SAND82-1230C

A TRAINER MODULE FOR SECURITY CONTROL CENTER OPERATIONS

E. A. Bernard
Sandia National Laboratories
Albuquerque, New Mexico 87185

SAND--82-1230C
DE82 017035

ABSTRACT

An operator trainer module has been developed to be used with the security control center equipment to be installed as part of a safeguards physical protection system. The module is designed to provide improved training and testing capabilities for control center operators through the use of simulations for perimeter equipment operations. Operators, through the trainer module, can be challenged with a variety of realistic situations which require responsive action identical to that needed in an actual system. This permits a consistent evaluation and confirmation of operator capabilities prior to assignment as an operator and allows for periodic retesting to verify that adequate performance levels are maintained.

INTRODUCTION

Safeguards systems now being installed at facilities throughout the country feature a security control center where alarm signals are processed and displayed to inform the operator of alarm situations. A properly trained operator will assess the information presented and take appropriate action in accordance with operating procedures. To train operators and verify their ability to handle the many potential situations which might occur, a trainer module has been developed which

DISCLAIMER

simulates various alarm events. This trainer module provides realistic displays to the operator without committing personnel to "stage" the event during training and evaluation exercises. As far as the operator is concerned, operations are identical to those associated with an actual event.

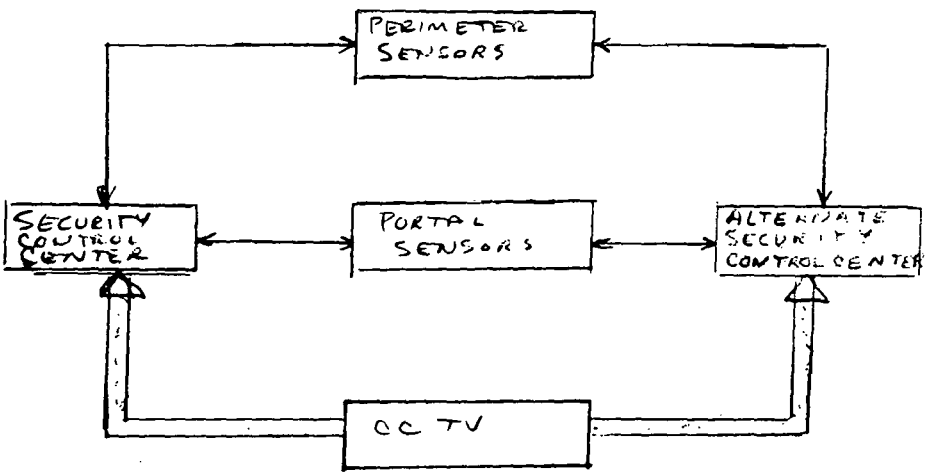
The module can be used with an off-line control center so that security of the protected area is not disturbed. Scenarios can be simulated to cover the spectrum of anticipated events to assure that all operators are trained and evaluated on an equal basis. New scenarios can be easily added to the library as additional events are developed. The mobile and modular characteristics of the trainer module make it adaptable for use at varied facilities where appropriate safeguards systems are installed.

SAFEGUARDS SYSTEM DESCRIPTION

The safeguards system design with which the trainer module presently interfaces is a perimeter protection system having dual control centers. (See Figure 1). A dual loop communications system transmits alarm signals, status messages, and control commands between each control center and the perimeter and portal sensors. Alarm signals and status messages are simultaneously processed and displayed at both centers on color-graphic displays. Automatic live and recorded video are also provided to permit remote assessment of the alarm by either operator. Based on the assessment, on-site communications equipment is then used to initiate responsive action.

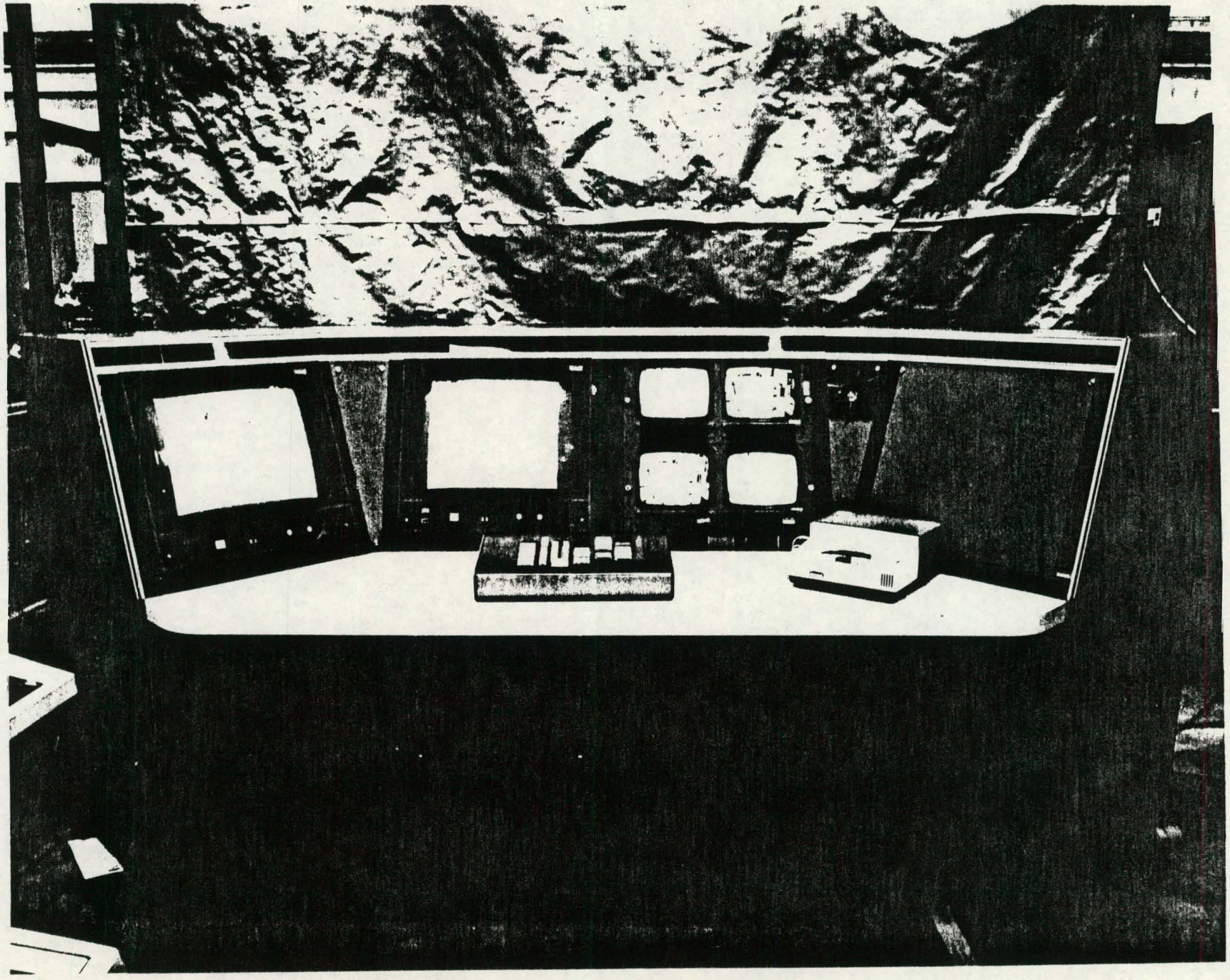
The operator's console for the safeguards system is shown in Figure 2. It has both a map and text color CRT, four video monitors, communications equipment, and a function keyboard for operator inputs. The displays and control signals are handled

Figure 1.



SAFEGUARDS SYSTEM DESIGN OVERVIEW

Figure 2. OPERATOR'S CONSOLE



by a microcomputer. This microcomputer also receives alarm signals from the perimeter sensors via the communications system station located at each center.

TRAINER MODULE CONCEPT

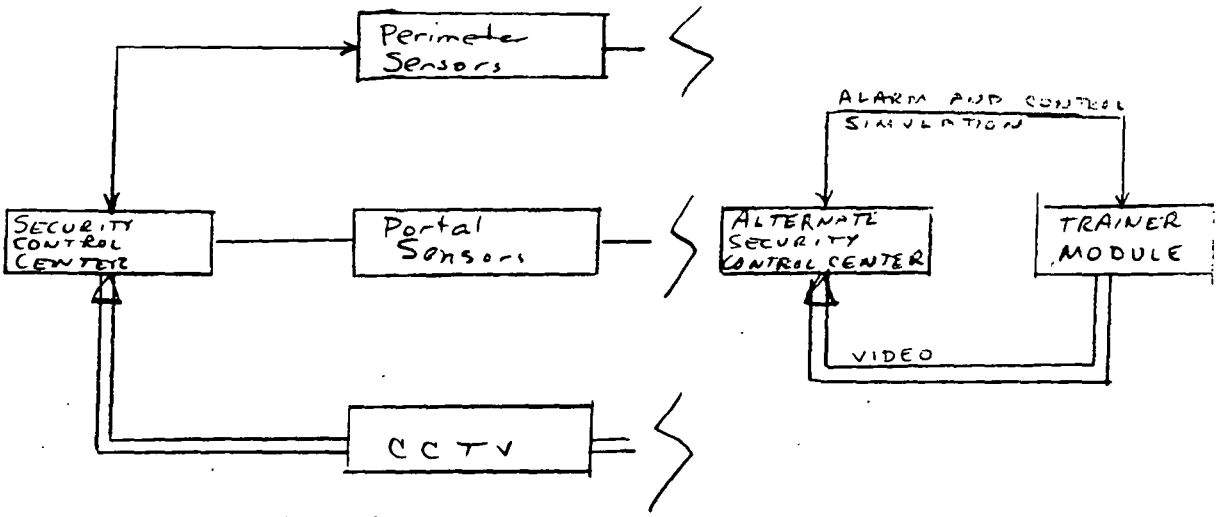
As shown in Figure 3, the trainer module replaces the sensors and CCTV of the operating system. Perimeter equipment and operations are simulated and video cassette tape units are provided for camera inputs. The module interfaces directly with the operational system microcomputer, replacing the communications system station at the center. The video cassettes provide the CCTV video that is normally provided by the perimeter cameras.

The trainer module operating concept is for the instructor to initiate alarm signals and scenario events from the instructor's keyboard. The trainer module microprocessor positions the video tapes, controls the video switcher, and then transmits the alarm signals to the control center. Alarm and video processing within the control center equipment are accomplished in the same manner as they would be in the actual system. Therefore, the operator is able to proceed in the usual manner with the handling of the situation.

Records are kept at the control center and at the instructor's stations on the operator's performance. Critiques and evaluations can then be made at the completion of a training/testing session.

As designed, the training module provides an improved means to train control center operators. The module's simulation capabilities make it possible to create a spectrum of conditions which would span those with which the operator is expected to

Figure 3.



SAFEGUARDS SYSTEM TRAINER MODULE OPERATIONS

be confronted. The operator's procedural response can be clearly illustrated and demonstrated by the instructor. In the final stage of the training program, a complete testing package would be used to confirm the operator's proficiency in handling all aspects of control center operations.

TRAINER MODULE DESCRIPTION

Objectives

Important aspects of a control center operator training program are to instruct the operator on fundamental principles which govern operations, acquaint the operator with established procedures, and provide appropriate sessions for practical applications. The training module makes the latter possible without major impact on personnel or facility security. Thus the operator can develop confidence that if challenged by an adversary, vital functions at the control center will be implemented in a secure and efficient manner.

The prime feature of the training module is that it can minimize "unexpected" conditions to which the operator must respond. A complete spectrum of events would provide the needed familiarization to increase the probability of effective and timely response by the operator in the event of adversary activity.

As described previously, training programs with the module are self-contained operations apart from the actual security system. This is achieved by using alternate or separate training center equipment. Procedures would be identical to the ones used in actual operations. From the operator's viewpoint, there would be no discernable difference between an actual system and the training module. The variety of simula-

tions would provide the realistic library of events necessary for effective training.

The testing and evaluation feature of the training module provides a common framework to establish operator competence. At the completion of the program, each operator trainee can be subjected to equivalent conditions which provide a measure of performance capabilities. Criteria can then be applied to determine successful completion of the training program.

An important aspect of operator training is to maintain proficiency once it is established. The module will also be used in this mode, where programs would be available for periodic retesting, thus assuring that satisfactory performance levels are maintained.

The training module effectively trains the control center operator. It provides for extensive instruction on what to do and how to do it. Through varied and repeated exercises, the operator is able to establish and maintain adequate performance levels. It provides high assurance that potential adversary events will be effectively handled at the control center.

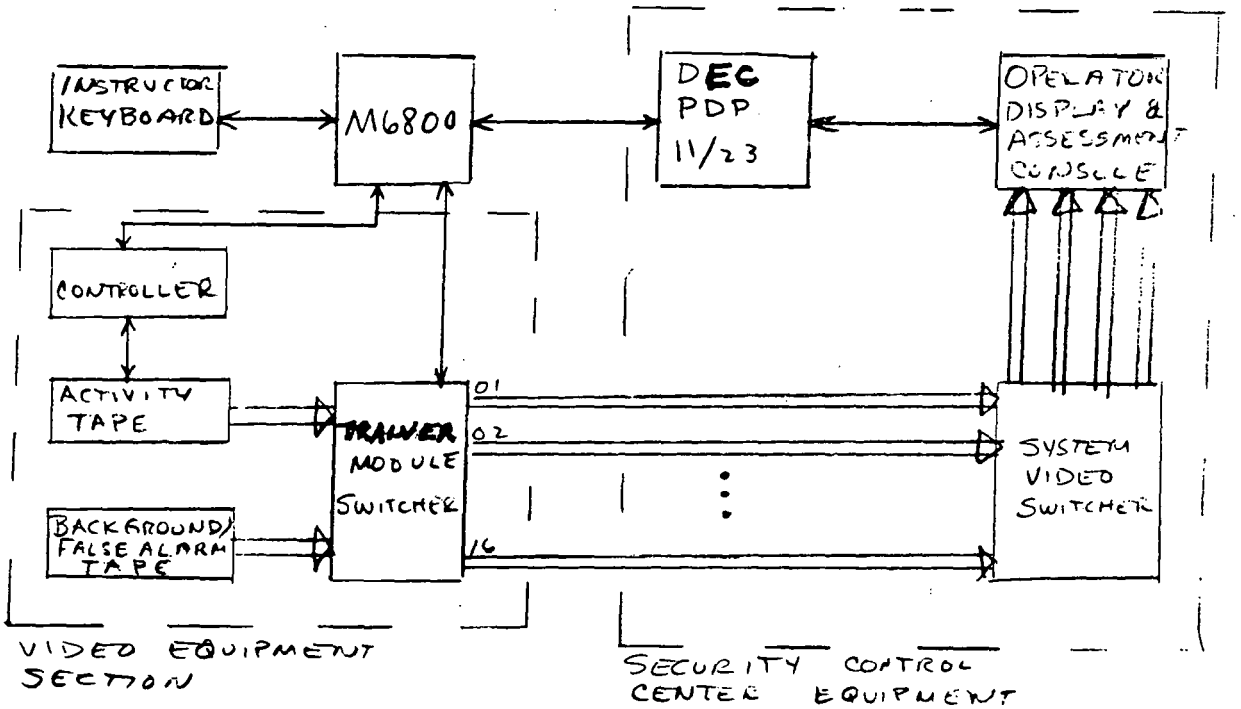
Configuration

The configuration of the trainer module is shown in Figure 4. Each of the components are described below. Those portions of the module which are in the actual system are indicated in Figure 4.

Instructor's Function Keyboard

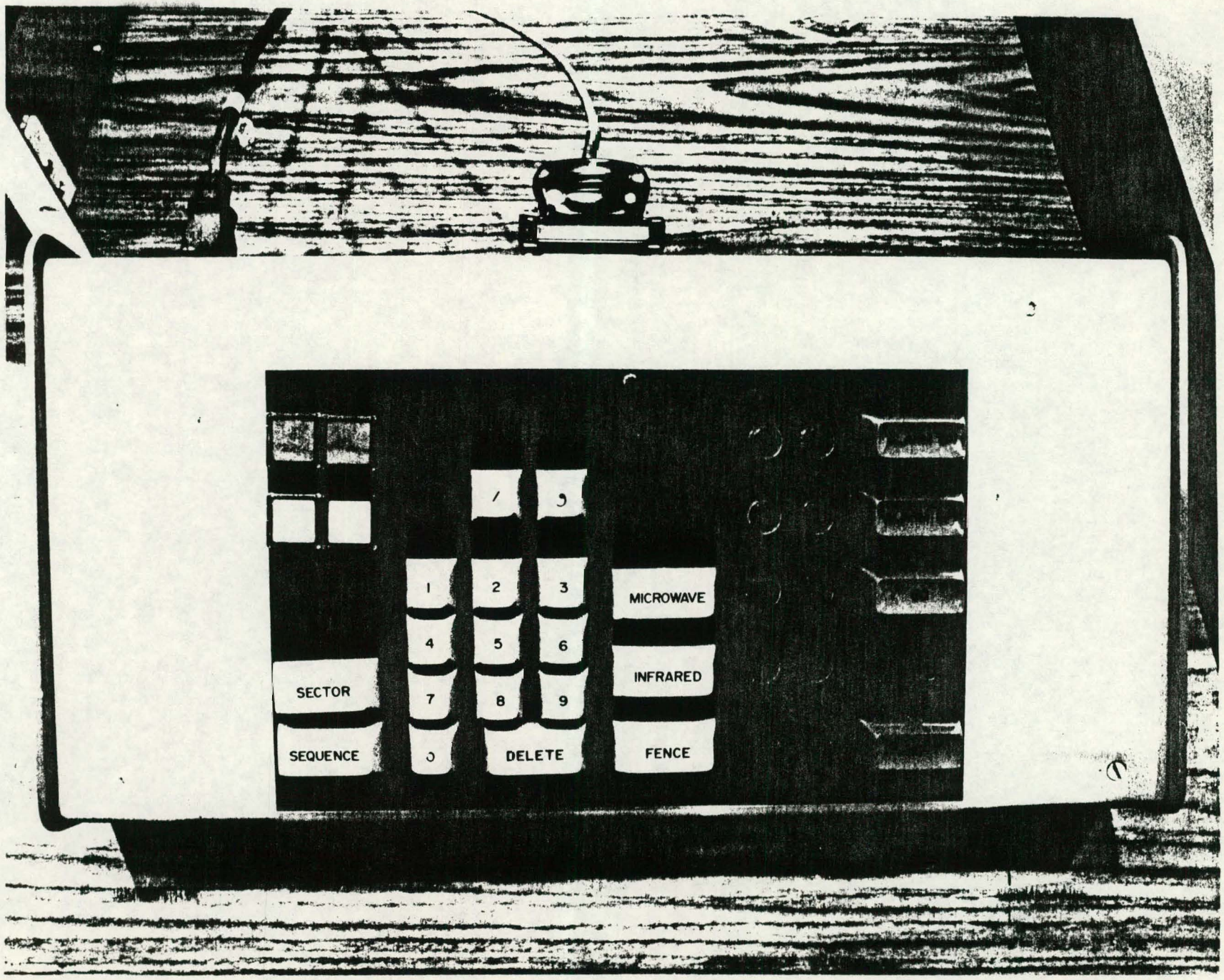
The instructor's keyboard is shown in Figure 5. It permits the entry of individual alarm signals (any one alarm from any

Figure 4.



TRAINER MODULE CONFIGURATION

Figure 5. INSTRUCTOR'S KEYBOARD



perimeter sector); sequence of alarm signals (a predefined series of individual alarms which are timed to correspond to the video activity tape; and an abort command key which turns all alarms off to clear the system. These capabilities allow a variety of instructor inputs for training and testing of console operators.

Trainer Module Microprocessor

An M6800 microprocessor is used for the trainer module. It replaces the communications system station at the center and interfaces directly with the system's PDP-11/23 microcomputer. As keyboard inputs are received by the M6800, the alarm and video signals (equivalent to those generated from an actual system) produce displays at the operator's console in the identical manner that they would be for an actual perimeter system.

Video Equipment Section

The video equipment section contains up to four video cassette tapes and a switcher. These four tape inputs can simultaneously provide up to four video scenes in different sectors. A switcher is provided for appropriate routing of the video scenes. The video tapes are cataloged into activity tapes and a background tape, the latter also serving as the false alarm tape. It plays continuously during the training session and is routed to all camera inputs in the background/secure mode. The activity tapes are divided into activity segments showing a variety of filmed events (e.g., animal nuisance alarms, maintenance activities, inadvertent intrusions, penetration, and adversary attacks). Approximately twenty activity segments can be handled on each one-hour VHS video tape. The activity tape

segment replaces the background scenes as dictated by the instructor's inputs.

Operations

There are currently six video activity scenes that have been developed for use with the trainer module. These are:

(1) A one-person crawl through a sector;

(2) A three-person rapid intrusion through a sector;

(3) A two-person maintenance crew inadvertently penetrating the sector;

(4) An animal nuisance alarm;

(5) A lightning strike; and

(6) A demonstrator crossing the perimeter.

With these scenes and the false alarm capability, a variety of events have been created for presentation to the console operator. In addition, several scenes have been sequenced in tandem to create a chain of events that the operator must handle.

Illustrative Sequence

The sequence selected for this example is one in which a selected sector has a false alarm on two of the three perimeter sensors, followed by an intrusion on another sector where all three sensors are alarmed in a prescribed pattern. The prescribed pattern is determined by the alarm activations that

would occur for an actual intrusion. Initially, all sectors are secure and video for each sector is provided from the background/false alarm tape.

The alarm pattern is extracted from memory and the video activity tape is positioned to the intrusion segment scene. The background/false alarm tape is controlled to continue providing video for the first sector. When the tapes are ready, the alarm and video signals are released to the control center.

The control center receives the alarm signals. Displays are driven accordingly by the system microcomputer. The video scenes are displayed on the operator's monitors. If procedures are properly followed, the operator will assess the first sector and switch his assessment to the second sector when the higher priority is automatically assigned to it. This occurs when the third sensor is activated in the second sector. To back up the assessment, the system provides recorded video of the intrusion for review by the operator. The operator then implements appropriate response measures.

Records are maintained at the control center and at the instructor's station pertaining to the initiation of the sequence, the displays and controls presented, and the operator's actions. Questions about proper adherence to procedures and effective assessment and action on the operator's part can be clearly resolved in critiquing and evaluating the exercise.

PLANS AND APPLICATIONS

In its current configuration, the trainer module will be used to demonstrate its operational capabilities using safeguards equipment available at Sandia. As requested, it will

then be deployed to selected facilities for evaluation and short-term use in the control center operator training program. Depending on the facility, the trainer module alarm simulations and video library tapes will be expanded and tailored to conform to local characteristics. Appropriate equipment and procedural modifications will be implemented to provide duplication of facility hardware and operations. Because of the modular nature of the training module, these modifications are expected to be accomplished without major difficulty. Thus through the use of this trainer module, a more effective means will be provided to train and test control center operators and establish greater confidence in the operator's capabilities to perform in the event of adversary activity.

ACKNOWLEDGEMENTS

The author wishes to express his appreciation to M. Helen Gallegos (software development), J. C. Bagg (hardware definition and development), and R. A. Malpass (system implementation), for their support of the Trainer Module Program.