ARI Research Note 86-79



# THE TRAINING INFORMATION MANAGEMENT SYSTEM: Phase II Functional Specifications

Perceptronics

for

ARI Field Unit at Presidio of Monterey, California
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U. S. Army
Research Institute for the Behavioral and Social Sciences

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The Training Information Management System (TIMS) is a computer-based system which can be used by Army personnel to collect and display training evaluation data during field training exercises, and to generate summary evaluation reports following the exercises. The TIMS has two major subsystems: the Electronic Clipboard System (ECS), and the Training Base Station (TBS). The ECS is a hand-held electronic field training and performance evaluation aid, which contains

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20.Abstract (continued)

and displays performance evaluation checklists and other associated information to allow a training evaluator to record the success or failure of a soldier in meeting the standards of performance for selected tasks. The TBS is a computer-based subsystem that maintains multiple checklist databases, transfers data to and from the ECS, and generates printed and displayed summaries of training performance. It is not field-portable, but resides at a fixed location (e.g., the unit headquarters). → to FED 19

This report documents the Training Information Management System's functional specifications.

The complete list of reports, of which this is volume 3, is as follows:

RN 86-85 THE TRAINING INFORMATION MANAGEMENT SYSTEM:
Phase II Final Report
Technical and Management Overview

RN 86-78 THE TRAINING INFORMATION MANAGEMENT SYSTEM:
Phase II Evaluation Report

RN 86-79 THE TRAINING INFORMATION MANAGEMENT SYSTEM:
Phase II Functional Specifications

RN 86-76 THE TRAINING INFORMATION MANAGEMENT SYSTEM:
User's Manual for the Training Base Station

RN 86-81 THE TRAINING INFORMATION MANAGEMENT SYSTEM:
Software Design Documentation for the
Training Base Station

RN 86-77 THE TRAINING INFORMATION MANAGEMENT SYSTEM:
User's Manual for the Electronic Clipboard System

RN 86-82 THE TRAINING INFORMATION MANAGEMENT SYSTEM:
Software/Firmware Design Documentation for the
Electronic Clipboard System

# TABLE OF CONTENTS

## 1.0 DOCUMENT PURPOSE AND SCOPE

This document presents the detailed system and subsystem requirements for the Phase II Training Information Management System (TIMS). As such, it presents the attributes of the TIM System that should be included in the Phase II system design, and against which the Phase II developed system and subsystems will be evaluated. This requirements document expands upon the requirments and constraints that are specified in the subcontract document with JPL (Subcontract No. 956863), and follows the specifications and guidelines of that subcontract document.

The following major sections are included herein:

- o TIMS Overview
- o TIMS System Level Requirements and Constraints
- o ECSP/Field Unit Requirements and Constraints
- o TBSE Requirements and Constraints

TIMS is being developed by the U.S. Army Research Institute, Presidio of Monterey Field Unit, as part of an overall program of developing advanced technology for training.

## 2.0 TIMS OVERVIEW

### 2.1 System Concept

The Training Information Management System (TIMS) is a concept for a computer-based system that can be used by Army personnel to collect and display training evaluation data during field training exercises, and to generate summary evaluation reports following the training exercises. The innovative part of the TIMS concept is the Electronic Clipboard Subsystem (ECS), a hand-held electronic field training and performanace evaluation aid. The Phase II ECS will contain and display performance evaluation checklists and other associated information to allow a training evaluator to record the success or failure of a soldier in meeting the standards of performance for selected tasks.

The second part of the TIMS concept is the Training Base Station (TBS) subsystem. The TBS is a computer-based subsystem that maintains multiple checklist databases, transfers data to/from the ECS, and generates printed and displayed summaries of training performance. The TBS will not be a field-portable subsystem, rather terminals to the TBS wil be available at fixed locations (e.g., the unit headquarters) . The TBS will have the potential for interface to any one of several existing or yet-to-be-developed Army training management systems. Depending on the configuration of the Army training management system, the TBS may reside in a computer that communicates with a larger training management system, or the TBS may be a software program that runs concurrently with existing databases in a larger training management system.

A third part of the TIM System is the databases that will be used and maintained by the ECS and TBS sybsystems. In this Phase II program these databases will consist of checklist data and the scoring vectors of individuals that are being trained.

The current Phase II program focuses on the development and demonstration/evaluation of a TIMS comprised of twenty (20) ECS field units and a TBS which meet the user requirements specified in this Phase II requirements document.

## 2.2 Hardware Approach

TIM System hardware, to be developed under the present Phase II program, consists of two types of units: (1) Electronic Clipboard Subsystem Prototype (ECSP)/Field Units, hand-held portable devices to display and collect field training and evaluation data; and (2) A Training Base Station Emulator (TBSE), which configures the hand-held ECSP/Field Units for field operation and summarizes and prints the collected data. The ECSP/Field Units and the TBSE will communicate with each other through a communication link. The ECSP/Field Units will be equipped with sufficient memory to hold the necessary training , evaluation , and personnel databases (as defined in detail in sections 3.2 and 3.3 below) for supporting a given field exercise (specifically, a Land Navigation, Gunnery, or STX exercise). They will also contain sufficient memory to store the scoring results associated with the evaluations conducted.

The TBSE will be implemented on a microcomputer with sufficient disk space to maintain all the required training, evaluation and personnel databases (as defined in sections 3.2 and 3.3 below) and the scoring data collected by the ECSP/Field Unit devices. An interactive terminal and high speed printer will provide an easy means for viewing the data gathered in the field.

## 2.3 Software Functions

The software functions of the TIM System will reside in the ECSP/Field Unit and TBSE subsystem processors as follows:

### 2.3.1 TBSE Functions - TBSE software will support the following primary functions

- o Creation/Editing of checklist-type training and evaluation databases
- o Entering of evaluator and personnel databases
- o Diagnosis of ECSP/Field Unit operating condition

- o Downloading of initial condition information and checklist and personnel databases to ECSP/Field Units, and uploading of scoring results from ECSP/Field Units

- o Display/printing of summaries of scoring results

2.3.2 ECSP/Field Unit Functions - ECSP/Field Unit software will support the following primary functions:

- o Receipt of initial condition information and checklist and personnel databases from TBSE

- o Diagnosis of the operability of selected system components

- o Interactive identification of evaluators, students, and training/evaluation checklists to be employed at a given date and time

- o Presentation of training data and interactive evaluation of checklist displayed items

- o Maintenance of field-collected scoring information

- o Selected utility functions, including a stopwatch function, screen display time-out function, and low-battery-power indicator function.

## 2.4 ECSP/TBSE Interface Requirements

### 2.4.1 General Interface Requirements

2.4.1.1 All communication of data between the TBSE and the ECSP/Field Units shall occur via the ECSP/TBSE interface, under the control of the TBSE.

2.4.1.2 The TBSE will automatically check to determine that an ECSP/Field Unit device is connected whenever the TBSE is to transfer information to/from the ECSP/Field Unit.

2.4.1.3 Data transfer between the TBSE and ECSP/Field Units will occur as follows: Uploading of information from the ECSP/Field Units to the TBSE will occur after selection of the "Update/Display Training Data" menu option displayed on the TBSE main menu. Downloading of information from the TBSE to the ECSP/Field Units will occur only under conditions where a checklist database has been specified.

2.4.1.4 The ECSP/Field Unit device clock, including date and time (day, month, year, hours, minutes), will be set automatically during data transfer from the TBSE, using the real-time clock information from the TBSE.

2.4.1.5 The TBSE will set the address for "start of execution" for the ECSP/Field Units.

2.4.2 ECSP/TBSE Interface Hardware Requirements

The TBSE will be connected to the ECSP/Field Units through a full duplex, asynchronous communication line and a connector that physically and electrically meet the requirements of EIA specification RS-232-C.

2.4.3 ECSP/TBSE Interface Software Requirements

2.4.3.1 Overview. The ECSP/TBSE interface software will include the Communication Module and two Utility Modules, one for downloading information to the ECSP/Field Units and one for uploading information from the ECSP/Field Units. These modules will reside in, and be controlled by, the TBSE.

2.4.3.1.1 Communication Module. The communication protocol will support transfer (i.e., uploading or downloading) of data between the TBSE and ECSP/Field Units at 9600 baud using a word structure of eight (8) data bits, one (1) stop bit, and no parity.

The following messages will be supported:

- o Run diagnostics
- o Return diagnostics
- o Set date and time
- o Execute program
- o Download data
- o Upload data request
- o Upload data response

2.4.3.1.2 Utility Modules - These modules will support the uploading and downloading of data to and from the ESCP/Field Units, and will support other functions such as "set time and date" and "run diagnostics".

## 3.0 TIMS SYSTEM LEVEL REQUIREMENTS AND CONSTRAINTS

### 3.1 Phase II TIMS Configuration Requirements

The Phase II TIMS shall be comprised of twenty (20) Electronic Clipboard Subsystem (ECS) Field Units and a Training Base Station (TBS).

### 3.2 Phase II Checklist Database Requirements

The Phase II TIMS Checklist Data Base will be comprised of the following data , as provided by the Fort Knox Armor School on 11 July 1985:

3.2.1 Basic Noncommissioned Officer Course MOS 19K, Criterion Scoring Checklist (Day): Direct Main Gun/Machinegun Engagements on an M1 Tank

3.2.2 Basic Noncommissioned Officer Course MOS 19K, Criterion Scoring Checklist (Night): Direct Main Gun/Machinegun Engagements on an M1 Tank

3.2.3 Basic Noncommissioned Officer Course MOS 19E, Criterion Scoring Checklist (Day): Direct Main Gun/Machinegun Engagements on an M60A3 Tank

3.2.4 Basic Noncommissioned Officer Course MOS 19E, Criterion Scoring Checklist (Night): Direct Main Gun/Machinegun Engagements on an M60A3 Tank

3.2.5 US Army Armor Center and School; Fort Knox, Kentucy Annex A; 19E/K BNCOC/CA STX A, Items 25-29

3.2.6 Criterion Scoring Checklists for Land Navigation, as follows:

a. Orient a Map to the Ground by Map-Terrain Association

b. Determine a Location on the Ground by Terrain Association

c. Orient a Map Using A Compass

## 3.3 Phase II TIMS Personnel/Unit Database Requirements

The Phase II TIMS Personnel/Unit Data Base shall support the following:

3.3.1 Basic Non-Commissioned Officer Couse (BNCOC) Students: forty (twenty per MOS for two MOS's)*

3.3.2 BNCOC Instructors/Evaluators: 10 (five per MOS for two MOS's)*

*As per requirements stated by Fort Knox Armor School representatives (including the head of BNCOC) on 11 July 1985.

## 4.0 ECSP FIELD UNIT REQUIREMENTS AND CONSTRAINTS

### 4.1 ECSP/Field Unit Assumptions

The following assumptions are made about the use of the Phase II ECSP/Field Units:

- The ECSP/Field Units will be used to support individual soldier (BNCOC) field training/evaluation during a Phase II evaluation at Fort Knox; specifically, during Land Navigation, Gunnary and STX training exercises. Instructors/evaluators will pick up ECSP/Field Units and then accompany soldiers to the field. There the evaluators will employ the hand-held ECSP/Field Units to present selected Checklist database information that can be used either to cue events when "running through" or training selected tasks, or as a list of items to be scored as GO or NO GO (NOT SEEN, NOT DONE) during evaluation.

- An evaluator may choose to work in one of two ways while performing evaluations: (1) The evaluator may follow one soldier through the performance of tasks on a series of checklists, in which case he would need to select a new checklist after scoring a previous checklist; or (2) The evaluator may score many different soldiers on one checklist, in which case he would need to identify a new soldier after scoring a checklist.

The implication of these two approaches for system use is that the access to the data (e.g., via menus) should be structured to facilitate both.

## 4.2 ECSP/Field Unit Hardware Requirements

### 4.2.1 Display Requirements

4.2.1.1 The ECSP/Field Units will have dot matrix Liquid Crystal Displays (LCD) and associated drive electronics. The display size shall be 640 x 200 pixels within an 8.82" x 3.86" display area. The characters shown on the display shall be constructed with an 8 x 10 matrix, with a dot size of 0.31mm x 0.45 mm. The display shall be capable of presenting a maximum of 80 characters per line and 20 lines per screen.

4.2.1.2 The display will be rear illluminated for nighttime use by an electroluminiscent panel. The brightness of the illumination source will be reduced so as to decrease the possiblity of detection of the soldier using the device. A switch will be available on the front of the ECS to allow activation of the night illumination. (Note that deactivation of the illumination will be via a software time-out function).

### 4.2.2 Memory Requirements

4.2.2.1 The ECSP/Field Units will be configured with 256K bytes of CMOS RAM (read/write) and associated read/write electronics sufficient to accommodate the Checklists Database specified in requirement 3.1 (above), the Personnel Database specified in requirement 3.2 (above), and 600 scoring vectors (each with up to 100 scores). Memory space will also be sufficient to allow for a minimum growth potential of 30%.

4.2.2.2 The ECSP/Field Units will contain 32 k bytes of EPROM and associated read only electronics sufficient for erasable storage of the ECSP/Field Unit operating system and applications software.

4.2.3 Power Requirements - Power will be provided to the ECSP/Field Units by a battery unit with the following characteristics:

4.2.3.1 Rechargeable nickel/cadmium batteries of sufficient capacity to support 80 hours of operating time with a 10% duty cycle for daytime operation or a 5% duty cycle during nightime (i.e., illumination-required) operation.

4.2.3.2 Rechargeable batteries of sufficient capacity to provide ECSP/Field Unit data storage for a minimum period of two weeks under non-operating conditions.

4.2.3.3 A display indicating ECSP/Field Unit operating time remaining and a low battery power safety "shut down" capability which causes the ECSP/Field Unit to shut down when the battery power remaining is sufficient only to retain the device memory.

4.2.3.4 A battery charging capability which, in conjunction with an external 110 V, 50-60 Hz, single-phase power source, will charge the batteries to full capacity in less than 8 hours.

4.2.3.5 The battery unit shall be nonremovable during normal use. The battery shall be removable only during maintenance operations (which will not be conducted in the field, but rather at the Subcontractor's facility).

4.2.4 Keyboard/Key Requirement

4.2.4.1 The ECSP/Field Units shall have an infrared touch panel with sufficient resolution to support 32 touch areas. The touch areas shall be configured into two arrays of 4x4 "touch keys".

4.2.4.2 The "keyboard" created by the use of the touch panel and the programmable keys shall be sufficient for supporting the following ECSP/Field Unit operating functions:

- o Operating mode display/selection
- o Personnel display/selection
- o Drill display/selection
- o Entry correction/cancellation
- o Scroll up/down
- o Task Go/No Go/Not Seen/Not Done annotation
- o Stopwatch timer start/stop/reset

4.2.4.3 Dedicated keys shall be available on the front of the ECSP/Field Units to support the following functions:

- o Power on
- o Display illumination on

4.2.5 Real Time Clock Requirement

4.2.5.1 Real time clock (hours/minutes) and calendar (month, day, year) functions will be supported, to include the display of date and time on the front of the ECSP/Field Unit .

4.2.5.2 Non-volatile storage will be available to support the real time clock and calendar functions.

4.2.6 Microcontroller Requirements - The microcontroller for the ECSP/Field Units shall be capable of supporting all of the data processing and control functions necesssary for ESCP/Field Unit operation, and shall allow for future expansion to include a keyboard. More specifically the microcontroller shall contain the following: a Z80 microprocessor, two (2) serial ports, a DMA access channel, and counter/timers.

4.2.7 Input/Output Electronics Requirements - The ECSP/Field Units will have input/output control electronics and an associated I/O port which are EIA RS-232 compatible and which support hardwire data transfer between the ECSP/Field Unit and the TBS, including the associated cabling.

4.2.8 Packaging and Environmental Requirements - The ECSP/Field Units are considered to be "subprototypes". As such they shall be subject to less stringent environmental constraints than would prototype or production units. More specifically, the ECSP/Field Units shall meet the following general packaging and environmental requirements and constraints:

4.2.8.1 The ECSP/Field Units package shall be as small as possible to facilitate handling and carrying, consistent with the items that must be included in the device (e.g., LCD display, batteries, printed circuit board). Packaging dimensions shall be as follows: 7.55" (height) by 11.50" (width) by 1.88" (thickness).

4.2.8.2 The ECSP/Field Unit shall be as light as possible, consistent with the enclosed items. The package (especially any handle) shall be designed to minimize the strain of carrying it in the nomal operating mode. The ECSP/Field Units shall not weigh more than five pounds, exclusive of any carrying case or strap.

4.2.8.3 The display frame shall be designed without right angle corners in order to facilitate cleaning of the display face.

4.2.8.4 The package shall contain the following labels:

- o "Power On" Switch shall be labeled "ON" (label shall be molded into the case)
- o The switch for activating the display nighttime illumination will be labeled "Light" (label shall be molded into the case)

- o The connector which supports the ECSP/TBSE data upload and download interface as well as the battery charger shall be labeled "RS-232/battery" (label shall be molded into the case)

- o A stick-on label shall be attached to the back of the case which describes selected critical environmental constraints

4.2.8.5 Temperature Range - Of the electrical components comprising the ECSP/Field Units, the LCD display is the most sensitive to temperature. Display specifications site the maximum operating temperature, under conditions of 95% humidity, as 104°F. (Note: LCD specification states that for ambient temperatures greater than 104°F, absolute humidity shall be less than TA=40°C/95% R.H). The case will (by specification) retain its integrity up to a temperature of 124°F.

4.2.8.6 Moisture and Humidity - The following items will be used as appropriate in ECSP/Field Unit construction in order to minimize the susceptability of the unit to damage/malfunction due to dampness/wetness:

- o Sealed switches (i.e., membrane switches or switches under a rubber membrane)

- o Silicon seal and silicon caulk

- o Sealed connectors

4.2.8.7 Shock - The ECSP/Field Unit case itself will withstand shock conditions equivalent to a fall from 30 inches to a concrete floor. However, the limiting factor in the ability of the entire unit to withstand shock is the survivability of the LCD display. Thus, specification of exact shock survivability figures for the entire subprototype unit are not possible.

## 4.3 Phase II ECSP/Field Units Software /Firmware Requirements

4.3.1 Overview. The software will be structured as firmware (EPROM) and RAM-resident databases. The firmware will contain the ECSP/Field Unit operating system (including a message handler for transfering data to and trom the TBSE), applications software, and diagnostics.

4.3.2 Confidence Check.- Upon power up, the firmware diagnostics will perform checks to insure that the hardware is operational before accepting data transfer requests.

4.3.3 Operating Time Remaining.- The ECSP/Field Units shall include an operating time remaining routine. This shall be a time-based function that will keep track of the operating time of the unit as initialized from the last battery charge. Battery charges will be assumed to occur coincident with the connection of the ECSP/Field Units to the TBSE. All measurements will be done in terms of time, with no voltage measurements initiated by the ECSP/Field Units.

4.3.4 Data Storage and Display Capabilities- The ECSP/Field Units will support storage and display of the Phase II TIMS Checklists Database described in section 3.1 above and associated personnel data records transmitted from the TBSE (described in section 3.2 above). Storage structure shall be developed to maximize ease of access and minimize storage space requirements.

4.3.5 Checklist Access. - Access to checklists and operating modes will be via displayed menus.

4.3.6 Checklist Item Access - Access to individual items within a given checklist , not displayed on the screen at a given time, shall be via software programmed forward and backward arrow keys on the screen. Scoring of individual checklist items shall be via software programmed touch keys representing "go", "no/go", "not seen", "not done", available scoring options. (Note that the default score for any given scorable item is "not done"; a "not seen" score means that the evaluator was not able to observe the performance of the item.)

4.3.7 Clock and Calendar Support- A software routine will display the current data from the clock/calendar function in the upper right corner of the display.

4.3.8 Stopwatch Function - A software routine will support display of elapsed time referenced to a given event time with a resolution of 0.1 second (as requested by representatives of the Armor School on 11 July 1985).

4.2.9 Automatic OFF- A timer shall be active that is reset with each keypress. If allowed to continue, the timer will shut off the display and power down the unit automatically. The time-out period shall be 3 minutes.

4.3.10 Operational Requirements. - The ECSP/Field Units will support the following functions:

- o Will receive initial condition information, checklist and personnel information from the TBSE.
- o Will have a diagnostic capability to test the operability of the RAM and the display.
- o Will maintain scoring information until uploaded to the TBSE.

- o Will support six primary operating modes:

  - o Identify the Evaluator
  - o Identify the Student
  - o Identify a Drill
  - o Train on a Drill
  - o Evaluate a Drill
  - o Review Pass (1,2, or 3)

The requirements of each mode are summarized below.

4.3.10.1 Identify the Evaluator Mode - This mode is the "default" mode. That is, this is the mode which becomes active automatically when the ECSP/Field Unit is first turned on after download from the TBSE. Evaluators will use this mode to identify themselves to the ECSP/Field Unit database. This mode will have the following characteristics:

- o The user will select this mode by touching the "ID EVAL" touch key.

- o The system will be designed to accommodate the names of 10 evaluators ( the maximum number of evaluators who will participate in the training exercises to be evaluated during the Phase II field test at Fort Knox (as defined by the Fort Knox BNCOC school representatives on July 11, 1985).

- o Up to four evaluator names will be displayed on each screen. Additional names can be seen by touching the appropriate "arrow" (i.e., scroll) response area.

- o An evaluator is selected by touching the "touch key" to the left of the desired name. A flashing asterick will be displayed in the touch area to indicate the selection that has been made.

4.3.10.2 Identify the Student Mode - Evaluators will use this mode to identify individual students who will be trained/evaluated. This mode will have the following characteristics:

- o The user will select this mode by touching the "ID THE STDNT" touch key.

- o The ECSP/Field Unit will support up to 40 student names/numbers (the maximum number expected to participate in the exercises to be evaluated during the Phase II Fort Knox evaluation, as defined by BNCOC representatives on July 11, 1985). Up to four names will be displayed on the screen at any given time. Users can page to additional names by touching the appropriate "arrow" (i.e., scroll) response area.

- o A trainee's name can be selected by touching the "touch key" to the left of the desired name. A flashing asterick will appear in the touch area to indicate the selection that has been made.

4.3.10.3 Identify a Drill Mode - This mode lists the available drills and allows the evaluator to select the particular one he wishes to work with at any given time. Characteristics of this mode are described below:

- o The evaluator selects a Drill by touching the touch area to the left of the line of text displaying the Drill title. A flashing asterick will be displayed in the touch area to indicate the selection that has been made.

- o A user can select another Drill simply by touching the "touch key" to the left of the new Drill title. The flashing asterick then appears to the left of the newly selected Drill and disappears from the left of the old Drill title.

- o The user will be able to scroll through the list of Drill titles by touching the appropriate "arrow" response area. If the user touches the "UP" arrow, the list will scroll DOWN to show more of the top of the list, and vice versa.

- o When the evaluator touches the "EVAL A DRILL" or "TRAIN A DRILL" keys, the drill that has been selected in this (i.e., the "ID A DRILL") mode will be displayed.

4.3.10.4 "Train on a Drill" Mode - This mode wil be the primary mode that is used during a field training exercise when no evaluation is to be performed. Characteristics of this mode are described below:

- o The title of the Drill that is being trained will remain displayed at the top of the screen in the Title Area.

- o The evaluator will be able to scroll through the list of Items by touching the appropriate "arrow" response area. If the "UP" arrow is touched, the list wil scroll DOWN to show more of the top of the list, and vice versa.

- o Any Item in the Drill can be displayed by scrolling until the Item appears on the display.

4.3.10.5 "Evaluate a Drill" Mode - Evaluators will use this mode when a student is being evaluated. This mode will be the primary mode that is used during a field evaluation. Characteristics of this mode are described below:

- o The number and title of the Drill that is being evaluated will always be displayed at the top of the screen in the Title Area.

- o When the user touches either the "GO" or "NO GO" key a flashing asterick will appear to indicate the selection which has been made.

- Immediately after a "GO" or "NO GO" for an Item has been selected, the Item list will move UP (scroll DOWN) to show the last evaluated Item at the top of the list. The next Item to be evaluated is displayed as the second item in the list. When the Item list is moved up automatically in this manner, the most recently evaluated Item is displayed as the first Item in the current list of displayed Items.

- An evaluator can also choose to evaluate an Item as "NOT SEEN" (i.e, the evaluator did not observe the performace of the Item) or "NOT DONE" (i.e., the item was not performed).

  The user first touches the "GET MORE WORDS" key, and the evaluation key labels change. When the user touches either the "NOT SEEN" or "NOT DONE" key, a flashing asterick appears to indicate the selection that has been made. After a "NOT SEEN" or "NOT DONE" evaluation has been made, the screen will automatically change back to the original "Evaluate a Drill" mode with the "GO" "NO GO" touch areas visible.

- Evaluators will be able to conduct three- pass evaluation using the ECSP/Field Units. That is, evaluators will be able to evaluate students on up to three attempts or "passes" on any given Item. When an evaluator first identifies a soldier and a drill, and selects the "EVAL A DRILL " mode, he will be taken to the next unscored "pass". If this is the first pass evaluation of a given soldier on a given drill, then all "GO" "NO GO" and "NOT SEEN" scoring columns will be empty, and astericks will appear in the "NOT DONE" column for all Items. If this is the second or third pass evaluation for a given soldier on a given drill, then the scores from the preceeding evaluation will have been automatically loaded into the display so that the evaluator may see which items were previously passed or not passed, and may rescore any Items desired. Soldier's scores for all three passes are retained in the ECSP/Field Unit for subsequent uploading to the TBSE.

4.3.10.6 "Review Pass" Mode - Evaluators may review a students scores for any given drill, and any given "pass" through that drill, by using the "Review Pass" mode. Characteristics of this mode are described below:

- o Any time a student has been scored on a given pass through a drill, the number of the pass (i.e., 1, 2, or 3) will appear next to the student's name as displayed in the "ID THE STDNT" mode. Thus the evaluator will be able to tell which students have been scored on a given number of passes for a given drill, and thus will know what data is available for review. After deciding which pass he wishes to review, the evaluator may indicate his selection by pressing either the the "REVIEW PASS 1" , "REVIEW PASS 2" or the "REVIEW PASS 3" displayed touch keys.

# 5.0 TBSE REQUIREMENTS AND CONSTRAINTS

## 5.1 TBSE Subsystem Assumptions

The following assumption is made about the use of the TBSE:

The TBSE will be used in the field to initialize a number of ECSP/Field Unit devices prior to their being taken to the field by evaluators. Therefore, the menu selection capability implemented in the TBSE should be optimized for this mode of operation.

## 5.2 TBSE Hardware Requirements

5.2.1 Overview - The TBSE will be implemented on an IBM PC XT computer. A terminal, printer, and the associated cabling will also be provided.

5.2.2 IBM PC XT- The IBM PC XT features an internal 8088 microprocessor with 640 k bytes of RAM.

The IBM PC XT to be used in the Fort Knox field evaluation will be configured with a 10 M byte hard disk and two dual-sided, double density integral floppy disk drives.

The IBM PC-based TBSE will support storage of the Phase II TIMS checklist and personnel data bases required for the Fort Knox field evaluation.

5.2.3 Data Terminal - A single IBM PC monochrome video display terminal will be used to communicate with the IBM PC. The terminal operates in full-duplex, asynchronous communications mode and is equipped with a standard RS-232 interface.The associated IBM PC keyboard supports both a standard QWERTY alphanumeric keyboard and a function keypad.

The data terminal will be used for conversion of written checklist and other data (e.g., personnel data, evaluator data) into corresponding data bases for the Phase II TIMS evaluation at Fort Knox, Kentucky.

5.2.4 Printer - The IBM PC to be used in the Phase II TIMS evaluation at Fort Knox will be configured with an EPSON LQ-1500 printer. The LQ -1500 runs at a speed of 200 characters-per-second, and operates via a parallel interface to the IBM PC.

The printer will be used to output a summary of the evaluation results uploaded from the ECSP/Field Units.

5.2.5 Cabling - The IBM PC TBSE will support three types of communication/data transfer: (1) communication via a standard connection between the IBM PC and the printer, (2) communication via a terminal cable between the PC display and the IBM PC, and (3) communication between the TBSE and ECSP/Field Units via a standard RS-232 C cable.

## 5.3 TBSE Software Requirements

5.3.1 Overview - Software will support the following functions of the TBSE:

- o Create/edit checklist data bases
- o Enter list of evaluators
- o Download information to an ECSP/Field Unit
- o Diagnose an ECSP/Field Unit
- o Receive scoring information from an ECSP/Field Unit
- o Display/print summary report based on scoring information

The TBSE will access seven software modules: the EinsteinWriter word processing software (for input and editing of checklist databases), a "Translate to Serial Format" module, a Checklist Database Postprocessor, a Menu Driver, a Protocol Handler, the ECSP Field Unit Diagnostic Routine, and a Report Generation Manager.

5.3.2 EinsteinWriter - Commercial word processing software (specifically, EinsteinWriter) will be available to support entry and editing of checklist database information. This software module will be accessable via a command line entered in response to the IBM PC operating system prompt. Generic commands will be inserted into the checklist database in order to allow subsequent formatting by the Checklist Database Postprocessor.

5.3.3 "Translate to Serial Format" Module - This module will translate the EinsteinWriter wordprocessing file into a serial ASCII file.

5.3.4 Checklist Database Postprocessor - This postprocessor will interpret the generic commands inserted in the checklist database in order to format the information according to a consistent set of format rules appropriate for the content being presented and the physical constraints of the ECSP/Field Units. All postprocessing/formatting of information will be accomplished in the TBSE, before information is downloaded to the ECSP/Field Units.

5.3.5 Protocol Handler - The protocol handler will provide all the communication routines and interfacing between the TBSE and the ECSP/Field Units in order to support downloading and uploading of information between the two subsystems.

5.3.6 Menu Driver - The menu driver will structure the appropriate menus and displays to provide the interface to allow users to configure ECSP/Field Units, select appropriate checklist databases for download, and identify evaluator and personnel databases for downloading.

5.3.7 ECSP/Field Unit Diagnostic Routine - This module will automatically perform a test of the functioning of the RAM and the display upon power-up of the unit, and will report the results (pass/fail) of each test.

5.3.8 Report Generation Manager - This module will create/update the personnel scoring database with information collected in the ECSP/Field Units, and will generate both visual and hardcopy reports of these databases. The summary report generated by this module will include the following information as a minimum:

- Student Name
- Evaluator Name
- Date and time of evaluation
- Type of evaluation (e.g., Gunnery, STX, Land Navigation)
- Name of drill
- Go, No/Go, Not seen, Not done scores for each scorable item in three column format, with one column showing the results of each pass through the evaluation

5.3.9 TBSE Operational Capabilities - The TBSE software will support the following functions:

- Main Menu - The main menu will allow the user to select one of four (4) options:
  - 1. Set ECS Initial Conditon
  - 2. Update/Display Training Data
  - 3. Diagnose ECS Status
  - 4. Quit

Each of these options is described more fully below.

- Set ECS Initial Conditions - This mode will allow the user to set up the environment for the ECSP/Field Units to be downloaded. More specifically, it will allow the user to specify the checklist database, evaluator's names, and soldier's names to be downloaded.

- Transfer Initial Conditions to the ECS Device - This mode will allow the user to initiate the downloading of an ECSP/Field Unit.

- o Update/Display Training Data - This mode will allow a user to initiate uploading of field data from an ECSP/Field Unit, and to display and/or print ECSP/Field Unit-collected evaluation scores. (See also section 5.3.8 for a list of the specific items to be displayed/printed.)

- o Diagnose ECS Status - This mode will allow users to initiate ECSP/Field Unit diagnosis.