

NBSIR 74-568

FY 75 Project Plans

Law Enforcement Standards Laboratory

Law Enforcement Standards Laboratory
Institute for Applied Technology
National Bureau of Standards
Washington, D. C. 20234

September 1974

Final

Prepared for
National Institute of Law Enforcement and Criminal Justice
Law Enforcement Assistance Administration
U. S. Department of Justice
Washington, D. C. 20530

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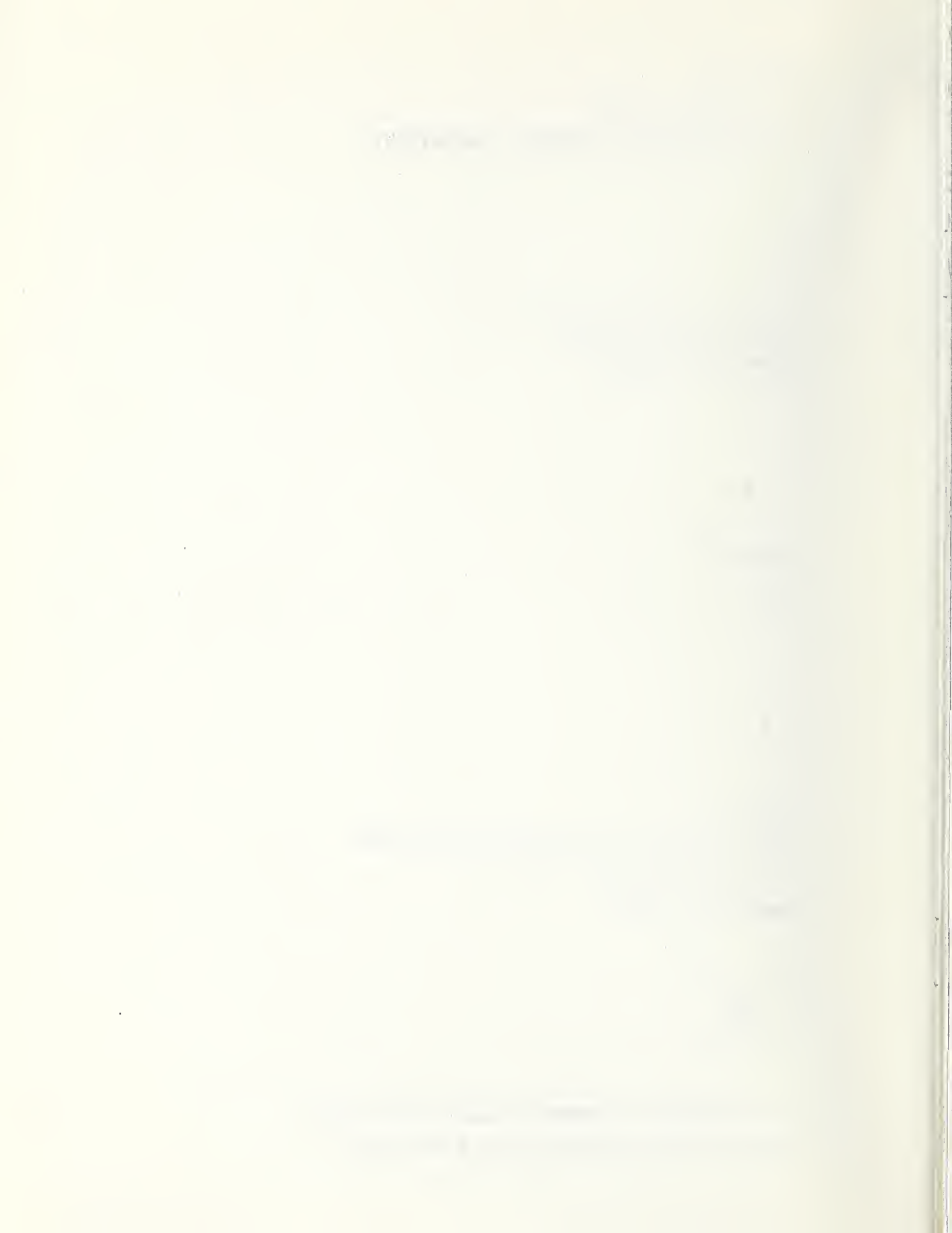
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U. S. DEPARTMENT OF COMMERCE, Frederick B. Dent, Secretary
NATIONAL BUREAU OF STANDARDS, Richard W. Roberts, Director



ACKNOWLEDGMENTS

The project plans were prepared by the Law Enforcement Standards Laboratory of the National Bureau of Standards under the direction of Jacob J. Diamond, Chief of LESL. The plans were prepared by the following LESL Program Managers: Marshall J. Treado, Communications Systems; Lawrence K. Eliason, Security Systems; Robert Mills, Investigative Aids; and Ronald C. Dobbyn, Protective Equipment. This program is sponsored by the NILECJ Office of Research Programs, Geoffrey M. Alprin, Director; Advanced Technology Division, Joseph T. Kochanski, Director; Lester D. Shubin, Program Manager for Standards.

TABLE OF CONTENTS

	<u>Page</u>
<u>Security Systems</u>	
Physical Security of Doors and Windows	1
Alarm Systems	4
Catalog of Security Equipment and Directory of Security Resources	7
<u>Communications Systems</u>	
Base Station and Transceiver Equipment	10
Transceiver Subsystems and Interfaces	14
Mobile Digital Communications	17
<u>Investigative Aids</u>	
Trace Vapor Generators	20
Gunshot Residue Detection	23
Glass Characterization	26
Guideline for Metal Detectors	29
Automotive Paint Colors	32
Criminalistics Laboratory Proficiency Testing . . .	35
Compliance Testing and Laboratory Accreditation . .	38
<u>Protective Equipment</u>	
Police Body Armor Guide	42
Police Helmet Guideline	45
Guidelines for Police Firing Ranges	48
<u>Court Equipment</u>	51

FOREWORD

Following a Congressional mandate* to develop new and improved techniques, systems, and equipment to strengthen law enforcement and criminal justice, the National Institute of Law Enforcement and Criminal Justice (NILECJ) has established the Law Enforcement Standards Laboratory (LESL) at the National Bureau of Standards. LESL's function is to conduct research that will assist law enforcement and criminal justice agencies in the selection and procurement of quality equipment.

In response to priorities established by NILECJ, LESL is (1) subjecting existing equipment to laboratory testing and evaluation and (2) conducting research leading to the development of several series of documents, including national voluntary equipment standards, user guidelines, state-of-the-art surveys and other reports.

A list of the documents already completed under the Law Enforcement Standards Program will be found at the end of this document.

The 1975 Project Plans of the Law Enforcement Standards Laboratory outline the approved research objectives and plans for the fiscal year starting July 1, 1974. The program of testing and evaluation described in the Project Plans has significant value for law enforcement and criminal justice agencies in the selection and procurement of quality equipment. This document is intended to present detailed information concerning this program so that all concerned may be aware of the ongoing research.

Comments and suggestions concerning these plans and future efforts in this area are invited from all interested parties. They should be addressed to the Program Manager for Standards, National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Administration, U.S. Department of Justice, Washington, D.C. 20530.

*Section 402(b) of the Omnibus Crime Control and Safe Streets Act of 1968, as amended.



Lawrence K. Eliason, Program Manager
Security Systems

Project Plan for
The Physical Security of Doors and Windows

SCOPE

The purpose of this project is to develop standards for the physical security of doors and windows for residences and small businesses. This project also involves work with various States and trade associations, the National Conference of States on Building Codes, the Department of Housing and Urban Development and others to implement the standards and to incorporate them into building codes and security ordinances.

BACKGROUND

The magnitude of the problem of burglary prompted NILECJ to fund the development of standards for the physical security of doors and windows. The methods of attack used by burglars were studied by LESL in detail, and levels of performance were established for doors resistant to four burglar skill levels. Specific test methods were developed and a draft standard was prepared for single, swinging, entry doors. The effort to establish performance levels and a standard for windows is now in progress.

It is essential that the standard for the physical security of windows be completed, and that the standard for the physical security of doors be expanded to include other types of doors used in residences and small businesses, such as double doors and garage doors.

Similarly, guidelines for physical security are needed by the general public. It is also incumbent upon LESL to press for the implementation of these standards through their incorporation into building codes and regulations: National, State and local.

PROJECT PLAN

The review and revision of the preliminary draft of the standard for the physical security of doors will be completed and the document published. The laboratory work for the

evaluation of window security will be completed and a standard prepared. Laboratory work on additional types of doors and add-on security devices for doors and windows will continue, and guidelines will be developed.

In addition, personnel will assist other Government Agencies such as HUD and NCHA in the implementation of these standards. This will include both participation in community crime prevention programs and action to achieve incorporation of the standards into building codes and security ordinances.

OBJECTIVES

The objective of this project are listed below, and the project schedule is shown on the milestone chart which follows.

1. Standard for the Physical Security of Doors
2. Standard for the Physical Security of Windows
3. Guideline for Residential Security
4. Guideline for Security of Small Businesses
5. Implementation Tasks

LEVEL OF EFFORT

1. Standards and Guidelines	\$50K
2. Implementation Tasks	\$50K
Total	\$100K

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Standard for the Physical Security of Doors (Single)	Continuing	Completed	Completed	Completed	11/74
Standard for the Physical Security of Windows	Continuing	Completed	Completed	8/74	3/75
Guideline for Residential Door and Window Security	Continuing	Completed	10/74	1/75	8/75
Guideline for Door and Window Security for Small Businesses	Continuing	Completed	11/74	3/75	10/75

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Lawrence K. Eliason, Program Manager
Security Systems

Project Plan for
Alarm Systems

SCOPE

The purpose of this project is to complete the development of standards for capacitance proximity sensors and photoelectric devices and initiate the development of a standard for burglar alarm system control boxes.

BACKGROUND

The projects to develop standards for proximity sensors and photoelectric devices were started during FY-74. The completion of standards for these and the other sensors included in the alarm systems project will provide the law enforcement community with performance standards for the majority of the commonly used burglar alarm system sensors. The use of these standards will help eliminate false alarms from the detector portion of burglar alarm systems.

The burglar alarm system control box provides for the human interface required for on/off control, testing, and maintenance of the system. More than fifty percent of alarm system false alarms can be attributed directly to operator mistakes, which are to a large extent alarm control procedural errors. This is a consequence of the fact that many of the control boxes currently being marketed lack adequate fail-safe features. The functional design features of control boxes must be studied as they relate to control mechanisms which allow accidental alarms to be caused by turning the system on with protected windows or doors open, entering the protected premises without turning the alarm system off, and similar inadvertent operator violations of procedure. A standard for control boxes which requires functional features that minimize the possibility of operator mistakes will greatly enhance the effectiveness of alarm systems. A decrease in false alarms will improve the probability of apprehension through improved police response and will result in an appreciable saving of money and effort.

PROPOSED PLAN

The laboratory evaluation of capacitance proximity devices will be completed, test methods and minimum levels of performance will be established and the standard for these

devices will be drafted. The literature study of photoelectric sensors will be completed, laboratory testing of commercial sensors performed, test methods and minimum levels of performance established, and a standard for these sensors will be drafted.

Manufacturer information concerning control boxes will be examined in detail to fully classify the functions and utility of units currently being marketed. Representative samples will be obtained and subjected to laboratory evaluation. Test methods will be developed for all initial performance parameters. In addition, the control and display functions will be studied in depth as they relate to the ability of the operator to accidentally cause a false alarm. Minimum requirements will be established for fail-safe capability and included in the standard together with other performance requirements and method of test.

OBJECTIVES

The objectives of this project are listed below, and a milestone chart presented on the page which follows.

1. Standard for Capacitance Proximity Devices
2. Standard for Photoelectric Devices
3. Standard for Alarm System Control Boxes

LEVEL OF EFFORT

1. Standard for Capacitance Proximity Devices	\$20K
2. Standard for Photoelectric Devices	\$20K
3. Standard for Alarm System Control Boxes	<u>\$45K</u>
Total	\$85K

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Standard for Capacitance Proximity Devices	Continuing	8/74	11/74	2/75	9/75
Standard for Photoelectric Devices	Continuing	11/74	3/75	6/75	1/76
Standard for Alarm System Control Boxes	12/74	4/75	7/75	10/75	5/76

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Lawrence K. Eliason, Program Manager
Security Systems

Project Plan for
Catalog of Security Equipment and Directory of Security Resources

SCOPE

The purpose of this project is to complete the development of the catalog of security equipment and directory of security resources, which were started during the preceding year, and to continue to expand and refine the documents for revision and republication early in 1976. A primary objective of the effort is to coordinate with the NCJRS staff to develop methods of integrating the data system directly into the NCJRS program for response to citizen requests for specific information.

BACKGROUND

The availability of consumer information is essential to the selection and use of security equipment and is important to community crime prevention program development. No single source of manufacturer information exists which includes all types of security equipment with explanations of their uses. Similarly, no directory of resources is available. The intelligent selection of security equipment by the general public requires that they first understand, at least in general terms, what certain equipment or devices are used for. From this, one can gain a general idea of what can be done to improve security, particularly if a range of cost is presented and sources of supply are identified.

Discussions with police departments, the National Crime Prevention Institute, and NCJRS served not only to substantiate the need for the catalog and directory in published form, but also established the usefulness of a response service which would allow individual specific inquiries to be answered on demand. Since the data base for this effort is computerized, it is well suited to such an application. The response received during the initial compilation of data was more limited than anticipated, and it is desirable to expand the data base to include additional services and products, while pursuing the evaluation of the first publications in terms of their usefulness to the general public.

PROPOSED PLAN

Review of the draft copies of the catalog of security equipment and directory of security resources will be completed and the documents will be published. A parallel effort will be initiated immediately to collect additional manufacturer and consultant information for incorporation into updated documents to be published in 1976. Direct liaison will be established with NCJRS to determine what modifications to the computer program are needed to allow the data base and response service to be incorporated directly into the NCJRS system.

Similarly, direct contact will be established with police departments, manufacturers, consumers, and installers to evaluate the effectiveness of the first volumes and to identify modifications of text and format which might improve the utility of the documents. This will serve as the basis for preparation of revised documents for publication in 1976.

When the revised draft documents have been prepared, the computered data and programs, together with all manufacturer catalog material, will be provided to NCJRS for continued use after the completion of this effort as a LESL program.

OBJECTIVES

The objectives of this project are listed below, and the project schedule is shown on the milestone chart which follows.

1. Security Equipment Catalog
2. Directory of Security Resources
3. Revised Security Equipment Catalog
4. Revised Directory of Security Resources

LEVEL OF EFFORT

All objectives \$35K

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Catalog of Security Equipment	Continued	Complete	N/A	8/74	3/75
Directory of Security Resources	Continued	Complete	N/A	8/74	3/75
Revised Catalog of Security Equipment	7/74	3/75	N/A	6/75	1/76
Revised Directory of Security Resources	7/74	3/75	N/A	6/75	1/76

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Marshall J. Treado, Program Manager
Communications Systems

Project Plan for
Base Station and Transceiver Equipment

SCOPE

The items of equipment involved in this project are the transmitters, receivers, antennas and associated equipment which are components of base station and transceiver systems. Standards and guidelines are being developed to assist law enforcement agencies in their selection and procurement of this type of equipment.

BACKGROUND

Recent technological advances in electronics have brought about many improvements in the communications equipment used for law enforcement. Better performance, longer operating life, lighter weight, smaller size, greater capability, better packaging and increased reliability are products of these improvements in technology. The law enforcement community has asked for more information regarding this sophisticated communications equipment and has created a demand for equipment performance standards to describe the needed operational capability. To meet this demand, law enforcement communications equipment standards have been developed for base station transmitters and receivers; mobile transmitters, receivers and antennas; and personal/portable transmitters and receivers. Additionally, standards are being developed for base station antennas and for personal transceivers. These standards are designed to assist the user of law enforcement communications equipment by establishing minimum levels of performance and the test methods to evaluate equipment performance. Guidelines which will discuss this equipment from the users' point of view are needed to complement the standards. To date, guidelines have not been developed for this purpose.

PROPOSED PLAN

Based on the data obtained during the development of performance requirements and test methods for the standards mentioned above, guidelines will be developed to assist the user in the selection and utilization of these items of equipment. The guidelines

will provide the technical rationale for the selection and operational use of basic communications equipment to meet the particular needs of individual law enforcement agencies. Topics discussed will include the relationship between power and range, the importance of improved performance in areas such as the attenuation of spurious emissions and intermodulation interference, the relationship between the transceiver and its antenna, and the degradation of performance due to terrain conditions, proximity of objects and personnel, weather, and rf interference. Some additional laboratory and field testing will be done. The effects of the components (antennas, microphones, etc.) on the capability of the overall system will be discussed, as well as the limitations of each item of equipment.

A variety of equipment has been tested, and such testing will continue. Tests thus far have primarily been conducted on equipment loaned by manufacturers and have been limited to non-destructive tests. The estimated costs of this project do not include the purchase of major items of equipment to be tested.

OBJECTIVES

The objectives of this project will be to complete the development of those standards initiated in previous years and to develop the four guidelines as indicated on the attached milestone schedule.

LEVEL OF EFFORT

The work on this project will be performed by the Electromagnetics Division at NBS Boulder, Colorado. Funds totaling \$250,000 are budgeted as follows:

Completion of previously started standards	\$60,000
Guideline for personal radios	\$50,000
Guideline for mobile radios	\$45,000
Guideline for fixed and base station equipment	\$45,000
Guideline for mobile repeater communications equipment	\$50,000

REMARKS

This project has been the nucleus of the LESL Communications Program since its initiation in FY 1971, when \$85,000 was committed. During FY 1972, this was a \$165,000 effort, and \$150,000 were provided from FY 1973 funds. \$60,000 of FY 1974 funding was earmarked for this project. Eleven standards and three reports have been developed under this project.

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Standard for Fixed and Base Station Receivers	Continuing	Completed	Completed	Completed	1/75
Standard for Mobile Receivers	Continuing	Completed	Completed	Completed	12/74
Standard for Personal/Portable Receivers	Continuing	Completed	Completed	Completed	2/75
Standard for Fixed and Base Station Antennas	Continuing	Completed	12/74	1/75	8/75
Standard for Personal Transceivers	Continuing	Completed	Completed	7/74	2/75
Guideline for Personal Radios	7/74	9/74	1/75	2/75	7/75
Guideline for Mobile Radios	7/74	9/74	1/75	4/75	9/75
Guideline for Fixed and Base Station Equipment	8/74	10/74	2/75	6/75	11/75
Guideline for Mobile Repeater Communications Equipment	8/74	11/74	2/75	5/75	10/75

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Marshall J. Treado, Program Manager
Communications Systems

Project Plan for
Transceiver Subsystems and Interfaces

SCOPE

This project involves the development of standards which will provide compatibility and interchangeability among various communications subsystems. The items of equipment involved during FY 1975 are components of base stations and transceivers such as cables, control heads, microphones and connectors.

BACKGROUND

Lack of standardization was cited as a deficiency in the law enforcement communication equipment selection and procurement process by the President's Commission on Law Enforcement and Administration of Justice. The Commission stated that "gross standardization of size, mounting brackets, receptacles and control heads can be accomplished immediately, and should go far toward making it possible to use the products of different manufacturers interchangeably." An initial review of the accessory communications equipment being marketed today substantiated this claim. One manufacturer's equipment will not ordinarily interface with another's from either the physical or electrical point of view. This situation often forces the law enforcement agency to purchase new accessory equipment each time a new transceiver is bought. Occasionally, components made by the same company during different model years will not physically mate with each other.

This project was established to review and categorize the accessory equipment presently available, to determine which equipment needed to be standardized, which equipment it seemed feasible to standardize, and to initiate a standardization program. A standard entitled RF Coaxial Cable Assemblies for Mobile Transceivers has been developed and is being reviewed prior to publication.

PROPOSED PLAN

It is proposed to continue this effort by developing two additional standards. One will be concerned with the control heads used with mobile transceivers, while the other will address microphone cables and connectors. Equipment being marketed will be examined and tested. Particular attention will be paid to the number and types of functions performed by the control head, the location and function of control head knobs and switches, the cable assembly and connectors leading to the transceiver and the cable assembly and connectors between the microphone and the control head. The advantages and disadvantages of specifying each of the above as a design requirement will be determined through equipment operation and testing plus discussions with knowledgeable users and manufacturers of these components. If feasible, the functions of the control head and the location and rotation of control head knobs and switches will be specified. The various cable assemblies and connectors will also be specified if the advantages to be gained warrant it. Additionally, minimum performance requirements and techniques for measuring these requirements will be determined for these components.

OBJECTIVES

The objectives for FY 1975 are to develop two standards for mobile transceiver interface and subsystem equipment. The milestones for this effort are shown on the attached schedule.

LEVEL OF EFFORT

The work on this project will be performed by the NBS Electromagnetic Division in Boulder, Colorado. Funding for FY 1975 is \$120,000, divided equally between the two tasks.

REMARKS

This project was initiated in FY 1973, and \$35,000 was spend in the development of the standard for RF coaxial cable assemblies.

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Standard for Control Heads Used With Mobile Transceivers	7/74	11/74	1/75	3/75	10/75
Standard for Microphone Cables and Connectors Used With Mobile Transceivers	8/74	1/75	3/75	6/75	1/76

Objectives

Standard for Control Heads Used With Mobile Transceivers
 Standard for Microphone Cables and Connectors Used With Mobile Transceivers

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Marshall J. Treado, Program Manager
Communications Systems

Project Plan for
Mobile Digital Communications

SCOPE

This project is concerned with mobile digital terminals used in police cars and the corresponding equipment at police headquarters. The effort for this fiscal year is directed at mobile facsimile equipment used by the law enforcement community.

BACKGROUND

The present congestion of the frequency spectrum used by FM two way police radios mandates that means for better utilization of this spectrum be found. One of the ways of accomplishing this has been to adapt and use digital techniques to send messages previously transmitted by voice. Accordingly, the development of digital equipment for this purpose and its purchase and installation has been given a high priority by many law enforcement agencies. Use of digital techniques has improved the speed of transmission, made more effective use of available spectrum and provided additional security to transmissions. The use of voice on these channels has not been eliminated completely, primarily because emergency calls must be sent by voice, but digital techniques are being used to handle a large majority of the message traffic; i.e., that of a status and inquiry nature. The use of digital equipment also lends itself to the provision of a permanent record, and it further provides a data transfer capability directly to and from state and national data banks.

Two reports have been produced as part of this project. One was a report on digital communications equipment for law enforcement use. The second report included the results of digital data transmission testing in Allegheny County, Pennsylvania. The data in these two reports are being used as baseline information in the development of a performance standard for mobile digital terminals for law enforcement use, an on-going task under this project.

Law enforcement agencies have asked for accurate, inexpensive facsimile equipment for their vehicles as digital techniques have made this capability available. Several models are now being marketed.

PROPOSED PLAN

The approach to this task will consist of several steps. The first will be a determination of the amount and type of facsimile transmission needed by law enforcement agencies. Next will be a compilation of the types of facsimile equipment being offered to police by the manufacturers. The resulting information will be compared with the digital message format, digital transmission rates, transceiver interface requirements, power requirements and the other performance characteristics being defined as a necessary part of the mobile digital terminal standard. These data, plus any obtained from viewing the facsimile equipment in operation and observing laboratory tests, will be used to develop a guideline for the selection and use of such equipment by law enforcement agencies.

OBJECTIVES

The primary objective of this task is to develop a guideline for the selection and use of facsimile equipment in police vehicles. The guideline will be developed as indicated on the attached schedule.

LEVEL OF EFFORT

The funding provided for this effort is \$45,000.

REMARKS

The mobile digital communications project was initiated in FY-1972. Two technical reports have been developed and one performance standard is being written. This effort has been allocated \$128K for the three year period.

Milestones*

	Assumed Starting Date	#1	#2	#3	#4
Objectives					
Guideline for the Selection and Use of Mobile Facsimile Equipment	Dec. 74	Feb. 75	June 75	Sept. 75	Jan. 76

- *Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.
- *Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.
- *Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.
- *Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Robert Mills, Program Manager
Investigative Aids

Project Plan for
Trace Vapor Generators

SCOPE

This project involves the development of a trace vapor generator to check the sensitivity of explosive vapor detectors.

BACKGROUND

Trace vapor detectors are devices designed to indicate the presence of minute concentrations of explosive vapors. They can be used to check unopened packages or luggage, or to detect traces on the hands or clothing of persons who have recently handled explosives. In some cases, they can provide information about the type of explosive used, after an explosion has occurred.

A variety of trace vapor detectors are being developed or are available commercially. One example is a portable gas chromatograph with a special sampling and concentrating valve which will detect explosive vapors in the presence of large concentrations of other material. Another device monitors the luminescence of light-emitting (bioluminescent) organisms which are sensitive to trace quantities of explosives in the surrounding atmosphere. The plasma chromatograph is another portable ionization-type detector for which preliminary studies indicate an extremely high sensitivity to explosives and various contraband materials. Explosives can be detected with high selectivity and sensitivity by measuring ion mobilities in a drift tube following ion-molecule reactions at atmospheric pressure. Other instruments becoming available include enrichment devices and separators coupled to mass spectrometers and electron capture detectors.

One of the most important attributes of a trace vapor detector is its sensitivity. Yet the sensitivities of explosive vapor detectors have not been accurately determined due to the difficulty of measuring the minute concentrations of vapor to which the detectors respond. Sensitivities

claimed by the manufactures of detectors have been based, at best, on theoretical considerations. A trace vapor generator which produces known concentrations of appropriate explosive vapors will be extremely valuable in the intercomparison of the lower detection limits of available trace vapor detectors.

PROPOSED PLAN

A trace vapor generator, using a column packed with a mixture of explosive and inert materials, has been built. The explosive vapor concentration is changed by varying the flow rate of a carrier gas through the packed column and by diluting the effluent with additional carrier gas in a mixing chamber. The project will be completed with the careful calibration of the generator, using proven laboratory techniques, and the preparation of a report describing the trace vapor generator.

OBJECTIVE

The objective of this project is the development and calibration of the trace vapor generator and the preparation of a report describing its design and operation. The attached chart gives the projected milestones for FY-75.

LEVEL OF EFFORT

A total of \$70,000 has been spent since this project was initiated in FY-73. An additional \$25,000 has been budgeted in FY-75 to complete the project.

Milestones*

Objectives	Assumed Starting Date	# 1	# 2	# 3	# 4
Report describing the trace vapor generator	Continuing	Completed	12/74	3/75	10/75

Objectives

Report describing the trace vapor generator

- *Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.
- *Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.
- *Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.
- *Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Robert Mills, Program Manager
Investigative Aids

Project Plan for
Gunshot Residue Detection

SCOPE

This project is for the development of a method for the detection of gunshot residues using neutron activation analysis, together with data on its reliability under a variety of circumstances.

BACKGROUND

Modern cartridge primers contain barium (Ba) and antimony (Sb) salts. When a weapon is fired, traces of these elements are deposited on the shooter's hand.

Two techniques are currently used to remove the Ba and Sb residues from the suspect's hand for chemical analysis. One technique involves the application to the hand of melted paraffin in layers reinforced with gauze. The second technique involves the use of cotton swabs moistened with dilute nitric acid (HNO_3). A third technique, not now in general use, involves wiping with a dry cotton ball after first moistening the hand with a spray of dilute HNO_3 .

Neutron activation analysis has proven to be a valuable method for measuring the amount of gunshot residue. Any Ba and Sb removed from the shooter's hand is made radioactive through the use of neutrons from a nuclear reactor. The gamma radiation emitted by the radioactive Ba and Sb is then determined by comparing it with the radiation from Ba and Sb standards. Concentrations of Ba and Sb significantly above background levels provide evidence that the suspect has fired a weapon in the recent past.

There are limits to the circumstances under which the collection and analysis of gunshot residues can be expected to give reliable results. For example, the amount of residue which remains on a suspect's hands is reduced if he showers, washes his hands or just sleeps in a bed. There have been cases where gunshot residue tests have been made even though it was known that the suspect had washed his hands several times after being fingerprinted. The resulting questionable results have cast undeserved discredit on the entire technique. There is a need for a recommended

procedure giving detailed instructions for gunshot residue collection and analysis which will give results of known reliability. There is also a need to carefully investigate the reliability of tests conducted under less than optimum circumstances.

PROPOSED PLAN

This is an ongoing project. To date, the following tasks have been completed: (a) optimization of the procedure for neutron irradiation of the sample, (b) perfection of the cotton ball technique for residue collection, (c) comparison of the relative efficiency and convenience of the three residue collection techniques being compared, (d) measurement of the stability of residues on hands as a function of time after firing and (e) measurement of barium and antimony background levels on the hands of the general population. The final task, to be completed in FY-75, is to measure barium and antimony levels on the hands of a statistically significant group of people who have fired various types of handguns in a variety of circumstances. These data, together with the background level data, will then be used to establish the reliability of this gunshot residue detection technique.

OBJECTIVES

The outputs of this project are (a) a recommended procedure for the analysis of gunshot residues using neutron activation analysis, (b) a recommended procedure for the collection of gunshot residues for analysis by neutron activation analysis, and (c) a report discussing the reliabilities of the recommended procedures. The attached table shows the projected milestones.

LEVEL OF EFFORT

A total of \$95,000 has been spent in FY 1973 and FY 1974. The \$30,000 budgeted for FY 1975 will complete this project.

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Recommended Procedure for the Analysis of Gunshot Residues	Continuing	Completed	Completed	9/74	4/75
Recommended Procedure for the Collection of Gunshot Residues	Continuing	Completed	Completed	11/74	6/75
Report Concerning Reliability of Technique	Continuing	Completed	1/75	3/75	10/75

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Robert Mills, Program Manager
Investigative Aids

Project Plan for
Glass Characterization

SCOPE

This is a project to develop (a) information concerning the reliability of glass characterization by means of refractive index measurement and by trace element analysis, (b) standard reference materials for refractive index measurements made in forensic science laboratories, and (c) recommended methods for characterizing automobile headlight glass for forensic purposes.

BACKGROUND

Forensic scientists characterize evidence in one of two ways. "Classification" is the process by which they identify the evidence as belonging to a particular subclass (e.g., a glass fragment as being auto headlight glass, or better, an auto headlight made by G.E.). "Individualization", on the other hand, is accomplished when the unique identity of evidential material is established (e.g., a glass fragment as coming from the right headlight of a specific car).

Data are needed to establish the specific subclasses into which glasses can usefully be classified, the cases for which individualization can be demonstrated, and the reliability with which these classifications and individualizations can be made. Data taken to obtain this information are referred to as "population statistics."

Measurements for either classifications or individualizations must be made by precise and accurate methods to insure that any observed variations are due to the characteristics of the material and not to the measurement process. Standard reference materials are needed by forensic laboratories for the calibration of their instruments, for the validation of their procedures, or for the confirmation of a classification by a direct comparison with the evidence.

In FY-73, LESL conducted a survey of the state-of-the-art of standard reference collections of forensic materials. The report of the survey findings constitutes an important part of the groundwork on which this project is based.

PROPOSED PLAN

This is a continuing project. In FY-74, new and used auto headlights were obtained and cut into samples for refractive index (RI) measurements and trace element analysis using neutron activation analysis (NAA). Results to date confirm that RI measurements can be used to distinguish auto headlight glass from other types of glasses. It has been found that older glass made by one of the two glass manufacturers can be differentiated from newer glass made by the same manufacturer. Tentative results also indicate that RI measurements are improved if the glass samples are first annealed.

Trace element analysis, on the other hand, shows greater promise for making individualizations. A NAA technique has been perfected which can be non-destructive and which measures 8 trace elements.

Additional data will be obtained in FY-75 on the precision and accuracy of both RI measurements and NAA. Attention will be directed to the characterization of window plate glass as soon as the work on auto headlight glass has been completed.

The first glass refractive index standard reference material (SRM) will be ready for distribution early in FY-75. These SRM's are certified for RI values commonly encountered in forensic applications, at several wavelengths and over an appropriate temperature range. Development of liquid SRM's began late in FY-74 and is now in progress.

OBJECTIVES

The objectives of this project are 1) glass and liquid RI standard reference materials, 2) a report on the population statistics of auto headlight glasses characterized by their refractive indexes and their trace element contents, 3) a similar report on the population statistics of window plate glasses, and 4) recommended procedures for making the refractive index and trace element profile measurements.

The projected milestones are shown in the attached chart.

LEVEL OF FUNDING

\$184,500 was spent for this project in FY-74. \$170,000 is budgeted for FY-75.

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Standard Samples of Refractive Index Glasses	Continuing	Completed	Completed	N/A	8/75
Report on Auto Headlight Glass Population Statistics	Continuing	Completed	12/74	2/75	9/75
Standard Samples of Refractive Index Liquids	Continuing	8/74	6/75	N/A	9/75
Report Concerning Window Glass Population Statistics	11/74	12/74	7/75	9/75	4/76
Recommended Method for Glass Refractive Index Measurement	Continuing	Completed	12/74	2/75	9/75

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Robert Mills, Program Manager
Investigative Aids

Project Plan for
Guideline for Metal Detectors

SCOPE

This project concerns the development of a guideline to advise users on the selection and use of both walk-through and handheld metal detectors for weapons detection.

BACKGROUND

The use of weapons, particularly handguns, in connection with such crimes as airplane hi-jacking, prison breaks, hostage captures, etc., has created a widespread demand for means to detect concealed weapons. Several devices have been developed to meet this demand, including those known as metal weapon detectors. The metal weapon detectors on the market are designed for use at prisons, airports, computer facilities, courtroom entrances, entrances to public buildings, etc. However, many potential users need assistance in understanding the performance which can be expected from these devices, and in making a judicious selection from available models.

PROPOSED PLAN

The Law Enforcement Standards Laboratory has developed performance standards for walk-through (NILECJ-STD-0601.00) and handheld (NILECJ-STD-0602.00) detectors. These standards, by necessity, are technical documents intended for laboratory use by technical personnel. This guideline will complement the performance standards by discussing weapon detectors in non-technical language. Subjects to be discussed will include the relative advantages of active and passive detectors, single and zone indication, performance to be expected at different sensitivity settings for various applications, and possible hazards to film, magnetic tape, and people using heart pacemakers.

Maximum possible use will be made of experience obtained from earlier work at NBS. However, it is likely that some limited additional laboratory tests will be necessary.

OBJECTIVE

The output of this project will be a guideline for metal detectors. The projected milestones are given on the attached chart.

LEVEL OF EFFORT

\$50,000 has been budgeted for this project.

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Guideline for metal detectors	11/74	12/74	4/75	6/75	1/76

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Robert Mills, Program Manager
Investigative Aids

Project Plan for
Automotive Paint Colors

SCOPE

This project involves the collection and distribution of standard reference collections of automotive paint colors.

BACKGROUND

Paint transfer occurs in many crimes involving vehicles. Criminalists are often asked to examine auto paint taken at the scene of a crime in order to make a classification or individualization. A classification is most useful in the early stages of an investigation and helps to determine the make, model, and year of the vehicle involved. An individualization is a more specific characterization and serves to establish that the paint came from a particular vehicle. The simplest methods of paint characterization involve the microscopic examination of color, surface texture, surface markings and layer structure, and the matching of broken edges.

In 1973, LESL conducted a study of standard reference collections and their potential value to forensic laboratories. It was found that the directors of many Federal, State and local criminalistics laboratories wanted a standard reference collection of auto paint colors for use in their laboratories.

PROPOSED PLAN

A Standard Reference Collection of Automotive Paint Colors has been developed with the cooperation of the auto manufacturers and their paint suppliers. This first reference collection consists of samples of 140 paint colors used on 1974 model domestic passenger vehicles, plus information pertinent to their use. The color samples are intended for use in making color comparisons, and are not certified for chemical composition.

All the color samples were prepared from actual production paint batches. The original-finish paint suppliers applied the paint to metal panels or, in some cases, to paper substrates. Samples approximately 25 x 40 mm in size were cut and each sample was placed in a plastic hinged holder. The samples can easily be removed from the hinged holders as needed, for ease in visual or microscopic comparison.

The reference collection includes information on color type, i.e., whether metallic or non-metallic; whether the sample is a new color for model year 1974 or a carry-over color from prior model years; the name of the auto manufacturer using the color and the 1974 models on which the color is used.

Arrangements have been made to distribute the 1974 reference collection gratis to approximately 200 qualified U.S. forensic laboratories. The collection and distribution of automotive paint color samples will be continued in FY-75. The 1975 reference collection will include color samples of 1975 model domestic passenger vehicles, some imported passenger vehicles, and some domestic non-passenger vehicles (e.g., trucks, buses). These will be made available for a small fee, rather than gratis.

OBJECTIVE

The objective of this project is to produce and annually update a reference collection of automotive paint color samples together with information pertinent to their use by forensic science laboratories. The attached chart gives the projected milestones for FY-75.

LEVEL OF EFFORT

A total of \$35,000 was spent in FY-74 for this project. An additional \$20,000 has been budgeted for FY-75.

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Standard reference collection of 1974 automotive paint colors	Continuing	Completed	Completed	N/A	9/74
Standard reference collection of 1975 automotive paint colors	Continuing	8/74	7/75	N/A	9/75

Objectives

Standard reference collection of 1974 automotive paint colors

Standard reference collection of 1975 automotive paint colors

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Robert Mills, Program Manager
Investigative Aids

Project Plan for
Criminalistics Laboratory Proficiency Testing

SCOPE

This project relates to technical support to be provided by LESL/NBS for a nationwide criminalistics laboratory proficiency testing program.

BACKGROUND

According to the American Academy of Forensic Sciences, evidence has been mounting concerning the existence of wide variations in the performance of criminalistics laboratories. The analysis of some types of physical evidence is of uniformly low quality, and in other cases the variations in analytical results between laboratories is high. This situation is not restricted to criminalistic laboratories. The same conditions have been found to exist, for example, in clinical laboratories.

Proficiency testing is being used successfully as a quality control and improvement device in several fields. For example, the College of American Pathology and the Center for Disease Control are conducting proficiency testing programs for hospitals and clinical laboratories. The Department of Transportation has recently initiated a proficiency testing program for blood alcohol measurements. However, there has been no nationwide proficiency testing program for criminalistics laboratories, covering all types of physical evidence.

The following are the specific goals of this program:

- Through the use of voluntary, anonymous proficiency testing, assess the analytical accuracy of criminalistic laboratories in the processing of selected physical evidence.
- Make statistical studies of the accuracy and precision of the various analytical methods used.
- Establish the basis for the design of educational programs, in the area of analytic methods, which will assist the criminalistics profession in the attainment of higher levels of proficiency.

There is strong feeling within the profession that these goals can best be met by a program administered by criminalists working within an organization that is criminalistically oriented. For this reason, NILECJ has assigned primary responsibility for the implementation and administration of this program to the Forensic Science Foundation, the education and research arm of the American Academy of Forensic Sciences. Procedural matters relating to specific tests will be studied by a Project Advisory Committee composed of eight eminent criminalists, each of whom has had extensive experience in the management of criminalistic laboratories. Overall evaluation of the proficiency testing concept will be performed by the participating laboratories under the aegis of the Project Advisory Committee. Technical support will be provided by the Law Enforcement Standards Laboratory of the National Bureau of Standards.

PROPOSED PLAN

A detailed plan has been submitted to NILECJ by the Forensic Science Foundation. In brief, selected items of typical physical evidence will be manufactured according to exact specifications and distributed, free of charge, to each criminalistic laboratory in the United States and its possessions, and to a group of laboratories in Canada. On a voluntary basis, each laboratory will submit its analytical findings concerning each item, and these findings will then be evaluated by NBS. Individual reports will be treated in a confidential manner; the identity of participating laboratories will be known only to the executive director of the Forensic Science Foundation. However, the data derived therefrom will be subjected to analysis for long-range study purposes.

OBJECTIVES

LESL is responsible for (a) providing technical support in the preparation of specifications for the manufacturer of the test samples, but not for writing the specifications nor for awarding and administering the contracts for the preparation of the test samples; (b) establishing "target values" for the test samples before their distribution to the participating laboratories; (c) establishing the statistical procedures to be used in the analysis of the proficiency test results; and (d) performing the statistical analysis. These responsibilities will be fulfilled primarily via informal communications to the Forensic Science Foundation. Since LESL's role is supportive in nature, milestones do not apply.

LEVEL OF EFFORT

\$80,000 has been budgeted for FY-75 LESL/NBS activities under this program. Funding for the Forensic Science Foundation effort is being provided directly by NILECJ.

Robert Mills, Program Manager
Investigative Aids

Project Plan for
Compliance Testing and Laboratory Accreditation

SCOPE

This is a project to plan, and to the extent appropriate, implement a system for testing law enforcement equipment for compliance with NILECJ standards, and for evaluating the ability of testing laboratories to perform such compliance testing.

BACKGROUND

Criminal justice officials need assistance in the selection and procurement of equipment. They need to know what the product will and will not do, how long it will last, and whether it will be safe for them and the public. The development of performance standards is an important first step. However, the maximum benefits to the criminal justice system, to the manufacturers and to the public cannot be realized without a program to ascertain which items available on the market do, in fact, meet the requirements of the standards.

The testing of equipment to determine compliance with a standard is referred to as compliance testing. Two types of compliance tests are of interest. Acceptance tests are those performed to determine the acceptability of delivered items which have been purchased under a contract requiring compliance with a particular standard. Qualification tests are those performed in advance of and independent of any specific procurement action, for the purpose of establishing a "complying products list."

The large amount of qualification testing and acceptance testing which the widespread use of the NILECJ standards will engender necessitates the involvement of private and public testing laboratories other than NBS. NBS's role is in the development of the standards and in the arbitration, if needed, of any disputes which may arise concerning compliance test results, but not in the compliance testing per se. If uniformly high standards of performance in compliance testing are to be maintained, laboratories must be selected which are competent and which are not controlled by the equipment manufacturers or distributors.

PROPOSED PLAN

A compliance testing and laboratory accreditation plan is under preparation. In brief, the planned program will (a) result in a body of qualification and acceptance test data, (b) establish a list of testing laboratories accredited to perform these qualification and acceptance tests, and (c) set up a "compliance information system" for the dissemination to officials in the criminal justice system of information obtained via the qualification and acceptance tests. The plan is described in greater detail in a concept paper titled "A Compliance Testing System for ESID/NILECJ." Consultants hired by NILECJ from the Underwriters Laboratories, the American Council of Independent Laboratories, the Los Angeles Police Department and the Economics Department of MIT have studied the paper, and have made comments and recommendations.

In FY-75, (1) the concept paper will be modified to incorporate the suggestions made by the consultants, (2) the proposed compliance testing system will be submitted to NILECJ management, (3) additional testing laboratories interested in evaluating law enforcement equipment in accordance with NILECJ standards will be identified, and (4) additional criteria for evaluating the qualifications of testing laboratories will be drafted.

During FY-74, 47 testing laboratories expressed an interest in compliance testing various items of law enforcement equipment in response to announcements in the Commerce Business Daily and three trade journals. In addition, criteria were drafted for evaluating laboratories for their ability to test equipment in accordance with five NILECJ standards.

OBJECTIVES

The objectives of this project are (a) a concept paper giving details of a proposed plan for establishing a NILECJ Compliance Testing System, together with visual aids summarizing the proposed plan, (b) a tabulation of testing laboratories grouped by their stated interest in performing compliance tests relating to various LESL program areas, and (c) written criteria for evaluating test laboratories. The attached table shows the projected milestones for the completion of the concept paper, the first edition of the tabulation of testing laboratories, and the first set of laboratory

evaluation criteria. The tabulation of testing laboratories will be added to and revised as necessary, and additional laboratory evaluation criteria which are appropriate for each NILECJ standard will be written as standards are completed.

LEVEL OF EFFORT

\$53,000 was obligated for this project in FY-74. \$50,000 has been budgeted for FY-75.

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Completion of concept paper	Continued	Completed	N/A	9/74	12/74
Tabulation of laboratories interested in compliance testing	Continued	N/A	N/A	9/74	4/75
First set of criteria for evaluating testing laboratories	Continued	Completed	N/A	10/74	5/75

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Ronald C. Dobbyn, Program Manager
Protective Equipment

Project Plan for
Police Body Armor Guide

SCOPE

This is a project for the development of a user guideline to the selection and use of police body armor. The guide will address all commercially available body armors.

BACKGROUND

Under the sponsorship of NILECJ, the Law Enforcement Standards Laboratory has maintained a continuing program for the evaluation of police body armor. This program has identified performance characteristics, developed methods of test and established performance requirements and standards for these armors.

Yet, it is apparent from the many significant advances made in this equipment area in recent years and from the numerous requests for additional information received from law enforcement agencies, that a source of sound guidance to the selection and use of body armor is sorely needed - it is of life and death importance to every law officer who confronts an armed criminal.

PROPOSED PLAN

The proposed plan consists of two phases. In Phase I, all technical information, user requirements, performance characteristics and test data will be assembled. All commercially available body armor will be addressed. From this information, an outline and technical text will be drafted. This phase will be supported by laboratory work as required.

Phase II will commence after review and acceptance of the technical draft, and will consist of those efforts required to produce the final camera-ready copy, including final editing, graphics, comprehensive layout, typography and color separations.

OBJECTIVES

A guide to the selection, maintenance, use and limitation of police body armor will be prepared. Projected milestones are given in the attached chart.

LEVEL OF EFFORT

The guideline is budgeted at \$40K. Phase I will be performed at NBS. Phase II will be contracted to a suitable graphics specialist.

Milestones*

Assumed Starting Date	#1	#2	#3	#4
10/74	10/74	1/75	5/75	12/75

Objectives

Police Body Armor Guide

- *Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.
- *Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.
- *Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.
- *Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Ronald C. Dobbyn, Program Manager
Protective Equipment

Project Plan for
Police Helmet Guideline

SCOPE

This project involves the development of a guide to the selection, maintenance, use and limitations of the various protective helmets offered to law enforcement officers. All commercially available helmets designated for police use will be included.

BACKGROUND

In a continuing effort to develop performance standards and guidelines for law enforcement equipment, LESL has maintained an up-to-date awareness of state-of-the-art developments in certain equipment areas; police helmets is one such area. As a direct result of its standards development activities, LESL has found that many of the helmets offered to police today fail to meet minimum performance requirements. LESL has also found that many police departments are buying helmets not intended by their manufacturers to serve as either riot or crash helmets, yet are often used in such situations. The evident need for detailed information and guidance on police helmets will be filled by the proposed guide.

PROPOSED PLAN

The proposed plan consists of two phases. In Phase I, all technical information including user requirements, performance characteristics and test data will be assembled. All commercially available helmets designated for law enforcement use will be addressed. From this information, an outline and technical text will be drafted. This phase will be supported by laboratory work as required. Phase II will commence after review of the technical draft and will consist of those efforts required to produce the final camera-ready copy, including final editing, graphics, comprehensive layout, typography and color separations.

OBJECTIVES

A guide to the selection, maintenance, use and limitations of police helmets. Projected milestones are given in the attached chart.

LEVEL OF EFFORT

The entire project is budgeted at \$40K. Phase I will be performed at NBS; Phase II will be contracted to a suitable graphics specialist.

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Police Helmet Guideline	9/74	11/74	1/75	4/75	11/75

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Ronald C. Dobbyn, Program Manager
Protective Equipment

Project Plan for
Guidelines for Police Firing Ranges

SCOPE

This is a project for the development of a guideline document which will aid law enforcement agencies in planning, constructing and/or retrofitting indoor and outdoor firing ranges for safe and efficient operation.

BACKGROUND

At any given time, six to ten police firing ranges in the United States are shut down for the correction of health or safety hazards. Reports of lead poisoning and stray missile accidents are frequent. The range is often located in an area where its efficient use is impossible.

All of the problems can be traced to deficient or archaic design specifications; modern and specialized construction and ventilation techniques are sacrificed for economy, yet lost time and damage suits often make these the most expensive ranges built.

PROPOSED PLAN

Much of the information required for the construction or retrofitting of a firing range, which will be both safe and efficient, already exists but is widely scattered. This information will be assembled and evaluated. Data on the sources and distribution of lead particulates and vapors, and detailed information on improved air handling and air cleaning equipment is also needed. Some laboratory and field work addressing these topics is anticipated. Mr. Ted Busch, a leading expert in firing range construction, will be retained as a consultant to LESL for this project and will assist the Program Manager in planning, evaluating and reviewing the total effort.

The first phase of the project will be concluded with the preparation, review and acceptance of a draft guideline document. The second phase will include those efforts necessary to produce the final camera-ready copy, including text editing, graphics, comprehensive layout, etc.

OBJECTIVE

A user guide to safe and efficient firing range facilities will be prepared. The projected milestones are given in the attached table.

LEVEL OF EFFORT

\$50,000 is budgeted for this effort. The first phase of the project will be performed at NBS; Phase II will be contracted to a suitable graphics specialist.

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Guidelines for Police Firing Ranges	7/74	10/74	3/75	5/75	12/75

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

Project Plan for
Court Equipment

SCOPE

The purpose of this project is to develop a series of documents directed toward the application of audio and video tape recording systems to all aspects of the judicial process. Included in this effort is a standard for audio recorder system component interchangeability, a standard for video tape recording systems, a standard for video tape recording system component interchangeability, and guidelines for video tape recording in the courtroom and for the use of closed circuit television.

BACKGROUND

The use of audio and video equipment in the courtroom holds the promise of assisting NILECJ to accomplish the major LEAA goal of significantly improving the total judicial process. Trials may be speeded up and the use of video taped depositions may remove unnecessary burdens from witnesses. Audio tape recording of court procedures is being used, primarily where it is needed as a consequence of manpower limitations, and video tape recording has been tried on an experimental basis. While the merits of video taped depositions and of trial procedures tape recorded for official record and for use in appellate court actions are recognized by court administrators, attorneys and judges, they remain reluctant to apply these techniques to their own proceedings. There are some legal considerations which enter into this concern. However, most of the resistance to these innovations stems from the notion that the equipment is expensive, complex, and perhaps unreliable. Use of the standards will remove much of the technical burden from the purchaser and assure that products of adequate quality are purchased.

This project is a continuation of a LESL project that has resulted in the development of a draft guideline and standard for audio tape recorders. In addition, a draft guideline for video tape recording systems for courtroom use is being revised and laboratory studies of video recorders are in process, aimed at the development of standards for this equipment. The FY-75 effort will complete the development of these documents, and initiate work on two additional standards; interchangeability of audio tape recorder system

components and interchangeability of video tape recording system components. The first year efforts have served to emphasize the need for standards to insure the compatibility of equipment for courtroom use.

These prior efforts have established that recording systems and closed circuit television systems should be treated separately. The current-year effort will involve the detailed development of closed circuit performance criteria, and will result in the preparation of a guideline and a standard later in the project.

PROJECT PLAN

During the preceding year, the investigation of the use of television recording systems in the courtroom resulted in a first draft of a user guideline. This will be revised to provide a more concise discussion of the topic with more limited technical treatment. The ongoing laboratory evaluation of test methods for video tape recording (VTR) systems will be continued to establish minimum levels of performance for the camera, monitor, and recorder and a standard will be prepared.

Throughout the laboratory evaluation of VTR systems, attention will be directed toward problems of interchangeability, and a parallel effort will be initiated to study these problems in detail. Existing standards for connectors, impedance, tape format, etc will be studied in detail. A standard will be developed to provide requirements for the interchangeability of VTR System Components. This will necessarily include consideration of the use of closed circuit television systems as well, and preliminary studies will be implemented to form the basis for later development of a standard for closed circuit television systems for courtroom use. The information gained will be used to develop a guideline for the use of closed circuit television in the courtroom.

Similarly, the effort during the preceding year to develop standards for audio tape recorders for courtroom use has also identified potential problems as a result of interchangeability requirements. A task will be initiated to review existing standards for tape, microphone impedance, and connectors. A standard for audio recorder component interchangeability will be developed.

OBJECTIVES

The objectives of this project are listed below, and the project schedule is shown on the milestone chart which follows.

1. Guideline for Video Tape Recording Systems for the Courtroom
2. Standard for Video Tape Recording Systems for the Courtroom
3. Guidelines for Closed Circuit Television for the Courtroom
4. Interface Standard for Video Tape Recorders for the Courtroom
5. Interface Standard for Audio Tape Recorders for the Courtroom

LEVEL OF EFFORT

1. Courtroom Use of Television	\$50K
2. Interface Standards for Courtroom VTR	\$45K
3. Interface Standards for Courtroom Audio Recorders	\$35K
Total	\$130K

Milestones*

Objectives	Assumed Starting Date	#1	#2	#3	#4
Guideline for Courtroom VTR	Continuing	Completed	N/A	9/74	4/75
Standard for Courtroom VTR	Continuing	8/74	12/74	3/75	10/75
Guideline for Closed Circuit TV	10/74	3/75	7/75	10/75	5/76
Interface Standard for Courtroom VTR	9/74	3/75	6/75	9/75	4/76
Interface Standard for Audio Recorders for Courtrooms	12/74	3/75	5/75	8/75	3/76

*Milestone 1 Completion of the survey of existing equipment, standards and test methods, and of detailed planning for further work.

*Milestone 2 Completion of the laboratory testing, analysis and evaluation of the data.

*Milestone 3 Completion of the first draft of the document by the project staff and its acceptance by LESL.

*Milestone 4 Completion of technical review and formal submission of the document to NILECJ.

PUBLICATIONS OF THE
LAW ENFORCEMENT STANDARDS PROGRAM

Standards

- NILECJ-STD-0101.00, March 1972. Ballistic Resistance of Police Body Armor (Stock No. 2700-0155; Price 25 cents)
- NILECJ-STD-0102.00, March 1973. Hearing Protectors for Use on Firing Ranges (Stock No. 2700-00182; Price 40 cents)
- NILECJ-STD-0103.00, May 1974. Portable Ballistic Shields (Stock No. 2700-00253; Price 55 cents)
- NILECJ-STD-0205.00, May 1974. MOBILE Antennas (Stock No. 2700-00250; Price approximately 60 cents)
- NILECJ-STD-0301.00, March 1974. Magnetic Switches for Burglar Alarm Systems (Stock No. 2700-00238; Price 65 cents)
- NHTSA-STD-2001.00, October 1973. Evidential Breath Testers for Alcohol Content*

Reports

- LESP-RPT-0201.00, May 1972. Batteries Used with Law Enforcement Communications Equipment: Comparison and Performance Characteristics (Stock No. 2700-0156; Price 50 cents)
- LESP-RPT-0202.00, June 1973. Batteries used with Law Enforcement Communications Equipment: Chargers and Charging Techniques (Stock No. 2700-00216; Price 80 cents)
- LESP-RPT-0203.00, June 1973. Technical Terms and Definitions used with Law Enforcement Communications Equipment (Radio Antennas, Transmitters, and Receivers) (Stock No. 2700-00214; Price \$1.55)
- LESP-RPT-0301.00, June 1974. Survey of Image Quality Criteria for Passive Night Vision Devices (Stock No. 2700-00259, Price 60 cents)
- LESP-RPT-0501.00, May 1972. Emergency Vehicle Warning Devices--Interim Review of the State-of-the-Art Relative to Performance Standards
- NBS Technical Note 752, June 1973. Directory of Law Enforcement and Criminal Justice Associations and Research Centers

- LESP-RPT-0002.00, May 1974. LEAA Police Equipment Survey of 1972, Volume II: Communications Equipment and Supplies (in press)
- LESP-RPT-0003.00, June 1974. LEAA Police Equipment Survey of 1972, Volume III: Sirens and Emergency Warning Lights (in press)
- LESP-RPT-0004.00, July 1974. LEAA Police Equipment Survey of 1972, Volume IV: Alarms, Security Equipment, Surveillance Equipment (in press)
- LESP-RPT-0005.00, LEAA Police Equipment Survey of 1972, Volume V: Handguns and Handgun Ammunition (in press)
- LESP-RPT-0006.00, June 1974. LEAA Police Equipment Survey of 1972, Volume VI: Body Armor and Confiscated Weapons (in press)
- LESP-RPT-0007.00, April 1974. LEAA Police Equipment Survey of 1972 Volume VII: Patrolcars (in press)
- LESP-RPT-0201.00, May 1972. Batteries Used with Law Enforcement Communications Equipment: Comparison and Performance Characteristics (Stock No. 2700-0156; Price 50 cents)
- LESP-RPT-0202.00, June 1973. Batteries used with Law Enforcement Communications Equipment: Chargers and Charging Techniques (Stock No. 2700-00216; Price 80 cents)
- LESP-RPT-0203.00, June 1973. Technical Terms and Definitions used with Law Enforcement Communications Equipment (Radio Antennas, Transmitters, and Receivers) (Stock No. 2700-00214; Price \$1.55)
- LESP-RPT-0204.00, March 1974. Voice Privacy Equipment for Law Enforcement Communications Systems (in press)
- LESP-RPT-0205.00, July 1974. Automatic Vehicle Location Techniques for Law Enforcement Use (in press)
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