INVENTORY OF TECHNOLOGY AND PROGRAMS APPLICABLE TO CARGO SECURITY

A REPORT OF
THE TECHNICAL COORDINATION SUBCOMMITTEE
PREPARED FOR THE INTERAGENCY COMMITTEE ON TRANSPORTATION SECURITY
JUNE 1, 1972

DEPARTMENT OF TRANSPORTATION
400 SEVENTH STREET S.W.
WASHINGTON, D.C. 20590

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TABLE OF CONTENTS

1. INTRODUCTION

1.1 Background

The Department of Transportation (DOT), to facilitate a concentrated U. S. Government effort for a civil aviation security program, has coordinated an R&D effort with responsible agencies on an informal basis. Before plans to formalize this technical relationship were accomplished, DOT expanded its security responsibilities to include cargo security in response to the problem highlighted by Congressional hearings before the Senate Select Committee on Small Business, the Senate Committee on Commerce and the House Committee on Interstate and Foreign Commerce.

A conference was held jointly by Government and industry in June 1971 at which time Secretary of Transportation John A. Volpe announced the formation of an Interagency Committee on Transportation Security with General Benjamin O. Davis, Jr., as chairman. At the second meeting held in July 1971, General Davis proposed an Interagency Technical Subcommittee to serve the Interagency Committee. With concurrence of the committee, a Technical Coordination Subcommittee was established, chaired by Dr. Robert H. Cannon, Jr., Assistant Secretary for Systems Development and Technology, Department of Transportation.

The Subcommittee was tasked to develop an inventory of the significant research efforts in progress within and outside the membership of this Committee which hold a high payoff probability, urgently needed, and a high potential for application to transportation security.

1.2 Purpose and Scope

The purpose of this report is to assemble in one document a summary of Government programs and capabilities that are useful in protecting cargo against theft. This summary is based upon descriptions submitted by Government agencies involved in physical security research and development programs. The information is presented in essentially the format and detail submitted by the agencies; some agency descriptions have been shortened to maintain consistency, and some editorial changes were made for clarity.

2. DEPARTMENTS AND AGENCIES

2.1 The Department of Transportation

The Department of Transportation provides the government-wide leadership to stop the loss of cargo in transit. Recognizing the urgency of this problem and the DOT's unique position to coordinate and energize the entire effort, Secretary Volpe, on June 17, 1971 announced the formation of the Office of Transportation Security and assigned to that office the responsibility for providing leadership in developing methods to reduce cargo loss. In response to legislation proposed as an outgrowth of the Hearings of the Senate Select Committee on Small Business affecting cargo security and promotion of programs which prevent cargo theft, loss, and damage, DOT established the Interagency Committee on Transportation Security.

2.2 The Department of Defense

DSPG (Defense Special Projects Group), Washington, D. C. Has initiated and managed physical security projects. Has tasked military services to accomplish a mission in physical security. This includes development of sensors and display devices. DSPG will be phased out by 30 June 1972 and its physical security projects will be turned over to the military services.

U. S. Army LWL (Land Warfare Laboratory), Aberdeen Proving Ground, Maryland. Has developed inspection equipment, metal detectors, explosives detectors, methods of training dogs for security use, and methods of intruder deterrence.

U. S. Army, MERDC (Mobility Equipment Research and Development Center), Fort Belvoir, Va. Has developed intrusion detection equipment for tactical use and for protection of installations and interiors. Has developed surveillance equipment including night observation devices.

U. S. Air Force, Air Base Defense Office, Electronic Systems Division (ESD), Hanscom Field, Mass. This is the primary effort in the Air Force for developing base defense systems. There is a large, on-going effort to evaluate equipment to accomplish this mission. This includes devices, perimeter sensors, low light level TV, etc.

ARPA (Advanced Research Projects Agency), Washington, D. C. Has some specialized sensors for the detection of intruders attempting to cross fences.

Interdiction Test Division of 3246 Test Wing, Eglin AFB, Florida. Large testing facility capable of testing entire physical security systems. They have limited development capability.

U. S. Army, MTMTS (Military Traffic Management and Terminal Service), Bailey's Crossroads, Va. Makes recommendations on transportation security for the three services. They have offered several facilities for use in testing any potential system design. MTMTS developed and is instituting an improved cargo accountability technique called CARDPAC.

U. S. Navy, NADC (Naval Air Development Center), Warminster, Pa. Experience in developing and testing acoustic sensors for use in marine environment.

U. S. Navy, NOL (Naval Ordnance Laboratory), White Oak, Maryland. Has an in-house quick reaction capability to design and build physical security systems for storage and depot areas.

U. S. Air Force, RADC (Rome Air Development Center), Rome, N. Y. Has the ability to develop sensors and has a testing facility to conduct environmental tests, particularly valuable in perimeter type sensors.

U. S. Army ECOM (Electronics Command), Fort Monmouth, New Jersey. Can build hardware involved in physical security and evaluate demonstration models provided by industry.

2.3 Department of Justice

FBI (Federal Bureau of Investigation), NCIC (National Crime Information Center), Washington, D. C. This is a computerized information real time system, national in scope and eesigned to complement development of similar systems at local and state levels.

Pilot operation began on 27 January 1967 with law enforcement agencies throughout the country on-line with the FBI computer in Washington, D. C. The NCIC was designed to be a record index on wanted persons, stolen property and criminal events.

Each agency has on-line capability to enter records and also to modify records. Only an originating agency can modify or clear a record from the computer. Other agencies which locate property may place a "located" addendum to the record.

Forty-nine of the 50 states, the District of Columbia, and Canada are tied to the NCIC computers through the use of dedicated circuits. The concept calls for each state to establish a computer control terminal. Each state is then responsible for the development of an intrastate communications network connecting all duly constituted law enforcement agencies within that state to the control terminal and to the FBI.

LEAA (Law Enforcement Assistance Administration), NILECJ (National Institute of Law Enforcement and Criminal Justice), Washington, D. C. The Law Enforcement Assistance Administration (LEAA) was created under the provisions of the Omnibus Crime Control and Safe Streets Act of 1968 to support the development of effective law enforcement activities at the local level. The goal of LEAA is to reduce crime and delinquency by granting funds on a matching basis to state planning agencies for action programs and by direct support to state and community programs. LEAA also awards discretionary action grants directly to states, cities, counties and other recipients. These discretionary grants are used for programs with national implications and for special problem areas.

The National Institute of Law Enforcement and Criminal Justice (NILECJ) is the research arm of LEAA, responsible for investigating and creating innovative crime control programs, techniques and equipment. It has established a Major Equipment Program comprising an Analysis Group, a Development Group and a Law Enforcement Standards Laboratory. The goal of the Analysis Group, in cooperation with local criminal justice agencies, is to determine ways in which new technology can assist the agencies to reduce crime and delinquency. The Development Group translates the requirements established by the Analysis Group into operating equipment that can be tested and used by the agencies. The Law Enforcement Standards Laboratory defines standards of performance and measurement for current equipment and equipment developed by the Program to guide subsequent manufacture to a common standard of excellence.

2.4 Department of Commerce

LEAA Law Enforcement Standards Laboratory, National Bureau of Standards, Washington, D. C. General - The Law Enforcement Standards Laboratory (LESL) was established in January 1971, sponsored by the Law Enforcement Assistance Administration, for the purpose of developing voluntary performance standards for federal, state and local law enforcement agencies.

Maritime Administration. Pilot Projects - Initial Tasks. Maritime Administration has completed Phase I of a three-phase effort to design, implement and operate a modern, high throughput Marine container port with a real-time control system embodying a built-in security safeguard.

Phase I was jointly funded by the Maritime Administration and a marine terminal operator. Determination on preceeding with Phase II and III will depend upon financial participation by private industry and/or other government agencies interested in developing systems for cargo control and security.

2.5 U. S. Atomic Energy Commission

The Commission has a facility for testing and qualifying to interim specifications, AEC and GSA alarm systems, interior security equipment and components. Results are published and available through GPO.

Typical of security devices or systems tested are:

a. Intrusion Equipment
b. Ultrasonics
c. Laser
d. IR
e. Light Threshold Detectors
f. Closed Circuit TV Alarm Systems
g. Capacitor Alarms
h. Magnetic Switches

2.6 The Department of State

The Department has sponsored investigation and tests of intrusion detection equipment intended to improve the security of its installations, particularly those situated outside the United States.

3. PROGRAMS AND TECHNOLOGY

3.1 Systems and Standards

AREA SECURITY ALARM SYSTEM

Agency: LEAA Law Enforcement Standards Laboratory, National Bureau of Standards.

Objectives: To develop standards for an Area Security Alarm System. The alarm system to be addressed during FY72 consists of the annunciator panel in the police station, the communication link to the protected site, and the control panel and sensor array at the site. The program will generate one overall system standard and one standard for each type of sensor that may be used in the sensor array.

Description: The system standard will be concerned with the overall performance of the system against a defined threat. Generally, it will provide reference installation guidelines, emergency power requirements, and non-hardware items that affect performance such as, operating procedures, system test and maintenance requirements.

Presently, there is a myriad of sensors available on the market that sense many different phenomena associated with an intruder. Any combination of same may be used to design an array to protect a particular site, depending upon the nature of the item being protected and the operating environment. Since the optimum array will be unique for a given environment, and since the environment cannot be standardized, the approach will be to develop a performance standard for each category of sensor which will include a characterization of those environments which tend to degrade performance.

Objectives (Cont'd)

The types of sensors to be addressed have been categorized as: (1) electromechanical, which includes switches for doors and windows, foil for windows, protective wiring, and manual hold-up switches; (2) heat detectors for safes; (3) photoelectric devices; (4) vibration detectors; (5) audio detectors; (6) capacitance devices which detect the proximity of a human; and (7) motion detection devices which detect motion of a human by the Doppler shift technique. For each of these sensors a standard will be developed that will establish minimum performance levels and test procedures for the following performance characteristics:

1. Sensitivity Range
2. Sensitivity Stability
3. False Alarm Modes and Sensitivity
4. Hardware Failure Detection
5. Tamper Detection
6. Reliability

Even though the system being addressed is that installed in a police department, the types of sensors and annunciator panels are the same equipments that could be utilized in cargo terminal areas.

JOINT SERVICES INTERIOR INTRUSION DETECTION SYSTEM (J-SIIDS)

Agency: Defense Special Projects Group

Objectives: The J-SIIDS is being developed as a standard detection system for military Joint-Service use in interior physical security. It is potentially useful for intrusion detection in warehouses, offices, cages, and similar enclosed buildings and rooms.

Description: The J-SIIDS consists of a sensor system and control unit, a data transmission system, a local audible alarm, a monitor unit and a telephone dialer.

The system is designed to detect the semi-skilled intruder who can be expected to attempt entry without detailed planning or sophisticated equipment and who may work individually or as a member of a small group. This intruder can be expected to attack the locks, doors, windows, vents, walls, floors, and ceilings of a room, or he may be a lock-in.

Status: Specifications have been completed, and prototype action initiated by U.S. Army Mobility Equipment Research and Development Center (MERDC), Ft. Belvoir, Virginia, for the following devices:

- Vibration Sensor
- Grid Wire Sensor
- Balanced Magnetic Switch
- Ultrasonic Motion Sensor
- Passive Ultrasonic Sensor
- Capacitance Proximity Sensor
- Magnetic Weapon Sensor
- Fixed Duress Sensor
- Portable Duress Sensor
- Control Unit
- Local Audible Alarm
- Telephone Dialer
- Data Transmission System
- Monitor Unit

BASE INTRUSION DETECTION SYSTEM (BIDS)

Agency: Defense Special Projects Group

Objectives: The BIDS is being developed as a standard, modular intrusion detection system for use around military bases and installations. It will interface with the J-SIIDS and many commercial devices. The three major subsystems are: Sensor Family; Transmission Link; Monitor Display.

Status: Functional and interface description completed March '72. System to be developed by U.S. Air Force, Air Base Defense Office, ESD, Hanscom Field, Mass.

COMPUTERIZED CONTAINER CONTROL SYSTEM

Agency: U.S. Maritime Administration

Objectives: To develop, test, and evaluate a system which employs computerized controls to monitor and record container movements at port terminals and staging areas.

Description: Developed by Computer Identics Corp., of Westwood, Mass. and Transocean Gateway Corp., of New York City, the system uses a computer and automatic container identification equipment to keep track of container movements into, out of, and within the terminal.

The Automatic Container Identification method uses coded strips on each container passing through the terminal, which are "read" by optical scanning devices. The identification strips designate the container's type, serial number, and owner's name.

Objectives (Cont'd)

The scanner transmits this information to a central computer, where it is combined with cargo and routing information on the container.

The optical scanners in the control system would be located at strategic points around the terminal -- entrances, exits, container cranes, and other control points within the storage areas in the terminal.

The central computer can be programmed so that containers cannot leave the terminal or be moved around the complex without warnings being sounded, unless the actual routing conforms to the routing instructions in the computer. This system will not only provide an up-to-the-minute, accurate container inventory but will help prevent thefts, as well as costly and time-consuming misroutings. Additionally, it will help increase the effiency of terminal operations to meet the accelerated container activity we foresee in coming years.

The container identification system is adapted from a similar system developed by the Association of American Railroads for controlling mail car movements.

Status: The system is described in a technical report entitled "Design and Development of a Pilot Terminal Control System with Automatic Container Identification" which is available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22151. Priced at $5 per copy, the report is numbered COM-71-00780.

INTEGRATED ACCESS CONTROL SYSTEM (IACS)

Agency: U. S. Army MERDC

Objectives: The primary objective is to provide protection for key public figures in controlled access situations by detecting and confirming the presence of weapons concealed on the person or in handbags, luggage, packages, etc., through the use of metal detection and x-ray techniques. Equipment which satisfies the primary objective may also be applicable to protection of the general public as may be required. X-ray equipment for personnel or baggage will be of extremely low dosage and its use wi-l be entirely contingent upon approval of the Surgeon General and/or other appropriate health agencies.

Description: IACS #1: Persons requiring access to the controlled area will enter through a revolving door fitted with a metal detecting system. If metal above a predetermined threshold is detected upon a subject's person, he will then be involuntarily x-rayed.

IACS #2: Persons requiring access to the controlled area will enter through a metal detecting system (Portal Detector). If metal above a predetermined threshold is detected upon a subject's person he will be offered the choice of either being x-rayed or subjected to a personal search.

IACS #3: Persons who wish to carry handbags, luggage, etc., into the controlled area will be required to permit these items to be x-rayed separately. Equipment will be designed to provide automatic positioning of the item so as to permit various aspects to be exposed to the x-ray.

Status: Prototypes of IACS #1 and IACS #3 are being evaluated at USAMERDC. The x-ray developed for IACS #1 will be suitable for use in IACS #2. Contracts are underway for improved metal detection systems (Portal Detectors) which will provide extremely high discrimination between targets of interest and extraneous metal objects. These Portal Detectors will be utilized in IACS #2 and may be suitable for IACS #1.

STANDARDS FOR COVERT COMMUNICATIONS

Agency: LEAA Law Enforcement Standards Laboratory, National Bureau of Standards.

Objectives: To develop standards for equipment to provide covert communications. In the communications area this year, this Laboratory is initiating development of a performance standarf for voice scramblers used in conjunction with hand-held and mobile transceivers. They are presently reviewing existing equipment and various scrambling techniques to determine a figure of merit for measuring the vulnerability of scramblers and techniques for measuring same. Additionally, emphasis will be placed on developing a means of measuring intelligibility of scramblers already on the market.

Status: In development.

CARGO LOSS INFORMATION MANAGEMENT SYSTEM (CLIMS)

Agency: Department of Transportation, Office of Transportation Security.

Objectives: The Cargo Loss Information Management System (CLIMS) objective is to provide timely and accurate data on the extent, nature, and location of cargo theft in U.S. domestic and international commerce. This project is considered as the lead, or pacing, project for the Cargo Security Program. Nature of the results will indicate the corrective measures that must be taken to improve cargo security management.

The phased project planning concept will be used in the system development to insure full response to management information requirements as these needs become more fully definitized. The four phases are:

6111 - Advanced Study: Completion of the identification process to determine available data and provide interim cargo loss reporting.

6211 - System Definition: Identification and specification of data requirements for valid reporting of cargo losses due to a variety of causes.

6311 - System Design: Total design of information system based on the approved specifications.

6411 - System Development: Testing and evaluation of system using actual data generated. This phase also includes a full year of operation to adjust and improve the system.

Status: In development.

STANDARDS FOR INSPECTION AND DETECTION DEVICES

Agency: LEAA Law Enforcement Standards Laboratory, National Bureau of Standards.

Objectives: To develop performance standards and specifications requirements for devices to detect weapons and contraband.

Description: Metal Detectors. A performance standard is currently being developed by LESL for walk-through metal weapon detectors, both active and passive designs. The devices are now on the market for use at airports, courtrooms, prisons, computer facilities, and other public buildings. One of the most important parts of this standard will be a performance test procedure which determines the minimum size metal object which is always detected, and the maximum size metal object which is never detected -- both of these critical sizes being determined in the same sensitivity test. Both minimum performance levels and test procedures for determining compliance with these performance levels will be suggested for other performance characteristics, such as degree of uniformity of detection sensitivity throughout walk-through region, and for test objects in various orientations.

X-Ray Devices. Recently, instruments have appeared on the market which, it is claimed, have extremely low radiation hazard levels. If in fact these radiation levels are safe to unshielded personnel, then this equipment has important law enforcement applications (as weapon, narcotic, and bomb detectors). Test methods for correctly measuring radiation levels will be essential. Assuming that radiation levels are found to be safe, LESL will develop performance requirements and tests for these low intensity X-ray devices. LESL will also be interested in radiological procedures which can be used in the laboratory for identification of explosives and narcotics.

Status: Under development.

AREA SURVEILLANCE - NIGHT VISION DEVICES

Agency: LEAA Law Enforcement Standards Laboratory, National Bureau of Standards.

Objectives: To develop standards for area surveillance systems and equipment.

The Surveillance Systems being addressed are those that assist in providing visual observation of an area, remotely or at the site, during daylight or night. These include night vision devices, such as low light level TV image intensifiers, portable and fixed; closed circuit TV; and the associated cameras and video tape recorders required to record evidence.

This year's effort will be directed toward a performance standard for night vision equipment, the portable image intensifier device. This was selected as top priority because of the interest expressed by local police agencies. Some of the performance characteristics being addressed are: Resolution for detection and identification as a function of illumination and contrast; intensification gain; effects of environment; and effects of fatigue. Other types of surveillance equipments will be addressed in subsequent years.

Status: Not reported.

ARMS ROOM SECURITY (ARROSE)

Agency: U. S. Army Land Warfare Laboratory

Objectives: To provide a system of area intrusion detectors, highly reliable and virtually false alarm free, complemented by various techniques of alarm and alarm annunciation, to bolster arms room security. Based largely on the ultrasonic motion sensor.

Status: Under evaluation in the field.

VEHICLE LOCATION

Agency: Urban Mass Transportation Administration

Objectives: To test advanced methods of electronically locating and tracking vehicles operating in urban areas.

Status: In development.

INDOOR SECURITY EQUIPMENT

Agency: U.S. Air Force Systems Command

Objectives: To provide militarized Indoor Security Equipment (ISE) unaffected by noise, air currents or temperature fluctuations caused by heating systems, air conditioning systems or severe line voltage changes, and yet permit high volume coverage with one detector. The system will be used worldwide for the protection of storage warehouses, vaults, and non-appropriated fund locations. The system will reliably detect moving intruders and the remote display will provide a visual indication of each protected zone. A single detector will protect room volumes up to 32,000 cubic feet. The system will provide fail-safe operation, line supervision, nonabortive operation, flexibility of installation and very low nuisance alarm rate.

Status: In development.

3.2 Intrusion Detection and Alarm Equipment

INFRARED INTRUSION DETECTOR (IID) AN/GSQ-135

Agency: U. S. Army MERDC

Objectives: To develop an active infrared beam-breaker system for use in line sensor applications. System to include a self-check feature and to interface with P-2 annunciator and AN/GSQ 113 radio.

Status: 100 produced for operational test and field use and evaluation.

INFRARED FENCE INTRUSION DETECTOR (IFID)

Agency: U. S. Army MERDC

Objectives: To develop an active beam-breaker infrared fence suitable for use over water barriers having varying water levels such as tidal harbors and rivers subject to flooding. Based on using four IFID systems with provisions for turning off two lower beams upon inundation by water. System to include a self-check feature and to interface with Model P annunciator and AN/GSQ 113 radio.

Status: Two built and feasibility testing completed.

PASSIVE INFRARED INTRUSION DETECTOR (PIRID)

Agency: U.S. Army MERDC

Objectives: To develop and produce Passive Infrared Intrusion Detectors for use as passive personnel and vehicle sensors. This system requires sequential interruption of two fields of view to generate an output.

Status: Superseded by DIRID III systems.

PIRIDs developed, prototypes produced, and field tested.

DIRECTIONAL INFRARED INTRUSION DETECTOR (DIRID)

Agency: U.S. Army MERDC

Objectives To develop and produce infrared intrusion detection systems for use in trail monitoring and other short range point sensor applications (sequential interruption of two fields of view is required).

Status: Program complete.

System produced for field operations.

INFRARED MINIATURIZED INTRUSION DETECTOR (IMID)

Agency: U.S. Army MERDC

Objectives: To develop a small, hand-emplaced, quickly set up infrared intrusion detector for use in detecting infiltration across paths, perimeters, and other selected sites for use in storage, depot, and other security applications. The device is an active IR beam-breaker system consisting of an IR source module, an IR receiver/RF transmitter module, and a remote annunciator.

Status: Four five-channel IMIDs were built and tested in Southeast Asia. Five single-channel IMIDs were built and tested in Southeast Asia and in the U.S.

MEDIUM RANGE INFRARED DETECTOR (MIR)

Agency: U.S. Army MERDC

Objectives: To develop a passive infrared detection system to detect personnel, at a range several times that of the DIRID, for use in perimeter protection and other medium range surveillance applications. (Sequential interruption of two fields of view is required.)

Status: 12 optical heads and 8 MIR modules procured and tested.

ULTRASONIC INTRUSION DETECTION EQUIPMENT

Agency: U.S. Department of State

Objectives: To investigate various types of intrusion detection systems in Phase 1, and in Phase 2 to evaluate five ultrasonic intrusion detectors, an infrared intrusion detector, and a line monitor; determine the environmental effects that are responsible for false alarms in the intrusion detectors; devise methods of evaluating environmental effects at the site or room to be protected; and develop a series of design rules and rules for the installation and adjustment of intrusion detection systems.

Status: Considering the wide variety of environmental conditions that are to be found at various Department of State installations, one ultrasonic detector, the Advisor V appears most suited for general use. In low noise environments, several of the other ultrasonic intrusion detectors were superior to the Advisor V in detection performance, although the Advisor V is unique in its extremely low false alarm rate.

Instructions for surveying the site to be protected were developed, including a technique of making realistic noise measurements at the site. Design rules that make use of the data from the site were developed. Finally, a method of adjusting the installed detection system for maximum detection capability was devised.

NON-TRANSPOSED LOOP SENSOR

Agency: U.S. Army MERDC

Objectives: To develop a line sensor which will monitor perimeters of warehouse and yard storage facilities. Furthermore, this monitor will be required to perform with a minimum of false alarms in an environment of high background magnetic noise and will not require loop transpositions to achieve this end.

Status: The Army has developed a magnetic line detector, designated the MCID (Multi-purpose Concealed Intrusion Detector) which can monitor the passage of ferromagnetic material over 12-gauge copper loops up to 100 meters in length. However, transposition of the loops into accurate areas is required to cancel background magnetic noise from natural or man-made sources. Preliminary investigation indicates that a modified MCID electronics module will permit employment of dual non-transposed loops for the sensor element.

Presently under the sponsorship of DSPG, a contract for a feasibility program for the Non-Transposed Loop Sensor is being prepared. Effort beyond this contract will be required to further improve this device.

MAGNETIC AUGMENTED SECURITY SYSTEM (MASS)

Agency: U.S. Army MERDC

Objectives: To develop a short range, easily deployed magnetic transducer which lends itself to a variety of installations and/or intended uses and maintains high rejection of unwanted signals. This improved transducer is intended to be suitable as a component of new intrusion detection devices and systems.

Status: The transducer is currently under development.

UNATTENDED VEHICLE DETECTION DEVICE

Agency: U.S. Army MERDC

Objectives: To develop a buried device, which detects and counts separately, vehicles moving in opposite directions along a road.

Status: Approximately 200 sets were delivered to operational units. Performance is very satisfactory. Counting accuracy is affected by size and speed of vehicles.

PASSIVE PORTAL DETECTOR

Agency: U.S. Army MERDC

Objectives: To develop a concealed door-frame metal detection system, for use with the MCID (Multi-purpose Concealed Intrusion Detector) to alarm on metal objects or weapons carried by persons walking through the door frame.

Status: Drawings of an improved proven design are on file. Three sets were used successfully in field operations. Tests showed excellent reliability of alarms on all types of concealed small arms. It does not alarm on very small metal objects such as keys or belt buckles, but can alarm on any medium-size steel object, such as cameras and tools.

ELECTROMAGNETIC PORTAL DETECTOR

Agency: U.S. Army MERDC

Objectives: To build two electromagnetic portal detectors with the maximum target discrimination and with capability to indicate the approximate position of the target. Use the components of the two systems as one dual unit to monitor two adjacent lines of traffic with separate receiver outputs.

Status: In development.

INTRUSION DETECTOR DISCRIMINATION LOGIC

Agency: U.S. Army MERDC

Objectives: To develop improved means of combining output signals from two intrusion detectors to reduce false alarm rates. Such logics exploit the low time-correlation of non-intrusion alarms from detectors of different physical phenomena and/or the stationary nature of non-intrusion alarms from similar detectors.

Status: Two types of devices have been developed.

The "Type II Counter" indicates the accrued number of intrusions in each of two opposite directions by sensing the alarms from two parallel MCID systems (see AD376133 & AF TM3189-4-15-3). False alarms, being non-progressive, are rejected.

The Combination Logic Device (CLD) incorporates provision for selection of one of four detector combinations: MCID-USD, MCID-IID, MCID-BPS (Balanced Pressure System), and MCID-MCID (See AD507193). Field tests have demonstrated that each of these modes can reduce false alarms by one or more orders of magnitude. A two year comparative study of lightning alarm rejection techniques showed the CLD to be superior, with a rejection ratio of 100 or more (see AD509213). About 100 CLD sets have been produced and supplied to Army field units.

HIGH-LEVEL SECURITY COMPONENT

Agency: U.S. Army MERDC

Objectives: To develop an alarm transmission line which cannot be defeated or compromised by a resourceful intruder.

Status: The device was developed under a contract with limited funds by Southwest Research Institute. The output from this contract is a bench-tested breadboard which demonstrates the principle of pseudo-random cryptography employed in its development. Further development is required to bring this program to fulfillment.

MAGNETIC UNDERGROUND COMMUNICATION

Agency: U.S. Army MERDC

Objectives: To develop a system of Magnetic Underground Communication as a means of reliable, range-contained, and covert communications. The range is easily predicted by the power expended in the transmitting antenna.

Status: The underground magnetic transmission feasibility has been demonstrated on the MINIMAGID (Miniature Magnetic Intrusion Detector) program and the Sensor Improvement Study. A pulse code modulation technique was used successfully; however, this may not have been the optimum technique and further development is warranted.

INTRUSION ALARM ANNUNCIATOR ID-1631A/GSQ (MODEL P1)

Agency: U.S. Army MERDC

Objectives: To develop an intrusion alarm annunciator as a small self-contained unit which renders audible tone and lock-up visual (lamp bulb) alarm indications upon receipt of signals along a telephone line up to three miles from line sensor intrusion detectors (such as MCID, BPS, BPDC, IID, or USD). It also provides means of system self-test by a push button which commands the generation of a simulated intrusion and a register which indicates accrued alarm counts.

Status: The initial experimental models were developed and proven internally at USAMERDC. These evolved through Army R&D cycle to a production design, (specification 13216E4820 and Army TM5-6350-233-15, Revised July 1969).

Several thousand Model P1 Annunciators have been put into operation throughout the world and have been quite successful.

FENCE DISTURBANCE ALARM

Agency: U.S. Air Force Systems Command

Objectives: To develop a fence disturbance sensor to be used for security of terminals, airfields, railroad yards, docks, and storage areas.

Status: Test and evaluation complete.

CAPACITANCE DEVICE

Agency: U.S. Air Force Systems Command

Objectives: To protect parked aircraft by using intrusion detection devices which are set in operation by placing them under the aircraft, connecting them to ground and to the aircraft structure and turning them on. The devices produce an electrostatic field around the aircraft which, if penetrated by a human, will be detected and cause an alarm. The units each contain three functional sections: Sensor and Detector; Local Alarm; Battery and Charger. The sensor and detector section operates by sensing a change in capacitance caused by an intruder penetrating the electrostatic field.

Status: Undergoing test and evaluation.

SAFE LOOK TEST-BETA

Agency: U.S. Air Force Systems Command

Objectives: To protect parked aircraft with intrusion detection sensors. Involves support of several development projects.

Status: Continuing.

SAFE LOOK TEST - ALPHA

Agency: U.S. Air Force Systems Command

Objectives: To test the effectiveness of the Electro-Optical TV system (Jackson and Church Electronics Co.) and the Gamma Radiation system (General Nucleonics Division, Tyco Laboratories) for use as intrusion sensors around high value resource areas such as munitions storage, POL storage, and aircraft parking areas. Both devices developed under cognizance of U.S. Air Force, Rome Air Development Center, in a program to discriminate against unwanted (nuisance type) intrusions.

Status: Test complete.

AUTO THEFT

Agency: Law Enforcement Assistance Administration

Objectives: To develop a systematic analysis of auto theft data in the Denver, Colo. area, including auto theft characterizations and profiles. Also, to conduct a study of the relative effectiveness of commercial and factory-installed anti-theft devices and their adaptability to different makes and models of automobiles.

Status: In process.

3.3 Surveillance Equipment

NIGHT VISION EQUIPMENT

Agency: U.S. Army MERDC, for Law Enforcement Assistance Administration.

Objectives: To develop prototype, night vision devices that incorporate the latest technological advances. These night-vision devices would assist law enforcement agencies in the following ways: Surveillance of organized crime activity, harbor patrol, surveillance of wharves and docks, and stake-outs for burglars or narcotic addicts.

Status: Not reported.

GROUND FLIR (FORWARD LOOKING INFRARED) EVALUATION

Agency: U. S. Army Land Warfare Laboratory.

Objectives: To evaluate the feasibility of using Forward Looking Infrared (FLIR) in detection and recognition of personnel and animal type targets. Based on Air Force "BLACK SPOT" FLIR.

Status: In process.

AN/PPS-14 LISTENING POST SURVEILLANCE DEVICE (RADAR)

Agency: U. S. Army Land Warfare Laboratory

Objectives: To develop a simple short range radar capable of detecting moving intruders. This radar stresses simplicity of operation and maintainability and annunciates the presence of moving intruders. The radar is being evaluated as a remote detector of intruders moving in a building. Applicable to detection of intruders in warehouses, air fields, docks and terminal areas.

Status: Ten prototypes are under evaluation.

MODEL 205 RADAR INTRUSION DETECTOR

Agency: U. S. Army Land Warfare Laboratory

Objectives: To develop and test a lightweight (20 lb.) radar with an automatic alarm and capability of remote operation. Applicable to detection of intruders in warehouses, air fields, docks and terminal areas.

Status: The radar has been tested in the open and in city type street environments.

AN/PPS-12 RADAR FOR SHORT RANGE PERSONNEL DETECTION

Agency: U.S. Air Force Systems Command

Objectives: To develop a sensor to be used for search of airfields, docks, railroad yards and terminal areas to locate intruder after detection. The PPS-12 is a short-range, personnel detection radar. The set operates at 8750 MHz and provides an audible output indication of a Doppler shift caused by moving target activity. The set can be operated as a hand-held or tripod mounted radar.

Status: Test and evaluation in process.

AN/PPS-11 RADAR FOR SHORT RANGE PERSONNEL DETECTION

Agency: U.S. Air Force Systems Command

Objectives: To develop a sensor to be used for search of airfields, docks, railroad yeards and terminal areas to locate intruder after detection. The AN/PPS-11 is a short-range, personnel detection radar. The set can be operated as a hand-held radar, mounted on a hand-held weapon, or tripod mounted.

Status: Test and evaluation in process.

SECURITY POLICE PERSONAL RADIO

Agency: U.S. Air Force Systems Command

Objectives: To improve security police communications by fostering commercial development of a personal radio transceiver. The result will be that a number of manufacturers will be in a position to supply a transceiver that meets USAF specifications.

Status: In development.

BUILDING SURVEILLANCE RADAR

Agency: U. S. Army Land Warfare Laboratory

Objectives: To develop a small portable device to enable the detection and localization from a position outside a building, of personnel moving inside the building. Based on the AN/PPS-14 radar.

Status: Field tests underway.

3.4 Inspection Equipment

CONTACTING INDUCTION PROBE

Agency: U.S. Army MERDC

Objectives: To develop an electromagnetic metal detector to detect contraband cargo concealed under loose regular cargo carried by boats, trucks, etc.

a. The detector shall be in a long rod (4-6 feet long) with a pointed end with a maximum 1-3/4" diameter.

b. The detector must be able to detect contraband cargo near large metal objects such as boat hulls or truck frame.

Status: One experimental model was completed and tested with satisfactory detection results; however, the workmanship was not satisfactory. The operational feasibility of the device has been demonstrated but physical redesign is required to make it suitable for production and field use.

FLEXIBLE OPTICAL INSPECTION DEVICE

Agency: Law Enforcement Assistance Administration

Objectives: To develop a prototype, instrumented probe that can be inserted into a container through a small orifice for a visual examination of the container's contents. The probe, which is composed of fiber optical materials, will contain a wide-angle feature and will transmit the interior view to an observer some distance away. The probe can be manipulated from behind a shield and it furnishes its own illumination.

Status: In development.

METAL DETECTION SYSTEMS

Agency: Transportation Systems Center

Objectives: To evaluate commercial metal and weapon detectors as a step toward improved detection systems for field conditions.

Status: Continuing.

PERSONNEL SEARCH DEVICE

Agency: U.S. Air Force Systems Command

Objectives: To develop and provide five personnel search devices for U.S. Air Force test and evaluation. This equipment will be built and tested to military specifications for possible use by the Air Force in searching personnel and their packages for smuggled arms and munitions. Each device consists of one sensor, one electronics assembly, two power sources, and a battery charger. The sensor (magnetometer) and electronics are designed to have the appearance of, and be carried as, a policeman's night stick with the power pack to be worn covertly under the operator's clothing.

Status: In development.

ADVANCED WEAPONS DETECTION SYSTEM

Agency: U.S. Postal Service Laboratory

Objectives: To study the effectiveness of existing active, multi-axis metal detectors as weapons detectors for parcel inspection. A false alarm rate of no more than 10% is sought.

Status: In development.

DETECTION OF CONCEALED METAL OBJECTS

Agency: U. S. Army Land Warfare Laboratory

Objectives: To provide a means to reduce pilfering from depots by providing walk-thru stations and hand held search units that allow hands-off search of individuals for concealed weapons and pilfered metallic items. Consists primarily of evaluation of commercially available items, including transfrisker (hand-held search units) and Infinetics ferrous metal walk-thru stations.

Status: In process.

CONCEALED WEAPONS DETECTION SYSTEM

Agency: Law Enforcement Assistance Administration

Objectives: To develop and test a feasibility model of a concealed gun detector based on new technologies which should significantly reduce the high error rates of current systems.

Status: In development.

END