shipper and the mode of transport to be used. The 'T' indicates the US Army, Thailand, and 'A' that the shipment will be made by air; the last three digits indicate the line number of the movement program.

QUESTION, Frame 6: What is the mode of transport for line entry number 7 in the Command Movements Program?

Answer:_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The mode of transport for line entry number 7 in the Command Movements Program is air.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 7:

621-658-V1

Look at items three and four in Annex A of the supplement. Origins and destinations are shown by the use of codes.

QUESTION, Frame 7: Go to section XIV, APP B, MILSTAMP, Volume 1 and look up the origin and destination codes for line number TA001 and write them in the clear.

Answer:_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

There are 2,000 pounds in one short ton.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 8:
621-658-V1

Look at item five in Annex A of the supplement. The material being shipped is normally expressed in terms of short tons (or measurement tons when appropriate) of the shipment. Read paragraph 5-51, 1, n, FM 55-15.

QUESTION, Frame 8: How many pounds are there in one short ton?

Answer:_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

There are 2,000 pounds in one short ton.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 9:
621-658-V1

Look at item six in Annex A of the supplement. The movement program lists the number of passengers to be moved, it does not give a description of the kind to be moved.

GO TO FRAME 10.

FRAME 10:
621-658-V1

Look at item seven in Annex A of the supplement. The movements program gives a description of cargo to be moved in terms of class of supply. Supplies are all items necessary for the equipment, maintenance and operation of a command. For planning and administrative purposes, supplies are divided into ten major classes. Look at Annex B of the supplement to 621-658 and study this annex.

QUESTION, Frame 10: What is the description for class of supply number VI?

Answer:_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The description for class of supply number VI is personal demand items (nonmilitary sales items).

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 11:

621-658-V1

Although the movement program allocates movement requirements to available movement capabilities and reflects priorities established by the commander, detailed information is limited. On receipt of the movement program, the local TMO, in coordination with the shipper and the mode operator, issues movement instructions to cover specific information not contained in the program and to furnish details pertinent to the area or to the particular shipment. Read paragraph 4-21, FM 55-11.

QUESTION, Frame 11: *Why is it necessary to issue movement* instructions?

Answer: _____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

It is necessary to issue movement instructions to cover specific information not contained in the movement program and to give details applying to the area or to the particular shipment.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 12:
621-658-V1

The movement program is a source document of information that is required on the Request for Transportation. It does not contain all the information that is needed on the request. The movement control activities need additional information to make all the necessary arrangements for shipment.

GO TO FRAME 13.

FRAME 13:
621-658-V1

The Request for Transportation also contains the shipping and receiving activity address codes and locations by name. The activity address code is a six digit code (example - AT0064) assigned to identify units, activities, or organizations. This code also identifies the location and name of installations. The location and name will be written "in-the-clear" on the request.

QUESTION, Frame 13: How many digits does the activity address contain and what does it identify?

Answer: _____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

There are six positions in the activity address code, and it identifies units, activities, or organizations.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 14:
621-658-V1

If personnel are to be moved, the Request for Transportation will include a description of the kind of personnel to be moved (medical evacuees, troops, prisoners of war, civilians). The Request for Transportation will also include the date of start of loading operation and of arrival at destination.

GO TO FRAME 15.

THIS COMPLETES COLUMN 6. GO TO COLUMN 7.

FRAMES 15 TO 36: COLUMN 7

FRAME 15:

621-658-V1

The movement program gives the description of the cargo to be moved in terms of class of supply. The Request for Transportation must contain information on any items that require special handling so that their characteristics can be readily identified. For example, heavy lifts should be expressed in units, dimensions, and short tons of each lift. Read paragraph 4-9, FM 55-10.

QUESTION, Frame 15: Should items requiring controlled temperature or environment be identified on the Request for Transportation?

Answer:_____

_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

Items requiring controlled temperature or environment should be identified on the Request for Transportation.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 16:

621-658-V1

The movement control center specifies the formats for the Request and Reply and the documents must be capable of transmission, in code form, by message or telephone.

Remove Practical Exercise 621-658, Section I to this self-paced text from your packet and complete it.

GO TO FRAME 17.

FRAME 17:
621-658-V1

After the Request for Transportation has been prepared, the Installation Transportation Officer submits it to the origin TMO for approval for movement.

GO TO FRAME 18.

FRAME 18:
621-658-V1

Upon receiving a Request for Transportation for a programed movement, the TMO verifies the request for accuracy and checks it against the movements program.

GO TO FRAME 19.

FRAME 19:
621-658-V1

The origin TMO then confirms with the mode operator that the transport capability is available and adequate.

QUESTION, Frame 19: Why is it necessary for the origin TMO to confirm transport capability with the mode operator?

Answer:_____

_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

It is necessary for the origin TMO to confirm transport capability with the mode operator because the movement program is not self-implementing. The movement program although a command directive, is simply a reservation of space for forecasted movements and enables the planners, coordinators, and operators to plan ahead for the overall use of transportation.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 20:
621-658-V1

After transport capability has been confirmed, the origin TMO forwards the Request for Transportation to the destination TMO.

GO TO FRAME 21.

FRAME 21:
621-658-V1

When the destination TMO receives the Request for Transportation, the TMO must determine the consignee's ability to receive the shipment.

GO TO FRAME 22.

FRAME 22:
621-658-V1

To determine the consignee's ability to receive a shipment, the TMO uses the Installation Capacity Report and the Daily Installation Situation Report.

GO TO FRAME 23.

FRAME 23:
621-658-V1

The Installation Capacity Report is used by transportation movement activites to determine the flow of supplies that can be shipped into and out of an installation to prevent overloading the installation and to adjust tonnages among the various modes of transport. Read paragraph 5-4 , FM 55-10.

QUESTION, Frame 23: When is the Installation Capacity Report prepared and how often?

Answer:_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The Installation Capacity Report is a one-time report prepared whenever a new installation is activated. When a major permanent change takes place, the Installation Transportation Officer submits a new report.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 24:
621-658-V1

Probably the most significant report installation transportation officers make is the Daily Installation Situation Report. All installations which load and unload cargo submit this report each day through the local TMO to the movements control center. This report is used to report the status of rail, barge, commercial highway and military equipment and containers: loaded; empty; being loaded/unloaded; awaiting loading or unloading.

GO TO FRAME 25.

FRAME 25:
621-658-V1

TMO's use the Daily Installation Situation Report to analyze daily transportation activities at each installation. From it they can see whether conveyances are being unloaded expeditiously to make them available for reuse in the transportation system; or are the being detained for unduly long periods. The report also shows the backlog of transportation equipment, either to be loaded or unloaded, and the status of equipment and facilities. Read paragraph 7-9, FM 55-10 and Appendix B.

QUESTION, Frame 25: Who prepares the Daily Installation Situation Report?

Answer:_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The Installation Transportation Officer prepares the Daily Installation Situation Report.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 26:
621-658-V1

Look at Annex C of the supplement to 621-658 and study the Daily Installation Report. Be sure to read the instructions on the back.

QUESTION, Frame 26: How is the number of inbound loaded conveyances on hand in the installation at the end of the period determined?

Answer:_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The number of inbound loaded conveyances on hand in the installation at the end of the period is determined by adding columns i + j + k.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 27:
621-658-V1

By comparing the Daily Installation Situation Report against the Installation Capacity Report, the destination TMO can determine the consignees capability to receive the shipment.

GO TO FRAME 28.

FRAME 28:
621-658-V1

After the consignees ability to receive the shipment has been determined, the destination TMO issues a Transportation Movement Release (TMR) to the origin TMO. A Transportation Movement Release is the authority for moving a shipment.

GO TO FRAME 29.

FRAME 29:
621-658-V1

The Transportation Movement Release is the authority for moving a shipment. It authorizes the dispatch of transport equipment, verifies that the consignee is able to accept and handle the shipment, and identifies the specific shipment during its movement. Read paragraph 4-20, FM 55-10.

QUESTION, Frame 29: What is the authority for moving a shipment?

Answer: _____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The Transportation Movement Release (TMR) is the authority for moving a shipment.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 30:
621-658-V1

The TMR identifies the destination TMO, the mode of transport to be used, and the movement priority and delivery date, and notes on special handling requirements. Look at Annex D of the supplement to 621-658 and study the example that illustrates the construction of a TMR.

QUESTION, Frame 30: What mode indicator is used for highway?

Answer:_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The mode indicator used for highway is H.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 31:
621-658-V1

Remove Practical Exercise Section III, 621-658 from your packet and complete it.

GO TO FRAME 32.

FRAME 32:
621-658-V1

When the origin TMO receives the TMR, the TMO notifies the mode operator to release the transport capability to the shipper for loading.

GO TO FRAME 33.

FRAME 33:
621-658-V1

The origin TMO then informs the shipper so that he may make preparations for the movement. When the shipment is loaded, the shipper notifies the origin TMO and releases the transport for movement.

GO TO FRAME 34.

FRAME 34:
621-658-V1

To complete the record of shipments maintained by the Transportation Movement Officer for reference purposes, the TMR should be recorded with its corresponding Transportation Control and Movement Document (TCMD). Read paragraph 7-18, 7-19, FM 55-10.

QUESTION, Frame 34: When is the TMR number entered on the TCMD document register?

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The TMR number is entered on the TCMD register when the shipment is released for movement.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 35:

621-658-V1

The Transportation Control and Movement Document (TCMD) register is a day-to-day record of all TCMD's originating within the area of responsibility of the transportation movement office.

QUESTION, Frame 35: Describe the TCMD register. _____

_____

EVALUATION:

The TCMD register is a day-to-day record of all TCMD's originating within the area of responsibility of the TMO.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 36:

621-658-V1

A suggested method for keeping this record is to divide a ledger type book into vertical columns for the data entries.

GO TO FRAME 37.

THIS COMPLETES COLUMN 7. GO TO COLUMN 8.

FRAMES 37 TO 43: COLUMN 8

FRAME 37:
621-658-V1

Headings for the columns should include, as a minimum, the date, TCN, consignor, consignee, mode (include vehicle identificaton numbers), cargo cube, weight, number of pieces in the shipment, and TMR number. Look at Annex E of the supplement to 621-658 and study the example of a TCMD register.

QUESTION, Frame 37: What information does the TCMD register contain?

Answer:_____

_____

_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The TCMD register contains information concerning the date, TCN, consignor, consignee, mode (to include vehicle identification), pieces, weight, cube, and TMR number.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 38:
621-658-V1

Remove Practical Exercise 621-658 Section V to this self-pace text from your packet and complete it.

GO TO FRAME 39.

FRAME 39:
621-658-V1

During the period that programed shipments are taking place. there will be a significant number of nonprogramed shipments which the TMO's will be required to coordinate. A nonprogramed shipment is one that has not been programed for movement and is not included in the movements program This results from the fact that it is not feasible to program all shipments for movement.

QUESTION, Frame 39: A shipment which was not included in the movement program is known as a _____

_____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

A shipment which was not included in the movement program is known as a nonprogramed shipment.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 40:

621-658-V1

When the origin TMO receives a Request for Transportation for a nonprogramed shipment, the request is forwarded to the next higher TMO. Normally the next higher TMO is allocated some transport capability in excess of that provided by the movement program and he may furhter allocate this to TMO's for decentralized use in processing requests for transportation for nonprogramed shipments.

QUESTION, Frame 40: Why is the Request for Transportation forwarded to the next higher TMO?

Answer: _____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

The Request for Transportation is forwarded to the next higher TMO because normally the next higher TMO is allocated some transport capability in excess of that provided by the movements program. The higher TMO may allocate this to TMO's for decentralized use in processing Requests for Transportation for nonprogramed shipments.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 41:

621-658-V1

If the next higher TMO cannot provide the transport capability, it forwards the Request for Transportation to the Movement Control Center (MCC).

GO TO FRAME 42.

FRAME 42:

621-658-V1

If the MCC cannot provide the transport capability and the request is of an emergency nature, the Request for Transportation goes to the command headquarters for a determination of priority and the possibility of deferment of a programed movement to permit satisfaction of the emergency movement requirement.

QUESTION, Frame 42: If the MCC cannot provide the transport capability and the request is of an emergency nature, to who does the request go to?

Answer: _____

Write your response on the Work-Sheet: then compare it with the EVALUATION given below. ↓ ↓ ↓ ↓ ↓ ↓

EVALUATION:

If the MCC cannot provide the transport capability and the request is of an emergency nature, the request goes to the command headquarters.

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame. ↑ ↑ ↑ ↑ ↑ ↑

FRAME 43:
621-658-V1

The installation transportation offices and TMO's are informed of any changes to the movement program. Once transportation has been arranged for, the remaining procedures parallel those for programed movements.

GO TO FRAME 44.

FRAME 44:
621-658-V1

If you are satisfied in your knowledge of this lesson, ask your supervisor for the final examination for this unit of instruction.

THIS COMPLETES COLUMN 8. GO TO COLUMN 9.

ATTACHMENT IV

AN EXAMPLE OF THE WORKSHEETS AND QUESTIONS
COORDINATED WITH LESSON 621-658

AD-A076 588 ARMY TRAINING DEVELOPMENTS INST FORT MONROE VA F/G 9/2
INSTRUCTIONAL MICROFICHE SYSTEM PROJECT.(U)
SEP 79 J P KOTTENSTETTE , A S WEST
UNCLASSIFIED TDI-TR-1-79 NL

2 OF 2
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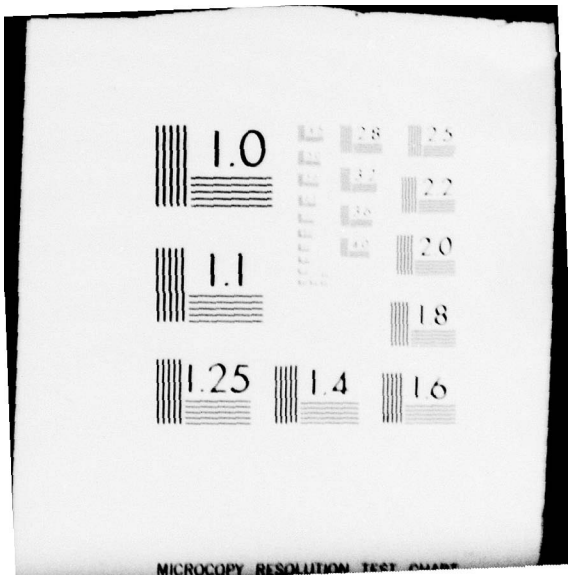
12-79
DDC


1.0
1.1
1.25
1.4
1.6
2.0
2.2
MICROCOPY RESOLUTION TEST CHART

WORK-SHEET for MODULE 4
"Introduction to Routing in Theatre of Operations"-621-658 NOTES

QUESTION, Frame 1: What information will the Request for Transportation normally include?

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(6) _____

(7) _____

QUESTION, Frame 3: What information does the movement program normally contain?

Answer: _____

_____

QUESTION, Frame 5: How often is a new planning cycle initiated?

Answer: _____

QUESTION, Frame 6: What is the mode of tranpsort for line entry number 7 in the Command Movements Program?

Answer: _____

QUESTION, Frame 7: Go to section XIV, MILSTAMP, Volume 1 and look up the origin and destination codes for line number TA001 and write them in the clear.

Answer: _____

QUESTION, Frame 8: How many pounds are there in one short ton?

Answer: _____

WORK-SHEET for MODULE 4
"Introduction to Routing in Theatre of Operations"-621-658

NOTES

QUESTION, Frame 10: What is the description for class of supply number VI?

Answer: _____

QUESTION, Frame 11: Why is it necessary to issue movement instructions?

Answer: _____

QUESTION, Frame 13: How many digits does the activity address contain and what does it identify?

Answer: _____

QUESTION, Frame 15: *Should items requiring* controlled temperature or environment be identified on the Request for Transportation?

Answer: _____
_____
_____

QUESTION, Frame 19: Why is it necessary for the origin TMO to confirm transport capability with the mode operator?

Answer: _____

QUESTION, Frame 23: When is the Installation Capacity Report prepared and how often?

Answer: _____
_____

QUESTION, Frame 25: Who prepares the Daily Installation Situation Report?

Answer: _____

WORK-SHEET for MODULE 4
"Introduction to Routing in Theatre of Operations"-621-658 NOTES

QUESTION, Frame 26: How is the number of inbound loaded conveyances on hand in the installation at the end of the period determined?

Answer: _____

_____

_____

QUESTION, Frame 29: What is the authority for moving a shipment?

Answer: _____

QUESTION, Frame 30: What mode indicator is used for highway?

Answer: _____

QUESTION, Frame 34: Describe the TCMD register.

Answer: _____

_____

QUESTION, Frame 36: What information does the TCMD register contain?

Answer: _____

_____

_____

QUESTION, Frame 38: A shipment which was not included in the movement program is known as a _____

_____

QUESTION, Frame 39: Why is the Request for Transportation forwarded to the next higher TMO?

Answer: _____

QUESTION, Frame 41: If the MCC cannot provide the transport capability and the request is of an emergency nature, to who does the request go to?

Answer: _____

_____

ATTACHMENT V

INSTRUCTIONS DEVELOPED TO CONVERT
THE PAPER-BASED LESSONS TO
THE MICROFICHE FORMAT

INDEX TO CODES

In each of these three booklets, you will note that there are a series of symbols or codes that are used to designate:

1. various paragraphs to facilitate organization for typing.
2. codes that represent directives that are frequently repeated-typed in a box.

CODES

E-1 = Element one; This labels the first paragraph or series of paragraphs of a frame that provides instructional and/or informational material.

E-2 = Element two; This paragraph is usually a question or a fill-in-the-blank statement in which the student is required to make a response. All element two paragraphs should start with "QUESTION, Frame #:." Within the booklets, a notation of "QF#" has been provided initially on the E-2 paragraphs to designate the placement of this phrase when typing. All E-2 elements have been identified because these will be Photo composed to make Student Work-Sheets.

E-3 = Element 3; This label identifies the statement or paragraph that supplies the answers for Element 2. Within the booklets, you will note that these answer keys will be found on the page following the question.

There are three directive statements seen in the texts. All directive statements have been developed to simpilfy typing.

D1 = Directive one; This label is seen after E-2. It represents the following response that is to be typed and enclosed within a box.

Write your response on the Work-Sheet: then compare it with the EVALUATION given below.

Following E-3, you will find one of these codes, D2 or D3. This tells the student that:

D2

If you answered correctly, CONTINUE. If you answered incorrectly, REVIEW this Frame.

or

D3

If you answered correctly, CONTINUE. If you answered incorrectly, (specific instructions within the particular Frame of the text will be given, and they should be typed here.)

These Directive Statements are to be typed and enclosed by a box. They explain to the student how he is to proceed.

Any othe notations that are seen within each of these books will be written out; e.g., GO TO FRAME #..

FORMAT OF EACH FRAME

There are three styles of a frame format that may be seen throughout these three books. Examples of each are shown below:

1. This particular Frame only contains a E-1 paragraph; i.e., an instructional paragraph. After the paragraph has been completed, then a statement follows, directing the student to the next step.

Example:

FRAME ___ 621- ___	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx XXX. GO T FRAME___.	E-1

See Frame 1 on page 3 of Book 621-606 which shows this paragraph. The Figure below demonstrates how this paragraph woul look when typed according to the desired format.

FRAME 1:
621-606 During this block of instruction you will be introduced to three basic regulations used in the movements field. These regulations are the Joint Regulation (JTR, Vol. I), the Military Traffic Management Regulation (AR 55-355) and the Terminal Facilities Guide (AR 55-357). These regulations will help and guide you in performing your duties as a Movements Specilist. These regulations are located in the library on your shelf. Take them out and page through them.

GO TO FRAME 2.

FIGURE 1

2. This Frame style contains the following Codes: E-1, E-2, D-1, E-3, D2 or D3.

Example:

FRAME ____ xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
621 - ____ xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx | E-1
xxxxxxxxxxxxxxxxxxxxxxxxx.

QUESTION, Frame____: xxxxxxxxxxxxxxxxxxxxxxxxx | E-2
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx_____.

| D1 (see the index for phrase test that should be typed here) |

EVALUATION:
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx | E-3
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxx.

| D2 (see the index for the phrase that should be typed here) |

See Frame 26 on pages 5 and 6 of Book 612-606 which shows this particular frame style. Now look at Figure 2 below to see that desired format.

FRAME 26:
621-606 To understand how the paragraph numbering system works, all paragraphs have six characters. For example, paragraph number 101001 means Chaper 101, paragraph 001. Another example 102006 would be Chapter 102, paragraph 006 and so on.

QUESTION, Frame 26: Break the following paragraph numbers down.
306012 Chapter _____, paragraph_____.
316005 Chapter _____, paragraph_____.
214059 Chapter _____, paragraph_____.

| Write your response on the Work-Sheet: then compare with the EVALUATION give below. |

EVALUATION:
The following paragraph numbers should reas as shown below:
306012 Chapter 306, paragraph 012.
316005 Chapter 316, paragraph 005.
214059 Chapter 214, paragraph 059.

| If you answered correctly, CONTINUE. If you answered incorectly, REVIEW this Frame. |

3. This Frame Style contains codes: E-2, D1, E-3, D2 or D3. There is no E-1 in this particular combination.

Example:

Frame_____
621-_____ QUESTION, Frame #: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx E-2
_____xxxxxxxxxxxxxxxxx.

D1 (see Index for the statement to be typed here)

EVALUATION:
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx E-3
xxxxxxxxxxxxxxxxxxxxxXXXXXXXXXXXXxxxxxxxxx.

D3 (see Index for the statement to be typed here)

See Frame 42 and 42a on pages 37 and 38 in Book 621-606 to illustrate this style. See Figure 3 for the correct format.

FRAME: 42
621-606 QUESTION, Frame 42: What is the regulation, chapter, and paragraph number that identifies individuals authorized to issue Government Transportation Request (GTR)?

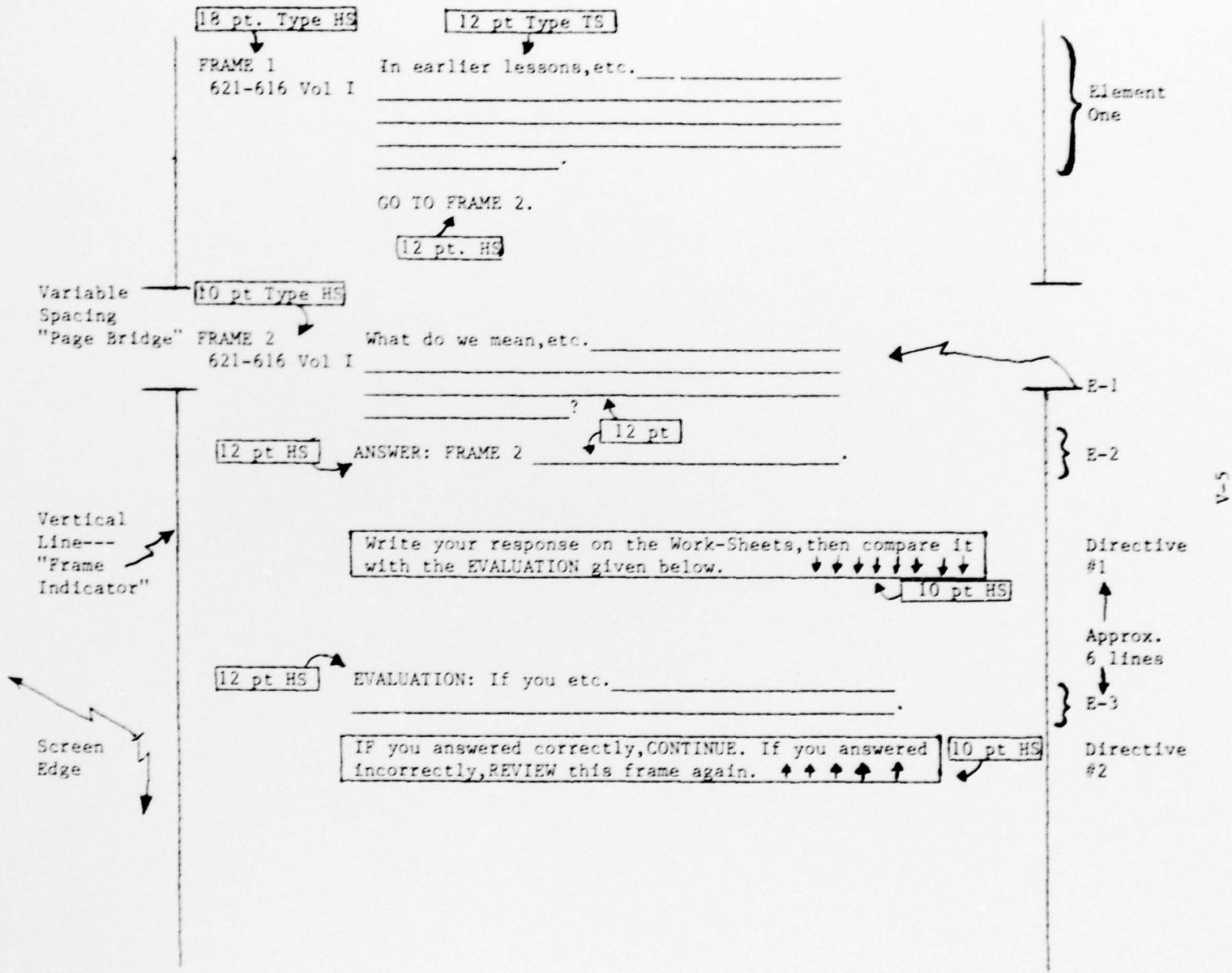
Answer: _____?

Write Your response on the Work-Sheet: then compare it with the EVALUATION given below.

EVALUATION:
Your answer should be AR 55-355, Chapter 309, Para 309010, and Chapter 103, Para 103001.

If you answered correctly, CONTINUE. If you answered incorrectly, to to AR 55-335, Chapter 309, Para 309010 and Chapter 103, Paragraph 103001.

FIGURE 3


18 pt. Type HS
12 pt Type TS
FRAME 1
621-616 Vol I
In earlier lessons,etc.
GO TO FRAME 2.
12 pt. HS
Element One
Variable Spacing "Page Bridge"
10 pt Type HS
FRAME 2
621-616 Vol I
What do we mean,etc.
12 pt
12 pt HS
ANSWER: FRAME 2
E-1
E-2
Vertical Line--- "Frame Indicator"
Write your response on the Work-Sheets,then compare it with the EVALUATION given below.
10 pt HS
Directive #1
Approx. 6 lines
12 pt HS
EVALUATION: If you etc.
E-3
Screen Edge
IF you answered correctly,CONTINUE. If you answered incorrectly,REVIEW this frame again.
10 pt HS
Directive #2

FINAL REPORT

EVALUATION OF AN INSTRUCTIONAL MICROFICHE SYSTEM DEMONSTRATION: AN ADMINISTRATIVE ASSESSMENT

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May 1979

II

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I. INTRODUCTION

A field demonstration of the use of the microfiche medium as the primary instructional text for a self-paced learning course was performed during the winter of 1978 at Fort Eustis, Virginia. The course chosen for the demonstration was the approximately three to five week course: Traffic Management Coordinator 71N10. A full description of the course and of the production of the fiche, the use of ancillary materials, and the processes required to put this demonstration in place are summarized in a companion technical report.[1] This report details the rationale for the selection of the fiche format, reduction ratios, and polarity, as well as the choice of hard copy organizing materials and procedures for student orientation, and fiche revision and update.

The demonstration had several objectives. Microfiche had been used successfully in several similar training situations in other branches of the service and in public and private education, and the purpose of this demonstration was not so much related to the experimental use of fiche as a research question as it was geared toward testing the training effectiveness of fiche materials in a particular self-paced course. In addition, there was a strong interest in examining the reactions of instructors and students toward working with the medium and for creating an opportunity for firsthand experience with the entire process of conversion and use for army

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[1] Kottenstette, J.P. Implementation of the Instructional Microfiche System Demonstration, May 1979.

personnel at the Army Training Support Center, the Transportation School at Ft. Eustis, TRADOC and TAGCEN.

The emphasis on collecting both comparative data (between hard copy and fiche trained students) and collecting information to become more knowledgeable about the efficient use of fiche in this kind of training environment translated into the following research questions:

1. Comparative Information
   - Do fiche trained students complete the 71N10 course within the same time period as those using hard copy?
   - Is the academic attrition rate the same as with hard copy materials?
   - Do fiche trained students retain information similar to those who use hard copy?
   - Do fiche trained students spend the same time in home study?
   - Do instructors/school administrators prefer fiche or hard copy training materials? Why?
2. Demonstration Information
   - How much student orientation/instructor orientation is required?
   - What kinds of classroom modifications are required?
   - Is performance with microfiche a function of duration of exposure to fiche materials?

- Is performance with microfiche a function of material typology, e.g., with use of reference materials, worksheets, graphics?
- Is performance a function of student characteristic variables, e.g., standardized test scores, education, human factors such as right or left handedness?
- Is performance a function of initial student attitudes toward instructional microfiche?

Limitations of the Evaluation

There are a number of other administrative questions that might have been appropriately asked but were not addressed by this evaluation. These questions are primarily related to costs, and range from examining comparative costs of initial materials development and use to costs of maintenance, classroom revision, and field data update. However, a basic cost comparison is presented in Reference 1. Similarly, the whole issue of the use of microfiche in the field for both training and reference was not examined by this study. Further, although most of the principal questions posed in the evaluation were satisfactorily resolved, others went unanswered because of incomplete data collection. These will be identified in the text.

The details of planning, structuring, and implementing a demonstration of this magnitude and providing a fair and complete test of the process are enormous. Most of the research questions have been answered by the demonstration.

The demonstration was designed to evaluate the use of microfiche in a learning setting that was self-paced and that required substantial use of forms and reference materials, testing, therefore, the fiche as an instructional medium and as a component of an organized instructional package. Variables such as coordination and suitable arrangement of hard and fiche copy, classroom noise level, illumination, readability of text and graphics were examined both directly (by questionnaire and classroom observers) and indirectly as a correlate of achievement and attitude response.

In order to measure differences in achievement, 75 students were chosen as the comparison hard copy group and the subsequent 47 students entering the course were selected as the demonstration group to receive parallel information on microfiche. No preliminary study of student characteristics was performed but post hoc analysis of background data on education and standard test scores showed the groups to be equivalent.

Summary of Results

In general, it was observed that students could and did learn the material presented to them on microfiche; they reported they liked fiche as well or better than paper copy, and there were no reports of attrition among the fiche trained group. Most students were comfortable with the fiche reader and reported positively on the human factors aspects of its use; instructor reports vary from mildly to strongly positive and the retention measures for the two groups show that fiche users retained information better than hard copy users. On the negative side, the fiche group took somewhat longer than the control group but

still finished in less time than the historic average for the course; the longer time in the course seemed to be largely because they took longer to complete each of the 15 open-book milestone tests. Special attention to the problems of using microfiche in this open-book test mode might have resulted in similar times to complete for both groups. One of the most revealing indicators of satisfaction with the microfiche is that the school is continuing to use the microfiche materials beyond the demonstration period. All of these data are presented in more detail, together with student and instructor comments, in the next section. A final section interprets these results and presents conclusions and recommendations.

II. EVALUATION DESIGN AND DATA ANALYSIS

It was recognized that the conditions for a true experimental evaluation design (requiring random selection of subjects, control groups with all independent variables held constant and normal population distribution assumptions) were not present for this test. Also, the course chosen for the study used criterion measures for course comprehension, with all students achieving a nearly perfect score before proceeding to successive modules, therefore limiting the kinds of data available for comparison. Further, there was no control over the path of instruction through the material (i.e., alternative modules could be taken in succession after completion of module 1 altering the instruction) and, finally, alternative test forms in use had not been validated for equivalence.

For all these reasons and on the basis of discussions with personnel from TDI, from the Transportation School, from the Office of the Adjutant General in Washington and, after a review of data available from the school and examination of facilities and training materials, an overall evaluation approach was developed that did not require "experimental" disruption and permitted the assessment of the fiche utilization within a real-world Army training context. The measures of effectiveness for the resulting field demonstration included time to complete each open-book milestone test, attrition rate, days to complete course, retention, and measures of user and staff acceptance and satisfaction. Suggested data collection forms prepared by the evaluator for capturing all of these data are shown in Appendix B.

The evaluation was designed to provide information relating processes, student characteristics, and material and course characteristics to the objective and subjective measures of effectiveness, all in the context of implementation variables. It did not include a cost/benefit analysis nor did it document all of the potential advantages of a fully optimized microform instructional system.

It was not anticipated that there would be any significant loss of information because of this decision to treat the study as a demonstration rather than as a controlled experiment. Whereas the rigorous experimental approach develops definitive information about a cause and effect relationship and is more defensible and communicable to a statistically sophisticated research audience, it does not provide the range of information on process issues of implementation generally required for administrative purposes.

Using the recommended data collection forms, school personnel and the COTR forwarded the raw data to the evaluator who worked with a subcontractor (COMARCO, Inc.) to set up guidelines for data coding, key punch, and analysis. Computer runs calculating the means and variances of each variable were requested, as were correlations between each pair of variables. Not all of these analyses were produced. The result is that although the data presented are generally reliable, many of the variables are presented only with mean values and not with their associates measures of variance (standard deviations) normally shown for these kinds of data. Without these additional calculations, no inferential measures of statistical significance can be computed.

For the purposes of this study, however, which are presumed to be primarily administrative, the information generated should be both valid and complete enough for policy planning. *These data are not appropriate for inclusion in the experimental literature of learning.*

Results

Baseline measures on the comparison and demonstration groups were collected in order to relate any observed differences in achievement to differences in ability or education. Seven of these measures were collected: CL score, GT score, sex, age, high school completion, months in the army, and whether or not there had been any previous military school training. Tables 1 and 2 summarize these measures.

TABLE 1. BASELINE MEASURES (Continuous Data)

	CL		GT		Age		Mos. in Army	
	$\bar{x}$*	σ**	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ
Comparison (Printed Lessons)	113.2	11.3	109.7	11.2	22.1	4.5	29.1	--
Demonstration (Microfiche)	112.8	9.8	107.2	10.0	21.6	5.1	26.8	--

*$\bar{x}$ = Mean
**σ = Standard Deviation

TABLE 2. BASELINE MEASURES (Dichotomous Data)

	H.S. Grad		Sex		Previous Military Trng	
	% yes	% no	% Male	% Female	% yes	% no
Printed Lessons	93	7	48	52	41	59
Microfiche	96	4	45	55	45	55

The slight differences observed in all of these measures shows that neither group had any advantage and that differences in performance were not likely to be attributable to differences in any of these measures.

Achievement Measures

There were several measures used to estimate the effect of fiche delivery on achievement: time to completion of course, time for completion of each open book milestone test, and one of three designated milestone tests re-given at the conclusion of the course as a retention measure. Tables 3, 4, and 5 summarize these results.

TABLE 3. ADJUSTED DAYS IN COURSE

	Average Days in Course	Average Sick Days	Average Typing Days	Adjusted Average Days in Course
Printed Lessons	20.7	2.64	2.41	15.7
Microfiche	22.5	2.43	2.41*	17.7

*As reported earlier, there was some question about the reliability of some of the data as they were originally reported. Typing days for the demonstration (microfiche) group were reported uniformly as "one day" each, whereas the comparison group had between one and ten days in typing. This entry was therefore questioned and based upon both observer comments and telephone conversations with the Transportation School, it was assumed an error in data recording had been made. The average number of days for the comparison group (2.41) was therefore used as an estimate and adjusted days in course was reduced by sick days and estimated average typing days.

These results indicate that the comparison group completed the course a full two days quicker than the demonstration group. These results were re-examined by individual class and again by individual students to see if some accounting could be made for these differences.

These exercises made little difference, however, and the data consistently show that time to complete ranges from 1½ to 2½ days more for the group using microfiche, or a difference of between 9.5 percent and 12.7 percent longer. It was hoped that we would be able to look at individual days to milestone for comparisons but these data were not consistently recorded.

Table 4 presents information on time to completion for each of the open-book milestone tests. Test means (but not variances) are shown for each.

TABLE 4. AVERAGE TEST COMPLETION TIMES (MINUTES)

Test No.	618	630	636	637	639	624	670	620	622	623	610	608	616	617	658
Printed Lessons	115	100	95	77	54	110	170	106	74	31	159	190	143	129	14
Microfiche	134	129	155	131	98	129	173	156	112	57	149	193	159	145	59

The microfiche group times are substantially higher in most cases than the printed lesson group except for tests 670, 610, 608 and 616 where the differences observed either favored the fiche group or were negligible. No apparent differences in the material account for this discrepancy. It was theorized that slower test times might be related to earlier modules, with students picking up speed as they gained more familiarity with the use of the microfiche, but module progression was also omitted from the data collected. The tests for Module 5, which is always one of the last modules, do not reflect any more favorable relationships between fiche and hard copy.

Table 5 reports on information on the scores of tests retaken at the conclusion of the class as a measure of comparative retention for the two groups. The three tests used for this purpose were 624, 628 and 636. The first of these tests encountered by the student as he/she branched through the material was used as the base measure. (These particular tests were chosen because they had been used in an earlier evaluation study.) That test was readministered at the conclusion of the course. Some data were lost for the printed lesson group because different forms of the test had been used for the retest. Previous research had shown the different forms to be nonequivalent and those cases were, therefore, removed from the data. The results are shown in the following table.

TABLE 5. RETENTION MEASURES

	N	Score Test 1	Score Test 2	Score Diff.	Elapsed # Days	Decrease Per Day
Printed Lessons	18	89.43	82.25	7.18	14.8	.485
Microfiche	45	90.79	83.72	7.07	17.0	.433

There is the same seven point loss on retest for both groups, but the loss per day is lower for the microfiche group. This is not, however, particularly significant since the number of days of elapsed time puts the retest well into the "long term memory" category of retention minimizing the importance of decrease per elapsed day.

Attrition

Four persons of the 75 people in the control group did not complete the course for one reason or another. No attritions were recorded for

the microfiche group. Instructors report that neither of these situations (0-4 attritions) is unusual.

Performance by Ability

Because the learning literature advances the theory that above average ability students are more likely than others to benefit from the introduction of an innovative teaching tool, two hypotheses related to ability were examined: (1) low ability students would not do as well with the microfiche as the other group and (2) high ability students would do better than others with the fiche materials. In order to test these hypotheses both groups of students were divided into ability quartiles based on their combined CL and GT scores. The students with lower ability, according to this criterion, took somewhat longer than average to complete in both groups and the fiche group performed slightly worse in relation to the printed lesson group than did those in the other ability quartiles. Similarly the high ability students did slightly better and came closer to meeting control group performance. Table 6 summarizes these results.

TABLE 6. COURSE DAYS BY ABILITY GROUPING

	Lowest Ability Quartile	Highest Ability Quartile
Printed Lessons	23.8	16.9
Microfiche	26.1	18.3
Differences	2.3	1.4

The average difference for the entire group, from Table 3, was two days, so these data reinforce the theorized relationship between ability and adaptation.

Subjective Measures

A number of subjective measures were collected to complement performance data and to enhance the amount of learning the participants could derive from this experience.

Student attitudes and comments. The attitudes of the subjects toward the instructional fiche material were assessed by a questionnaire survey of the demonstration group (see Appendix B). The questionnaire was administered immediately after the course was completed. The attitudes toward the fiche material were very positive. Rating responses on a scale from 1 (highly negative) to 5 (highly positive), the average score was 4.0. When asked if they would elect to take a similar course using microfiche or printed lessons, only six out of 46 preferred printed lessons, nine indicated no preference, and the remaining 31 chose microfilm. All of those who wrote comments (14) had favorable things to say about the fiche approach, but several, both in comments and in response to one of the questions, commented on the unavailability of viewers in the barracks for home study. Almost one-third indicated that for one reason or another (presumably because of viewer availability) they studied less outside the classroom than they might have with printed lessons. Other comments centered around uncorrected errors in the microfiche, the worksheets, or on inconsistencies between the two. Wrong

answers, misprints, and inconsistencies were listed as problems by seven of those commenting, who nevertheless reported satisfaction with the materials. Legibility was listed as a problem "sometimes" by eight of the respondents.

Most of the questions that were related to human factors, i.e., eye strain, body fatigue and comfort, were answered either as "no difference" or in favor of the fiche materials. Four people reported more eye strain and four reported more body fatigue than with hard copy, but even among those seven (one reported both) only one (the one who reported having both problems) gave the microfiche bad marks. Only one of the students who reported eye strain wore glasses or contacts. No differences in attitude or performance were related to left or right-handedness.

In sum, the students' reactions were positive in spite of minor annoyances and most stated that they were at least as positive (many more so) than they had been before the course.

Student attitudes and achievement. Attempts were made to relate student achievement to responses to the attitude questionnaire. Since there was such a consistently positive reaction to the fiche there was not sufficient "spread" to develop any achievement/attitude relationships. The two students who had the most negative reactions (one of whom was the student who reported eye and body fatigue) were among the higher achievers completing the course in 15.5 and 16.5 days respectively or well below the average of 17.7 days.

Instructor attitudes. A structured interview form was prepared for use by the demonstration coordinators in getting instructor reactions and observations (see Appendix B). The forms were designed for personal interviews, and suggestions were given for exploring answers in depth.

The interview form, however, was used as a questionnaire, with the result that brief answers (usually "yes" or "no") were recorded. It was also hoped that the personal interview would generate spontaneous comments from the instructor staff. This section reports, instead, the responses of five instructors/facilitators to the referenced interview form when it was used as a questionnaire.

Students did not seem to have any problems with the fiche readers or questions about their use. Instructors reported that students occasionally had problems locating the correct fiche and finding the proper frame number. All five of the instructors indicated that there were more questions on content than they usually experienced from the hard-copy group. There were only a few complaints about eye strain or fatigue, as student responses also indicate. Few students complained about the noise associated with classroom viewer use. Destruction of fiche seemed to be less of a problem than loss or destruction of printed materials. All instructors agreed that the answer sheet was used more effectively with the microfiche group. None of the instructors, however, seemed to think that putting reference materials on fiche was a good idea or that the trainees should have microfiche materials for field study. Additional questioning of the instructors showed that most of these comments were related to the impression that readers would not be available in the field and to the (erroneous) notion that revising fiche for field distribution was an expensive and impractical concept. They concluded this from the observation that problems with the materials were not corrected during the course of the demonstration. Most of the revisions/corrections were completed after instructors answered the interview questions.

If the inaccuracies had been brought to the attention of project managers earlier, it is believed that instructors would have had the opportunity to see the rapid correction process available using the automated fiche producing procedures.

III. CONCLUSIONS

The results of this investigation are consistent with previous research on the use of instructional microfiche. Most students used the fiche without problems and no major administrative issues relating to their distribution, use or loss arose. There was some increase in the average number of days it took to get through the course, although both groups (hard-copy and microfiche) finished the course in less than the average of 22 days reported in previous evaluations. The tests also took longer to complete for the microfiche group (contributing to longer course time). The longer test time may be attributed to the difficulties encountered in taking an "open book" test using a combination of fiche and printed materials. The longer course time might be related to the increase in questions, the decreased amount of home study, and the more diligent use of the worksheets.

An attempt to examine both test taking time and time to milestone as a function of the temporal placement was thwarted by the lack of data collected on these variables. There appeared to be no direct relationship between student attributes such as being left-handed or wearing glasses and performance. The lower ability students who used microfiche were slower in relation to the other students when compared with the printed lesson group and the higher ability students did better than the rest of their group.

Original learning and retention measures are both slightly higher for the fiche group, but this could be attributable to the somewhat longer time for them in the course.

Previous research (Reference 2) has similarly shown that students working in a self-paced mode work slightly slower than those using the familiar printed lessons, but that learning and retention is slightly increased. The use of microfiche instructional materials in a lockstep mode has been demonstrated to be equally efficient with hard copy (Reference 3).

Classroom observers reported that fiche readers occasionally malfunctioned, but that students showed little or no difficulty in tracing instructional fiche, workbooks or references. Only two classes had formal observers and one of these classes was observed for only one day. Recommended observations guidelines are shown in Appendix B.

Very little orientation time (a ten-minute film followed by a few minutes of experimentation) was required for students or instructors. The classrooms, already equipped with electrical outlets, required no further modification. Handling the fiche was not a problem nor was loss or destruction of fiche. Instructors reported that the worksheets prepared for use with fiche materials were actually used more effectively than previous classroom worksheets.

If the use of microfiche is continued in this course for the purpose of gathering more information on its effectiveness and use, it would be important to:

- provide additional viewers for home study;
- provide additional attention to the open-book test aspect of fiche use;
- update and correct microfiche using computer output microfiche techniques;

- correct inconsistencies in printed worksheets and fiche materials;
- collect data on each of the performance measures suggested by the proposed evaluation design.

EPILOGUE (FOR INTERNAL USE ONLY)

The purpose of a field demonstration is to be able to generalize for the normally operational condition from conditions neither more advantageous (as they sometimes are during an experiment) nor less optimal than there is reasonable expectation that they will be on a routine basis. Further, in order to be fairly certain that the data will be collected and handled appropriately to get all of the available information from the demonstration, a pilot test of the process is standard procedure. Although the consultants had first-hand experience with the instructional uses of microfiche and with evaluation processes, each learning environment has unique aspects of use, and any evaluation design has opportunities for misinterpreting directions. Therefore, throughout the early stages of the consulting agreement, a pilot test to observe the entire process of implementation, use, and data gathering was strongly advised.

For several reasons, most of them related to the logistics of putting the demonstration in place very rapidly, this recommended iterative procedure of implementing, pre-evaluating, and correcting deficiencies was not performed. The result is that there are several questions relating to the potential of the instructional microfiche that are still unresolved.

If it had been observed, for example, that students were having difficulties using the microfiche for their open book tests, it may have been possible to either redesign the fiche for outline scanning or to make better use of the worksheets for this purpose. Similarly,

if the unavailability of sufficient readers for home study was observed to be making a significant difference in the amount of outside preparation, then this situation could have been corrected prior to full-scale implementation. In regard to the loss and mishandling of data, most of these problems should have been avoided through the use of appropriate pre-test procedures.

Considering the fact that the fiche were administratively successful, if the concept is still attractive, there may be some interest in identifying those instances of use that were less than optimal and running another class to determine the extent to which correction of problem areas is acceptable on a routine basis and to determine whether they result in a more competitive course duration time, the single but important variable on which the demonstration group did not come up to standard.

REFERENCES

1. Kottenstette, J.P. Implementation of the Instructional Microfiche System Demonstration, Ft. Eustis, Virginia. May 1979.

2. Rizzo, W.A. Evaluation of Microfiche as an Instructional Medium in a Technical Environment, TAEG Report No. 48. July 1977.

3. Grausnick, R.R., West A.S., et al. Microform Use in a Technical Training Environment--An Experiment, AFHRL-TR-71-43. May 1971.

APPENDICES

INSTRUCTIONAL MICROFICHE SYSTEM (IMS) PROJECT

PROJECT MANAGERS

ATSC

(MR. MAITZ)

* COORDINATE AND PROVIDE POINT OF CONTACT FOR OVERALL PROJECT

* PROVIDE FUNDS AND CONTRACT FOR DESIGN, DEVELOPMENT, AND EVALUATION OF MICROFICHE SYSTEM

TAGCEN

(MR. GREENHALGH)

* MONITOR PROGRESS OF PROJECT

* PROVIDE FUNDS AND CONTRACT FOR PRODUCING MICROFICHE, PURCHASING READERS AND READER/PRINTER, AND TECHNICAL SUPPORT FOR EVALUATION OF PROJECT

TRANSP SCHOOL

(MR. VASSOS)

* COORDINATE ACTIONS WITHIN SCHOOL

* SELECT PROTOTYPE COURSE

* PROVIDE RESOURCES FOR AND MANAGE DEMONSTRATION

CONSULTANTS

(DR. WEST AND MR. KOTTENSTETTE, UNIVERSITY OF DENVER)

* EXPERIMENTAL DESIGN

* COURSE CONVERSION

* EVALUATION AND REPORTING

PRODUCTION

(MR. STEVE BROWN, NAVY PUBLICATIONS AND PRINTING SERVICE BRANCH POINT MAGU, CALIFORNIA)

* MONITOR PHOTO COMPOSITION CONTRACT WITH COMMARCO INC.

* PRODUCE MICROFICHE AND PRINTED MATERIALS

NAME_____ #D_____

DATE_____

Wear glasses for schoolwork?	12 Yes	34 No	[ ]
Wear contacts for schoolwork?	1 Yes	45 No	[ ]
Left- or right-handed?	9 Left	37 Right	[ ]

The purpose of this questionnaire is to find out more about your experience and opinions concerning the use of microfiche in the course you have just taken. This information will remain strictly confidential and will not become part of your military records.

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1. Did you receive adequate explanation about the use of microfiche before you started this course?	46 Yes	0 No	[ ]
2. Did you receive enough instruction about the microfiche-reader before you started this course?	46 Yes	0 No	[ ]
3. Had you ever used any kind of microfilm before?	16 Yes	30 No	[ ]
If yes, explain_____			
4. Had you ever used self-paced instruction before?	6 Yes	40 No	[ ]
If yes, explain_____			
5. Did you have any problem in selecting the right microfiche?	6 Yes	40 No	[ ]

6. Did you have any problems in loading the fiche into the reader?	3 Yes, at first	1 Yes	42 No	[ ]
7. Did you have any problems in locating the correct frames using the index?	4 Yes, at first	4 Yes	38 No	[ ]
8. Did you have any problems keeping the reader or film clean?		6 Yes	40 No	[ ]
9. Did you usually keep the evaluation portion of the frame off the screen until you tried to answer the questions given?	6 Usually	39 Yes	1 No	[ ]
10. Were the instructional materials, directives, and answers spaced properly for ease of use?		46 Yes	0 No	[ ]
If no, please explain_____				
11. Was your notebook well prepared with the necessary forms and answer sheets?		46 Yes	0 No	[ ]
12. Would you have liked to have reference materials on fiche to take with you when you leave here?		43 Yes	3 No	[ ]
13. Would you have liked to have reference materials on fiche to use in the classroom?		36 Yes	10 No	[ ]
14. Was the legibility of the microfiche text adequate?	5 Sometimes	41 Yes	0 No	[ ]
15. Was the legibility of the illustrations adequate?	6 Sometimes	40 Yes	0 No	[ ]
16. Did you have more or less eye strain with fiche than with paper text?	4 More	21 Less	21 About the same	[ ]

17. Was there more or less body fatigue using fiche than with paper text?

4	20	22	[ ]
More	Less	About the same	

18. Was the reader at the proper height for you to use comfortably?

1	1	44	[ ]
Too low	Too high	About right	

19. Did you have problems shifting your eyes from the microfiche reader to your supplemental forms or written answer sheets?

4	42	[ ]
Yes	No	

If yes, please explain_____

20. Were you able to study as long in the classroom as you think you might have with printed lessons?

37	3	6	[ ]
As long with fiche	Not as long with fiche	Longer with fiche	

21. Were you able to study outside of the classroom as long as you think you might have with printed lessons?

16	27	3	[ ]
As long with fiche	Not as long with fiche	Longer with fiche	

22. What was your attitude toward microfiche before you began?

13	22	11	[ ]
Positive	Negative	Neutral	

23. How did your attitude change?

31	2	13	[ ]
More positive	Less positive	About the same	

24. Would you prefer to use microfiche or printed lessons in a similar course using self-paced instruction?

9	31	6	[ ]
Don't Care	Micro-fiche	printed lessons	

On the back of this sheet please write any comments you care to about the use of the microfiche in this course.

Name of Instructor

Date

Name of Interviewer

- After the orientation did your students have many questions about the use of the reader?
  Note to interviewer: Try to find out if problems were pervasive. and how serious they were.

- Did they have problems finding the correct fiche?

- Did they complain about locating frame numbers on the fiche?
  Note: If yes, try to explore problem and determine what might be done to help.

- Were there any complaints about eye strain?

- Were there any complaints about body fatigue? (If answer is non-committal, re-ask as follows: Did they seem to need more rest breaks than other classes?)

- How many years have you taught this course?

  Did you ever teach it when it was a classroom lecture class?

  When it used sound media?

  Have you taught other programmed instruction classes?

- How long have you been in the army?

- Do you think this fiche-trained group asked more questions about the material (course content) than the paper trained classes?

- Was the use of supplemental materials (forms, answer sheets) any more or less awkward for the fiche group?
  Note: Explore room at the carrel for reader, materials, etc.
  Note: Explore use of notebook.

- Was noise related to the use of the viewer a problem?

- Was loss or destruction of fiche more or less of a problem than printed materials?

- Was the answer sheet used more or less effectively with the fiche than with the paper trained group?

- If viewers were available at their destination, do you think trainees should have filmed (microfiche) reference materials to take with them?

- Would you have liked to see the reference materials on fiche in the classroom?

- What is your overall impression of the use of microfiche for programmed instruction in army training?

GUIDELINES FOR USE OF OBSERVER

THE PURPOSES OF HAVING AN OBSERVER IN THE CLASSROOM ARE:

(1) TO IDENTIFY ANY SPECIAL CIRCUMSTANCES OR INCIDENTS THAT MIGHT IMPACT THE OUTCOMES OF THE DEMONSTRATION, E.G., A BIASING INSTRUCTOR OR STUDENT REMARK, A POWER FAILURE, INCORRECT PACKAGING OF MATERIALS, ETC.

(2) TO CONTRAST WORK PATTERNS/INSTRUCTOR PATTERNS WITH THE HARD COPY AND THE FICHE MODES OF INSTRUCTION.

(3) TO BE JUST ONE MORE SOURCE OF INFORMATION ON THE USE OF THE FICHE FOR SELF-PACED INSTRUCTION.

THE OBSERVER SHOULD BE SOMEONE FAMILIAR WITH THE ARMY TRANSPORTATION SCHOOL CLASSES, NON-THREATENING TO THE INSTRUCTORS, AND UNOBSTRUSIVE IN THE CLASSROOM. HE (SHE) SHOULD NOT SPEAK OR INTERFERE IN ANY WAY DURING CLASS SESSIONS. IF ASKED FOR ADVICE/OPINIONS/INFORMATION THE ANSWER SHOULD BE AS BRIEF AND NON-COMMITTAL AS POSSIBLE OR SIMPLY FORWARDED TO RICH MAITZ FOR REPLY.

OBSERVATIONS SHOULD BE RECORDED IN A NOTEBOOK SHOWING TIME, DATE, PLACE, CLASS NUMBER, AND A WRITTEN EXPLANATION OF WHAT WAS SAID/OBSERVED, INCLUDING GRIMACES OR BODY LANGUAGE THAT COULD BE INTERPRETED TO SHOW STUDENT ATTITUDES. ALL QUESTIONS/COMMENTS RELATING TO THE FICHE OR READER OR USE OF THE NOTEBOOK OR PERIPHERALS SHOULD BE RECORDED. RICH SHOULD SEE THESE DAILY. THE OBSERVER SHOULD ALSO FEEL FREE TO WRITE IN ANY COMMENTS OF HIS OWN--THESE SHOULD BE CLEARLY LABELED "OBSERVER COMMENTS."

THE OBSERVATIONS SHOULD FOLLOW OBSERVATION IN THE HARD-COPY CLASS FOR BASELINE DATA. THIS SHOULD INCLUDE: TOTAL ORIENTATION PERIOD, AND AN HOUR OR SO ON THE FIRST AND SECOND DAYS, ON ABOUT THE EIGHTH DAY, AND TOWARD THE END OF THE COURSE. THE OBSERVATION OF THE DEMO CLASS SHOULD FOLLOW THE SAME PATTERN, BUT WITH MORE EXTENDED (ABOUT 3-HOUR) PERIODS OF OBSERVATION.

THE OBSERVER SHOULD BE INTRODUCED TO THE CLASS IN AN OFF-HAND MANNER AS SOMEONE INTERESTED IN THE COURSE.

VARIABLE		N=71 CONTROL $\bar{x}$		N=71 CONTROL σ	N=47 DEMONSTRATION $\bar{x}$	N=47 DEMONSTRATION σ
1	Sequence No.					
2	CL Score	113.21		11.31	112.81	9.83
3	GT Score	109.75		11.25	107.21	9.96
4	Sex; M=1, F=0	.48		.5	.45	.5
5	Age	22.11		4.51	21.60	5.08
6	H.S. Grad; Y=1, N=0	.93		.25	.96	2.0
7	Months in Army	29.15			26.79	
8	Previous Training; Y=0, N=1	.41		.5	.45	.5
* 9	Typing Days	2.41		2.8	1.0	0
10	Sick Days	2.64		2.87	2.43	1.86
11	Total Days in Course	21.67		8.3	22.5	
12	Adjusted Days in Course	15.73		6.54	17.7	4.76
†13	Academic Attrition	0		0	0	0
14	Administrative Attrition	0		0	0	0
TESTS		$\bar{x}$	$\bar{x}$ corr	σ	$\bar{x}$	σ
15	618 Minutes	109.40	115.0	74.32	134.15	99.46
‡16	618 Days to Milestone	1.97		1.40	1.49	1.08
17	630 Minutes	94.73	100.0	51.09	129.38	99.16
18	630 Days to Milestone	2.12		1.42	1.49	.91
19	636 Minutes	90.07	95.14	51.76	155.66	89.61
20	636 Days to Milestone	2.05		1.39	1.55	1.18
21	637 Minutes	72.93		50.45	131.70	83.58
22	637 Days to Milestone	1.03		.37	.34	.64
23	639 Minutes	51.47	54.37	37.96	98.09	64.80
24	639 Days to Milestone	.97		.33	.21	.55

*Typing Days--The one day reported uniformly for the demo group was an apparent data collection error. The 2.41 day average for the control group was substituted in computing adjusted days in course.

†Academic Attrition--Although no academic attrition was reported for either group, missing test data revealed there were four attrits in the control group. The zeros averaged into their test time scores was recalculated as missing data, resulting in the corrected mean shown as $\bar{x}$ corr. (75/71 $\bar{x}$)

‡Days to Milestone--These data were not collected for enough subjects to generate meaningful data. Missing data were averaged in as zeros.

		CONTROL			DEMONSTRATION	
		$\bar{x}$	$\bar{x}$ corr	σ	$\bar{x}$	σ
25	624 Minutes	105.0	110.92	78.5	128.83	105.80
26	624 Days to Milestone	5.69		2.45	4.89	1.66
27	670 Minutes	161.15	170.01	136.45	173.09	110.64
28	670 Days to Milestone	2.45		1.52	1.96	1.33
29	620 Minutes	100.93	106.58	73.35	156.28	98.54
30	620 Days to Milestone	1.19		.78	.77	1.0
31	622 Minutes	70.20	74.13	51.57	112.34	75.80
32	622 Days to Milestone	1.03		.4	.26	.61
33	623 Minutes	29.56	31.22	19.0	56.81	48.75
34	623 Days to Milestone	.95		.23	.04	.2
35	610 Minutes	150.27	158.68	137.83	149.04	120.80
36	610 Days to Milestone	1.89		1.43	--	--
37	608 Minutes	179.80	189.87	106.78	193.40	104.01
38	608 Days to Milestone	2.19		1.62	--	--
39	616 Minutes	135.87	143.48	73.84	159.89	97.0
40	616 Days to Milestone	1.25		.7	--	--
41	617 Minutes	122.20	129.04	71.58	145.53	95.67
42	617 Days to Milestone	1.25		.86	--	--
43	658 Minutes	13.05	13.78	11.55	58.98	61.30
44	658 Days to Milestone	.99		.42	--	--

SELECTED INDIVIDUAL SUBJECT DATA

	ID & CLASS	GLASSES	CONTACTS	L/R-HAND	HUMAN FACTORS	OVERALL RATE	ITEM 23	ADJ DAYS
11/29/78	301	Y	N	R	✓	3	PL	11
	302	N	N	R	✓	4	M	13
	303	N	N	R	✓	4	--	15
	304	N	N	R	✓	5	M	17
	305	N	N	L	eye,body	2	--	17
	306	Y	N	R	eye	4	M	17
	307	N	N	L	✓	2	--	18
	308				✓	5	M	15
	309	N	N	R	✓	4	M	13
	310	N	N	R	✓	4	--	20
	311	N	N	R	body	4	M	23
	312	N	N	R	✓	5	M	23
	313	Y	Y	R	✓	4	--	18
	314	N	N	L	✓	4	--	22
	315	N	N	L	✓	4	M	20
1/10/79	501	Y	N	R	✓	4	M	18
	502	(missing)						
	503	N	N	R	✓	4	--	13
	504	N	N	R	✓	5	M	17
	505	N	N	R	✓	5	M	18
	506	N	N	R	✓	5	M	18
	507	N	N	R	✓	5	M	14
	508	N	N	R	✓	5	M	17
	509	N	N	R	eye	4	M	12
	510	N	N	R	✓	4	M	11
	511	Y	N	R	✓	5	M	18
	512	N	N	R	✓	4	M	20
	513	N	N	L	X	3	M	16
	514	N	N	R	✓	4	M	18
	515	N	N	R	✓	3	PL	18
	516	N	N	R	✓	4	M	26
	517	N	N	R	✓	4	PL	19
	518	Y	N	L	✓	4	M	21
	519	N	N	R	✓	4	M	24
	520	N	N	R	eye	3	--	12
	521	Y	N	R	✓	3	PL	17
	522	N	N	R	✓	3	M	24
	523	N	N	L	✓	4	M	14
	524	N	N	L	body	3	M	33
Feb., 1979	701	N	N	R	✓	4	M	14
	702	Y	N	L	✓	4	M	14
	703	N	N	R	✓	4	M	14
	704	N	N	R	body	4	PL	21
	705	Y	N	R	✓	3	PL	22
	706	Y	N	R	✓	3	--	17
	707	Y	N	R	✓	5	M	18
	708	Y	N	R	✓	5	M	15