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COMPUTER-MANAGED INSTRUCTION FOR TANK COMMANDERS:
19K BNCOC COMPUTER-BASED MANAGEMENT SYSTEM
DESCRIPTION AND DOCUMENTATION

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   The project called "Computer-Managed Instruction for Tank Commanders" was set up to help improve armor school training. It involved the design and development of a computer-based instruction (CBI) system for the M1 Tank Commander Course (19K BNCOC). The CBI system includes both computer-assisted instruction (CAI) and Computer Managed Instruction (CMI) for the 19K BNCOC course.
   This report provides a detailed description of the design of the CMI system developed by InterAmerica Research Associates.   (over)

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20. Abstract (continued)

In addition, the report outlines the results of an assessment completed to identify the instructional and administrative needs of the 19K BNCOC course. Finally, complete documentation on the use of the CMI system is given in two related manuals included with the report: 1) "The 19K BNCOC Tutorial and Reference Manual" contains material for conducting training workshops and details how BNCOC instructors should make use of the system, 2) "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual" includes the technical documentation needed by a MicroTICCIT Operator/Site Manager to implement the CMI system.

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INTRODUCTION

The Fort Knox Training Technology Field Activity (TTFA) has been in operation since November 1983. The TTFA, a consortium within the Department of the Army consisting of representatives from the Training and Doctrine Command (TRADOC), the United States Army Research Institute (ARI), and the United States Army Armor Center (USAARMC), has undertaken a series of activities that explore the application of emerging technologies to the Armor School Training Program. Currently, the primary goal of these activities is the improvement of the effectiveness and efficiency of training provided through the Basic Noncommissioned Officer's Course (BNCOC) for training M1 tank commanders (MOS 19K).

The TTFA at Fort Knox has developed an agenda of interrelated projects that include the design and development of computer-based instruction appropriate for 19K BNCOC. Included on the agenda is a project entitled "Computer-Managed Instruction for Tank Commanders." The activities conducted through this project were tasked to InterAmerica Research Associates, Incorporated through contract number MDA 903-84-C-0479. InterAmerica, assisted by Human Resources Research Organization (HumRRO) and Interactive Television Company (ITC), has undertaken activities that include the design and development of components of a computer-based instruction system appropriate for the 19K BNCOC course including prerequisite tasks associated with this military occupational specialty.

The computer-based instruction system developed through this project included both computer-assisted instruction (CAI) and computer-managed instruction (CMI) in order that the potential of these technologies could be realized and effectively utilized in an Army training environment. Specifically, the purposes established for this project effort were:

1. To develop, apply, and refine a CMI system related to the administration and management of the 19K BNCOC course, and

2. To develop, apply, and refine CAI which provides task-specific remedial training necessary for students entering the 19K BNCOC course.

The CMI project effort encompassed the following activities and tasks. InterAmerica staff associated with the CMI component completed an analysis of the administrative needs associated with the 19K BNCOC course and identified a design for a CMI System to meet those needs (Task 1), developed the CMI System (Task 3) based on the identified needs and parameters, and implemented and field tested that system (Task 5) in order to judge its utility in an Army training environment. Similarly, staff affiliated with the CAI component conducted an analysis of the prerequisite tasks related to 19K BNCOC and specified a design for CAI appropriate for remedial training (Task 2), developed the remedial CAI (Task 4), and implemented and field tested the CAI (Task 6). The analysis, design and development activities related to both the CMI and CAI components focused on the use and implementation of the MicroTICCIT computer system. Following development, both the CMI and CAI were reviewed by ARI personnel. Based on the field trial results, the CMI and CAI components were refined.

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This report is designed to describe the results of the Task 3 activities and to describe the CMI System with respect to the 19K BNCOC course. The report is divided into two major sections. The first section, "The CMI Needs Assessment" presents a summary of the results of the analysis of MicroTICCIT and other training technologies planned for implementation in 19K BNCOC and a description of the instructional and administrative needs of 19K BNCOC. The second section,"The CMI Design", describes the CMI System developed for 19K BNCOC by InterAmerica. This report as well as two complementary documents entitled "The 19K BNCOC MicroTICCIT Tutorial and Reference Manual for Instructors" and "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual" provide a complete description, training materials, and technical documentation for the 19K BNCOC CMI System.

PART I. THE CMI NEEDS ASSESSMENT

The first section of this report focuses on topics related to the needs of the 19K BNCOC program related to the 19K BNCOC CMI System developed by InterAmerica for implementation on a MicroTICCIT System II. Three major sub-tasks were conducted:
- o Analysis of the MicroTICCIT System and Other Training Technologies;
- o Identification of the 19K BNCOC Instructional Requirements; and
- o Identification of the 19K BNCOC Administrative Requirements.

ANALYSIS OF MicroTICCIT AND OTHER TRAINING TECHNOLOGIES

The primary training technology introduced into the 19K BNCOC program is Hazeltine Corporation's MicroTICCIT system. MicroTICCIT is a computer-based training system which provides professional trainers with authoring, delivery, and management capabilities. The CMI System as well as several instructional components are to be delivered on a System II MicroTICCIT. Provided below is an overview of the MicroTICCIT hardware and software components which will be used for the implementation of the CMI System.

MicroTICCIT HARDWARE

The System II MicroTICCIT configuration is designed to optimize ADAPT (the authoring language which runs on MicroTICCIT) courseware development and delivery for medium-scale computer-based training efforts. Although currently configured to support eight MicroTICCIT terminals, a System II will support up to 40 MicroTICCIT workstations by installing seven additional hubs. The following components are included with a MicroTICCIT System II (See Figure 1):

<u>S/20 Eclipse Processor</u>: The Data General Eclipse S/20 host has 256 Kilobytes (K) of random access memory (RAM). The Data General Real-time Disk Operating System (RDOS) is a general purpose software package which supports the Eclipse computer. RDOS can allocate program control to many different subprogram tasks. Supplied with the Central Processing Unit (CPU) is the virtual console, a program which permits users to perform control panel functions via the processor console.

<u>Fixed Hard Disk</u>: The system has one fixed disk which provides 50 Megabytes of storage space for on-line system software, student records, and courseware.

<u>Cartridge Tape Drive</u>: The system includes one 15.4 Megabyte cartridge tape drive for loading or dumping data from the fixed disk. A complete dump of the disk requires four cartridges.

<u>Data General Console CRT</u>: The console (Dasher) is used to perform system startup, shutdown, and backup routines. In addition, the console is used for generating off-line TICCIT reports.

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FIGURE 1
MicroTICCIT SYSTEM II COMPONENTS

MicroTICCIT Hardware Components

Eclipse S/20 Microprocessor
50 Megabyte disk
15 Megabyte tape drive
D210 Dasher, Model 6242 (Data General console)
D210 Dasher Keyboard, Model 6246A
Desk and Pedestal
Modem, Model 490190-A
IBM DMA Board
Associated cabling

MicroTICCIT Workstations consisting of:
IBM Personal Computer, Model 5150*
Network Controller*
Sony Video Monitor Model 1270
MicroTICCIT display board and videodisc overlay
MicroTICCIT keyboard
Light Pen
Nestar ARCNET Local Area Network
Sony Disk Player

MicroTICCIT Software Components

Data General Disk Operating System (RDOS)
TICCIT Operating System (MPOS)
ADAPT courseware authoring language
APT courseware authoring language

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* One terminal serves as the Network Controller and has one disk drive; the other workstations have 2 disk drives.

ARCNET Local Area Network: ARCNET is a communications interface which allows workstations to be located up to 2,000 feet from the host processor and can be extended to four miles with optional active repeaters.

Modem: The modem included with the system is used for interfacing to Hazeltine's MicroTICCIT maintenance service network.

MicroTICCIT Workstation: The MicroTICCIT student/ author workstation consists of an IBM personal computer with 64K RAM, equipped with a Sony Profeel full-color display, an expanded keyboard, a light pen, a plug-in local area network communication interface to the host processor and a Sony videodisc player. The standard terminal supports displays of computer-generated text and graphics. Each workstation's keyboard includes an alphanumeric keypad, an editing keypad, and a special functions keypad designed to give students easy access to instructional components (e.g., OBJECTIVE, HELP, ADVISOR, RULE, PRACTICE, etc.). In addition, the keyboard includes programmable function keys that can be used to define as many as 35 special characters or symbols unique to a particular training application.

Optional Equipment: The following items are listed as optional equipment for the MicroTICCIT System II.

o   <u>Data General printing console (Execuport)</u>. The
    Execuport replaces the standard operator console CRT to
    support hard-copy printing of student management data.
    This printer, however, may only be used when the TICCIT
    system is not running. Printing is available only
    through the Data General Console and not from the
    MicroTICCIT terminals.

o   <u>Line Printer (Versatek)</u>. The Versatek is a
    printer/plotter which operates independently of the
    Data General console and may be interfaced with the
    TICCIT operating system to provide printed management
    reports from the MicroTICCIT terminals. Using the
    Versatek printer does not prohibit other users from
    accessing courseware and also allows instructors to
    access printed reports using TICCIT menus. The
    Versatek also prints ADAPT courseware files required
    for documentation of projects and useful for author
    debugging.

o   <u>Epson Printer</u>. The Epson printer (currently available)
    and related software (to be released by Hazeltine
    Corporation in 1986) will permit on-line access to
    MicroTICCIT print utilities, but will not print ADAPT
    courseware files.

o   <u>Streaming Tape Drive</u>. The streaming tape drive
    replaces the standard cartridge tape drive. The
    "Streamer" is useful in converting magnetic tapes to
    formats which may be read by other computer systems.
    The unit serves the same functions as the cartridge
    tape drive.

o   <u>Multipurpose Communications Adaptor (MCA)</u>. The MCA is
    a communications link between processors. It transfers
    data at high speed from one computer to another through
    the computer's data channel facilities. Typically, the
    MCA is a link between the Main Processor (the S/20
    Eclipse processor) and the Terminal/Refresh Processor.
    Both RDOS and MPOS will support up to 15 CPU's across
    the MCA. On larger TICCIT System Configurations, the
    MCA is used to access additional disk devices which are
    configured on additional processors.

MicroTICCIT SOFTWARE

The software included with the MicroTICCIT system includes the Data General
Real-time Disk Operating System (RDOS) and RDOS utility programs, the
TICCIT operating system (MPOS) and MPOS utility programs, and the ADAPT as
well as the APT authoring language.

RDOS and RDOS Utilities: Generally, only programmers and TICCIT operators will use RDOS programs. Communication with RDOS takes place at the Data General terminal (console) using an interface program called the Command Line Interpreter (CLI).

TICCIT (MPOS) and TICCIT Utilities: To access TICCIT courseware, the TICCIT operating system (MPOS) must be installed. The current TICCIT version is #3417. The process of transferring control of the processor from RDOS TO TICCIT is called "bringing TICCIT up." When TICCIT is "up," RDOS is not available. TICCIT was designed primarily for the purpose of managing TICCIT courseware developed using the ADAPT authoring language. TICCIT also offers most of the utilities available through RDOS and the Command Line Interpreter (CLI).

TICCIT utilities are used for managing the TICCIT data bases and for generating reports. These utilities are divided into two categories: On-line and off-line. On-line utilities are accessed by logging on TICCIT Course 0 and making menu selections. Off-line utilities are available from the Data General console.

ADAPT: ADAPT is a high level programming language which runs in the TICCIT operating system environment, and is specifically designed for authoring courseware. ADAPT also includes a limited number of functions which can be used in data management and data reduction.

APT: The TICCIT system also includes a second authoring language called APT, which is used to create TICCIT maps. These maps are the basis of the built-in TICCIT management system. The CMI System developed by InterAmerica uses light pen driven menus in place of TICCIT maps. APT files are also used in TICCIT test management. These files are incorporated in the CMI System courseware developed by InterAmerica project staff.

OTHER TRAINING TECHNOLOGIES

Several projects related to 19K BNCOC have been planned, some of which are MicroTICCIT CAI; some involve other computer-based technologies. Below are brief descriptions of these projects which indicate their relationship to the 19K BNCOC CMI System.

Interactive Videodisc Training for Land Navigation Skills (HumRRO, Alexandria, Virginia): This project produced MicroTICCIT CAI courseware for the 19K BNCOC Task Cluster, Land Navigation. Five 19K BNCOC tasks from this task cluster will be delivered on-line; four others will continue to be taught off-line. The project includes one videodisc which supports the courseware. Land Navigation courseware is accessible through light pen driven menus which were developed as part of the 19K BNCOC CMI System. Off-line test results are also managed by the CMI System.

The Application of Voice Technology to Armor NCO Training (Scientific Systems Incorporated (SSI), Cambridge, MA): This project will produce MicroTICCIT CAI with the addition of a voice recognition and synthesis device. This courseware addressed the topic of "Fire Commands" which is taught in the 19K BNCOC Gunnery Task Cluster as part of the task titled "Direct Main Gun/Machinegun Engagements on an M1 Tank." This task was

formerly taught in a classroom environment by a lecturing instructor using transparencies and a viewgraph, demonstrated by an assistant instructor during range exercises, practiced while occupying the tank commander's position during live-fire and subcaliber exercises, and evaluated after each set of three or four engagements on the range. SSI will develop a curriculum for a new 19K BNCOC Task titled "Fire Commands/Communications" which trains tank commanders to give fire commands orally in response to visually presented target scenarios. The new materials will include instructor guidance, student materials, management guidance, visual displays, and controlling software. This new task will be incorporated in the Gunnery Task Cluster. The hardware configuration used to present the "Fire Commands/Communications" curriculum will include voice technology equipment, videodisc players, and the MicroTICCIT equipment.

The second topic addressed by SSI will be "Communications-Electronics Operating Instructions (CEOI)" which falls under the Military Communications Task Cluster and the task listed on the 19K BNCOC Master Record as "Use Automated CEOI." This topic is also being developed on MicroTICCIT and may include a videodisc and voice technology. Both products are listed on the 19K BNCOC CMI System menus. Additional disk space (in excess of the 50 MB included with the System II) may be required to store this courseware.

Advanced Terrain Representation (Decisions and Designs, Inc., McLean, VA): The Advanced Terrain Representation (ATR) system presents interactive surrogate travel over open terrain. Its initial use with the MicroTICCIT system will be to present instruction in the Land Navigation Task Cluster for the 19K BNCOC task designated on the current Master Record as: "Navigate from one point on the ground to another point (STX-A)." This task is included in 19K BNCOC's Land Navigation Task Cluster. One MicroTICCIT workstation was adapted to support the ATR system including an additional videodisc player and supporting hardware. ATR was originally developed on a Compac-PC (a IBM-PC compatible system) using diskettes and requires one disk drive and at least 128 Kilobytes of random access memory (RAM).

ATR will function independently of the Data General host computer. Test results are stored on the ATR diskettes and must be transferred manually to the MicroTICCIT CMI system using the off-line data entry module developed by InterAmerica project staff.

19K BNCOC INSTRUCTIONAL REQUIREMENTS

The primary purpose of the 19K BNCOC program is to train M1 Tank Commanders to lead, train, and direct subordinates to maintain, operate, and employ weapons and equipment. The MOS for which the soldiers are trained is 19K. Several cycles of the course occur each year, each consisting of six weeks (30 days) of instruction in 19K BNCOC tasks plus two additional days called Report Day and Day 0 during which the incoming class undergoes inprocessing and diagnostic testing of Skill Level 1 and 2 tasks which are prerequisite skills for the 19K BNCOC program. Remedial instruction and retesting of the prerequisite skills are conducted as needed throughout the course cycle. The 19K BNCOC course includes more than forty testable events.

The 19K BNCOC CMI system developed for a MicroTICCIT System II by InterAmerica project staff provides automated management of the entire 19K BNCOC training program including the diagnostic testing and task-specific remedial training for students unable to perform satisfactorily on prerequisite skill tests.

THE 19K BNCOC CURRICULUM

The 19K BNCOC curriculum consists of two major components which are managed by the CMI System:

o   The Prerequisite Tasks and Remedial Training Activities, and
o   The 19K BNCOC Tasks and Training Activities.

Prerequisite Tasks: During the first or second day of the 19K BNCOC cycle, a series of diagnostic tests is administered. The diagnostic tests currently being used include two testing modes: Hands-on (checklists) and Paper/Pencil performance tests. In each case, students are scored as either GO (pass) or NOGO (fail) according to the established criterion for that task. A copy of each written test or checklist is placed in the student's course folder. Students who do not demonstrate mastery of the task are given remedial instruction and retested (a maximum of three times) during the course cycle. The remedial activities and retesting take place outside of the regular course schedule during the evening or weekend study halls.

This project produced five diagnostic tests which will be delivered on the MicroTICCIT system, as well as MicroTICCIT CAI remedial training activities for each of those tasks. The prerequisite tasks for which testing and instruction will be delivered via the MicroTICCIT system are:

-    Determine Grid Coordinates
-    Prepare/Operate a Radio Set
-    Communicate Using Visual Signals
-    Recognize/Identify Friendly/Threat Vehicles
-    Establish Tank Firing Positions

19K BNCOC Tasks: The 19K BNCOC course currently includes 12 task clusters consisting of 43 tasks scored as GO (pass) or NOGO (fail) on the Master Record. Current testing modes are either: hands-on (checklist) or paper/pencil knowledge-type tests. When a student does not demonstrate mastery of the task, an "Academic Counseling" session is held, remedial activities are assigned, and the student is scheduled for retesting whenever time is available. Students are tested a maximum of three times. Instruction, testing, and retesting take place in classrooms or in the field exercise areas. A copy of each test or checklist administered to a student is placed in his course folder. Figure 2, 19K BNCOC Tasks and Testing Modes, lists the twelve (12) task clusters (A to L) showing the forty-three 19K BNCOC tasks evaluated during the course. In addition, the testing modes of these tasks are specified, including the MicroTICCIT based testing mode for those tests which have been placed on MicroTICCIT as a result of InterAmerica's and other TTFA project activities.

Tests in 19K BNCOC which are conducted in the classroom or in the field are administered by instructors at the end of the instructional period. Tests require an average of ten minutes for the students to complete.

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FIGURE 2
19K BNCOC TASKS AND TESTING MODES

19K BNCOC TASKS BY CLUSTER	TESTING MODES

A. INFORMATION BRIEFING (0)

C1--Law of Land Warfare/SAEDA Orientation	*
C2--Equal Opportunity	*
C3--Alcohol and Drug Abuse Prevention	*

B. NCO RESPONSIBILITIES AND TRAINING (5)

C4--Duties and Responsibilities of an NCO+	paper/pencil
C5--Conduct Performance Counseling with a Subordinate+	paper/pencil
C7--Train the Trainer to Train (BTMS)+	*
C8--Physical Fitness Instruction+	DA Form 705**
C11--Multiple Integrated Laser Equipment Systems (MILES)	*

C. LAND NAVIGATION++ (11)

C12--Analyze Terrain Using Five Military Aspects of Terrain+	paper/pencil***
C13--Identify Adjoining Map Sheets+	paper/pencil
C14--Identify Terrain Features & Determine Azimuths	
1. Identify Terrain Features on a Map+	paper/pencil***
2. Determine a Magnetic Azimuth Using a Compass+	checklist
3. Determine an Azimuth Using a Protractor and Compute Back Azimuth+	paper/pencil
C15--Orient a Map to the Ground by Map Terrain Assoc.+	checklist
C16--Determine a Location on the Ground by Terrain Association+	checklist***
C17--Determine Directions Using Field Expedient Methods+	checklist***
C18--Orient a Map Using a Compass+	checklist***
C19--Locate an Unknown Point on a Map or Ground by Intersection or Resection+	
1. Locate an Unknown Point on a Map or Ground by Intersection	
2. Locate an Unknown Point on a Map or Ground by Resection	
C20--Navigate from One Point on the Ground to Another Point (STX A)+ §	checklist

FIGURE 2
19K BNCOC TASKS AND TESTING MODES (continued)

19K BNCOC TASKS BY CLUSTER	TESTING MODES

D. NUCLEAR, BIOLOGICAL AND CHEMICAL DEFENSE (8)

C21--Prepare and Submit NBC-1 Reports+	*
C22--Prepare and Submit NBC-4 Reports+	*
C23--Use an IM-174 Series Radiacmeter+	checklist
C24--Read and Report Radiation Dosages+	checklist
C25--Use an AN/PDR-27 Radiac Set	Deleted
C26--Prepare for an NBC Attack+	paper/pencil
C27--Implement Mission Oriented Protective Posture	
1. Implement Mission Oriented Protective Posture +	paper/pencil
2. Use M256 Chemical Detector Kit+	checklist
3. Initiate Unmasking Procedures+	paper/pencil

E. MILITARY COMMUNICATIONS (4)

C30-- Use CEOI, Encode and Decode Messages, Authenticate Transmissions, & Enter/Leave a Radio Net +	checklist***
1. Use an Automated Communications Electronics Operations Instructions	checklist
2. Encode & Decode Messages Using KTC 600D Tactical Operations Code	checklist
3. Use KTC 1400 Numerical Code to Authenticate Transmissions and Encrypt/Decrypt Messages & Grid Zone Area	checklist
4. Establish, Enter or Leave a Radio Net	checklist
C31--Recognize Electronic CounterMeasures & Implement ECCM+	paper/pencil
C32--Install & Operate Hot-Loop Wire Communications+	checklist
C33--Conduct Field Expedient Antennas+	checklist

F. MINE WARFARE (2)

C34--Prepare & Submit Standard Shelling, Mortaring and Bombing Report+	*
C35--Install/Remove a Hasty Protective Minefield+	
1. Install a Hasty Protective Minefield	paper/pencil
2. Remove a Hasty Protective Minefield	paper/pencil

FIGURE 2
19K BNCOC TASKS AND TESTING MODES (continued)

19K BNCOC TASKS BY CLUSTER	TESTING MODES

G. TACTICS (2)
C37--Prepare & Issue an Oral Operations Order+   paper/pencil
C38--Direct Consolidation and Reorganization   paper/pencil
      on the Objective+

H. MAINTENANCE (2)
C39--Inspect DA Form 2408-4 for Accuracy+   paper/pencil
C40--Supervise Maintenance on Individual   paper/pencil
      TO&E Equipment+

I. TANK COMMANDER'S STATION/TANK GUNNERY (8)
WPN1--Estimate Range+   paper/pencil
WPN2--Select Firing Position+   paper/pencil
**WPN3--Training Devices+   *
**WPN4--M1 Commander's Weapon Station+   checklist
  1. Install/Remove a Caliber .50 M2 HB   checklist
     Machinegun on an M1 Tank
  2. Prepare Commander's Weapon Station   checklist
     for Operation on an M1 Tank
  3. Secure Commander's Weapon Station on   checklist
     an M1 Tank
  4. Perform Tank Commander's Preventive   checklist
     Maintenance Prepare to Fire Checks & Services
     on an M1 Tank
  5. Perform Tank Commander's Preventive   checklist
     Maintenance After Firing Check & Services
     on an M1 Tank
**WPN5--Boresight on an M1 Tank and System   checklist
     Calibrate the Main Gun+
**WPN6--Boresight & Zero a Caliber .50 M2   checklist
     HB machinegun on an M1 tank+
  1. Boresight a Caliber...   checklist
  2. Zero a Caliber...   checklist
WPN7--Direct Main Gun & Machinegun   *
     Engagements on M1 Tank+
  1. Direct Main Gun Engagements on an M1 Tank   checklist
  2. Direct Machinegun Engagements on   checklist
     an M1 Tank

FIGURE 2
19K BNCOC TASKS AND TESTING MODES (continued)

19K BNCOC TASKS BY CLUSTER	TESTING MODES
**WPN8--Engage targets from the Commander's Weapon Station+	
1. Engage Targets with the Main Gun	checklist
2. Engage Targets with the M240 Coax Machinegun	checklist
3. Engage Targets with Caliber .50 HB Machinegun	checklist
4. Fire and M250 Grenade Launcher	checklist
J. TACTICAL FIELD TRAINING EXERCISES (FTX) (1)+	*
K. SITUATIONAL TRAINING EXERCISES, A,B,C (STX B - C) (1)+	*
L. COURSE REVIEW AND DIAGNOSTIC TESTING	
Army Physical Readiness Test	DA Form 705
Identify Ammunition	checklist
Load Main Gun	checklist
Loader's Misfire	checklist
Breechblock	checklist
Subsequent Fire Command	checklist
Driver Station	checklist
M-240	checklist
M-2	checklist
Gunner's Misfire	checklist
Prepare Gunner Station	checklist
Engage Targets Using Precision Fire	checklist
Engage Targets Using Battlesight	checklist
Call for (Indirect Fire)	checklist
Six Digit Grid	MicroTICCIT
Operate Radio Set	MicroTICCIT
Communicate Using Visual Signals	MicroTICCIT
Recognize and Identify Friendly/Threat Armoured Vehicles	MicroTICCIT
Establish Tank Firing Positions	MicroTICCIT

+ These tasks are designated "testable events" and are listed individually on the 19K BNCOC Master Schedule.
* Evaluated by some means other than checklist or paper/pencil; or information not available.
** Task which appears in 19K BNCOC curriculum but not in 19E BNCOC curriculum; all other tasks appear in both courses.
*** Scheduled for MicroTICCIT development and implementation during 1985.
S Courseware to be delivered on a MicroTICCIT terminal but not interfaced with the TICCIT operating system or CMI system.

19K BNCOC TEST DEVELOPMENT SELECTION

To demonstrate the potential of computer-based tests for tasks instructed off-line (i.e., in the field or the classroom), the InterAmerica project staff proposed to develop selected tests for tasks not included in courseware development by other MicroTICCIT projects. Only tasks for which paper/pencil tests currently existed (as opposed to the checklists for field exercises) were considered.

Figure 3, Analysis of BNCOC Paper/Pencil Tests, lists those tasks with paper/pencil tests which were considered for MicroTICCIT development. Criteria for selection of 19K BNCOC paper/pencil tests which were developed by project staff and placed on the MicroTICCIT were:

1. The task had not previously been selected for MicroTICCIT development in another project; e.g., the Land Navigation Task Cluster;
2. Three forms of the test were available, thus providing a sufficient pool of items;
3. Complex graphics were not required;
4. Test items had a discrete set of correct responses (e.g., all of the possible correct answers would be identified); and
5. The entire test was suitable for on-line testing (i.e., administering part of a test on-line and part off-line posed unnecessary administrative problems).

Applying these criteria to the paper/pencil tests available for 19K BNCOC resulted in the selection of three tasks. These were:

o   Conduct Performance Counseling with a Subordinate (Cluster B),
o   Select Firing Position (Cluster I), and
o   Estimate Range (Cluster I).

All test materials converted to MicroTICCIT-based tests by the CMI project staff were provided by BNCOC instructors. No new test development was done. Three forms of each paper/pencil test used in BNCOC were developed on MicroTICCIT and correspond to the forms previously administered in paper/pencil format.

FIGURE 3
ANALYSIS OF BNCOC PAPER/PENCIL TESTS

POI FILE NO.	TASK DESCRIPTION	TEST DESCRIPTION
C4	Duties and Responsibilities of NCO	5 fill-ins & 8 multiple choice
C5	Conduct Performance Counseling	8 multiple choice
C12	Analyze Terrain Using 5 Military Aspects of Terrain	5 matching; 5 identification & short answer (drawing)
C13	Identify Adjoining Map Sheets	9 multiple choice
C14-3	Determine Azimuths Using a Protractor & Compute Back Azimuths	6 items using a protractor
C26	Prepare for NBC Attack	7 multiple choice & 1 fill-in
C27-1	MOPP	20 fill-ins
C27-3	Initiate Unmasking Procedures	Part of C27-1 test
C31	Recognize ECM & Implement ECM	7 multiple choice & 7 fill-ins
C35	Install/Remove Hasty Protective MF	1 multiple choice, 5 fill-ins, & a sketch and checklist
C38	Direct Consolidation and Reorganization on the Objective	1 multiple choice, 4 fill-ins & checklist
C39	Inspect DA Form 2408-4 for Accuracy	8 itemed scoresheet
C40	Supervise Maintenance on Individual TO&E Equipment	2 fill-ins and 1 arrange topics in order
WPN1	Estimate Range	8 multiple choice and checklist
WPN2	Select Firing Position	7 multiple choice

Decisions related to test development and security were made based on discussion and feedback from ARI and BNCOC personnel. Most of these test characteristics can be modified by personnel with ADAPT training. For example, instructions can be added to test files to allow for early mastery or failure if such action became desirable in the future.

The characteristics of MicroTICCIT tests developed by InterAmerica project staff are listed in Figure 4, "Characteristics of 19K BNCOC Tests on MicroTICCIT."

FIGURE 4
Characteristics of 19K BNCOC Tests on MicroTICCIT

1. Students are given the same test items on each form of the test; those items, however, are shuffled for each student. Therefore, each student who takes the test may see some items in a different order.

2. Students are required to answer all items once they begin a test. If they exit a test without correctly answering the number of items required for a passing score, TICCIT will score the test attempt as Fail (or NOGO).

3. The item pool is the size of the pool which existed on the paper/pencil versions from which the test items were derived.

4. Items are presented to each student in a different sequence. Response choices (e.g., a, b, c, d) are also shuffled.

5. Students are not permitted to view test items in REVIEW MODE. This TICCIT feature is appropriate in situations where the size of the item pool is considerably larger than the number of items presented during test administration.

6. The system will not display feedback (e.g., Tell them if their answer was correct or incorrect) during the test. Students are presented with test results at the conclusion of the test. The result report tells the student whether he passed or failed and the number of items he answered correctly.

7. Students are not allowed to skip items or back-up to previous items.

8. Students are not given the opportunity to reanswer the questions.

9. Students are permitted a maximum of three test attempts.

10. Access to a test requires instructor or proctor intervention. Instructions for giving students access to tests are provided in both Appendix A, The 19K BNCOC MicroTICCIT Tutorial and Reference Manual for Instructors and Appendix B, The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual.

OVERLAPPING BNCOC TASKS (19K and 19E BNCOC)

Soldiers in the 19K BNCOC and 19E BNCOC attend combined classes whenever the course tasks overlap. The majority of the 19K BNCOC tasks are included in the 19E BNCOC program of instruction (POI). POI differences occur with respect to equipment used in those tasks involving field activities. Although the CMI project focuses on 19K BNCOC, the interrelated skills and the organization of the BNCOC program have implications for the CMI System and its implementation. For example, the CMI System could be used to collect performance data from 19E BNCOC students by enrolling these students in a separate MicroTICCIT course section. The CMI System could also be modified to correspond to the 19E POI.

Part II of this report fully describes the implementation of the CMI System; however, it is useful to point out at this point that TICCIT registration procedures allow for different groups of students to be enrolled concurrently in the same course by designating different sections. Any data collected about 19K BNCOC students or their performance would be stored separately from the 19E BNCOC students.

OTHER 19K BNCOC INSTRUCTIONAL NEEDS

Interviews with BNCOC instructors and course managers and ARI staff revealed other instructional needs which were analyzed to determine if they could appropriately be addressed by the MicroTICCIT CMI System. Each is discussed below.

Counseling Reports: Instructors are required to generate two types of counseling reports throughout the 19K BNCOC program cycle: Academic and Non-Academic. Each time a soldier receives a NOGO result on a task evaluation, instructors complete an academic counseling report. Non-academic counseling reports usually relate to attitude problems. Each counseling report is signed by both the soldier and the instructor and placed in the student's course folder.

Because these reports require a word-processing type software, the CMI System was not considered to be an appropriate way of generating these reports.

End-of-Course Awards: At the end of each course cycle, instructors select students from the BNCOC school for end-of-course awards. These awards are based on the least number of NOGO's received during the course and other criteria such as leadership, conduct, motivation, and punctuality. Instructors use the Master Record to perform a manual count of the number of NOGO's each student received in order to produce a list of the students ranked by the total number of NOGO's. They also examine individual folders to determine whether the student has received negative counseling. Weekly leadership reports (DA Form 1050) are also inspected.

BNCOC instructors indicated that a substantial amount of time could be saved if the CMI System could produce a class list ranking students by least to most NOGO's received during the course. Data regarding the incidence of counseling reports would also be useful.

Because the CMI System maintains a record of each student's GO's/NOGO's, the CMI System is able to generate a class report that lists each student's ID number, name and total number of NOGO's received during the course. Although this list is not ranked by least to most NOGO's, instructors can easily determine the information by inspecting the totals that appear.

BNCOC Historical Data: During the in-processing stage of the course cycle (Report Day and Day 0), students complete a BNCOC Background Questionnaire, ATNG Form 44-05 (1/May/84). These forms are placed in the student's course folder which is stored at the end of the course cycle at the Academic Records Section of the NCO Academy. An alternative form to collect these data was developed by ARI personnel. These data are provided to the Director of Evaluation and Standardization (DOES) at Ft. Knox for processing. A DOES computer program has been developed for entering and processing ARI forms. The Army Research Institute (ARI) foresees an historical data file which could be used for course evaluation and hypotheses testing. BNCOC data may also be stored on the Automated Instructional Management System (AIMS) which is now being installed at Ft. Knox.

Because MicroTICCIT is primarily designed to deliver courseware, project staff determined that collecting demographic data via MicroTICCIT would not be consistent with the capabilities of the system. Student performance data, however, will be collected by the CMI System.

PROJECTIONS FOR CHANGE

Any change in the structure of the 19K BNCOC program, such as changes to the Task Clusters, will impact the CMI System developed by InterAmerica. InterAmerica identified several changes in the current 19K BNCOC course structure which have already taken place or will take place in the future. As a result, the CMI System was designed to permit the following types of changes:

- o   Add or delete a Task Cluster to 19K BNCOC course,
- o   Add or delete a Task to a 19K BNCOC Task Cluster,
- o   Add, change, or delete a TICCIT test,
- o   Add or delete 19K BNCOC MicroTICCIT courseware, and
- o   Change titles of Task Clusters or Tasks.

In addition, the CMI System is designed so that it could be modified for use with a course other than 19K BNCOC. Complete instructions for modifying the courseware developed by InterAmerica for the CMI System are included in the manual entitled "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual" included as an appendix in this report.

19K BNCOC ADMINISTRATIVE REQUIREMENTS

This section includes the findings of the analysis of the 19K BNCOC program documentation and instructional reporting requirements as well as the administrative needs of the Director of Evaluation and Standardization (DOES) and the Automated Instructional Management System (AIMS). In addition, the general evaluative information requirements associated with MicroTICCIT courseware developers are discussed.

BNCOC DOCUMENTATION AND REPORTING

In general, the following three categories depict the various types of BNCOC reporting and documentation requirements:

o   The student's individual course folder which includes documentation for each Prerequisite Task and each 19K BNCOC Task including:
  - A copy of each test or retest (including checklists)
  - Completed Counseling reports (DA Form 4856-R)
  - A summary sheet indicating the status of each task (DA Form 3847), BNCOC Questionnaire (ATNG Form 44-05 (1/May/84)), Army Physical Readiness Test Scorecard (DA Form 705), and
  - Leadership Reports

o   The Master Record, a summary sheet listing each soldier enrolled in the course, includes the following information for each Prerequisite and 19K BNCOC task:
  - The name and number of each student enrolled in the course,
  - Results of each test (GO/NOGO), and
  - The number of attempts required to successfully master the task.

o   End of course documentation which includes:
  - Annotation to the DA Form 201, Military Personnel Record Jacket (MPRJ), and
  - Historical data summaries to DOES.

These requirements outline both the instructional and administrative needs associated with each 19K BNCOC cycle. Reporting and documentation procedures completed during or at the conclusion of each course cycle have been established by 19K BNCOC personnel to meet these requirements. Each is briefly discussed below.

COURSE CYCLE REPORTING PROCEDURES

During the BNCOC cycle, administrative reporting procedures and data needs can be grouped into three phases.

In-Processing: The 19K BNCOC course cycle begins with Report Day, generally on the Friday prior to the first day of the regular BNCOC cycle. Instructors determine whether students meet the academic and physical prerequisites for BNCOC. Soldiers complete the BNCOC questionnaire at this time. Some of that information is required to determine whether the soldiers meet the prerequisite requirements for entering the 19K BNCOC program.

The second day, Day 0, which is usually the Saturday prior to the first day of the BNCOC cycle, the Diagnostic Tests which cover the 19K BNCOC prerequisite tasks are administered. If necessary, diagnostic testing is completed on Day 1 of the BNCOC cycle. Diagnostic tests will be administered in three modes:

- Hands-on tests using the M1 tank and other equipment;
- Paper/pencil performance tests; and
- MicroTICCIT on-line tests.

On-going status reports: Throughout the course cycle instructors track the students' performance on (1) prerequisite tasks including remedial activities and retesting; and (2) 19K BNCOC tasks. Instructors need to be able to determine each soldier's status at any given point in the course cycle to find out whether academic or non-academic counseling, remedial instruction, or retesting is required.

As each 19K BNCOC task is tested, soldiers receive either a GO or NOGO. Copies of all tests or checklists are placed in the soldier's folder. In the event of a NOGO, the soldier receives individual Academic Counseling which includes assignment of remedial activities. In the case of the paper/pencil performance tests, soldiers may be expected to do remedial work *during the evening and weekend study halls*; however, remediation and retesting may occur at the end of the regular class or whenever the instructor can make the arrangements. In the case of a NOGO on hands-on activities (which may occur in the field on the M1 tanks), instructors generally offer remedial instruction on the scene and conduct the retest on an individual as-needed basis as soon as it is convenient.

Each student's test or checklist is given to the Operations Sergeant who enters these test results on the Master Record (also called the Master Track) throughout the course cycle. The Master Record is continuously updated, as is the soldier's individual folder.

The Master Record lists each student's name, student number, and a brief description of each task. Scores are recorded as GO or (N1), (N2), (N3) or N3. The symbol, (N1), indicates that the soldier passed the first retest, (N2) indicates passing on the second retest, etc. A score of N3 without a circle indicates that the soldier received a NOGO on the third retest. Three retests is the maximum number permitted.

The Master Record includes scores for both the 19K BNCOC tasks and the Diagnostic Tests. The soldier's record may also include an "A" indicating that he was absent during testing. The soldier must receive a GO on each 19K BNCOC Prerequisite task and each 19K BNCOC task in order to successfully complete the program. In addition, instructors complete a leadership evaluation report on each soldier once each week throughout the course cycle using DA Form 1059. The 19K BNCOC CMI System, when implemented, will provide for automated computer-based storage of test results during the BNCOC cycle.

End-of-course documentation: At the end of each course cycle, the Master Record for 19K BNCOC showing scores on both Prerequisite and 19K BNCOC tasks is transmitted to the BNCOC Course Manager. When *implemented*, *the* CMI System will produce the BNCOC Master Record. Following the soldiers completion of a course, the appropriate form housed within his Military Personnel Record Jacket (MPRJ), DA Form 201, is annotated to show course completion.

COURSE EVALUATION AND IMPROVEMENT

In addition to the reports and documentation requirements of 19K BNCOC instructors and the Armor School, other departments and individuals have information needs. Those departments or groups include:

- o   The Director of Evaluation and Standardization (DOES),
- o   The Automated Information Management System (AIMS),
- o   The Army Research Institute (ARI), and
- o   MicroTICCIT project developers.

The Director of Evaluation and Standardization (DOES): DOES is charged with the task of collecting historical data about each soldier as well as performance data from the BNCOC course. A form was developed by ARI personnel to gather historical data which includes 37 items. BNCOC instructors currently use the ATNG Form 44-05 (1/May/85). It is expected that the form developed by ARI personnel will replace all other existing forms.

Data from the ARI form can be transferred to punched cards and entered into the DOES computer system via a card reader. A program has been developed to enter and process these data. No specific hypotheses or data summary formats were identified for use of these data during the CMI needs assessment phase of this project.

The Automated Instructional Management System (AIMS): AIMS (developed ʒy SysCom, Inc.) is a computer-managed instructional (CMI) system currentlʲ being installed at Ft. Knox primarily to manage courses at the post level. Although AIMS has the capability to deliver tests and computer-assisteɔ instruction (CAI) as well as to manage personnel and other resources, tʰe specific purposes for which the system will be used, particularly witʰ reference to BNCOC courses, are currently undetermined. A mechanical means of transferring historical and performance data collected by the InterAmerica CMI System for 19K BNCOC from the MicroTICCIT to AIMS is desirable. Such a method, however, does not currently exist due to both MicroTICCIT hardware and software restrictions. Also, AIMS at Fort Knox does not currently have software for analyzing and formatting BNCOC data or producing BNCOC reports.

ARI and MicroTICCIT Developers: Several projects are planned to develop MicroTICCIT courseware for 19K BNCOC. Each MicroTICCIT developer must develop an individual evaluation plan identifying the specific types of information required from the CMI System. In addition, each developer (using the ADAPT authoring process) will need to provide the data required by the CMI System in order to obtain required BNCOC reports. The primary data required by the CMI System are the test results for each 19K BNCOC Prerequisite or 19K BNCOC task which is scored as GO or NOGO on the Master Record. Complete instructions for MicroTICCIT developers with respect to interfacing MicroTICCIT projects to the 19K BNCOC CMI System developed by InterAmerica are specified in the manual entitled "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual" included as an appendix to this report.

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RESOURCES FOR PART I

ADAPT System Functions (1984), Hazeltine Corporation.

ADAPT Reference Manual (1984), Hazeltine Corporation.

Application of Voice Technology to Armor NCO Training, Statement of Work, provided by the ARI staff.

Automated Instructional Management System (AIMS) documentation provided by ARI staff.

BNCOC Background Questionnaire, provided by the ARI staff.

BNCOC Reporting forms, provided by BNCOC course managers, operations sergeants, and instructors.

Interactive Videodisc Training for Army Land Navigation Skills, Statement of Work, provided by the HumRRO staff.

Interviews with BNCOC instructors, administrative sergeants, course managers, AIMS personnel, DOES personnel, and ARI staff.

Introduction to RDOS (1983), Data General Corporation.

Introduction to TICCIT Operations (1984), Hazeltine Corporation.

MicroTICCIT Coordination Meeting (December 18, 1984), organized by InterAmerica at HumRRO.

19K BNCOC and 19E BNCOC course documentation including Program of Instruction (POI), Unit Training Schedules and Reporting Forms.

19K BNCOC (19 Oct. - 30 Nov. 84), Unit Training Schedule.

RDOS/DOS Command Line Interpreter (1983), Data General Corporation.

TICCIT System Utilities (1984), Hazeltine Corporation.

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PART II. The 19K BNCOC CMI SYSTEM

The 19K BNCOC CMI System developed by InterAmerica for the 19K BNCOC course consists of two TICCIT courses that are implemented on MicroTICCIT. The purpose of the System is to manage the entire 19K BNCOC course including on-line and off-line instruction and testing and to produce the 19K BNCOC Master Record. The design of the CMI System is based on a match of MicroTICCIT capabilities and the needs assessment presented in Part I of this report.

The System utilizes the MicroTICCIT CMI capabilities and includes two software components written in ADAPT which run in the MicroTICCIT environment. They are:

o   19K BNCOC For Tank Commanders (Course 19) which stores
      all of the on-line BNCOC courseware on MicroTICCIT, and
o   The 19K BNCOC CMI System (Course 20) which includes the
      off-line data entry system and modules which produce
      the BNCOC Master Record.

This section of the report provides a discussion of the design of the CMI System and a description of each of these TICCIT courses. Prior to these discussions a brief description of the CMI MicroTICCIT capabilities is provided.

MicroTICCIT CMI CAPABILITIES

The CMI System developed by InterAmerica will be implemented on the Hazeltine MicroTICCIT system which consists of a Data General Host and MicroTICCIT terminals. MicroTICCIT software components are the Data General disk operating system (RDOS), the TICCIT operating system (MPOS), and the TICCIT authoring language (ADAPT). The system hardware and software are fully described in Part I of this report. The TICCIT operating system and the ADAPT language are primarily designed for the purpose of developing and delivering courseware. MicroTICCIT's main purpose is to present instructional activities as compared to a system developed to collect and manage data and to produce reports. ADAPT courses, however, automatically collect a great deal of information about the students' performance in a course which is stored in disk files and used by TICCIT to produce "Student Progress Reports."   Student Progress Reports are the main CMI capability of MicroTICCIT. Instructors may access them through menus found in a TICCIT course called "Course 0" (See footnote #1).   These reports may be displayed on the MicroTICCIT screen or printed using a line printer.   Additional information about MicroTICCIT's CMI utilities is included below.

TICCIT REPORTS

Although none of the existing TICCIT data reduction utilities meets the specific instructional and/or administrative needs identified in Part I of this report, several TICCIT CMI utilities are available. Several of the data reduction utilities which relate to the 19K BNCOC CMI System are discussed below.

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Student Progress Reports Menu: The Student Progress Reports menu, available from Course 0's Instructor Menu, lists the student performance reports which are accessible at the MicroTICCIT terminal. Instructors may request data for an individual student or an entire class. Data are available for specific units or an entire course. All of these reports may be displayed on the terminal or printed via a line printer. The Student Progress Reports utility can be used by BNCOC personnel to track a student's progress through the parts of 19K BNCOC course which are conducted on MicroTICCIT. This TICCIT utility cannot be used to track off-line activities or to produce the BNCOC Master Record.

Notes Utility: The Notes utility reports on-line comments entered into the system by users. Students or other users press the NOTE key on the MicroTICCIT keyboard at any location in a course and enter comments using the keyboard. They may sign a message or remain anonymous. After entering the message, the user returns to the course at the location where he was working. Notes information is saved on a logging tape or in a disk file and is accessed through the NOTES utility found in Course 0.

NOTES is useful to developers in gathering informal evaluation data during a pilot test of courseware. Information gathered in this environment could also be useful to BNCOC instructors and course managers.

Item Analysis: "Print Selected Item Analysis" is an option listed or a TICCIT Course 0 menu. To gather item analysis data the logging tape must be turned on. When the logging tape is on, TICCIT saves information about every keystroke made by a user in a course. To obtain a printed copy of the item analysis, the TICCIT operator uses the "off-line" ITEMS utility which prints out the report. Item analysis reports are of interest to course developers or evaluation specialists. These data must be loaded from the logging tape on the disk in order to be processed. Item analysis data requires a large amount of disk space and should be archived on tape following the running of the item analysis reports.

MAKECOURSE AND PERMANENT DATA AREAS

Makecourse is a TICCIT utility which is of primary importance to the CMI System. Authors use it to establish the course structure, e.g., the number of units and lessons in each unit. All of the information about the course structure is stored in a disk file called the course template. The name of this file begins with the prefix "PDA" which stands for permanent data area.

When a student is registered into a course, TICCIT creates an individual permanent data area using the course template which stores his performance data as he works in the course. These disk files have the extension .PD. The contents of these individual data files will be accessed by the CMI System to store student performance data and to retrieve data to produce the BNCOC Master Record.

ADAPT/MicroTICCIT CMI CAPABILITIES

ADAPT is a high level computer language especially designed to develop courseware. ADAPT contains a few file management commands which allow a programmer to create files, write to those files, and to retrieve the information in them. APT, the second language on the system, is also used to manage courseware. Selected features of these languages that relate to the CMI System are discussed below.

Student Record Data Base Symbols: The Student Record Data Base Symbols, an external symbol file, includes one function called "SRDBI." This function allows programmers to read data stored in a student's permanent data file (files with the .PD extension) and to write directly to those files. This capability was used to develop a system for entering results of BNCOC tests conducted off-line and to combine those results with on-line test results to produce a single BNCOC Master Record.

TICCIT Maps: The basic method for managing the CMI features of an ADAPT course is the TICCIT map which must be created using APT. The CMI System developed by InterAmerica for 19K BNCOC does not use TICCIT maps to manage BNCOC courseware; rather, a special set of menus were designed to manage the 19K BNCOC course.

ADAPT Menus: Use of TICCIT maps to access parts of a TICCIT course requires use of the MicroTICCIT keyboard including the special MicroTICCIT function keys. ARI policy which guided the InterAmerica project specified that all courseware be light pen driven. That is, students would move through the courseware and enter responses using the light pen and not the keyboard. The InterAmerica project staff, therefore, created menus for the CMI System using ADAPT. Complete documentation is included in the manual entitled "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual" which is included as an appendix to this report.

TICCIT Tests: Test Control Files written using the APT editor define the test files to be included in the master test, specify the point at which permission is needed for a student to enter a test, and provide other types of controls. The file structure for a test is made up of an APT Test Control File and one or more ADAPT Test Files. In addition to the ADAPT file which contains the test items, the author may create a Test Introduction file to introduce and explain the test and a Results file to display the results of the test to the student.

TICCIT tests may be given only at the lesson, unit, and course levels; a segment may have practice items which may be used to test the student's knowledge, but may not have a test. Performing satisfactorily on all of the lesson segments can be the criteria for passing a lesson. For more information about TICCIT tests and authoring considerations during test development, refer to the manual entitled "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual" included as an appendix to this report.

Attention and Proctor Functions: After logging on TICCIT, system users may press the ATT'N (attention) key to access a variety of functions. Most of the ATT'N functions have been turned off by authors during courseware development. However, the ATT'N function includes access to use of the Proctor functions which are important to the CMI System.

Use of Proctor functions is restricted to the TICCIT operator or instructors since these functions can only be accessed by typing in a system password. Most proctor functions are useful in courseware development; however, one function (Allow student to take a restricted test) is important to the CMI System users. All MicroTICCIT tests developed for 19K BNCOC are restricted; however, access to a test can be restricted or unrestricted according to author specifications. If the test is restricted, a password is required to gain access to the test. The password is entered via the Proctor function. By restricting access to tests, TICCIT promotes interaction between the student and instructor/proctor. Tests are also restricted for security reasons.

THE DESIGN OF THE CMI SYSTEM

As previously noted, the purpose of the CMI System developed by InterAmerica is to manage the entire 19K BNCOC course including on-line and off-line instruction and testing and to produce the 19K BNCOC Master Record (See footnote #2). The CMI System consists of two TICCIT courses:

1.   19K BNCOC For Tank Commanders (Course 19), and
2.   The 19K BNCOC CMI System (Course 20).

SYSTEM OVERVIEW

TICCIT Course Structure: To produce a Master Record which reflects the results of all 19K BNCOC testing, all student performance data associated with the 19K BNCOC program must be entered into the permanent data areas associated with one TICCIT course. These data are stored in the individual permanent data files associated with the TICCIT course, "19K BNCOC For Tank Commanders (Course 19)."

A TICCIT course structure is hierarchical with the course having a given number of units. Each unit can be divided into lessons; and each lesson is divided into segments. Only the number of units and lessons need to be specified at the time the course is created. For 19K BNCOC, task clusters are defined at the unit level, and tasks recorded on the Master Record as GO/NOGO are defined at the lesson level. See Figure 5, TICCIT Structure of 19K BNCOC.

FIGURE 5
TICCIT STRUCTURE OF 19K BNCOC

COURSE LEVEL:	19K BNCOC (including 19K BNCOC tasks and diagnostic tests and remedial training)
UNIT LEVEL:	Task Clusters, e.g. Land Navigation
LESSON LEVEL:	Tasks within a Task Cluster; the task level recorded on the Master Record as GO or NOGO
SEGMENT LEVEL:	Learning activities associated with Task objectives

Diagnostic Tests and Remedial Training: At the beginning of each BNCOC cycle, students are given a series of diagnostic tests to determine their mastery of designated prerequisite tasks. Those tests are included in the 19K BNCOC course structure as "Cluster L." The CMI System handles these diagnostic tests and remedial training as one unit (or Task Cluster) of the 19K BNCOC course on MicroTICCIT. Although this Cluster appears at the end of the 19K BNCOC Program of Instruction (POI), it is placed first on the course menu of the 19K BNCOC MicroTICCIT course.

Students begin using MicroTICCIT at the start of each BNCOC cycle by taking the battery of tests covering each of those prerequisite tasks which have a diagnostic test and corresponding training on MicroTICCIT. The "on-line" tests include the five prerequisite tasks selected for MicroTICCIT CAI development for InterAmerica's CMI project. The results of the remaining "off-line" tests must be entered by BNCOC personnel at the MicroTICCIT terminals using the CMI System's off-line data entry program which is a part of Course 20.

Results of the Diagnostic Tests are reported as a part of the BNCOC Master Record produced by the CMI System on a single page format in the same manner as the previous BNCOC Master Record which was produced manually.

Off-Line BNCOC Instruction and Testing: The majority of the 19K BNCOC tasks are instructed and tested off-line, i.e., not using the MicroTICCIT system. The results of the tests (scored as GO or NOGO) will be entered into the students' individual permanent data areas associated with 19K BNCOC's Course 19 using the off-line data entry program which is a part of Course 20. The programs in Course 20 allow instructors to enter information directly into each student's data file.

DATA ENTRY

The 19K BNCOC "data" required to produce the Master Record includes two types of information:

    (1) GO or NOGO results on each task (the test results), and
    (2) the number of test attempts, from one to three.

These data are entered in two ways:

    o   TICCIT automatically records data when students
         complete on-line MicroTICCIT CAI and tests; and/or
    o   Instructor or operations sergeant enter test results of
         the off-line tests using programs in Course 20.

DATA STORAGE

All test result and test attempt data are stored in disk files on MicroTICCIT. These data are stored in files associated with the 19K BNCOC MicroTICCIT course (Course 19) in files with .PD extensions. Other files are created by Course 20 to store test result data used to translate results into BNCOC codes and to print the Master Record. Complete

documentation regarding these files is included in the manual entitled "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual" included with the report.

DATA OUTPUT

There are two methods of retrieving 19K BNCOC test result data. First, instructors may view results by student or by class at the MicroTICCIT terminal by using the TICCIT utility, Student Progress Reports, which is part of TICCIT Course 0 (See footnote #3). TICCIT reports display the results of on-line student performance including the off-line data entered using Course 20. TICCIT reports can also be printed using the MicroTICCIT system's line printer.

Second, instructors may select to print the 19K BNCOC Master Record by logging on Course 20, the 19K BNCOC CMI System, developed by InterAmerica project staff, and select the appropriate option from the course menu.

DATA SECURITY

The integrity of BNCOC data is protected both at the entry and retrieval levels. All BNCOC tests are "restricted" which means that a student cannot take a test without intervention from a person who knows the "Proctor Password". This password is not the same as the user password which is used to log on the system. TICCIT Proctor functions cannot be accessed by users with student authorization codes unless this special password is entered. Restricting tests should help to assure that the test data are obtained from the correct student.

Log on procedures in BNCOC will be conducted by the TICCIT operator. Results of off-line tests can only be entered or changed using Course 20. Only authorized personnel should be registered in this course.

Retrieving BNCOC test results occurs by accessing the Student Progress Reports utility in TICCIT Course 0. Only registered users with an instructor's authorization code would be able to access the data in this manner. Data can also be displayed or printed using Course 20. As stated above, only authorized users should be registered in Course 20.

TICCIT Authorization Codes: Every registered TICCIT user has an authorization code assigned (see list below) at the time of registration by the TICCIT operator. If no authorization code is assigned, TICCIT assigns a student code by default. Every option on the standard TICCIT menus in Course 0 has a security level associated with it. These levels may be changed by the TICCIT operator using a TICCIT utility developed for that purpose. The following TICCIT security levels are available:

- STUDENT (ST),
- PROCTOR (PR),
- INSTRUCTOR (IN),
- OPERATOR (OP), and
- SYSTEMS PROGRAMMER(SY).

Students should be assigned a STUDENT (ST) authorization code which enables them to access only the Student Menu in Course 0. Students can also access Attention Functions (ATT'N) unless they are prevented from doing so by

courseware authors. Only ATT'N Off cannot be prohibited since a student would be unable to log off without using that command. Students may not access "Proctor Functions" without entering the Proctor Password; therefore they will not be able to access restricted TICCIT tests. To access a "restricted test," an instructor or proctor must enter the proctor password (See footnote #4).

TICCIT Modes: The "mode" refers to the way a course is presented to a user and also controls data collection by TICCIT. The system only collects test results and other performance data for users registered in STUDENT MODE.   During course registration, the TICCIT operator must assign the STUDENT MODE (ST) to students in "19K BNCOC For Tank Commanders," Course 19.   Instructors registered in Course 19 should be assigned an INSTRUCTOR MODE (IN).

USER INTERFACES

As both instructors and students use the 19K BNCOC CMI System (both Courses 19 and 20), the principal method of interacting with MicroTICCIT will be through the display screen and light pen. Several icons have been created such as a question mark (?) for on-line help. Users will mark these icons with their light pens. Students will also enter responses to activities or test questions using a light pen.

Using TICCIT Course 0 which contains the TICCIT utilities such as the Student Progress Reports will require instructors and TICCIT operators to use the MicroTICCIT keyboard including the function keys. Logging on and off MicroTICCIT also requires using the keyboard.

Instructors using Course 20 will use the light pen for the following:

- o   Menu selections,
- o   Icon selection, and
- o   Data entry, e.g.   GO/NOGO.

Students and Instructors using Course 19 will use the light pen for the following:

- o   Menu selections,
- o   Icon selection, and
- o   Data entry, e.g. selecting responses to activity or test items.

Students and Instructors will be required to use the keyboard for the following:

- o   Logging on and off MicroTICCIT. To log on, one must press the ATT'N key and type an identification number and course number; to log off, one must press ATT'N and type an "o." No other method is possible without creating assembly language level utilities.
- o   Accessing any part of Course 0 including all TICCIT utilities, e.g. the Student Progress Reports.
- o   Entering NOTES data requires pressing the NOTE key and typing information.

Course 19 was developed by the InterAmerica project staff as a means of organizing all of the 19K BNCOC MicroTICCIT courseware as one TICCIT course. This was necessary in order to produce one BNCOC Master Record. Course 19 contains all of the menus required to access all parts of the BNCOC course. Each part of the BNCOC course developed for MicroTICCIT can be placed in Course 19.

Course Menu: After logging on Course 19, the first screen displayed is the main menu which lists all of the 19K BNCOC Task Clusters including Cluster L, Diagnostic Tests and Remedial Training. The main menu has two pages. Figure 6, The BNCOC Course Menu, shown below illustrates the first page of that menu. On the MicroTICCIT screen, Task Cluster titles are displayed in cyan (light blue).

FIGURE 6: The BNCOC Course Menu
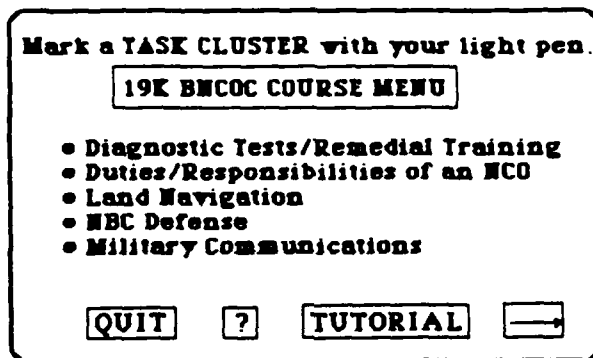
Course Icons: At the bottom of the course menu screen shown above as Figure 6, several icons are displayed. An icon is a symbol that prompts a student to take a certain action. For example, if the user marks the QUIT icon with his light pen, he will advance to a screen with instructions for logging off the system. The question mark icon (?) always takes the student to a help page which provides information about a specific section of the course. The right arrow always appears at the right corner of the screen and always advances the student to the next page in that particular section of the course. Likewise, the left arrow which appears at the left corner of the screen always returns the student to the previous page in that section.

On-Line Tutorials: Marking the TUTORIAL icon takes the student or instructor to a series of screens designed as a tutorial for Course 19. Instructions for using menus, the light pen, and other MicroTICCIT features are included. Actually, there are two versions of the tutorial on-line. One is designed for students and one for instructors. The version seen depends on the user mode assigned during registration.

Task Cluster Menus: The student selects a Task Cluster by marking its title with the light pen. The Task Cluster menu lists all of the tasks in that cluster, generally in the order that they appear in the BNCOC Program

of Instruction (POI). Tasks may be listed on more than one page depending on the number of tasks in that cluster. Students select a task by marking its title with their light pen. Task titles again appear in cyan. An example of a task cluster menu is shown below as Figure 7, BNCOC Task Cluster Menu.

FIGURE 7: BNCOC Task Cluster Menu

```
┌──────────────────────────────────────────┐
│                                            │
│   Mark an option with your light pen.      │
│  ┌──────────────────────────────────────┐ │
│  │ Cluster B: NCO Responsibilities/Training│ │
│  └──────────────────────────────────────┘ │
│                                            │
│    • Duties & Responsibilities of an NCO   │
│    • Conduct Performance Counseling        │
│    • BTMS                                   │
│    • Physical Fitness Instruction          │
│    • MILES                                  │
│                                            │
│         ┌───┐     ┌──────┐                 │
│         │ ? │     │ MENU │                 │
│         └───┘     └──────┘                 │
│                                            │
└──────────────────────────────────────────┘
```

If on-line instruction exists for that task, the student advances to that section of the course. Otherwise the program displays the message:

> Instruction and testing for this task are provided by your instructor.

On-line BNCOC Tests (off-line instruction): In a few cases, marking a task title will advance the student to an on-line BNCOC test where the instruction is provided off-line. The InterAmerica project staff developed three tests as examples of how existing BNCOC paper/pencil tests could be adapted for MicroTICCIT presentation in situations where instruction continued to be conducted in the field or the classroom. Those tasks are:

o   Conduct Performance Counseling with a Subordinate (Cluster B),

o   Estimate Range (Cluster I), and

o   Select Firing Position (Cluster I).

In these cases if the student marks the task title with his light pen, he will be presented with a menu listing the option "Take the test on this task." Students select to take the test by marking the menu item, "Take the Test". To actually access the test file, the Proctor Password must be entered by authorized BNCOC personnel.

Task Menus: Each MicroTICCIT developer will create the Task Menus which will be inserted into the 19K BNCOC for Tank Commanders course (Course 19). These menus will vary; however, procedures for accessing segments of instruction will be similar to the procedures described above. For example, students will use a light pen to make menu selections. They will enter responses using the light pen. They will require the Proctor Password to access restricted tests.

Diagnostic Tests and Remedial Training: Cluster L, Diagnostic Tests and Remedial Training, has been placed first on the 19K BNCOC Course Menu because it is the first part of the course which students complete.   This part of the course involves those tasks designated as "prerequisite" to the 19K BNCOC tasks included in the other Task Clusters.

In the 19K BNCOC course, students receive instruction and then complete tests. In this section of the course, however, students take the diagnostic tests first, and complete remedial training only for those tasks on which they received a NOGO.   Only five of the prerequisite tasks are tested and remediated on MicroTICCIT.   All others are tested and instructed off-line.

When the student selects this Task Cluster, the program displays the sub-menu displayed below as Figure 8, Diagnostic Tests and Remedial Training Menu.   If the student selects the third option, Off-line Prerequisite Tasks, the list of off-line tasks is displayed.   Remedial Training, Option 2, cannot be selected unless the Diagnostic Tests have been taken and failed.

FIGURE 8:   Diagnostic Tests and Remedial Training Menu

Registration Procedures for Course 19:   The TICCIT operator will register each student in Course 19 and assign a two-digit section number. Students will be assigned an identification number (ID), a user mode (ST), and an authorization code (ST). Students may be assigned a four character user password if desired (See footnote #5).   A maximum of 15 students may be registered in each section.

Instructors and others may also be registered into Course 19.   They should not be assigned a section number.   They should be assigned an instructor (IN) user mode and authorization code.   Passwords are optional.

To log on to TICCIT, students (or their instructors) will enter their ID, and their password (if one has been assigned).   If students are registered for only one course, they do not need to know the course number since entering their ID and pressing ENTER will advance them to that course. Otherwise, they should enter course number "19".

If desired, 19E BNCOC or other groups of students may be registered for Course 19, "19K BNCOC For Tank Commanders."   They must be assigned a different section number.   A separate BNCOC Master Record can be created using Course 20, The 19K BNCOC CMI System, for each section registered in Course 19.

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THE 19K BNCOC CMI SYSTEM (Course 20)

Course 20, The 19K BNCOC CMI System, was developed by the InterAmerica
project staff to allow an instructor to log on one time and enter test
results for an entire class for off-line tasks. Course 20 was written
using the ADAPT courseware authoring language and has the same structure as
other TICCIT courses, i.e., course, unit, lesson, segment. Course 20 must
be used in conjunction with Course 19. To use the System, the instructor
must be registered in Course 20. Students must be previously registered in
Course 19. A complete set of instructions for installing the courseware and
registering students is included in the manual entitled, "The 19K BNCOC
MicroTICCIT Site Manager and Operator's Manual" included with this report.

For each set of test results, the following procedures would be followed by
the instructor/operations sergeant:

- o   Log on Course 20,
- o   Enter the course and section number of the students in
       question,
- o   Select the option "Enter Off-Line Test Results,"
- o   Select the appropriate Task Cluster from the Course
       Menu,
- o   Select the appropriate Task from the Task Cluster Menu,
       and
- o   Enter test results for each student.

The Course 20 program will present the name of each student enrolled in the
course and prompt the instructor to enter test results. The instructor
indicates whether the student received a GO or NOGO for each test attempt.
Test results are stored in the students' data file and in a disk file
created by Course 20 which is used to print the 19K BNCOC Master Record.

Students must be registered in Course 19 and assigned to a section in order
to use the CMI System. The number of students in each section cannot
exceed 15; however, multiple sections (up to 100) can be created.

It is important, however, to understand that a student's permanent data
files are destroyed by TICCIT when the student is dropped from the course.
Making changes in the course structure requires students to be dropped and
re-registered. Therefore, it is important that NO changes be made to a
course template (PDA019000) during a BNCOC cycle (See footnote #6). At the
end of a BNCOC cycle, students' permanent data files can be archived on
tape using the TICCIT PDADUMP utility.

Course Menu: After logging on Course 20, the first screen displayed is the
main menu which lists all of the options available to instructors and
operators. Figure 9 below, "The Course 20 Main Menu," illustrates those
options. The TICCIT operator will need to register students in Course 19
and establish the TICCIT Roster File. The overview below focuses on the
uses of the System by BNCOC personnel.

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FIGURE 9: The Course 20 Main Menu

```
 _____
|                                        |
|    Mark an option with your light pen. |
|         _____           |
|        |    MAIN MENU       |          |
|        | 19K BNCOC CMI SYSTEM|         |
|         --------------------           |
|                                        |
|    ● Identify Course and Section       |
|    ● Create/Update Master Record File  |
|    ● Review CMI Roster                 |
|    ● Enter Off-Line Test Results       |
|    ● Print BNCOC Reports               |
|                                        |
|                                        |
|      _____    ___    _____        |
|     |QUIT |  | ? |  | TUTORIAL |       |
|      -----    ---    ----------        |
|_____|
```
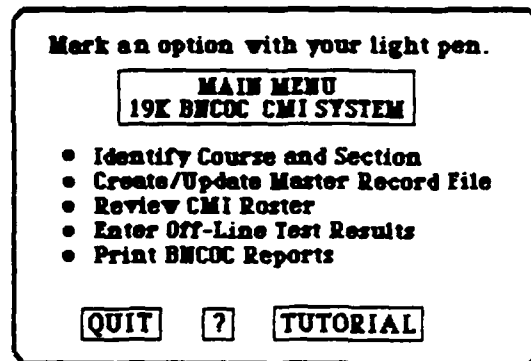
Course Icons: At the bottom of most display screens, icons are displayed. These icons closely parallel those used in Course 19 except where special symbols were required.

Tutorial: An on-line tutorial has been developed for Course 20 which explains in detail how to use each part of the course. Users access the tutorial by marking the TUTORIAL icon on the main menu with the light pen. In addition, help pages are placed throughout the course to provide assistance for specific parts of the program. The question mark icon (?) is the symbol for the help pages. Feedback messages also provide assistance to the user.

Identify Course and Section: Each time an instructor uses Course 20 to enter off-line test results or to print a BNCOC report, he must 'first enter the course and section number of his students.   The CMI System includes this option in order to assure the flexibility of the software and to allow it to be used in the future with courses other than "19K BNCOC For Tank Commanders" (Course 19).   Entering the section number also allows BNCOC personnel to use the System with multiple sections during each BNCOC cycle.

Users mark each number with the light pen to enter the course number. When the course number has been entered, they mark ENTER SECTION.   Then they mark the section numbers.   Finally, they mark MENU to return to the main menu.   They may start over if they make a mistake by marking the START OVER icon which erases the previously entered information from the screen.

Once a course and section are chosen they become visible on the main menu. All options chosen from the main menu will reference the indicated course and section until changed by identifying a new course and section or logging off from Course 20 completely.

Figure 10, "Identify Course and Section," illustrates the screen instructors will use. Course 20 requires users to enter responses with a light pen rather than the MicroTICCIT keyboard.

FIGURE 10: Identify Course and Section

```
------------------------------------------------------------
COURSE:                  SECTION:

   1    2    3    4    5    6    7    8    9    0

START OVER        ?        MENU            ENTER SECTION
------------------------------------------------------------
```

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Create/Update the Master Record File: Only TICCIT operators should access this option which must be selected once at the beginning of each cycle. This part of the program creates the files that store student performance data used to create the BNCOC Master Record. Complete technical documentation is included in the manual entitled "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual" included as an appendix to this report.

Review CMI Roster: If instructors would like to see the names of students enrolled in a particular section of Course 19, they may access this option after they have entered the course and section number in option one (see above). The CMI System will display the TICCIT Identification Number and name of each student enrolled in the specified section.

Enter Off-Line Test Results: This option allows BNCOC personnel to enter the test results for tasks which occur off-line into the same TICCIT data files which store the results of student performance on tests taken on-line. Naturally, they must first have selected option one, Identify Course and Section.

The menus which were displayed in Course 19 showing the Task Clusters and Tasks are duplicated here in Course 20. Instructors locate the Task for which they wish to enter off-line test results by selecting the appropriate Task Cluster from the "Course Menu" and then selecting the appropriate Task from the "Task Cluster" menu.
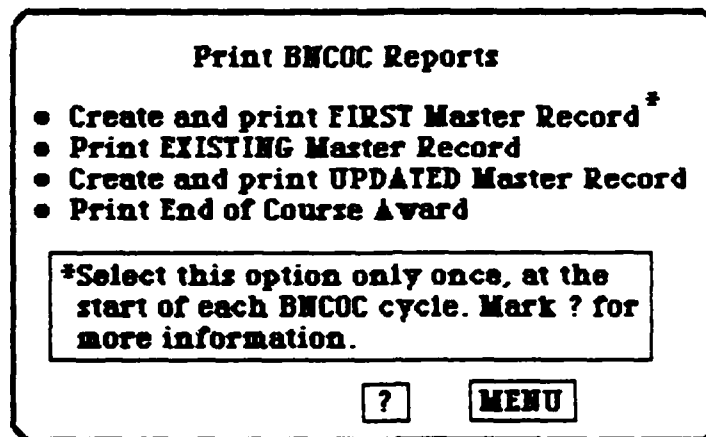
Once the appropriate task has been identified, the off-line data entry screen will be displayed. Figure 11, "The Off-Line Data Entry Screen" is shown below. Like other parts of the course, the bottom of the screen contains special icons that prompt the user to take specific actions. The right arrow in this case advances the program to the next student on the roster. NO ATTEMPT wipes out previously entered test data and returns the student's status to "No attempt." The MENU icon takes the user back to the Task Cluster menu so that another Task may be selected in that Task Cluster if desired.

FIGURE 11:   The Off-Line Data Entry Screen

```
-------------------------------------------------------------
Task Cluster:                             Task:
Title:
Student Name:
Student ID:
-------------------------------------------------------------
                      TEST ATTEMPTS
-------------------------------------------------------------
GO  NOGO              GO  NOGO                  GO    NOGO
-------------------------------------------------------------
NO ATTEMPT            ?                  MENU
-------------------------------------------------------------
```

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Print BNCOC Reports: The final selection on the main menu of Course 20 takes the user to a submenu listing choices within this portion of the program.   Figure 12, "Print BNCOC Reports," shown below illustrates those options.

FIGURE 12:   Print BNCOC Reports

Print BNCOC Reports

● **Create and print FIRST Master Record**[*]
● **Print EXISTING Master Record**
● **Create and print UPDATED Master Record**
● **Print End of Course Award**

[*]**Select this option only once, at the start of each BNCOC cycle. Mark ? for more information.**

| ? | | MENU |

o   Create and Print FIRST Master Record: This option is used only by the TICCIT operator.   This part of the program establishes the Master Record files associated with the CMI System which are required to print the BNCOC Master Record.   Ordinarily, it will be accessed only once during a BNCOC cycle. Complete documentation for this option is included in the manual entitled "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual."

o   Print EXISTING Master Record: Selecting this option prints the BNCOC Master Record.   The system's line printer must be connected, turned on, and ready to operate.   The Master Record will reflect all test results which have been entered into the system as of the last "Update."   To update the Master Record file, see the next option.

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o   Create and print UPDATED Master Record: Selecting this
    option causes the program to read each student's data
    file and place the results of all tests (off-line and
    on-line) which have been entered into the system in the
    CMI System's Master Record files. The CMI System uses
    the ADAPT SRDBI function to read each data area
    individually. Since there are 61 test results in the
    current BNCOC course and as many as 15 students in a
    section, there could be as many as 732 separate system
    actions. In each case TICCIT loads the student's data
    file into memory, reads the designated area of the
    file, closes the file and stores that information in a
    variable created by Course 20. Eventually, all data
    are rewritten into the BNCOC Master Record files
    created by Course 20. This explanation is included to
    indicate the complexity of the operation involved and
    to explain why this option requires a rather lengthy
    delay. TICCIT will continue to operate courseware on
    other terminals while this procedure is going on.

Results on the Master Record form are coded as shown below.

> NA --- No attempt
> G1 --- Go on first attempt
> G2 --- Go on second attempt
> G3 --- Go on third attempt
> N1 --- Nogo on first attempt
> N2 --- Nogo on second attempt
> N3 --- Nogo on third attempt

A sample Master Record form is included in Part XIII, Recordkeeping, in
"The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual".

o   Print End-Of-Course Award: This option produces a list
    of all students registered in an identified section of
    Course 19 and the number of NOGO's they received during
    the BNCOC cycle. The student with the least number of
    NOGO's would be the highest ranking student in that
    particular cycle. This report was created to assist
    BNCOC instructors in identifying students for preparing
    end-of-course awards. Data used to produce this report
    include only results of 19K BNCOC tasks and do not
    include results of diagnostic tests for prerequisite
    tasks.

THE CMI SYSTEM CAPACITY AND RESTRICTIONS

o   A maximum of 100 sections numbered from 00 to 99 can be
    created on TICCIT at any one time for each course.

o   Each section can have a maximum of 15 students. This
    restriction is imposed by the CMI System, not
    MicroTICCIT.

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o   Data can be archived on tape at the end of each BNCOC
    cycle using the TICCIT utility PDADUMP.

o   Under no circumstances should Course 19 or Course 20 be
    modified using the TICCIT Makecourse utility during a
    BNCOC cycle.

o   Students may be dropped or added to a class roster
    during a BNCOC cycle; however, dropping a student
    erases from the disk any data collected for that
    student, completely and permanently. For this reason,
    dropping a student from the class roster in the middle
    of a BNCOC cycle is not recommended. In this case, the
    student should remain on the class roster and the CMI
    system will automatically enter that "no results (NR)"
    are recorded on tests that were not taken by the
    dropped student.

TRAINING AND SUPPORT
INSTRUCTOR TRAINING REQUIREMENTS

The training requirements associated with the 19K BNCOC CMI System requires
the training of all instructors via a workshop which covers basic
information about MicroTICCIT and the BNCOC Courseware on the system.
Because all BNCOC instructors (not only the 19K BNCOC instructors) rotate
study hall duty, they should all attend the training workshop.

TRAINING MANUAL

"The 19K BNCOC MicroTICCIT Tutorial and Reference Manual for Instructors"
included as an appendix to this report was designed to address the BNCOC
instructor training requirements and includes all necessary workshop
materials as well as a reference section. The Manual includes training
objectives, a suggested training schedule, and a workshop outline. It also
includes a glossary and an index.

Topics in the Tutorial Section are:

o   Parts of the MicroTICCIT System
o   Roles of MicroTICCIT Users
o   19K BNCOC Courses on MicroTICCIT including:
        The 19K BNCOC For Tank Commanders, Course 19
        The 19K BNCOC CMI System, Course 20, and
        TICCIT Menus and Utilities, Course 0.
o   TICCIT Registration
o   The Proctor Password
o   TICCIT Courseware Structure
o   Student Performance Data and Reports
o   Other Kinds of Information (Logging Tapes and NOTES data)

Topics in the Reference Section are:

o   Bringing TICCIT Up
o   Logging On Procedures

- o   Overview of 19K BNCOC on MicroTICCIT: Course 19
- o   Giving Students Access to Restricted Tests
- o   Diagnostic Tests and Remedial Training
- o   19K BNCOC CMI System: Course 20
- o   The Instructor Menu
- o   Using the Light Pen
- o   Using the Keyboard
- o   Using the NOTE Key
- o   TICCIT Colors and What They Mean
- o   Feedback Messages and What To Do
- o   Attention Functions
- o   Proctor Functions
- o   Using the Videodisc Player
- o   Logging Off Procedures
- o   What's On Line?

INSTRUCTOR TRAINING METHODS

The suggested instructor training includes a group orientation session and individual on-line instructions using the printed Manual. All BNCOC instructors should receive a copy of the Manual for their personal use.

In addition, an on-line Tutorial for Instructors has been developed as a part of the 19K BNCOC For Tank Commanders, Course 19. Users must be registered with an Instructor Mode to access this Tutorial. An icon appears on the course menu which takes users to the Tutorial.

An on-line Tutorial has also been developed for Course 20 which provides complete instructions on using the CMI System. Several "Help" pages are also incorporated in this course.

STUDENT TRAINING REQUIREMENTS

Students will not be involved with entering test results or otherwise directly interacting with the CMI System. They will require general instruction on the use of the MicroTICCIT system including:

- o   Log on and log off procedures;
- o   General introduction to TICCIT courseware; and
- o   Using the Menus and interpreting color codes.

STUDENT TRAINING METHODS

An on-line Tutorial has been developed as a part of the 19K BNCOC For Tank Commanders, Course 19, which is accessed through an icon on the course menu. Only users with a STUDENT Mode (ST) will be able to access this version of the Tutorial. It provides all of the instruction students will require to use MicroTICCIT and to access courseware using the Course 19 menus.

TICCIT PERSONNEL

Three types of TICCIT staff have been identified for support of TICCIT sites. While the functions of these positions will be combined in a small site, they fall into discrete categories.

- o **The Site Manager:** The individual responsible for managing system resources, scheduling system use, managing maintenance procedures and system environments, and developing procedures for routine maintenance and courseware development.

- o **The TICCIT Operator:** The individual responsible for carrying out day to day procedures such as bringing the system up, shutting it down, monitoring terminal use, solving minor system problems, backing up the system, loading the logging tape, transferring courseware to tape, and other duties.

- o **The Proctor:** The individual responsible for assisting students with instructional needs as well as system problems. This individual must be familiar with the courseware as well as the system operations.

SMALL SITE MANAGEMENT AND TRAINING REQUIREMENTS

At small sites all three types of roles might be performed by the same individual; at larger sites more than one TICCIT operator and/or more than one Proctor might be required. The essential difference between a Site Manager and a TICCIT operator is that a Site Manager develops procedures, routines, etc. and an operator carries those procedures out. Therefore, an operator need not have an extensive computer background, although familiarity with ADAPT is useful. The Site Manager, however, should have experience or training with RDOS, the Data General disk operating system as well as knowledge of the TICCIT operating system (MPOS) and the ADAPT language. Proctors will require hands-on training with the system which may be provided by the operator or site manager. The training should include a thorough explanation of TICCIT menus, Attention and Proctor functions as well as the structure of courseware they will be monitoring. Proctors should also know how to access printed reports as well as how to use and service the printer. Proctors also must know how to identify and load videodiscs for various parts of the course. Tasks assigned to each type of TICCIT personnel are listed in Figure 13, "Roles of TICCIT Personnel."

SYSTEM SUPPORT

The technical documentation for installing and maintaining the CMI system is included in this report in the manual entitled "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual." The CMI system must be maintained by an individual with the types of skills described under TICCIT Site Manager above. Both Course 19, 19K BNCOC for Tank Commanders, and Course 20, The 19K BNCOC CMI System, can be modified to accommodate changes in the 19K BNCOC program. Detailed instructions are included in the Site Manager and Operator's Manual. Personnel making those changes, however, must have ADAPT programming skills.

FIGURE 13
Roles of TICCIT Personnel

TICCIT SITE MANAGER
- Manage system resources.
- Schedule system use.
- Establish procedures related to routine daily tasks; develop macro files for performing routine tasks as needed such as UP, DOWN
- Manage system environments (data bases) and creates additional environments as need, monitors existing environments, and develops procedures for their maintenance.
- Develop routines (procedures) for monitoring courseware development and activities.
- Develop command files to maintain records of courseware files and to clean up unwanted disk files.
- Manage system security.
- Install new TICCIT software releases and generates new operating systems when necessary.
- Conduct training of TICCIT operators and Proctors as needed; may also provide initial training to students
- Handle courseware errors which occur and may make minor modifications to courseware as needed
- Call Hazeltine for service when necessary; handle service contracts.

TICCIT OPERATOR
- Bring the TICCIT Up.
- Turn on MicroTICCIT terminals and the videodisc players.
- Manage logging tapes .
- Handle routine problems encountered by users.
- Bring TICCIT Down and make a back-up tapes .
- Bring down TICCIT at the close of the day.
- Assist instructors and other users with printing reports; service printer.
- Install and transfer courseware.

TICCIT PROCTOR
- Provide assistance regarding use of the MicroTICCIT keyboard and special function keys.
- Provide assistance to instructors who need to access on-line student progress reports.
- Provide assistance in the use of videodiscs; identify discs which match specific courses or units within courses.
- Assist students or instructors through the TICCIT "PROCTOR" functions.
- Bring the system UP or DOWN when necessary; Load the logging tape; and perform other routine tasks.
- Manage print materials associated with the courseware.

RESOURCES FOR PART II

ADAPT Reference Manual (1984), Hazeltine Corporation.

ADAPT System Functions (1984), Hazeltine Corporation.

Introduction to RDOS (1983), Data General Corporation.

Introduction to TICCIT Operations (1984), Hazeltine Corporation.

Meetings and discussions with Hazeltine personnel, October through December 1984.

MicroTICCIT Coordination Meeting (December 18, 1984) organized by InterAmerica at HumRRO.

19K BNCOC Program of Instruction, Report Forms, Unit Training Schedule, and discussions with BNCOC instructors and course managers.

RDOS/DOS Command Line Interpreter (1983), Data General Corporation.

TICCIT System Utilities (1984), Hazeltine Corporation.

FOOTNOTES

1. Course 0 contains all of the on-line TICCIT utilities including access to the ADAPT and APT courseware editors. The main menu, called "The Supermenu", organizes utilities into submenus for instructors, operators, programmers, authors, and students. Access to submenus is restricted according to the authorization code assigned to users when they are registered. Instructors, operators, and other authorized personnel should be registered in Course 0. Students are not registered in this course and access the Student Menu using the Attention function.

2. MicroTICCIT course numbers are assigned arbitrarily by developers. The InterAmerica project staff chose "19" for the 19K BNCOC for Tank Commanders Course and "20" for the 19K BNCOC CMI System course. Since these numbers are used in all of the documentation including instructions for installing and using the system, they should be used at installation sites if at all possible. Duplicate course numbers at an individual site are not allowed by TICCIT.

3. TICCIT Course 0 was developed by Hazeltine Corporation and contains the TICCIT system utilities including the Student Progress Reports. The Report utilities are accessible from the Instructor Menu.

4. Be sure to distinguish between a user password which is used to log on MicroTICCIT and a proctor password which is used to access Proctor Functions from within a TICCIT course. A system recognizes only one proctor password at any given time.

5. Be sure to make a distinction between a user password and a System Proctor Password which will be used to access proctor functions and to give student access to restricted TICCIT tests.

6. Be sure to distinguish between the course template, filename PDA019000 which stores the structure of a course, and the individual data files created for each student registered in the course. The individual files have a .PD extension. Complete details are included in "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual."