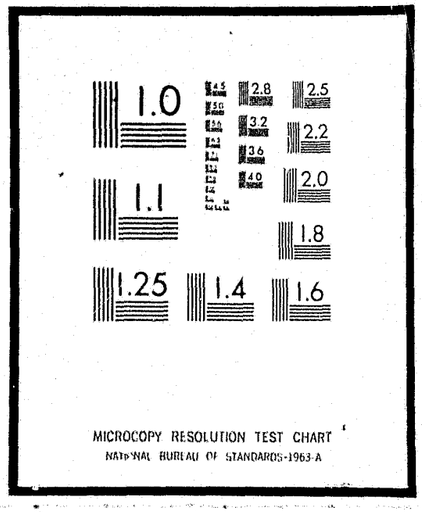

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EQUIPMENT SYSTEMS IMPROVEMENT PROGRAM - DEVELOPMENT

CANDIDATE EQUIPMENT PROJECTS FISCAL YEAR 1974

30 March 1973

Prepared By

Law Enforcement Development Group
THE AEROSPACE CORPORATION
El Segundo, California

Prepared For

LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
U.S. DEPARTMENT OF JUSTICE

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EQUIPMENT SYSTEMS IMPROVEMENT
PROGRAM - DEVELOPMENT

CANDIDATE EQUIPMENT PROJECTS
FISCAL YEAR 1974

Approved by:

John O. Eylar, Jr.
Director, Law Enforcement
Development Group

CONTENTS

I. SUMMARY

I SUMMARY

This document describes equipment development projects aimed at the needs of police, courts and correction agencies as well as projects to increase the security of private homes and businesses. Every attempt was made to include all projects which appeared reasonable and did not violate the basic laws of physics. Drug related projects were excluded.

The MITRE defined problem areas were followed and cross coordinated to an Aerospace ranking system. This system is described in chapter III. Heavy weighting in the MITRE report on the crime of burglary resulted in high ranking on solutions in this problem area.

A fold-out chart is provided to show the ranking and MITRE weighting for all the projects. The rank order of the candidate projects, shown on the next page, results from the application of a specific ranking criteria described in Section IV.

RANK ORDER OF CANDIDATE PROJECTS

1. Cost-Effective Security Alarm System
2. Improved Hardened Doors and Windows
3. Residence/Business Lock Systems
4. Architectural Design Concepts
5. Police Emergency Call Warning System
6. Stolen Goods Detection System
7. Integrated Police Car Equipment Systems
8. Hardened Cash Registers
9. Modularized Command and Control System
10. Command and Control Equipment Simulation
11. Citizen's Alarm System
12. Guard and Inmate Security System
13. Lightweight Body Armor
14. Blood and Bloodstain Analysis
15. Integrated Police Car Design
16. Police and Witness Paging System
17. Court Video Recording System
18. Crime Lab/Court Communications System
19. Improved Institutional Locking Systems
20. Automated Inmate Accountability System
21. Property Tagging and Identification Systems
22. 911 System
23. Police Vehicle RF Siren
24. Advanced Fingerprint Holography
25. Advanced Digital Fingerprint Encoding
26. Conversion of Non-Secure Buildings
27. Communications Helmet
28. Automatic Police Car Location System
29. Spray Film Evidence Collection
30. Active Metal-Weapon Detection System
31. X-Ray Weapon Detection
32. Improved Crime Scene Recording Equipment
33. Individualization of Hair
34. Perimeter Security
35. Satellite Applications for Law Enforcement
36. 900 MHz Technology
37. Improved Airborne Policing
38. Speaker Identification
39. Explosives Vapor Detection
40. Mobile Detention Facility
41. Vehicle Emergency Call System
42. Detection of Gunshot Residue
43. Individual Patrolman Location System
44. Bullet Tracing and Identification
45. Lightweight Power Sources
46. Data Security Techniques
47. Frequency Management Study
48. Truck Antihijacking System
49. Robber Tagging
50. Auto Theft Prevention
51. Improved Fingerprint Lifting Techniques
52. Explosives Tagging and Detection
53. Positive Identification Credit Cards
54. Event Dating Techniques
55. Autopsy Technology
56. Thermoluminescent Techniques
57. Police Weapon Safety System
58. Traffic Light Regulation System
59. Digital Communications Systems
60. Mobile Video Communication System
61. Steerable 450 MHz Antenna
62. Low-Cost Secure Communications
63. Less-Lethal Weapons
64. Low-Cost Transmitter Identifier
65. Ion Microprobe Analysis
66. Remote Bomb Disposal Techniques
67. Material Covert Tagging Techniques
68. Analysis of Non-Blood Body Fluids
69. Rape Cocoon
70. Undercover Agent Communications
71. Sniper Disabling and Apprehension
72. High Intensity Portable Lights
73. Integrated Lethal/Less-Lethal Weapons
74. Night Vision Aids
75. New Mass Spectrometry Methods
76. Computer-Aided Facial Features Identificatio
77. Remote Weapon Arming System
78. Concealed Recording System

II. INTRODUCTION AND BACKGROUND

II. INTRODUCTION AND BACKGROUND

This report is part of an effort resulting from direction given by Mr. Danziger following the Semi-Annual Review of the Development Group activities on 14 Feburary 1973. The initial phase was performed by MITRE and involved defining problem areas for which solutions were to be identified. A rough draft of the MITRE results was submitted to NILECJ on 19 March 1973. Comments on the MITRE submittal were provided by Mr. Danziger on 21 March 1973.

The second phase of the activity was performed by The Aerospace Corporation. It involved screening all available sources for candidate development programs as solutions to the MITRE-identified problem areas. Both Mr. Danziger's comments on the MITRE report and guidance offered by NILECJ planning personnel influenced the final form and content of this report. By direction, drug programs are not included.

III. EVALUATION CRITERIA

III. EVALUATION CRITERIA

The MITRE Corporation has identified problem areas and classified them under the general categories of Police, Courts, Corrections, and Community. As a further step, the relative significance of a solution in each problem area for improving the quality of criminal justice and decreasing the incidence of selected crimes was estimated. By NILECJ direction, emphasis was directed at the following five crimes: Robbery, Burglary, Aggravated Assault, Rape, and Murder.

Review by NILECJ of the MITRE inputs resulted in additional guidance and direction to further limit the scope of the equipment systems development program and to focus attention on high-priority items as defined by NILECJ.

Based upon the planning guidance provided by the MITRE effort and adjusted to reflect NILECJ comments and recommendations, numerous candidate solutions were considered by the Aerospace Corporation for each of the identified problem areas. To provide a rational basis for selecting projects for the FY 74 Development Program from the large number of possible candidates, a criteria rating and ranking system was developed.

Five evaluation criteria were considered. An evaluation number which is composed of an individual score for each criterion was then generated for each candidate solution. The five criteria upon which the evaluation number is based are:

a) The MITRE problem area priority.

b) Technical factors which determine the desirability of a specific problem area solution.

c) Application and economic factors which determine the acceptability of a specific problem area solution.

d) The expected level of R&D funding.

e) Civil factors which determine the social, political, and legislative acceptability of the specific problem area candidate solution.

The individual score for the fourth criterion was noted by an alphabetical letter. All other criteria were numerically ranked. A detailed discussion of the technique for scoring each individual criterion follows.

MITRE Problem Area

A table summarizing MITRE-devised scores for problem areas is given in Section IV. (Some adjustments have been made to both the problem area listing and the numerical scores given in the original MITRE table which was included in Reference 1. All changes were however, discussed and coordinated with MITRE.)

In order to weigh the significance given by MITRE to each problem area, the MITRE total scores were divided into three groupings. Each grouping was then assigned a number for use in the Aerospace evaluation. The relation between the total MITRE score and the first unit in the Aerospace project evaluation number is as follows:

Aerospace Evaluation No.	MITRE Total Score
3	11 or greater
2	6 to 10
1	5 or less
0	No MITRE ranking

The first number in the Aerospace evaluation thus clearly indicates the level of importance attached to a candidate program by MITRE. In general, unless a value of 2 or 3 is indicated, the program should probably not be considered.

Reference 1. Analysis of Criminal Justice Problems, MITRE Technical Report No. 6358, 19 March 1973.

Technical Factors

The second digit in the Aerospace evaluation number represents a measure of the technical factors which influence the desirability of a candidate solution. The value of the second digit can fall between 0 and 9 and depends upon the individual ranking of three separate factors. The three factors considered under this category are:

a) Technical Risk

b) Time to Demonstrate

c) Degree of Improvement (over existing capability)

Each factor was subjectively rated from 0 to 3 for every candidate project and the three values added to give the rating for Technical Factors. The basis for the rating assigned each factor is given below:

Technical Risk	
3	Low
2	Medium
1	High
0	Very High
Time to Demonstrate	
3	Less than 2 Years
2	2 to 3 Years
1	3 to 4 Years
0	Greater than 4 Years
Degree of Improvement	
3	New Capability or Major Improvement
2	Moderate Improvement
1	Small Improvement
0	No Improvement

The highest attainable score for Technical Factors is 9. In assessing desirable candidate solutions, a high score in this category is a necessary but not sufficient criterion. Equal consideration ought be given application and economic factors as well.

Application/Economic Factors

The third digit in the Aerospace evaluation number represents a measure of the nontechnical factors which will influence the utility and acceptability of a candidate solution. The value of this third digit can also fall between 0 and 9 and also depends upon the individual ranking of three separate factors. These are:

a) Extent of Market
b) Manufacturing Base
c) User Acceptance

The "extent of market" provides a measure of the solution applicability to the five crimes of interest. A program impacting both burglary and robbery would rank higher than one impacting only robbery.

The "manufacturing base" offers a measure of the opportunity for wide industry participation. A sophisticated piece of forensic laboratory equipment would be available from fewer sources than a residence intrusion alarm. Thus, the latter would rank higher in this category.

The "user acceptance" category is a means for recognizing that no solution will be adopted and used by the law enforcement community unless the user is sufficiently motivated. It was reasoned that if a severe problem exists, this in itself is motivation for the user to consider an offerred solution. Consequently, the same digit used for the MITRE Problem Area rating was repeated as the rating in the "user acceptance" category.

As before, each of the three factors was rated from 0 to 3 for every candidate project and the three values added to give the rating for Application/Economic Factors. Also as before, the ratings are essentially subjective.

The basis for the rating assigned each factor is as follows:

Extent of Market	
3	Very large
2	Medium
1	Small
0	Only 1 or 2 users

Manufacturing Base	
3	Thousands of potential manufacturers
2	Hundreds of potential manufacturers
1	Tens of potential manufacturers
0	Less than 10 potential manufacturers

User Acceptance	MITRE Problem Area Rating
3	3
2	2
1	1
0	0

The highest attainable score for Application/Economic Factors is also 9. Here, too, a high score is a necessary but not sufficient criterion for selecting a desirable development candidate. The sum total of this and the Technical Factors score formed the basis for selection (assuming other criteria have also been met).

R&D Funding

The fourth digit in the evaluation number is a letter and represents an estimate of the research and development funding needed to carry the project through prototype and field testing. The rating is based on the following four funding ranges:

Rating	Cost Range
A	Less than $200,000
B	$200,000 to $500,000
C	$500,000 to $1M
D	Greater than $1M

Civil Factors

The fifth and final digit in the Aerospace evaluation number is again a number and represents an assessment of the social, political, and legislative factors which can influence the acceptability of a proposed solution. Questions

considered include issues such as invasion of privacy, deprivation of civil liberties, discrimination potential, abridgment of freedom of speech, and public impact and acceptance.

The scoring in this category was based on either an "acceptable" or "not acceptable"rating for each candidate solution, thus :

Rating	
1	No adverse Civil Factors
0	Potentially sensitive or infringes on civil liberties

Obviously, if a solution is given a rating of "0" in this category, it should be deleted from serious consideration.

EXAMPLE

A typical evaluation number for a proposed development project might be

1 76 D 0.

The first digit indicates that although the proposed project does address a MITRE-identified problem area, its priority ranking is very low. Although a "0" can occur as the first digit, it should not automatically disqualify a project from consideration. It merely indicates that the project does not address a MITRE-identified problem area. For example, NILECJ may wish to support technology development projects which are not directed at solving a specific problem.

The second digit rates technical factors and indicates that for the three contributing items with a possible total score of 9, the proposed project scores 7.

Similarly, the third digit which corresponds to application and economic factors is also the sum of the individual scores for three contributing items. Again, out of a possible total score of 9, the proposed project scores 6 in this category.

A simple means of comparing candidate projects results by adding the second and third digits. The greater this total, the more attractive the project.

The fourth or letter digit offers an indication of the anticipated R&D funding requirement. For the example used, the estimated cost exceeds $1M.

The fifth and final digit in the series must be "1" for the project to be considered. If it is "0", the proposed project should be rejected as unacceptable, for it is highly probable that the developed item will violate a civil liberty or create an adverse public reaction. The "0" in the example could be caused by a project to develop an improved electric cattle prod or incapacitating gas for crowd control (adverse public impact) or by a development associated with clandestine surveillance which could violate civil liberties.

Applying these evaluation criteria and the resulting rating system to select specific development programs can be done in several ways. For example, as a first step, all candidate projects with zeros at either end could be eliminated. This excludes all non-MITRE-problem-oriented projects as well as those which are socially and politically controversial. Next, those projects scoring less than 14 on the combined total of the second and third digits could be eliminated. Finally, of the remaining projects only those requiring less than a $500,000 R&D program would be considered. In this manner, various combinations of selection criteria could be devised to structure a program best suited to NILECJ's objectives.

IV. CANDIDATE PROJECT SUMMARY

The seventy-eight (78) candidate projects decribed in the following section have been summarized on the chart contained in the pouch just inside the rear cover of this report. This chart cross correlates the projects organized according to the NILECJ Fiscal Year 1973 Task Plan.

The projects have been organized according to the primary objectives of the NILECJ, namely, to reduce crime and improve the quality of justice. For consistency, program areas have been grouped into the same categories as identified in the NILECJ FY 73 Program Plan. That plan was organized into the following major areas:

I. Reduce Causes of Crime

- A. Alleviation of Conditions Leading to Crime
- B. Intervention in Criminal Careers

II. Control Incidence of Crime

- A. Reduce Opportunities for Crime
  - 1. Target Vulnerability
  - 2. Community Support
- B. Increase Risk of Committing Crime
  - 1. Detection (and Reporting) or Criminal Activity
  - 2. Identification Techniques
  - 3. Apprehension Systems
  - 4. Adjudication Systems

This organization has been followed with the exception that two additional sections have been added to Part II-B in order to provide a more balanced listing. These additional sections cover Investigative Systems and Command and Control Systems.

It should be noted that programs in support of Part I-A, Alleviation of Conditions Leading to Crime, are for the most part not equipment oriented but rather sociological studies and analyses. Programs for Intervention in Criminal Careers, Part I-B deals with correction and rehabilitation activities and as such will require new or improved equipment systems. There are numerous programs to support public, court, and police agency needs to Control Incidence of Crime, Part II.

The following summary description of the proposed FY 74 Program does not include any drug-related projects. Projects in this category will probably be picked up by the new "super drug agency."

The Aerospace rank score identified in Section III of this report and explained further below is listed on the left hand side of the chart opposite each project. The MITRE weighting factor is listed on the chart under the appropriate MITRE specific crime problem areas. The numbers assigned to each of the problem areas at the top of the chart are the total MITRE weighting factor for that problem area for all of the five (5) major crimes. (see Table P4-4). Partial weightings were given if the project was directed toward only 1 or 2 crimes (i.e., semen individualization - rape only).

The organization of the project areas has been modified in accordance with a review of the MITRE report held with Mr. M. Danzinger on 22 March 1973. As a result of this review many of the problem areas associated with the court systems were deleted. Additional categories such as weapons detection and explosives detection under the police problem area were added to accomodate proposed projects. Weighting for these categories were coordinated with Mr. W. Holden of MITRE on 26 March 1973. Another change from the original MITRE outline was to transfer citizen oriented crime detection and reporting (i.e., burglar alarms) projects from the police to the community category.

The Aerospace rank order of the projects contained in the Summary (Section I) was arrived at by applying the following criteria to the Aerospace rank score.

All projects receiving an Aerospace score of 3XXXX (MITRE Priority 1 rating) were first listed in desending order of the total of the technical and applications/economic factors.

All projects receiving a score of either a 2XXXX or 1XXXX were then combined and added to the list again in descending order of the same total as above.

Finally that project receiving a score of XXXX0 (politically unacceptable) was listed last.

MITRE'S RANKING OF PROBLEMS

PROBLEM AREAS	CRIME SPECIFIC WEIGHTING: Murder	Aggravated Assault	Rape	Robbery	Burglary	Total Score
• POLICE						
Prevention						
1. Patrol Effectiveness	0	2	1	5	22	30
2. Patrol Intelligence	0	2	2	4	8	16
3. Safety During Police Operations	1	4	0	3	0	8
Detection						
4. Surveillance	0	0	1	4	0	5
5. Weapons Detection	1	2	0	4	0	7
6. Explosives Detection	0	2	0	2	0	4
Investigation						
7. Evidence Collection	0	1	1	1	6	9
8. Evidence Analysis	0	1	1	1	6	9
9. Witness Identification	0	1	0	1	0	2
Apprehension						
10. Response Time:						
(a) Dispatch	0	0	0	2	7	9
(b) Travel	0	0	0	2	7	9
11. Search and Pursuit	0	1	0	1	3	5
12. Apprehend and Arrest	0	1	0	0	0	1
Communication						
13. Improved Effectiveness	0	1	0	1	3	5
14. Emergency	1	2	0	0	0	3
15. Undercover	0	0	0	1	3	4
16. Data Accessibility	0	1	0	1	3	5
17. Remote	0	1	0	0	0	1
• COURTS				Q	R	
Pretrial						
18. Arrest Review				3	0	3
Trial						
19. Courtroom Security				3	0	3
20. Trial Conduct				6	2	8
• CORRECTIONS						
Security						
21. Locks				6	1	7
22. Perimeter Security				3	2	5
23. Surveillance				6	2	8
24. Weapon Detection				3	1	4
25. Officer & Inmate Safety				6	0	6
Rehabilitation						
• COMMUNITY						
Prevention						
26. Target Hardening	0	0	0	0	12	12
27. Defensible Space	0	0	1	2	18	21
28. Property Identification	0	0	0	0	6	6
Crime Detection/Reporting						
29. Detection	0	0	0	4	12	16
30. Reporting	0	0	0	2	6	8

V. PROJECT DESCRIPTIONS AND EVALUATION

The various projects described in this section cover a variety of developments, for police, courts, corrections and community use. Most of the projects fall into one or more of the following development phases:

Technology Development	Technology assessment and acquisition of technical data to develop and establish appropriate technology for problem solution.
Concept Development	Identification and development of feasible solutions and concepts by design analysis, tradeoff studies, and breadboard or prototype testing.
Hardware Development	Actual hardware design and development of systems identified as feasible and useful.
Field Test/Standardization Support	Technical support to the Analysis or Standards Groups for field testing or standard preparation

The phase of development of each project is noted at the top of each of the one page descriptions. The number of projects in each development phase are summarized below:

	No. Projects
Technology Development	6
Concept Development	31
Hardware Development	37
Field Test/Standards	4
Total	78

The descriptions are of necessity brief and are intended to provide sufficient background concerning needs (and possible solutions) for new equipments or methodologies to explain the inclusion of the projects among the roster of candidates for further consideration. Projects considered of immediate interest by the Institute will receive more detailed description in subsequent documentation.

The evaluation rating listed on each description are those already explained in Section III. Comments are provided to explain special characteristics of the project not covered by the description. Comments are also provided when extraordinary ratings are given, particularly zeros in the first and last categories.

No detailed information has been provided concerning schedules and costs (other than gross estimates) since there was not time to develop such data and it was not considered worthwhile until Institute preferences had been established.

A listing of the projects by major category precedes the compilation of project descriptions. This listing provides the tab headings under which specific project descriptions may be found. The projects described are listed on the following summary chart.

LIST OF PROJECTS
BY MAJOR CATEGORY

I. REDUCE CAUSES OF CRIME

A. ALLEVIATE CRIME CONDITIONS

(No Candidate Equipment Programs)

B. INTERVENTION IN CRIMINAL CAREERS

1. CUSTODIAL METHODS

a. Guard and Inmate Security System
b. Conversion of Non-Secure Buildings
c. Improved Institutional Locking Systems
d. Perimeter Security
e. Automated Inmate Accountability System
f. Mobile Detention Facility

2. TREATMENT AND REHABILITATION

(No Candidate Equipment Programs)

II. CONTROL INCIDENCE OF CRIME

A. REDUCE OPPORTUNITIES FOR CRIME

1. TARGET VULNERABILITY

a. Cost-Effective Security Alarm System
b. Improved Hardened Doors and Windows
c. Lightweight Body Armor
d. Residence/Business Lock Systems
e. Hardened Cash Registers
f. Positive Identification Credit Cards
g. Data Security Techniques
h. Architectural Design Concepts
i. Property Tagging and Identification Systems

2. COMMUNITY SUPPORT

(No Candidate Equipment Programs)

B. INCREASE RISK OF COMMITTING CRIME

1. DETECTION AND REPORTING SYSTEMS

a. X-Ray Weapon Detection
b. Active Metal-Weapon Detection System
c. Explosives Vapor Detection
d. Explosives Tagging and Detection
e. Citizen's Alarm System
f. 911 System

g. Vehicle Emergency Call System
h. Night Vision Aids
i. Material Covert Tagging Techniques
j. Stolen Goods Detection System
k. Robber Tagging

2. INVESTIGATIVE SYSTEMS

a. Detection of Gunshot Residue
b. Event Dating Techniques
c. Autopsy Technology
d. Individualization of Clue Materials
   (1) Bullet Tracing and Identification
   (2) Thermoluminescent Techniques
   (3) New Mass Spectrometry Methods
e. Concealed Recording System
f. Ion Microprobe Analysis
g. Spray Film Evidence Collection
h. Rape Cocoon
i. Improved Crime Scene Recording Equipment

3. PERSONNEL IDENTIFICATION SYSTEMS

a. Blood and Bloodstain Analysis
b. Analysis of Non-Blood Body Fluids
c. Speaker Identification
d. Individualization of Hair
e. Improved Fingerprint Lifting Techniques
f. Advanced Fingerprint Holography
g. Advanced Digital Fingerprint Encoding
h. Computer-Aided Facial Features Identification

4. COMMAND AND CONTROL SYSTEMS

a. Integrated Police Car Equipment System
b. Integrated Police Car Design
c. Improved Airborne Policing
d. Communications Helmet
e. Lightweight Power Sources
f. 900 MHz Technology
g. Digital Communications Systems
h. Low-Cost Transmitter Identifier
i. Mobile Video Communication System
j. Frequency Management Study
k. Automatic Police Car Locations System
l. Undercover Agent Communications
m. Steerable 450 MHz Antenna
n. Individual Patrolman Location System
o. Low-Cost Secure Communications
p. Modularized Command and Control System
q. Command Control Equipment Simulation
r. Satellite Applications for Law Enforcement

5. APPREHENSION SYSTEMS

a. Police Emergency Call Warning System
b. Truck Antihijacking System
c. Remote Bomb Disposal Techniques
d. Police Vehicle RF Siren
e. Less-Lethal Weapons
f. Integrated Lethal/Less-Lethal Weapons
g. Remote Weapon Arming System
h. Police Weapon Safety System
i. Sniper Disabling and Apprehension System
j. Traffic Light Regulation System
k. High Intensity Portable Lights
l. Auto Theft Prevention

6. ADJUDICATION SYSTEMS

a. Police and Witness Paging System
b. Court Video Recording System
c. Crime Lab/Court Communications System

REDUCE CAUSES OF CRIME

INTERVENTION IN CRIMINAL CAREERS

CUSTODIAL METHODS

Hardware Development					
EVALUATION No.	2	8	7	B	1

TITLE: Guard and Inmate Security System

PROBLEM AREA: Corrections - Security

DESCRIPTION:

This project is directed at the development of a personal alarm system designed specifically for the correctional institution environment. The system is to be used by correctional officers as well as inmates to rapidly summon assistance should they be threatened with bodily harm.

The equipment should be designed to operate within the buildings of correctional institutions as well as outside in yard, work, and exercise areas. The alarm transmitter should be a small, low-cost, inconspicuous device easily carried on the person. It must be capable of activating a call for assistance received at a central station including the caller's identity and location (i.e., kitchen, classroom, yard, bathroom).

Such a system would be similar in many ways to the Citizen's Alarm System currently included under the FY 73 development effort. It is proposed that a technology assessment and program planning phase be initiated to assess the feasibility of utilizing concepts already available from the Citizen's Alarm Program. Subsequent concept assessment and hardware development will include subcontracting to industry.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
4	3	3	2	2	3	2	B	1

COMMENTS:

This project will utilize technology from the Citizen's Alarm System development for its unique application. The technical risk is considered low and the available industrial base large. The extent of the market and user acceptance is judged to be moderate.

Hardware Development					
EVALUATION No.	1	6	6	A	1

TITLE: Conversion of Non-Secure Buildings

PROBLEM AREA: Corrections - Security

DESCRIPTION:

The overcrowding of local jails and other correctional institutions and the advent of correctional innovations such as half-way houses make it desirable to rapidly develop and inexpensively convert existing structures into facilities capable of serving minimum security detention purposes. A secondary objective would be to provide nonpermanent conversion capability thereby permitting the return of the building to its original purpose and to provide for flexibility in use of the building.

It might be desirable to use the building as a temporary jail facility for a period of time and later permit inexpensive reconversion to a "half-way house" type of structure. Concepts for such building conversions would have to meet various applicable building codes and would need to be coordinated with the National Clearing House for Criminal Justice Architecture.

This project would utilize and coordinate the application of new materials concepts, new security devices currently under development or planned, and proposed developments of hardened windows and doors. Of particular interest would be concepts for movable walls which are lightweight and hardened for security purposes. Because of the multiple use of such buildings, esthetic design aspects will be considered.

This project will review the current state of the art for suitable materials and devices and will integrate them into a pilot structure for test and evaluation.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	3	3	0	2	3	1	A	1

COMMENTS:

It is anticipated that many construction and remodeling contractors could accomplish the conversion. Therefore, the manufacturing base as judged high. The degree of improvement over that which can presently be accomplished is considered low.

Hardware Development					
EVALUATION No.	2	5	7	B	1

TITLE: Improved Institutional Locking System

PROBLEM AREA: Corrections - Security

DESCRIPTION:

The purpose of this project is to provide correction institutions with highly reliable locks which can withstand the abuse of the prison environment. A further objective is to combine such improved locking devices with an ancillary system to indicate whether or not the lock mechanism is truly engaged and the door is locked.

The master control of the system to be developed should be activated from a central point. Individualized control should be provided to the correction officers and the contained inmate. In the latter case, an inmate is given the capability of locking his individual cell to prevent access by other inmates. Indication of a secured lock should be given at both the central control point and locally at the locking mechanism. Any indication should also be provided if the lock mechanism doesn't engage on command.

The installation of improved institutional locking systems present different problems for retrofit and new applications. The retrofit system requires the ready adaptation to existing hardware and components whereas the new application allows for incorporation as part of new architectural standards. In either case, low cost, equipment commonality, and trouble free operation are desired. Extensive cooperation with both correction institutions and industry are anticipated.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	3	2	1	2	3	2	B	1

COMMENTS:

The technical risk and the time to demonstrate feasibility are considered moderate. However, while the anticipated improvement allows for more convenient operation it does not provide for any new capability beyond that available with present manual locks.

Hardware Development					
EVALUATION No.	1	6	5	A	1

TITLE: Perimeter Security

PROBLEM AREA: Corrections - Security

DESCRIPTION:

Correctional institutions and detention facilities employ secure boundaries around their perimeters to prevent unauthorized entry and exit. Security is currently provided by both mechanical and electronic devices supplemented by guard forces. The incidence of escape from minimum security facilities appears to require a more effective perimeter security system. At the same time, a requirement exists for devices to reduce the manpower currently devoted to perimeter security. Such devices must be economical, reliable, invulnerable and offer a very low false alarm rate.

A need therefore exists to adapt current military intrusion prevention technology to the criminal justice system. This technology makes use of beam interruption alarms, capacitance devices, sonic alarm systems as well as linear pressure and electromagnetic sensor systems. Other sensor systems could operate with inmate-coupled automatic accountability devices such as wrist band RF transmitters.

This project will review the state of the art for intrusion sensors and related equipment and will develop concepts for integrated perimeter alarm and guard systems to use the latest proven technology. Engineering models will be developed for the more promising components and tested in simulated perimeter security systems. Experimentation will be undertaken to develop the most effective operational methodology.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	2	3	1	2	2	1	A	1

COMMENTS:

Industry motivation in this area should be high because of the many other applications for perimeter security devices (other than around correctional institutions). The most important part of this project could be the state-of-the-art review and engineering analysis of system effectiveness.

Concept Development					
EVALUATION No.	2	7	5	B	1

TITLE: Automated Inmate Accountability System

PROBLEM AREA: Corrections - Surveillance

DESCRIPTION:

Significant manpower in correctional institutions is consumed in inmate body counts which are performed four to six times a day and involve up to 5000 inmates. Automatic systems which could relieve the guard force of this assignment would contribute materially to more effective and safer utilization of manpower. Concepts to meet this need include cooperative as well as noncooperative systems. They could utilize devices based on RF transmission of coded, individualized signals, magnetic signature devices or simple cooperative reporting systems such as button pushing.

State-of-the-art RF transmitters exist in medical research which are small enough to be placed into steel wrist bands complete with a power source sufficient for one year's operation. They could be used upon automatic interrogation to provide both prisoner identification and location data in a noncooperative operational mode. Magnetically coded wrist bands could be used during prisoner movement through special barriers to give similar indications in a mode requiring some prisoner cooperation. Central computers would scan such data periodically, or on demand, and would either report on the absence of an individualized signal from the total roster or the location of a specially selected signal source.

This project will review the utility of current technology for this application and select the more promising concepts for laboratory evaluation and test. Engineering models for operational evaluation will be developed for the most cost-effective concept.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	2	2	3	2	1	2	B	1

COMMENTS:

Successful developments in this area could provide new or substantially improved methods for counting inmates. Specialized system components could limit the manufacturing base.

Hardware Development					
EVALUATION No.	2	5	5	B	1

TITLE: Mobile Detention Facility

PROBLEM AREA: Corrections - Officer and Inmate Safety

DESCRIPTION:

Inmate transportation has become a major problem due to the need for frequent inmate transfers between overcrowded correctional facilities, and to transport prisoners awaiting trial or inmates serving as witnesses. These requirements involve the use of guard personnel as well as inmate restraining devices to protect the guards during frequent intervehicular and interbuilding transfers.

The use of mobile, trailer-type, detention facilities capable of being parked in secured open spaces, not necessarily near current jails or courthouses, offers the promise of overcoming some of these problems. The trailers could also be used to temporarily house inmates of overcrowded local correctional facilities.

This project will examine concepts for lightweight, secure trailer construction, some with sleeping and personal hygiene facilities, and others with cooking and mess-hall equipment. Methods for operating these trailers both in the transportation mode and in the temporary holding mode will also be addressed. In addition, requirements for building modifications to improve the utility of the mobile concept in reducing guard service requirements will be examined.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	2	2	1	1	2	2	B	1

COMMENTS:

There may be civil factors to consider concerning this development if it appears the inmates are being shipped around in small boxes like caged animals. The larger trailer concept will probably not encounter this reaction.

CONTROL INCIDENCE OF CRIME

REDUCE OPPORTUNITIES FOR CRIME

TARGET VULNERABILITY

Hardware Development					
EVALUATION No.	3	6	9	C	1

TITLE: Cost-Effective Security Alarm System

PROBLEM AREA: Crime Detection and Reporting

DESCRIPTION:

This project provides for the development of security alarm systems for residences and small businesses which are lower in cost, more reliable, and with lower false alarm rates than currently available systems.

To reduce high cost of installation, a FY 73 development project is underway (final report, June 1973) to investigate the feasibility of using house power lines for transmitting information within and between structures.

Four major activities are proposed for follow on. To further reduce hardware installation costs, development of conductive translucent tape will be undertaken. To reduce false alarms, a pick-resistant integrated shunt lock will be developed. Improved breaking and entering sensors will be developed, including new approaches to detecting window breakage such as "conducting" glass. To decrease installed system cost, concepts to extend the utility of a single receiving/display terminal over a greater number of alarm installations will be examined.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
3	2	2	2	3	3	3	C	1

COMMENTS:

This is potentially one of the most broadly applicable developments under consideration. It could have a direct impact on crime reduction if low cost, low false alarm systems are successfully developed and widely used. Market considerations and design for low cost are extremely important in order to achieve wide use.

Hardware Development						
EVALUATION No.	3	6	9	C	1

TITLE: Improved Hardened Doors and Windows

PROBLEM AREA: Target Hardening

DESCRIPTION:

Doors and windows are the obvious point of entry in most burglaries. While there has been considerable design effort on these items for many years, there are additional improvements stemming from new technology which could be made. Development of new window materials which are low in cost and burglar resistant has been suggested. New door designs which can better accommodate advanced security systems are also candidates for development. The guidelines and standards presently being assembled by the National Bureau of Standards which define security performance standards for door and window systems and the subsequent testing to meet these specified standards will be useful in identifying additional development objectives and concepts.

To meet these objectives, a program is proposed on new door and window designs, based on the best available technology for achieving varying levels of stated hardness. Designs for single unit and multiple dwellings, small business, warehouses, and public buildings will be considered. Minimum performance levels will be defined for different door and window types, including the required capability of components such as grills, frames, hinges, etc. Equipment samples fabricated by industry suppliers will be field tested and assessed for protective capability.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
3	2	2	2	3	3	3	C	1

COMMENTS:

This project has an extremely large market potential and industrial base. The extent of applicability and low cost will be an important consideration in selecting new designs for development and test.

Hardware Development						
EVALUATION No.	2	8	6	B	1

TITLE: Lightweight Body Armor

PROBLEM AREA: Safety During Police Operations

DESCRIPTION:

Under the FY 73 equipment development program, a lightweight protective garment that can be worn by public figures for protection against small handguns (including the .38 caliber police special) was designed and underwent initial tests. The test results were very encouraging. The new materials employed (Dupont PRD types) were significantly better than any similar nylon types previously tested. Considerable interest has been expressed by the police community for garments made of this material and specifically designed for law enforcement personnel.

It is proposed to extend this program into FY 74 and to undertake activity in two general areas. First, the sport coat garment developed in FY 73 will be transferred to field test for evaluation. Second, garments suitable for police and FBI needs will be fabricated from these new materials and tested against more extreme threats, environments, and damage criteria than are faced by key public figures. Designs to withstand penetration by knives and pointed weapons (of particular interest to prison guards) will be emphasized.

In addition to penetration protection, blunt trauma effects will be considered in the overall protection provided by the garments. Support from the Land Warfare Lab and Edgewood Arsenal will be continued in the material procurement and testing phases.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	3	3	2	2	2	2	B	1

COMMENTS:

This project scores high on technical factors because of the successful tests to date. There appears to be no reason why the continued systematic development and testing of these new garments should not be equally successful.

Hardware Development					
EVALUATION No.	3	6	9	B	1

TITLE: Residence/Business Lock Systems

PROBLEM AREA: Target Hardening

DESCRIPTION:

This project is directed at applying new technology to locks and locking systems in order to improve their effectiveness and reliability. The vulnerability of residences and businesses as well as multilock users such as hotels, schools, public buildings, and other similar facilities to lock-defeating techniques is of obvious concern. Methods for additionally hardening door and window locking systems are needed to reduce the frequency of unauthorized entry.

For residential applications, low cost and retrofit ease are of importance. Business applications have similar objectives as well as additional requirements such as a reprogramming capability for hotel and office building locks or special purpose locking systems for high-security areas.

Effort under this program will include new lock developments such as integrated shunt locks which involve an interface with reliable burglar alarms. In addition, the feasibility of fingerprint activated and voice activated locks will also be examined. Close coordination will be maintained with related NILECJ-supported development projects.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
4	2	2	2	3	3	3	B	1

COMMENTS:

There is a large market for improved locks so that industry incentive in this area is high. The development projects in this area could be considered successful if prototype demonstration immediately leads to industry adaption for marketing. It is not expected that the more advanced lock designs (involving, say voice identification) could be demonstrated in less than 2 to 3 years.

Concept Development					
EVALUATION No.	3	5	7	B	1

TITLE: Hardened Cash Registers

PROBLEM AREA: Target Hardening

DESCRIPTION:

This project will provide for the development of a hardened cash register to limit accessibility to the cash drawer and reduce small business burglaries. It would extend the exact change concept already in use by small businesses throughout the country. After the amount of the sale is punched in, the machine would read the value of an inserted paper bill and produce the correct change.

The machine would eliminate the operator's accessibility to its contents. It would only be opened by armed personnel (once a day, for example) for emptying and refilling the change dispenser.

Change machines for a single paper bill denomination and postage stamp issuing machines which accept a single denomination paper bill are now used extensively. However, there are added requirements and complexity if the machine is to accept several paper bill denominations (i.e., $1, $5, $10, $20) and issue paper bills as well as coins in change. Recycling of paper money originally accepted in payment as change imposes further complexity.

The initial step in this program will involve design feasibility and tradeoff studies and will include a technology review of advanced electronic cash registers presently on the market. Extensive industry cooperation will be involved.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
3	2	2	1	3	1	3	B	1

COMMENTS:

This may be a widely used device, particularly for the smaller "Mom and Dad" stores, if the development is successful. The manufacturing base is probably small if only the big cash register companies could economically produce the new machine.

Concept Development					
EVALUATION No.	2	4	5	B	1

TITLE: Positive I.D. Credit Cards

PROBLEM AREA: Property Identification

DESCRIPTION:

The increased rate of theft of credit cards, and their ascendancy to the status of primary target through mail theft and other means, have made it necessary to make their fraudulent use by other than the owner more difficult. A correlary objective would be the development of means to trace a stolen credit card to the thief and assure rapid apprehension of the fraudulent user.

Technology is required to provide additional positive identification means to the user of credit cards. Such means might include fingerprint data if this could be obtained quickly and compared quickly and reliably at the point of use. Covert identification means could be considered in which data known only to the legitimate user could be read by special equipment from the card. Whether such special equipment is affordable at the point of use is a problem associated with this approach. Should a fraudulent user be detectable, means for covertly notifying the police and tagging the suspect are needed for rapid apprehension of the suspect.

This project will review current concepts relating to this problem and will select the most promising for further analysis and testing, if cost and operator skills limitations are considered acceptable.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	2	2	0	2	1	2	B	1

COMMENTS:

The project scores a "0" in degree of improvement because of the already well developed methods of attaching pictures or signatures to identify cards. Fully automated techniques to perform identification do not appear to be critically needed since sales personnel are typically present when credit cards are used.

The project <u>almost</u> rates a "0" on MITRE problem area since it is only the stealing of the card (robbery or burglary) that is critical and not its use.

Concept Development						
EVALUATION No.	1	5	5	B	1

TITLE: Data Security Techniques

PROBLEM AREA: Data Accessibility

DESCRIPTION:

As more and more information of a sensitive nature is accumulated on criminals and their activities, the need becomes more acute to provide the necessary security for these files. Care is necessary to assure that accessibility to this data is kept to those persons or agencies whose "need to know" is valid, that the obtained information is not abused or does not jeopardize the criminal court proceedings through due process, and that the individual's rights to privacy are not invaded.

This project will examine techniques to provide the desired security for such computerized data. The feasibility of terminals equipped with personnel identification devices such as finger or voice prints will be considered. Procedures for preventing unauthorized message intercept, data storage tampering, or even data file destruction, will be identified. Proof of concept testing will be performed on a scaled system suited to the needs of the law enforcement and criminal justice community. The development of appropriate operational procedures will also be undertaken.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	2	2	1	2	2	1	B	1

COMMENTS:

The project will require close coordination with Search activities.

Concept Development					
EVALUATION No.	3	6	8	D	1

TITLE: Architectural Design Concepts

PROBLEM AREA: Defensible Space

DESCRIPTION:

Recent research has developed information tending to explain the higher incidence of crime in certain high rise housing developments to the absence of a living environment termed "defensible space". Architectural concepts have been suggested which tend to provide this defensible space by dividing larger housing units into smaller groupings permitting better surveillance and greater community cooperation. With such architectural and social restructuring of large housing groups, security can be enhanced with surveillance and control techniques designed to both prevent opportunities for crime as well as provide rapid response to a crime situation.

Closed circuit television coupled with a central control station permits relatively low-cost surveillance of large areas and enhances the rapid dispatch of aid to individuals in danger. Such a system also permits remote locking or erecting of intrusion barriers to barr exit or entry to nonresidents without sufficient reason to be present and also allows remote observation of offenders. Security can also be increased by the use of an electronic identification system to control entry into the housing area and to record arrival at the destination apartment.

This project will review sociological and architectural data concerning the defensible space concept and will integrate the application of electronic devices with such concepts to create designs of secure living spaces for a variety of public and private housing configurations. Recommendations concerning such integral secure living systems will be prepared for test and evaluation in new public housing developments.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	2	3	2	3	2	3	D	1

COMMENTS:

This project rates high because of its wide applicability and potential impact on reducing stranger-to-stranger crimes. It could be administered as a separate program from ESIP.

Concept Development					
EVALUATION No.	2	5	7	A	1

TITLE: Property Tagging and Identification Systems

PROBLEM AREA: Property Identification

DESCRIPTION:

Theft incidence can be reduced by increasing the difficulty of selling the stolen object profitably. Indelible identification of personal or commercial property would make it more difficult to profit from theft. Furthermore, the ability to identify a stolen object can assist in tracing it back to the thief. If batch-coded tagging were used, commercial goods stolen during transit could, for example, be traced back to a particular shipment. Tagging can be either covert to avoid removal by the thief or overt. If the latter, it should damage the value of the object if attempts were made to remove it. Available techniques include scribing or tape labeling of personal articles, and engraving, die marking, and/or color coding for manufactured commercial goods. Marking with materials visible only under ultraviolet or infrared radiation is also being used. Other methods utilizing trace quantities of rare earths have been suggested for tagging of materials such as drugs. Covert signatures could also be provided for reading by thermal or X-Ray luminescence techniques.

This project will review and evaluate the effectiveness of various existing and proposed tagging and identification techniques. Effectiveness will be related to the various potential applications, and demonstration testing will be performed to prove concepts suitable for personal use, for commercial goods, and for overt and covert procedures.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	2	3	0	3	2	2	A	1

COMMENTS:

The market is large for practical (low-cost) material I.D. kits. While industry incentives are high, there appears to be numerous new technical approaches which could be rapidly demonstrated and possibly adopted by industry for distribution to the public.

CONTROL INCIDENCE OF CRIME

INCREASE RISK OF COMMITTING CRIME

DETECTION AND REPORTING SYSTEMS

Hardware Development					
EVALUATION No.	2	6	5	C	1

TITLE: X-Ray Weapon Detection

PROBLEM AREA: Weapons Detection

DESCRIPTION:

Hidden weapons are a continuous threat to public figures, court officials and passengers on skyjacked airplanes. Although weapon screening techniques are available and in extensive use at airline terminals, their accuracy and reliability are not completely adequate. Improved methods for rapidly screening large numbers of people for hidden weapons are desirable.

The objective of this program is to develop a very low radiation exposure X-Ray system for real time detection of small weapons hidden on individuals. Such a system has several advantages over other weapon detection methods. The probability of detection of small concealed metallic handguns, knives or similar objects is very high with an X-Ray system, and the false alarm probability is very low. Also, it is impossible to "spoof" the system with covering material since the image formation results from X-Ray penetration. The principal issue is dose rate uncertainty and the technical problems of whole body imaging.

The National Bureau of Standards is initiating a program with the Bureau of Radiological Health to establish dosage standards for humans in non-medical applications. The corollary problem of the minimum exposure needed for weapon detection is the basis of this candidate project.

The feasibility of attaining a very short duration, intense beam will be assessed. In addition, the feasibility of combining new developments in image retaining, electraluminescent panels with image enhancement techniques will also be examined. Extensive industry participation will be involved.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	2	2	2	2	1	2	C	1

COMMENTS:

Civil factors could preclude this project. While presently rated "1" it could be zero if the radiation question is not resolved (i.e., how much radiation is permitted).

Concept Development					
EVALUATION No.	2	5	6	C	1

TITLE: Active Metal-Weapon Detection System

PROBLEM AREA: Weapons Detection

DESCRIPTION:

Improved methods for rapidly screening large numbers of people for hidden weapons are required. Of special interest are methods for checking corrections institution inmates for concealed, improvised weapons. Although pass-through portals are now used at airports, an advanced metal-weapon detection system with higher sensitivity and better discrimination is desired.

Imaging systems operating in millimeter-wave, long-wave infrared, and ultrasonic regions offer potential for meeting the desired objective. An assessment of the state of the art and availability of existing industry-produced hardware for all three approaches will be undertaken. Concept development and testing of selected systems will follow the technology assessment phase and the feasibility of incorporating a system into a pass-through portal acceptable for corrections institution use will also be examined.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	2	2	3	1	2	C	1

COMMENTS:

It is assumed that only projects offering a measurable degree of improvement in weapons detection will be considered, hence the "2" rating in improvement even though present day metal detectors are fairly good. Improvements could cover lower false alarms or systems to scan large crowds in real time.

Concept Development					
EVALUATION No.	1	6	4	C	1

TITLE: Explosive Vapor Detection

PROBLEM AREA: Explosive Detection

DESCRIPTION:

The purpose of this project is to demonstrate the technical feasibility of using sensitive and reliable instrumentation to detect concealed explosives by means of their characteristic vapors. Unfortunately, the data available on the characteristics of the trace gases emanating from explosives are limited. (A study sponsored by the FAA has reported the vapor pressures for several explosives and the U.S. Army has characterized the gases coming from military dynamite.) There is therefore, an initial need for an extensive study of explosive vapors, including identity, rate of emission, and the effect of barriers such as wrappings or suitcases and of dilution by turbulent air.

It is anticipated that vapor characterization and equipment evaluation will best proceed as a combined task. Both precision laboratory equipment (gas chromotograph - mass spectrometer combination) and commercially available sniffer/analyzers will be used to analyze and identify the vapors from a range of sample explosives. The benefit of selective preconcentration prior to vapor analysis and the effect of explosive aging and time dependency of vapor species will be considered.

If successful, this program will establish instrument sensitivity and detectability limits for specified explosives and will offer guidance to potential users of explosive vapor detection equipment.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	1	2	3	2	1	1	C	1

COMMENTS:

Simple to use, reliable explosive detectors are not presently available.

Concept Development						
EVALUATION No.	1	5	4	B	1	

TITLE: Explosive Tagging and Detection

PROBLEM AREA: Explosive Detection

DESCRIPTION:

This project provides for the development of a practical system(s) for "tagging" explosives with additives during manufacture. Tagging systems are intended to facilitate both the detection of concealed explosives and the pre- and post-detonation determination of the origin of the explosives.

The initial phase of this program will involve technical assessment of methods for explosive tagging and identify several industry contracts to be let under a technology development phase. The following five major activities comprise the technology development phase of this program:

- Investigation of methods based on atmospheric sampling.
- Investigation of methods based on the excitation of trace atoms.
- Investigation of analytical methods suitable for taggant identification and measurement.
- Evaluation of physical markers.
- Evaluation of additional methods of explosives tagging.

In addition, new methods of explosive tagging devised during this program for the purpose of permitting explosive identification or detection will be evaluated.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	1	2	2	2	1	1	B	1

COMMENTS:

Civil factors could change to a zero rating if radioactive tags are used. It is assumed that only rare earths, microballoons, or other noncontroversial tagging materials will be used.

Hardware Development						
EVALUATION No.	2	8	8	C	1	

TITLE: Citizen's Alarm System

PROBLEM AREA: Crime Reporting

DESCRIPTION:

The purpose of this program is to reduce assaults on individual citizens by providing them with a means for reporting in real time where and when an assault occurs whether inside a building or in open spaces.

A component feasibility study was undertaken as part of the FY 73 development program for an in-building alarm which used a radio frequency actuator and building power lines for alarm transmission. The proposed FY 74 effort will extend the system technology assessment previously initiated. Competing radio frequency and ultrasonic actuators for in-building application will be examined. Error-correcting techniques to assure low system false alarm rates will be considered and additional system-level feasibility demonstrations will be made with two different building scenarios. In addition, methods for increasing the system channel capacity and alternate methods of reliable alarm transmission will be evaluated. Extensive industry participation is anticipated.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	2	3	3	3	3	2	C	1

COMMENTS:

This project has wide applicability if properly designed and developed. It is a continuation of FY 73 funded effort.

Hardware Development					
EVALUATION No.	2	7	5	B	1

TITLE: 911 System

PROBLEM AREA: Community/Detection and Reporting

DESCRIPTION:

This project provides for the nationwide adaption of telephone number 911 for reporting and locating crime. The primary area of importance will be to monitor, perform cost tradeoffs and to simplify, where possible, the major 911 System already in existence under the Institute.

The initial effort will be to continue the present ongoing Institute's work in this field and perform those technical analyses required in order to determine the most applicable design concept for the equipment. Several possible system concepts will be considered.

This project also provides for an important new area which will be the analysis and preliminary definition of the interface between automatic alarm systems and the 911 System. This concept would be compatible with either the 911 "on line" or the 911 centralized system approach. Implementation would be by means of an integrated circuit card which would accept inputs from designated security alarm systems, and after the proper initiation, would automatically dial 911. Identifying information, such as building description, automatic alarm type, confidence assessment, could be tone generated and transmitted by 911 to the dispatch operator. Fire alarm and other data (critical health data) could be tone keyed and also transmitted by the system. It is important that 911 has the capability to accept minimal critical code identifiers and that such techniques are compatible with 911 development.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	3	3	1	3	0	2	B	1

COMMENTS:

Nine eleven systems are steadily being adopted across the country. It would appear that if the Institute is going to influence the design of these systems, it is necessary to initiate a project in this area.

Hardware Development					
EVALUATION No.	2	4	6	B	1

TITLE: Vehicle Emergency Call System

PROBLEM AREA: Crime Reporting

DESCRIPTION:

This project provides for the development of a means for transmitting a call for help by persons in buses, taxicabs, trucks, and private automobiles in both rural and urban areas.

The initial effort will include an investigation of several possible system concepts. These will be reviewed with DOT to insure compatibility with the roadside communication systems it has under development. Next, a feasibility study will be performed to define the technical requirements of the system selected. After the technical requirements have been established and coordinated with LEAA and DOT, a conceptual hardware development will be initiated. Prototype equipment will be built on subcontract and feasibility testing conducted.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	1	1	2	2	2	2	B	1

COMMENTS:

This could get an "0" on civil factors if it is expensive and only available for the wealthy. It must also be applicable to bus riders, taxicabs and other users of the public highway systems. Car location methods must also be considered for a successful system.

Hardware Development						
EVALUATION No.	1	4	3	C	1

TITLE: Night Vision Aids

PROBLEM AREA: Surveillance

DESCRIPTION:

This project will provide for the development of an improved night vision aid for law enforcement agencies. The initial activity will be to review the state of the art of portable image intensifiers and determine the key problem areas associated with reducing cost and improving performance. This analysis will be performed in close association with MITRE in order to determine the operational requirements for important factors such as optical gain and resolution. The work of the National Bureau of Standards on testing performance characteristics and setting standards for night vision equipment will be closely monitored.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	1	2	1	1	1	1	C	1

COMMENTS:

Special covert night surveillance could have some adverse public impact. The present critisism of LEAA-purchased night vision equipment was not considered quite adverse enough to rate this "0" on civil factors (but almost).

Concept Development						
EVALUATION No.	1	5	3	A	1

TITLE: Material Covert Tagging Techniques

PROBLEM AREA: Search and Pursuit

DESCRIPTION:

There are cases where undercover agents must identify goods or money with covert markings in order to improve the probability that the suspect will retain the evidence in his possession. In some situations involving undercover work, the act of marking may also have to be covert. The use of fluorescent powders or liquids, with the marking becoming visible under UV light, is widely used. Unfortunately, UV or IR sources are commonly available and can be used by the criminal as well as by the law enforcement community to check for the presence of incriminating markings.

New methods of covert markings are desired which are as easily applied as current methods but which are less easily detected by the suspect. Trace quantities of rare elements or compounds applied with the new strength adhesives are examples of new covert gagging methods requiring investigation. Other possible candidates include radioactive materials applied in such small quantities that only very sensitive laboratory-type instrumentation can detect their presence.

This project will review and evaluate promising new concepts for the covert tagging of materials and will perform experimentation where appropriate to prove the concept.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	2	2	1	1	1	1	A	1

COMMENTS:

This is a rather specialized development for undercover agents. It ranks low on MITRE's weighting and is rated low on manufacturers potential because of its highly specialized nature (i.e., rare earth compounds).

Hardware Development					
EVALUATION No.	3	6	7	B	1

TITLE: Stolen Goods Detection System

PROBLEM AREA: Crime Detection

DESCRIPTION:

The solution of crimes of theft and the rapid apprehension of the thief would be materially aided by devices which alarm security forces to the presence of stolen goods or perhaps even to the act of stealing. Such devices have been postulated for thefts ranging from shoplifting to the theft of expensive items from warehouses or transportation carriers. Methods for initiating alarms which have been proposed range from radioactive tagging to the use of small, inconspicuous and inexpensive RF signalling devices which respond to interrogative signals when passing through checkpoints. RF signalling devices can also be used to indicate unauthorized movement of articles such as boxes and crates stored in warehouses and, furthermore, can serve as locating beacons for security forces responding to a theft alarm. If movement of the goods is authorized, alarm can be prevented through coded inactivating signals. Miniaturization of electronic circuitry and power sources through solid-state techniques, and the potentially low cost of such equipment through widespread usage, make a variety of RF tagging and locating devices feasible.

This project will assess requirements for detection devices for a variety of theft situations and will review concepts suitable for several classes of application categorized by property value and goods handling and distribution practices. Promising systems will receive development through the proof-of-concept stage and will be made available for test and evaluation in actual operational situations.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
3	2	2	2	2	2	3	B	1

COMMENTS:

The cheaper, more reliable concepts in this project will probably take at least two years to develop and test.

Hardware Development					
EVALUATION No.	1	5	5	A	1

TITLE: Robber Tagging

PROBLEM AREA: Search and Pursuit

DESCRIPTION:

Hot pursuit and apprehension might be feasible following a rape, robbery, or assault if the suspect could be readily identified from among the people in the area in which the incident occurred. Information and a description provided only by the victim and even information from witnesses, should they be available, is often inaccurate and misleading. The victim might still be under too great a stress for coherent questioning, and the use of a police artist and the preparation of a composite picture is time consuming.

In such situations, a positive signature marking the aggressor is of interest. A mark directly applied by the victim or by a device covertly activated by the victim would be useful in tracking and identifying the suspect. A mark visible to the eye would alert witnesses and aid pursuit but would encourage attempts by the suspect to remove the mark or go into hiding. An invisible mark requires special viewing equipment and police-only identification.

This project involves a review of available tagging techniques during a stranger-to-stranger crime. Concepts for tagging an aggressor in both the overt and covert modes will be considered. Evaluation and testing of the more promising concepts will be undertaken.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	2	2	1	2	2	1	A	1

COMMENTS:

This project could have application to other major crimes, for example, indelible trace elements in lipsticks could provide positive identification of rapists.

CONTROL INCIDENCE OF CRIME

INCREASE RISK OF COMMITTING CRIME

INVESTIGATIVE SYSTEMS

Concept Development					
EVALUATION No.	2	5	5	A	1

TITLE: Detection of Gunshot Residue

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

There is a need for fast, reliable, and inexpensive techniques and equipment for use by crime laboratories to detect gunshot residues on suspects' hands or around bullet wounds. In addition to providing evidence of a shooting, such information is useful for determining firing distance and distinguishing between suicides and homicides.

Most of the methods previously used are now in limited use because of limited reliability and sensitivity. These include the "paraffin test" for nitrate and the "Harrison and Gilroy test" for antimony, barium, and lead. Neutron activation analysis is the currently preferred test. However, it is time consuming, expensive, and inconvenient. Moreover, it cannot detect lead.

The effort proposed under this project involves evaluating gunshot residue detection by fluorimetry and flameless atomic absorption spectraphotometry. Both provide adequate lead and antimony sensitivity and improve on the convenience and rapidity of current detection methods. Both collecting and interpreting gunshot residue from the hands and from the bodies of suicide victims will be undertaken.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	2	2	2	1	2	A	1

COMMENTS:

The initial work will test the basic feasibility of the concept. Relatively low R&D funds are required to accomplish this, hence the "A" rating.

Concept Development					
EVALUATION No.	2	5	4	B	1

TITLE: Event Dating Techniques

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

It is often useful to know with precision when a particular event related to a criminal act occurred. Procedures for improving currently used event-dating techniques would be beneficial.

The purpose of this program is to extend the preliminary work on electron spin resonance as a technique for dating pyrolized or burned materials. The free radicals (molecules with unpaired electrons) which occur as a result of burning disappear with time. The characteristic lifetime depends upon the nature of the free radical.

Work has been done on bullet primer residue. This program will consider other clue material such as gunshot powder residue, ashes, explosive residue, cigarette butts, etc. Those materials having free radicals with characteristic lifetimes greater than a few hours will receive more detailed investigation. The effort will also include assessing the uncertainty that can be assigned to the estimated time of the event.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	2	2	1	1	2	B	1

COMMENTS:

This would extend the work of a previous Institute Grant.

Concept Development					
EVALUATION No.	2	4	5	A	1

TITLE: Autopsy Technology

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

Medical-legal authorities estimate that at least one-half of the nation's population resides in areas where the methods and personnel to adequately determine the cause of sudden, violent, or unexplained deaths are inadequate. The purpose of this program is to develop simplified equipment and procedures for use by paramedical personnel to effectively augment the autopsy capabilities of the inadequate number (about 200) of forensic pathologists in the United States.

Goals will be defined and plans evolved for autopsy concepts which can be pursued by medically trained aids specializing in forensic autopsy procedures and directed by forensic pathologists. The possibility for a semi-automatic approach to routine procedures will also be considered and simplified sampling and analysis techniques will be identified.

This project interacts heavily with the medical profession and support by recognized medical authorities will be involved.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	2	1	2	1	2	B	1

COMMENTS:

No comment.

Concept Development					
EVALUATION No.	2	5	5	B	1

TITLE: Bullet Tracing and Identification

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

The capability to trace a recovered bullet or shotgun pellet to a specific cartridge or gun from which it was fired is a useful law enforcement tool.

The purpose of this project is to improve the ability of law enforcement personnel to establish gun and gun barrel signatures from bullets and pellets. Specific program objectives include:

a) Automatic topographical comparison of evidence bullets with bullets recovered at the crime scene or fired from recovered weapons.

b) Compositional analysis where conventional ballistics methods can not be applied.

Automated procedures can extend the utility of "topographical matching". To augment such capability, criteria will be determined for establishing the degree of "match" between bullets and a classification system devised to establish and permit searching of bullet files.

Compositional analysis will aid those cases where bullets are so badly deformed by impact/ricochet that topographical or visual comparison is meaningless. This technique is especially useful with shotguns, since pellets are not reproducibly marked upon firing. The amounts of minor trace elements present in bullets from a wide variety of sources will be determined. This information will be used to statistically evaluate the degree of individualization which can be achieved through trace element analysis. The feasibility of lead isotope ratio analysis to establish bullet individualization will also be examined.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	2	2	2	1	2	B	1

COMMENTS:

This technical risk is considered high, particularly for a major breakthrough in topographical comparison techniques.

Concept Development					
EVALUATION No.	2	4	5	B	1

TITLE: Thermoluminescent Techniques

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

Improved identification methods are needed for clue materials such as glass, hair, paint, fibers, and blood. From work conducted by the Jet Propulstion Laboratory, it was demonstrated that thermoluminscent* techniques may be one of the more discriminating methods available for differentiating materials such as glass, soils, safe insulation, salts, and other non-metallic solids. JPL developed and extensively field tested a thermoluminescence instrument and concluded that further procedural development work and data base collection is desirable in order to establish thermoluminescence as a standard laboratory method for the comparison of evidence materials. A program is proposed to extend the development work of JPL and obtain base data at three selected crime laboratories.

*Thermoluminscence is the emission of light that may occur when a material is heated to temperatures below incandescence and can be characteristic of a material, its composition and history. The primary cause of these light emissions is previous exposure to natural or laboratory ionizing radiation.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	2	1	2	1	2	B	1

COMMENTS:

This could provide the criminalist with a new investigation tool. Time to demonstration and adoption by crime labs could be less than the 2 to 3 years estimated.

Technology Development					
EVALUATION No.	2	4	3	B	1

TITLE: New Mass Spectrometry Methods

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

Trace chemical analysis of clue material is a useful investigative tool. Further improvement in the utility of this tool would be beneficial to the forensic scientist.

Trace constituents are introduced in a material during manufacture, by exposure to some environment after manufacture, and by contact transfer from one material to another. Analysis effort to date has emphasized trace elements introduced during manufacture. Recent improvements in ion detector design should significantly enhance the capability of spark source mass spectrometry and ion sputtering mass spectrometry for trace analysis of clue materials such as paint and glass chips on the surface or transferred by contact.

The purpose of this program is to evaluate the utility of spark source mass spectrometry and ion source mass spectrometry for clue material analysis. In addition, effort will be made to identify new methods for evidence collection to ensure best possible utilization of mass spectrometric techniques.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
4	1	2	1	1	0	2	B	1

COMMENTS:

The project would emphasize new techniques, consequently technical risk is considered high and time to adequately demonstrate is at least two years.

Hardware Development					
EVALUATION No.	1	4	4	B	0

TITLE: Concealed Recording System

PROBLEM AREA: Undercover Communications

DESCRIPTION:

In criminal investigations, the covert recording of conversations has often been found useful. Miniaturized electronic equipment has already been commercially developed and is in operational use by law enforcement and intelligence gathering organizations.

The advent of integrated solid-state-circuit devices further aided the miniaturization process for devices such as pick-ups and transmitters which do not utilize moving parts. The technology of recording devices using tape or wire has not yet experienced as significant a size reduction. As a consequence, reliance upon an RF or hard wire link with the pick-up often exists. Investigative situations can occur in which remote recording will not be productive or will not be feasible for reasons of time constraints or physical constraints such as shielding, etc. New technology needs to be developed or adapted from DOD or space developments to permit the investigator to record on the scene with devices covertly carried on his body, his clothing or in other objects legitimately carried by him in his cover identity.

This project will search related technology areas for concepts and equipment suitable for the covert recording function. An analysis will be performed to determine equipment design requirements as a function of investigative scenarios likely to be encountered in law enforcement work. The most promising concepts will be developed for proof of concept demonstration testing.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	2	2	0	1	2	1	B	0

COMMENTS:

This is rated "0" on civil factors because of the highly political aspects (Watergate Affair) associated with development of new bugging devices.

Concept Development					
EVALUATION No.	2	4	4	B	1

TITLE: Ion Microprobe Analysis

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

The recently developed ion probe mass analyzer is a sensitive device for the nondestructive chemical analysis of surface materials. It operates by vaporizing a microportion of the surface of a clue material which is then accelerated and analyzed by a scanning mass spectrometer.

This approach promises to be of particular utility in analyzing for tag materials implanted in the surface during the manufacturing process. For example, drug pills could be tagged with trace quantities of elements such as rare earth elements which would be specific to a particular manufacturer. The quantity of tag material would be too small to allow detection by other means and would not be physiologically detrimental. Identification of bullet manufacturer is an example of another possible use.

Since the instrument is capable of detecting type as well as quantity of tag material, a very large number of signature combinations is available for marking a variety of objects and for identifying batches of manufactured articles.

The objectives of this project include identification of classes of objects which can be traced, development of methods for implanting the tag materials, and the establishment of the sensitivity and accuracy of ion microprobe analysis for various feasible tag materials.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
4	1	3	1	2	0	2	B	1

COMMENTS:

This would be a complimentry program to other tagging and identification projects.

Concept Development					
EVALUATION No.	2	6	5	A	1

TITLE: Spray Film Evidence Collection

PROBLEM AREA: Evidence Collection

DESCRIPTION:

Evidence collection at the scene of a crime has always been uncertain in that it depended on the circumstances of discovery of the crime, the age of the evidence, the ability of the investigating officer to protect the evidence, the availability of trained technicians for the collection process, etc. Collection problems would be aided if simplified, foolproof techniques could be developed which would allow the first officer to arrive at the scene of the crime to quickly protect the evidence and to preserve it for later collection by trained technicians, or even to collect it himself if required.

A possible scheme for collecting and processing evidence involves the application of a quick-drying plastic film, possibly sprayed from an aerosol container, which would cause adherence of hair, dust, small objects, and possibly even latent fingerprints, in much the same manner as scotch tape. Such a spray material would have to be relatively nonreactive with the clue materials to be encountered, and yet retain adherent characteristics.

This project will investigate the feasibility of such a concept. The desired characteristics of sprayed film will be established and a spray film system which meets the desired objectives will be developed and tested.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	2	3	1	2	1	2	A	1

COMMENTS:

The extent of the market could be rated larger than 2 if the spray film becomes routinely used for robbery investigations.

Concept Development					
EVALUATION No.	1	4	4	A	1

TITLE: Rape Cocoon

PROBLEM AREA: Evidence Collection

DESCRIPTION:

Among the difficulties encountered during investigation of rape cases is the natural tendency of the victim to cleanse herself as quickly as possible after the crime. If this occurs before the victim has been examined by qualified personnel, much valuable evidence such as hair, seminal stains, etc. will be lost.

It has been suggested that the incidence of such loss of evidence could be reduced if the policeman answering the complaint call were equipped with means to preserve the evidence in a manner acceptable to the victim. A suggested means for such evidence preservation would be a plastic garment which the victim would don over whatever clothing was worn during the commission of the crime. This garment would be worn until the victim had reached a medical facility for a thorough examination of both the garment and the person.

This project will examine the actual utility of this evidence collection approach, and if found worthwhile, will undertake the development of practical procedures for its use. In conjunction with the Analysis Group, determination will, for example, be made whether this garment should be provided to each patrol unit or only to special units, and whether additional equipment should be provided to preserve evidence. Whether special training should be provided to law enforcement personnel for instructing a victim in its proper utilization will also be considered.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	1	3	0	1	2	1	A	1

COMMENTS:

The above reference to women as rape victims is not meant to be discriminating. The design of the cocoon would be such that it could also be used in cases where the victim is a man.

Test & Standardization					
EVALUATION No.	2	5	6	B	1

TITLE: Improved Crime Scene Recording Equipment

PROBLEM AREA: Evidence Collection

DESCRIPTION:

Many crimes have no witness to assist in the identification of the criminal. If witnesses are available, the stresses of the criminal event make it difficult for them to provide a description with sufficient accuracy to permit early pursuit and apprehension of the perpetrator or to assure conviction subsequent to apprehension. Audio and video recording devices which are activated during the commission of a crime to either replace or supplement witness information are already in use (especially in banks) and greatly aid the apprehension and conviction of criminals. Many apartments and small businesses are only equipped with monitoring equipment for surveillance and are not able to provide a permanent record of a criminal event. Equipped with sound and recording capability, the effectiveness of such a tool for increasing apprehension and conviction of suspects will improve.

The objectives of this project include a survey of commercially available crime scene video-audio recording systems and the development of concepts for making such systems more generally available to additional locales subject to burglary and robbery. Such concepts will include means for lowering the system cost and providing simple, reliable methods for covert activation and use only during crime events. Close coordination will be maintained with NBS to coordinate technical requirements and standards.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	2	2	1	2	2	2	B	1

COMMENTS:

This project could proceed rapidly to field test and evaluation.

CONTROL INCIDENCE OF CRIME

INCREASE RISK F COMMITTING CRIME

PERSONNEL IDENTIFICATION SYSTEMS

Hardware Development					
EVALUATION No.	2	8	6	B	1

TITLE: Blood and Bloodstain Analysis

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

This project will facilitate the utilization of modern techniques of blood individualization by developing reliable and easy-to-use blood analysis equipment for police laboratories.

Prototype blood individualization kits suitable for police laboratories will be developed and tested. The feasibility of a blood individualization data file will be investigated.

The combinations of protein and enzyme polymorphisms will be determined based upon the degree of individualization provided and the ease of performing the required analyses. A "basic" kit and several progressively more complete (and expensive) kits will be developed and tested.

The operation of a blood data bank suitable for the individualization of the criminal population of the United States will be analyzed. The optimum combination of blood group factors at the least cost for analysis will be investigated.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	3	3	2	3	1	2	B	1

COMMENTS:

These techniques are accepted by the courts in England, consequently the technical risk is low and it could easily be demonstrated within two years. It should be widely applicable to many crimes (including burglaries) in which blood stains are found.

Concept Development						
EVALUATION No.	1	6	2	B	1	

TITLE: Analysis of Non-Blood Body Fluids

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

This project will provide law enforcement agencies with the capability for individualizing liquid or dried urine, semen, saliva, and sweat to the same degree as is now possible with blood.

This program will entail four activities aimed at individualizing body fluids and developing techniques of practical value to police investigators. Feasibility analyses and studies will be undertaken and experimental work will be performed by suitable university or industrial subcontractors.

Morphological studies of semen will be undertaken by a subcontractor contingent upon the results of initial feasibility studies.

The possibility of determining some aspects of an individual's phenotype (in particular, hair color) from spermatozoa will be investigated. This work will also be carried out by a subcontractor.

The feasibility of extending the present capabilities for the individualization of body fluids other than semen (and blood) will be assessed. Subcontractors will perform necessary experimental work in those areas which appear promising.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	1	2	3	0	1	1	B	1

COMMENTS:

There may be additional considerations such as requiring a court ruling on obtaining semen specimens from suspects. This might make the social factors a "0" rating.

Technology Development						
EVALUATION No.	0	7	2	C	1	

TITLE: Speaker Identification

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

The overall objective of this project is to validate and improve speaker identification methods. This will include, 1) investigations to improve voiceprint technology and validate areas for its application; 2) development of interim semi-automated speaker identification system along with statistical evidence of its capabilities; and 3) developing information which will improve voice recordings used for speaker identification.

The effects of female voices, mimicry, equipment performance, disguise, speaker behavior and background, word context, etc. on voiceprint reliability will be assessed.

A computer-aided voice identification system will be developed. It will provide a capability to process a large number of cases in an objective manner based on experiments run on large speaker populations. Most of this effort will be subcontracted.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
0	2	2	3	1	1	0	C	1

COMMENTS:

This is an on going project which does not appear to be applicable to the important crimes of interest. However, the work in this area is important in order to establish the credibility and reliability of speaker identification technique. This influences the quality of the criminal justice system since certain of these methods are already being introduced as courtroom evidence.

Concept Development					
EVALUATION No.	2	7	4	B	1

TITLE: Individualization of Hair

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

This project provides for the demonstration of the potential of using the light emitting or luminescent properties of hair for individualizing this material. Development of luminescence spectroscopy techniques will be undertaken for the individualization of single hairs.

The initial phase of this project will involve the analysis and selection of those luminescence parameters that best individualize hair. While initial measurements will be made at low temperatures, efforts will be made to establish techniques and procedures for the individualization of hair employing luminescence analysis at room temperature.

In addition to establishing the most reliable luminescent properties for identifying hair, the luminescence spectra and decay curve will be measured at varying positions along the length of selected hairs in order to evaluate possible effects of environment, nutrition, and related effects. The correlation between optical microscopy and UV excited luminescence will be evaluated.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	3	3	2	1	2	B	1

COMMENTS:

Hair is found mostly in rape and murder cases and consequently rates low on extent of applicability. Improved crime scene collection techniques could change this. Degree of improvement is rated 3 on the assumption that greatly improved individualization will be achieved.

Concept Development					
EVALUATION No.	2	6	5	A	1

TITLE: Improved Fingerprint Lifting Techniques

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

Effective methods for fingerprint visualization and recording are known for many investigative situations. In particular, fingerprint lifting from non-porous surfaces by means of appropriate powders ranging from graphite to fluorescent materials has been well established. Adequate methods have also been developed for some porous materials such as paper and cloth.

There is, however, a need for the development of methods usable by non-specialists, such as the patrolman answering a trouble call, if a situation requires immediate action to avoid destruction of latent prints. Other methods still needing development include the lifting of prints from live human skin where liquid and vapor exudation as well as tissue sensitivity to chemical reagents must be taken into consideration.

This project will initially survey requirements of latent finterprint lifting techniques for a variety of materials and investigative situations, and will relate existing methodology to these needs by considering factors of reliability, speed, facility and equipment needs, and operator skill requirements. Where satisfactory answers to existing needs do not exist, the development of new techniques will be undertaken on an exploratory basis in order to demonstrate basic feasibility.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	2	3	1	2	1	2	A	1

COMMENTS:

Development of new fingerprint lifting methods was not given a high priority by the participants at the Institute's recent Forensic Science Seminar (March 20, 1973). There are, however, a number of relatively low cost development projects in this area which could improve the lifting of prints by inexperienced personnel or permit a greater variety of surfaces to be examined.

Technology Development					
EVALUATION No.	2	6	6	D	1

TITLE: Advanced Fingerprint Holography

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

Fingerprint processing and file searching is a major problem confronting criminal justice agencies at all levels of government. Recent advances in laser technology and holographic pattern recognition techniques could be applied to solving these problems.

For example, prototype holographic equipment has already been demonstrated to search latent print files. A test conducted by Project Search illustrated the potential advantages of these systems. A file of 10,000 cards was searched automatically by these systems with acceptable error rates. Equipment improvements were identified in order to reduce the time to process the cards.

This project would involve a cooperative program with Project Search to further develop holographic fingerprint processing equipment. The possibility of using holographic transformation to obtain a single number which uniquely identifies a fingerprint will be investigated.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	2	3	3	1	2	D	1

COMMENTS:

This program requires systematic development and orderly application of a new technology. The potential payoff is large particularly for the latent print search problem.

Hardware Development					
EVALUATION No.	2	6	6	C	1

TITLE: Advanced Digital Fingerprint Encoding

PROBLEM AREA: Evidence Analysis

DESCRIPTION:

Numerous studies and analyses have established the potential gains that digital computer technology can make to the reading, classifying, sorting, and matching of fingerprint cards.

The FBI equipment, under development by Cornell Aero Lab for the past five years, can now read the standard 8 x 8 card and store fingerprint minutia location data on magnetic tape. The system requires further development and simplification before this data can be used to perform routine file search and matching tasks.

The FBI digital fingerprint equipment program is presently designed to solve the massive file search problem at the FBI's Washington Headquarters (30,000 inquiries per day, 1500 employees searching). It is not directed to the fingerprint recording and filing problems at the state and local level. The recent RFP's required by Project Search in this area do not specifically cover development of digital encoding and processing equipment.

This project would involve development of new digital equipment and procedures to encode and store fingerprint information. Application of modern data processing techniques in this area can save resources and greatly reduce processing time.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	2	3	3	1	2	C	1

COMMENTS:

This could be one of the most important developments for the Institute to support. A cooperative program within the Justice Department between the Institute and the FBI, would provide 1) improved utilization of development funds, and 2) compatibility of new digital encoding procedures and equipment being developed for federal, state and local agencies.

Concept Development					
EVALUATION No.	1	3	4	C	1

TITLE: Computer-Aided Facial Features Identification

PROBLEM AREA: Evidence Collection

DESCRIPTION:

This project will devise new concepts for suspect appearance identification procedures which are faster and more flexible than currently employed police artist systems.

The initial phase of this study will survey the current state of the art in order to establish what already exists that is applicable to a computerized suspect identification system. Contact will be made with identification experts to identify what they consider to be the critical facial features and to understand thoroughly the results of their studies.

A review will be conducted of the automatic feature (pattern) identification field to identify the classes of features useful for identification and the minimum number required.

A review will be conducted to determine available algorithms and techniques for fast efficient sketching, for subject viewing angle changes, for three-dimensional perspectives, and for color sketching.

A review will be conducted of the current state of the art of computer termainals for the display and data handling requirements of the suspect identification system.

A conceptual definition of one or more candidate systems and performance of a laboratory test evaluation will be completed.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	1	1	1	2	1	1	C	1

COMMENTS:

This could be an expensive way to replace an artist. The technical risk is considered high and it is unlikely that a complete demonstration of a workable system could be accomplished in less than three years. The related NYSIIS work in this area will be carefully reviewed.

CONTROL INCIDENCE OF CRIME

INCREASE RISK OF COMMITTING CRIME

COMMAND AND CONTROL SYSTEMS

Hardware Development					
EVALUATION No.	3	5	7	C	1

TITLE: Integrated Police Car Equipment System

PROBLEM AREA: Patrol Effectiveness

DESCRIPTION:

This project provides for the development of equipment which is to be developed as integrated modules of a system for police cars.

Four activities are proposed. A short study will be performed to determine the state-of-the-art equipment now in use or in development for most medium and large police agencies. A study to determine physical packaging and electrical power requirements will be performed in close conjunction with the work done by NBS in this area.

Prototype development will be recommended for integrated equipment modules to perform some of those functions now performed by equipment which is not presently integrated. Concept development of equipment to perform identified new functions needed in police cars will be initiated. Interfaces between the integrated equipment and the police car will be established to assure compatibility.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
5	2	1	2	2	2	3	C	1

COMMENTS:

There is laxity will be closely coordinated with work on improved police car designs, command and control developments, and communication improvements.

Concept Development					
EVALUATION No.	2	6	7	D	1

TITLE: Integrated Police Car Design

PROBLEM AREA: Patrol Effectiveness

DESCRIPTION:

This project will aid in the development of new police cars which are functionally designed to meet police requirements and well integrated to support new equipment needs.

A four-phase total program is required to design and develop an integrated police car and major subsystem equipment. The first phase will establish technical requirements and design criteria. The NBS survey and MITRE analysis will be used.

The second phase will be a design competition among car manufacturers and industrial design firms.

At least two of the promising car designs resulting from Phase II will be constructed and tested during the third phase.

The final phase is to procure a relatively large number (100 or more) of the best car design from the Phase III feasibility tests and field test them with selected police agencies.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	3	1	2	3	2	2	D	1

COMMENTS:

The purchase of 100 or more newly designed cars could exceed $1M in total funds.

Concept Development					
EVALUATION No.	2	6	7	D	1

TITLE: Integrated Police Car Design

PROBLEM AREA: Patrol Effectiveness

DESCRIPTION:

This project will aid in the development of new police cars which are functionally designed to meet police requirements and well integrated to support new equipment needs.

A four-phase total program is required to design and develop an integrated police car and major subsystem equipment. The first phase will establish technical requirements and design criteria. The NBS survey and MITRE analysis will be used.

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At least two of the promising car designs resulting from Phase II will be constructed and tested during the third phase.

The final phase is to procure a relatively large number (100 or more) of the best car design from the Phase III feasibility tests and field test them with selected police agencies.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	3	1	2	3	2	2	D	1

COMMENTS:

The purchase of 100 or more newly designed cars could exceed $1M in total funds.

Concept Development						
EVALUATION No.	1	6	5	A	1	

TITLE: Improved Airborne Policing

PROBLEM AREA: Surveillance and Reduce Response Time

DESCRIPTION:

This project provides for the development of the technology associated with airborne policing, especially airborne vehicles and their related support equipment.

An initial study of airborne vehicles and support equipment was conducted in FY73. This study investigated current state-of-the-art designs and cost data. Insufficient operational data are available to be able to assess the relative cost benefit of helicopter versus STOL modified airplanes.

Three major activities are proposed for FY74. Additional controlled testing will be performed to compare the effectiveness and cost benefits of helicopters and STOL modified airplanes in actual operations. Proposed modifications to current government regulations which seriously effect possible development of equipment for airborne policing will be discussed with the FCC and the FAA. Improved airborne sensors development will be initiated, especially night vision devices.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	4	3	1	2	2	1	A	1

COMMENTS:

The R&D funding is rated low because major system developments are not planned but rather analysis and testing of existing systems.

Hardware Development						
EVALUATION No.	1	6	6	A	1	

TITLE: Communication Helmet

PROBLEM AREA: Improved Communication Effectiveness

DESCRIPTION:

This project will provide for the development of improved radio communication equipment which can be built into protective helmets, and does not require wiring to other equipment on the wearer's person.

The specific objective will be to assess the feasibility of designing a complete lightweight, two-way communication system into a protective helmet. The system will use conventional police frequencies and only a single transmitting and a single receiving channel will be involved.

Various designs will be considered for transmitting sound to the wearer. These will include earphones, in-the-ear speaker, mastoid bone transmission, and acoustic tubing transmission. Similarly, unique microphone designs and locations built into the helmet will also be examined. In addition, support will be solicited from the communications and hearing-aid industry. One or more concept development contracts will be let for helmet prototypes and several units will be provided for subsequent field tests.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	2	3	1	3	2	1	A	1

COMMENTS:

This could procede rapidly to test and standardization. The past work of NBS on helmet standards will be utilized.

Technology Development						
EVALUATION No.	1	4	6	B	1	

TITLE: Lightweight Power Sources

PROBLEM AREA: Remote Communications Equipment

DESCRIPTION:

This project will provide for the development of improved power sources for self contained equipment for security systems, police use, and other law enforcement and criminal justice applications.

Self contained power sources represent significant cost and weight items when they are used in law enforcement applications. A state-of-the-art survey of potential power sources will be conducted. As requirements for capabilities develop which cannot be met by existing hardware, this information will be used to define new programs. It is anticipated that NASA and DOD research programs will provide the technology upon which to base new equipment development in this area.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	1	1	2	3	2	1	B	1

COMMENTS:

The development of new power sources will take at least 3 to 4 years and involves a rather high technical risk if a moderate improvement is to be made.

Technology Development						
EVALUATION No.	1	6	5	A	1	

TITLE: 900 MHZ Technology Study

PROBLEM AREA: Improve Communications

DESCRIPTION:

This project will provide a plan, including recommendations to the FCC for a method of allocating frequencies in the recently authorized land mobile frequency band about (900 MHz range).

To relieve the current congestion in the police frequency bands around 150 MHz and 450 MHz, the FCC has authorized about 45 MHz additional spectrum to land mobile communication. As yet this spectrum has not been allocated, and many mobile users, especially the telephone companies, are requesting use of this spectrum. Unless a system study is soon presented to the FCC which effectively presents the requirements for police communications, both current and projected, it is possible that the spectrum will be allocated in a manner which prohibits advanced equipment development.

A system study of the possible police uses for this spectrum is proposed. Technical assessments will be performed of the spectrum requirements for new equipment which might be used in this band as well as expansion of requirements for current services. A plan will be prepared which presents an efficient utilization of this band, or part of it, for police services.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	2	2	2	2	2	1	A	1

COMMENTS:

This is primarily a study and consequently is rated mostly with two's.

Hardware Development					
EVALUATION No.	1	5	4	B	1

TITLE: Digital Communication System

PROBLEM AREA: Improved Communications

DESCRIPTION:

The utilization of digital communication systems could greatly improve radio communications. Frequency crowding could be alleviated since digital transmission requires only a fraction of the voice bandwidth for the same data content. Hard copy data could be made available in instances where the volume or importance of data required it. Secure communications could be provided since coding individualized to each vehicle could be utilized. Finally, the vehicle could be provided with direct access to data sources without need to involve control center personnel.

As an example of the last advantage, the patrol car could have direct access to a central computer to query for suspect identification on the basis of car registration or driver's license number. Mobile crime laboratories could search computerized central fingerprint files or other data files of immediate value to an on-the-spot investigation.

Although digital communication is within the state of the art, application to mobile police communication systems may require considerable product improvement to permit reliable operation in the urban police car environment. This environment causes technical problems such as multipath interference and equipment reliability, and human factor problems such as operator training and user preferences.

This project will initially be a review of police communication requirements and digital communication equipment in order to determine what developments and new designs are required to increase digital equipment usage.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	2	2	1	2	1	1	B	1

COMMENTS:

In general, the equipment in this area is technically well developed but requires redesign, specifically for police use. Consequently the degree of improvement is rated low. The manufacturing base was rated "1" but it could almost be a "2" for manufacturers of digital communication equipment.

Hardware Development					
EVALUATION No.	1	4	5	A	1

TITLE: Low Cost Transmitter Identifier

PROBLEM AREA: Reduce Response Time

DESCRIPTION:

Current police communication equipment requires identification of the police vehicle to the dispatcher. The control center may have other overlapping incoming calls making recognition of the individual signal difficult. Radio net confusion from concurrent call-up can result in undue delay of recognition and acknowledgement of the call-up, possible decreasing the effective use of police forces.

Digital communications technology is available to solve this problem as simple add-on equipment to currently used vehicle radio communication sets, and as an integral part of advanced communication and control systems to be developed under another project. Digital code transmission devices could be made available from current technology which could be activated by the act of picking up the transmitter microphone, and which would automatically send the vehicle's call signal.

At the control center, a minicomputer would translate this coded signal into a visual signal for simultaneous display with other incoming calls. To further reduce confusion, incoming signals could also be buffered to produce a sequential display in the order of receipt.

This project will initially evaluate the actual utility of such a coded device for the call-up function. If economically justifiable, an engineering model of the system including the control center portion would be developed to permit evaluation of the operational utility of the concept.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	2	2	0	2	2	1	A	1

COMMENTS:

This development could be an integral part of future command and control systems.

Hardware Development					
EVALUATION No.	1	5	4	B	1

TITLE: Mobile Video Communication Systems

PROBLEM AREA: Communication Effectiveness

DESCRIPTION:

The dependence of police primarily on aural communications will continue but there are many applications of mobile video and associated visual displays which could provide significantly improved communication capability.

This project area includes the following mobile displays:

1) Indicator lights for canned messages
2) Teleprinters
3) Facsimile
4) Video (slow scan or TV)
5) Alphanumeric cathode ray tube displays

This program will review the state of the art in visual display systems with emphasis on the technical method used to achieve the desired output. Costs, reliability, compatibility with existing communications equipment, and radio frequency band width requirements will be emphasized.

The output of this program will provide the technical basis for hardware developments in the five areas listed above.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	2	2	1	2	1	1	B	1

COMMENTS:

This is an area in which there is much industrial activity and current hardware procurement by police departments. The state-of-the-art survey will provide background to identify areas not being adequately covered at the present time.

Technology Development					
EVALUATION No.	1	5	5	A	1

TITLE: Frequency Management Study

PROBLEM AREA: Improve Communication Effectiveness

DESCRIPTION:

This project provides for a long range spectrum management plan to be a guide for future requests for, and allocation of, frequencies for police agencies, thereby guiding the developments of new equipment requiring the use of radio frequencies.

Most, if not all, of the metropolitan areas of the United States now have overloaded radio channels which sometimes delay critical police communications. Projections are for considerably more requirements for the use of the available, and soon to be available, spectrum. Even with new spectrum allocations, the projections are for over-crowded conditions again in the near future.

Three studies are proposed. One study is needed to determine the total operational requirements for spectrum use by police agencies in the major metropolitan areas for the rest of this century. The second study will determine the amount of spectrum required to perform each of the projected requirements. The third study will result in a plan for long range spectrum allocations and for frequency allocations within current regulations and spectrum allocation which will lead to an orderly transition to the desired goals. This plan, if adopted, will be a guide for new equipment developments which utilize radio frequencies.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	2	2	1	2	2	1	A	1

COMMENTS:

This is a long range project which is timely because of new equipment such as digital communications and automatic police car location devices which may require new and different frequency allocations.

Hardware Development						
EVALUATION No.	2	6	5	C	1

TITLE: Automatic Police Car Location System

PROBLEM AREA: Reduce Dispatch Time

DESCRIPTION:

This project will provide for the development of automatic police car location systems for metropolitan areas and medium size cities. The first efforts will be directed toward the medium size cities, since extensive developments have been directed toward the larger metropolitan areas.

Four activities are proposed. A review of the state of the art, including the DOT developments, will be conducted. A determination of the requirements for medium size police agencies will be accomplished in conjunction with Mitre. A technical and economic analysis of possible equipment to satisfy these requirements will be performed. A concept development effort will be initiated followed by a demonstration in a typical medium size city.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	2	2	2	2	1	2	C	1

COMMENTS:

Very close coordination with Mitre is anticipated in determining the requirements and in performing the state-of-the-art review.

Concept Development						
EVALUATION No.	1	4	4	B	1

TITLE: Undercover Agent Communications

PROBLEM AREA: Undercover Operations

DESCRIPTION:

This project provides for the development of compact, easily hidden communications equipment for covert police operations.

Three activities are proposed. A state-of-the-art survey will be conducted of civil and military supported developments in areas of small communication and tracking equipment. The survey will also include the possible use of miniaturized scramblers. Technical and economic analysis will be performed to ascertain the most promising equipment for development. A concept development program will be recommended.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	1	2	1	1	2	1	B	1

COMMENTS:

This is a rather specialized development project which requires refined definition of the operational requirements.

Hardware Development						
EVALUATION No.	1	5	4	B	1	

TITLE: Steerable 450 MHz Antenna

PROBLEM AREA: Remote Communication

DESCRIPTION:

This project investigates the feasibility of improving police communications in the 450 MHz band by using directionally steerable antennas at the base stations. Since base stations usually must cover large areas radiating in all directions from the base station their antennas must be omnidirectional which results in low gain. If the base station operator could increase his antenna gain when a transmission from a low power mobile unit is poor, better communications would result.

The initial portion of this project will consist of a feasibility study followed by the design of a prototype antenna to test the practicability and benefits of electronic steering and lock-on concepts.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	2	2	1	1	2	1	B	1

COMMENTS:

The antenna would probably be applicable to larger cities which are spread out and have multipath problems, consequently the applicability is considered low.

Concept Development						
EVALUATION No.	2	5	5	B	1	

TITLE: Individual Patrolman Location System

PROBLEM AREA: Response Time

DESCRIPTION:

Positive control of the location of a foot patrolman or a policeman away from his vehicle is desirable for many of the same reasons as for the police vehicle. It would permit flexible force disposition and response to emergency situations. Knowledge of the location of the policeman at any moment would increase his safety by assuring more rapid assistance when needed. Administratively, better utilization of manpower can be attained by assuring more conscientious adherence to programmed patrol activities.

RF signalling devices capable of constant operation at milliwatt levels are state of the art and can be developed to radiate coded identification signals. However, urban use amidst high-rise buildings make conventional radio direction finding methods difficult because of the multipath problem caused by building reflection. Other methods involving, for example, the "signpost" approach need to be developed to assure sufficiently accurate location.

This project will perform a state of the art review of civil and military programs for automatic location systems for small vehicles and individuals. The Philadelphia DOT tests will also be evaluated. Promising concepts such as the "signpost" concept will be analyzed for feasibility. One or two of the most effective concepts will be developed to the demonstration testing phase.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	2	2	2	1	2	B	1

COMMENTS:

This development could be extremely useful to the patrolman in high rise downtown areas. It could be a complimentary system to be used in conjunction with an emergency call "panic button" for the foot patrolman.

Hardware Development					
EVALUATION No.	1	5	4	B	1

TITLE: Low Cost Secure Communications

PROBLEM AREA: Improved Communications Effectiveness

DESCRIPTION:

This project provides for the review of equipment requirements for secure communications in police practice and will evaluate existing equipment and techniques capable of meeting such requirements. When found necessary, new equipment specifically designed for secure police communication purposes will be identified, developed and tested.

The usual voice police communication channels are open to monitoring by the criminal during the act of committing the cirme and during a possible pursuit phase, enabling him to thwart police attempts to prevent the crime or to apprehend the perpetrators. Additionally, during undercover operations a requirement for silence may prevent normal voice communications even over secure links, or may prevent the use of conventional radio equipment while in the field of view of the suspects or bystanders.

Miniaturized transmitters/receivers are available from the intelligence community and from space technology which could be adapted to provide secure police communication by the addition of devices such as scramblers, if also capable of miniaturization. Other schemes available for this purpose would include CW type transceivers with hidden code keys.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	2	2	1	1	2	1	B	1

COMMENTS:

This project would require coordination with Army development communications equipment for undercover agents. Both of these areas have a rather limited extent of applicability.

Concept Development					
EVALUATION No.	3	6	6	C	1

TITLE: Modularized Command and Control Systems

PROBLEM AREA: Patrol Effectiveness

DESCRIPTION:

This project provides for the development of modularized equipment systems for command and control applications, particularly for medium sized cities or groups of cities that share C&C facilities. These systems can be easily configured from modularized components; adapted to specialized or peculiar situations and in this way needless duplication can be avoided.

The development will concentrate on equipment systems which will reduce response times via speeding up the dispatching function while reducing average travel time. An important consideration is the modularizing to reduce maintenance costs and system down time.

A few of the advantages of system modularization are:

1. Elimination of higher costs associated with reconfiguration "nonmodular" systems for each city.
2. Higher performance by means of meeting unique requirements of individual medium sized cities.
3. Simplified maintenance, low down time and minimal spare parts costs.
4. Simplified interfaces and improved compatibility with other civil systems (fire, disaster, etc.)

The project approach will consist of the following tasks:

1. A study to determine the state of the art of applicable equipment.
2. A technical and cost analysis to delineate new equipment concepts.
3. Development and definition of optimized modularized system concepts to answer the needs of the medium sized city.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
3	2	2	2	2	1	3	C	1

COMMENTS:

The extent of market is considered to be median from the standpoint of the number of total systems to be installed. However there may be thousands of component modules which could increase the marketing factor and the manufacturing base.

Concept Development					
EVALUATION No.	3	6	6	B	1

TITLE: Command and Control Equipment Simulation

PROBLEM AREA: Patrol Effectiveness

DESCRIPTION:

This project provides an analytical tool to assist in the selection of the most promising areas for equipment development in C&C. This tool will be a command and control equipment simulation model.

This model will be used to quantify the performance of equipment systems currently utilized. In addition, planned equipment system improvements will be analyzed in terms of system reliability, performance (e.g., response time), feasibility and cost effectiveness.

This activity will consist of three phases. The first phase will be the determination of the major equipment parameters (e.g., number of channels) in each of the functional subsystems. The second phase will consist of development and subsequent validation of the equipment performance model. The third phase will consist of utilizing the model to determine equipment parameters and areas for immediate development. The initial models and programs will probably be developed on a stand-alone basis to evaluate specific equipment systems. As the number of these models grow they can be combined to allow for the evaluation of combinations of equipment systems.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
3	2	2	2	2	1	3	B	1

COMMENTS:

It is important to understand that this is not an operations analysis type of model. Instead it is used for analysis of equipment and equipment systems improvement. Significant equipment improvement parameters can be analyzed and evaluated. This model will become a key factor in future equipment development and problem solution.

CONTINUED

1 OF 2

Concept Development					
EVALUATION No.	1	6	5	A	1

TITLE: Satellite Applications for Law Enforcement

PROBLEM AREA: Data Accessibility, Improved Communication Effectiveness, Dispatch and Travel Time

DESCRIPTION:

This project provides for the examination and determination of satellite feasibility for law enforcement purposes. Analysis and feasibility studies will be performed to evaluate the utility, usefulness and figure of merit of potential application areas.

Recent advances in satellite technology have very substantially reduced the cost of ground stations for fixed or mobile installations. Attainable RF link margins and performance characteristics make feasible hundreds of additional 2 way voice and/or low rate digital communications channels between mobile units and command/dispatch centers.

Multiple digital and video links applications would be examined for feasibility and cost effectivity. Examples of particular areas which would be analyzed are:

Fingerprint card transmission
Personal alarm communications
Local C&C performance and growth improvements
Local/state and state/Federal communications

It is planned to exclude possible application of navigation satellites for police car location since these have been reviewed in studies sponsored by other government agencies.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	2	2	2	2	2	1	A	1

COMMENTS:

The initial effort will be an analysis and feasibility study similar to the FY73 task involving Improved Airborne Policing. Since this is a study the technical and economic factors are all in the medium range. The importance of the problem area (and the user acceptance factor) was "1" by applying the MITRE weighting for Data Accessibility only. This could be higher if satellites are useful and economically justifiable for other law enforcement applications.

CONTROL INCIDENCE OF CRIME

INCREASE RISK OF COMMITTING CRIME

APPREHENSION SYSTEMS

Hardware Development					
EVALUATION No.	3	7	7	B	1

TITLE: Police Emergency Call Warning System

PROBLEM AREA: Increase Patrol Effectiveness

DESCRIPTION:

A patrolman usually looses his capability to communicate with the dispatcher when he leaves his patrol car. It is at this time that he is most likely to encounter dangerous situations requiring immediate assistance.

The purpose of this program is to develop a small transmitter capable of sending a number of emergency signals to a transciever in the patrol car. These signals will activate the transmission from the car of an appropriate emergency message to the central dispatcher.

The feasibility of using a simple coded transmitter capable of remotely activating a taped message to be transmitted from the radio car has been demonstrated and field tested by NASA's Jet Propulsion Laboratory.

This project proposes to extend the initial JPL effort and to address the limitations encountered in the field tests of the initial system. Specifically, an increase in transmitting range to 500 feet, repackaging into a more convenient configuration, and the expansion to at least six separate messages will be undertaken. Consideration will also be given to the feasibility of retransmitting the coded signal from the car for decoding at dispatch headquarters.

The project will involve JPL cooperation and will include field testing of prototype equipment.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
3	2	3	2	2	2	3	B	1

COMMENTS:

This project rates high because of the potential to increase patrol effectiveness and the short time to demonstrate. JPL has already accomplished the basic design work.

Hardware Development					
EVALUATION No.	1	6	4	B	1

TITLE: Truck Anti-Hijacking System

PROBLEM AREA: Crime Detection/Reporting

DESCRIPTION:

Hijacking of commercial cargo trucks is of national concern. The purpose of this program is to develop a system for determining when a truck carrying cargo has been hijacked or stolen and to provide information on the identity and location of the truck.

An initial effort on locating the position of a hijacked truck was undertaken by the Development Group as part of the FY73 ESIP activity. The effort proposed for FY74 will continue the location system activity and will initiate work on an alarm for detecting a hijacking attempt.

Prototype development will be initiated on at least one location system. Only conceptual activity will be involved on the hijack detection and alarm system. The alarm system must be designed to function independently and without aid or direct action by the driver. Its purpose will be to alert the dispatcher or a security guard that a hijack attempt is being made.

This project requires close coordination between NILE, DOT, and the automatic industry.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	2	2	2	1	2	1	B	1

COMMENTS:

This is an ongoing project aimed at reducing a specific type of robbery.

Concept Development					
EVALUATION No.	0	4	3	B	1

TITLE: Remote Bomb Disposal Techniques

PROBLEM AREA: Safety During Police Operations

DESCRIPTION:

Although not a frequent occurrence, bombs have exploded while being dismantled or removed by disposal crews from law enforcement agencies. Means for remotely working with dangerous materials have been developed by both the nuclear and the aerospace industries and could easily be applied to bomb disposal and, in instances of less sophisticated fuzing devices, to disarming.

Possible new bomb disposal systems could utilize systems electrically powered, servo-controlled mechanical arms and grippers. These could be manipulated by a human operator from a safe distance and use TV for close observation of the dismantling. Other systems eliminate the video link and position the operator behind a blast-proof shield with transparent observation ports. In these systems, hard-wire linkage with the servo-controls is used.

Very delicate laboratory operations, analagous in sensitivity requirements to most defuzing operations, are currently performed in this manner. Bombs which could not be defuzed in this manner could be transported by teleoperated device to blast-proof containers for remote destruction.

This project will review the applicability of such teleoperated devices to the bomb disposal problem and will identify equipment and procedures suitable to police needs and operations.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
0	1	2	1	2	1	0	B	1

COMMENTS:

While this project is in the area of Safety During Police Operations it does not involve safety associated with reducing the five major crimes. Consequently it is rated "0" with respect to solving a Mitre stated problem.

Hardware Development					
EVALUATION No.	2	6	6	B	1

TITLE: Police Vehicle RF Siren

PROBLEM AREA: Safety During Police Operations

DESCRIPTION:

Current automobile designs have improved soundproofing which frequently prevents the driver from hearing the siren of police and other emergency vehicles.

The purpose of this project is to develop a radio frequency (RF) warning system to alert vehicular street traffic of approaching police cars. The effort would include development of a transmitter for police cars and a low cost receiving device or radio modification kit for installation by the general public in their cars and trucks.

The initial activity will address the basic feasibility of widely applicable, low cost receiver-transmitter concepts. Passive signal conversion devices, battery-operated signal converters, and self-contained signalling units will be considered. Possibilities for limited, directional signal transmission will be evaluated and both audio and visual indicators will be treated. Prototype hardware will be developed and tested.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	1	3	2	2	2	2	B	1

COMMENTS:

This addresses a problem which is increasing as cars are designed to be better soundproofed.

Hardware Development					
EVALUATION No.	1	4	5	B	1

TITLE: Less Lethal Weapons

PROBLEM AREA: Apprension and Arrest

DESCRIPTION:

There is a great deal of public support for the development of non-lethal police weapons systems for both crowd and individual control/apprehension.

Many less-than-lethal weapons have already been developed and several of these have found application by police forces abroad and in this country. Considerable question still exists, however, as to the situations in which such weapons can be safely used and about the actual degree of non-lethality of these weapons.

Less-than-lethal weapons include the kinetic or impact type, such as the club or the rubber bullet, the chemical type such as disabling gases, the electrical type such as the electrified baton and the TASER, as well as a variety of miscellaneous devices such as hypodermic darts, water cannons, instant cocoons, etc. Depending upon the situation of use and the training of the operator all of these devices appear to have the potential for serious physiological damage and possibly even lethal effects. In addition, some have considerably less acceptability to the public or to law enforcement personnel than others.

This project will review and rank proposed and existing less-than-lethal weapon systems. Primary emphasis will be placed on weapons designed for the individual encounter. The ranking will reflect considerations of weapon effectiveness, reliability, ease of use, and user skill requirements, public acceptance and cost-effectiveness. If appropriate, improved weapons concepts will be identified and an engineering model developed for test and evaluation.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	1	2	1	2	2	1	B	1

COMMENTS:

No comment.

Hardware Development					
EVALUATION No.	1	4	3	B	1

TITLE: Integrated Lethal/Less Lethal Weapons

PROBLEM AREA: Apprehension and Arrest

DESCRIPTION:

Possible applications and descriptions of less-than-lethal weapons are given in the "Less Lethal Weapons" program discussion. In most situations, the law enforcement officer would carry both his conventional weapon and a less lethal device and would select his weapon on the basis of the situation confronting him.

It is technologically feasible to consider combining both types of weapon capability into a single device as a means for reducing the weight and number of equipment items carried by an officer. No technology breakthroughs are required, for example, to produce a gun which can selectively fire solid bullets or tear gas capsules or hypodermic darts. It is, however, likely that such an integrated weapon may exhibit disadvantages such as bulk, higher failure rate, etc.

This project will concentrate initially on an analysis of situations in which integrated weapons would offer definite utility. If such situations can be defined preferred operational and design characteristics will be established. Available technology will be reviewed to select applicable concepts, and design and development will be carried through the proof-of-concept stage. Experimental equipment will be produced for operational evaluation.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	1	1	2	1	1	1	B	1

COMMENTS:

No comment.

Hardware Development					
EVALUATION No.	0	3	2	B	1

TITLE: Remote Weapon Arming System

PROBLEM AREA: Safety of Police Operations

DESCRIPTION:

In high emotional stress situations such as riots, law enforcement personnel may sometimes fire lethal weapons when not essential to self-defense or control of the riot. A system which could control these weapons and permit their remote arming by a central authority might prevent needless loss of life such as occurred at Kent State University. The practicality of such a system as applied to available or projected police weapons requires evaluation.

Remote arming and disarming devices have been used extensively for both military and civilian purposes. Examples of the latter are the arming and initiation of blasting charges over RF links. Current technology could provide gun trigger safeties operating on electro-mechanical principles and requiring little power for actuation. Applying such devices to conventional police weapons, however, introduces serious problems in areas such as reliability, operational modes, and user acceptability.

This project will review engineering and design factors related to remote weapons arming in the law enforcement situations. Emphasis will be given to add-on devices to be introduced only in situations making remote arming desirable, Proof-of-concept development will be undertaken and prototype systems will be identified for possible development.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
0	1	2	0	1	1	0	B	1

COMMENTS:

This system is exclusively for riot control applications and not for police operations involving the five major crimes. Preventing a crime caused by the police is not considered and, consequently, the project rates a zero in addressing a MITRE problem area.

Hardware Development					
EVALUATION No.	2	4	5	A	1

TITLE: Police Weapon Safety System

PROBLEM AREA: Safety During Police Operations

DESCRIPTION:

A significant number of policemen are injured or killed each year during struggles with suspected felons by the latter's use of the policeman's own gun.

A method of preventing removal of the gun from its holster by anyone other than the owner, as well as a method for preventing its firing after such removal, would be very helpful in reducing the frequency of such incidents. The possibility of highly individualized gun safing devices to prevent the immediate use of the gun by a felon during a struggle with the police officer is one possibility. In addition, holster mechanisms can be conceived which require pressure from several fingers at special and individual holster locations before the gun can be withdrawn, thus making it unlikely that the gun could be drawn against the officer during the heat of a struggle.

This project will review concepts for safing both holsters and guns which can be individualized to the owner and which require a learning process to precede rapid operation. Engineering models of the more promising concepts will be constructed for test and evaluation. If appropriate, prototype devices will be constructed for field testing.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
2	2	2	0	2	1	2	A	1

COMMENTS:

The manufacturing base is perhaps rated too low. This could be a simple device or a minor change in the presently installed safety device.

Concept Development					
EVALUATION No.	1	4	4	B	1

TITLE: Sniper Disabling and Apprehension System

PROBLEM AREA: Apprehend and Arrest

DESCRIPTION:

Increases in the ambush slaying of policemen and innocent bystanders have increased markedly in recent years. In many instances, such crimes have been committed by a sniper who remains near the area of the ambush and exacts an additional tool in lives and injuries during the attempt to apprehend him. Such attempts usually involve more or less conventional approaches, using guns and/or gas to disable the sniper.

Other, more advanced, means are required to accelerate the apprehension process as well as to reduce the risk to both the apprehending officers and innocent bystanders. Such means may include the use of comfortable protective clothing which can be worn by policemen during normal duty tours. Psychological devices to assist in the apprehension process, such as high intensity lights blinking in colors and at frequencies designed to disorient the sniper and make it impossible for him to place well-aimed shots, could also be considered.

The objectives of this project will include review of all mechanical and physiological factors associated with the problems of preventing injury due to surprise attack and the disabling and apprehension of the ambush attacker. The more promising concepts identified as a result of this review will be analyzed and evaluated by exploratory test if appropriate. The development of equipment to the engineering model stage will be undertaken for the most promising concepts for subsequent operational field testing.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
1	1	2	1	1	2	1	B	1

COMMENTS:

This would be a rather specialized device with limited applicability.

Hardware Development					
EVALUATION No.	2	4	5	B	1

TITLE: Traffic Light Regulation System

PROBLEM AREA: Safety During Police Operations

DESCRIPTION:

Current automobile design emphasis on noise reduction and environmental conditioning of the car interior have made it more difficult for the occupants of cars to hear police and other emergency vehicle audio warning devices. Tests have also indicated that warning signals such as flashing lights often are not visible under certain urban environments or depend upon aid from an audio signal such as the police screamer before being noticed if the vehicle is being approached from the rear.

To avoid accidents and to speed the transit police or emergency vehicles, new concepts are required to remove traffic from the path of a vehicle having emergency precedence. Central station activated devices to turn traffic lights red at street intersections have been in use in many American cities during fire emergencies. These generally will stop traffic in large sections of the city and do not provide normal traffic with clues as to the actual path to be taken by the emergency vehicle. Other means are required to control traffic only along routes to be taken and only for the time period of the passage. Also, since communication with a central station to arrange for such specific traffic control may be too time-consuming, a control system operable from the emergency vehicle itself would be helpful.

This project will undertake a review of concepts permitting RF or sonic control of traffic lights ahead of the emergency vehicle for a sufficient distance to permit normal traffic to clear the roadway. Engineering models of promising systems will be developed for test and evaluation.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		

COMMENTS:

Of course, the past work (including field demonstrations) by DOT in this area will be reviewed and evaluated.

Hardware Development					
EVALUATION No.	1	4	4	A	1

TITLE: High Intensity Portable Lights

PROBLEM AREA: Search and Pursuit

DESCRIPTION:

Most stranger-to-stranger crimes occur at night. Thus, attempts at early pursuit and apprehension also take place at night. In addition, patrol activity to prevent such crimes must also be carried our during darkness. Both during patrol as well as in pursuit, law enforcement personnel must have available sources of illumination to aid in the detection and identification of suspects and/or clues to the commission of a crime.

Devices for providing the needed illumination are usually hand-held light sources such as flashlights or patrol-car mounted searchlights. New light sources capable of higher intensity operation and packaged in hand portable configurations for mobility would be useful. Also, the spectral composition of such a light source should be adjustable to provide better penetration of haze, smog and fog. Ruggedness of construction would be another desirable characteristic of such a new light source.

This project will undertake a survey of suitable light producing devices and evaluate their suitability to police needs. Concepts offering the promise of economical utility will be considered for prototype development and operational testing.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
1	2	2	0	1	2	1	A	1

COMMENTS:

No comment except that there is surely a large incentive in industry to develop this one.

Hardware Development					
EVALUATION No.	0	5	5	B	1

TITLE: Auto Theft Prevention

PROBLEM AREA: Target Hardening

DESCRIPTION:

The purpose of this project is to investigate the feasibility of concepts to aid in the prevention of theft of private autos and to deter unskilled auto thieves who steal on impulse.

The initial effort will be devoted to an assessment of automobile theft-prevention planning. A survey will be conducted of automobile manufacturers to identify theft-prevention equipment and procedures incorporated in current year models. Information will also be solicited on plans for incorporating new and improved features in future models.

Requirements will then be formulated for one or two advanced anti-theft concepts and subcontracts let to industry for the development of prototypes.

In addition, theft prevention features which the DOT could require manufacturers to incorporate into their new automobile designs will be identified.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECH-NICAL RISK	TIME TO DEMON-STRATE	DEGREE OF IMPROVE-MENT	EXTENT OF MARKET	MANUFAC-TURING BASE	USER ACCEPT-ANCE		
0	2	2	1	3	2	0	B	1

COMMENTS:

Automobile theft is not considered common law burglary or a major stranger-to-stranger crime. Consequently it is rated "0" in addressing the stated MITRE problem area.

CONTROL INCIDENCE OF CRIME

INCREASE RISK OF COMMITTING CRIME

ADJUDICATION SYSTEMS

Test/Standardization					
EVALUATION No.	2	7	6	A	1

TITLE: Police and Witness Paging System

PROBLEM AREA: Trial Conduct

DESCRIPTION:

Court appearance times for both police and civilian witnesses are difficult to schedule accurately because of the many factors which can delay trial schedules. As a consequence, such witnesses may spend inordinate amounts of time, up to several days, in the court building while waiting to be called. A system which would permit notification of witnesses while performing their normal duties in sufficient time to permit their travel to the court would increase availability of police officers for regular assignments and increase the willingness of the public to be involved in the criminal justice system. Electronic notification systems have been in use by the medical profession and others for both in-building and city-wide application. New technology will therefore not be required to develop effective witness paging systems. In order to insure that the system does not contribute to further court delays, such systems must exhibit high reliability under a variety of occupational and geographical location situations in which witnesses may find themselves.

This project will investigate operational modes tailored to the needs of the court system and will select off-the shelf equipment best suited to such operational requirements. Test and evaluation criteria used in the selection process will stress reliability of operation and economical multiple use application of the paging equipment. Repeat paging by automatic equipment will be considered.

SYSTEMS

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	3	3	1	2	2	2	A	1

COMMENTS:

Electronic paging systems are already in wide use and are well developed. Tests of court paging systems are underway in Illinois. New equipment developments are probably not required and the project can go directly to test and standardization and consequently the technical and applications factors tend to be relatively high.

Test/Standardization					
EVALUATION No.	2	7	6	A	1

TITLE: Court Video Recording System

PROBLEM AREA: Trial Conduct

DESCRIPTION:

Court proceedings are currently being transcribed into written records either by stenographers or from tape for several purposes. A permanent record must be kept for archival needs. Testimony may be required to be reviewed during the trial. Juries need transcripts to review testimony given often weeks or months prior to jury deliberations. The preparation of such transcripts is costly and time consuming. In addition, viewing an audio-visual recording of a witness during his testimony may be more revealing and instructive than the written record. No new technology is required to produce recording systems capable of this function. New techniques will be required to assure a match between existing equipment and special court needs. For example, the recording process must not disturb or interfere with the court proceedings. Noise and excessive lighting must therefore be avoided. Witness distraction must be avoided, indicating that the equipment should be relatively hidden. Costs must be low, pointing to automatic operation. Instant replay should be feasible, perhaps from a central building studio to reduce individual court room costs.

This project will examine special recording needs of the court system and will adapt existing audio-visual recording equipment to such needs. Operational methodology will be developed to assure maximum reliability and minimum interference with proceedings. Integrated court building systems will be developed to assure minimum cost. An engineering model of such an integrated system will be constructed for operational trial and demonstration.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	3	3	1	2	2	2	A	1

COMMENTS:

This equipment is also under test in criminal courts. New developments will be coordinated with this ongoing work.

Test/Standardization					
EVALUATION No.	2	7	6	A	1

TITLE: Court/Crime Lab Communications System

PROBLEM AREA: Trial Conduct

DESCRIPTION:

Court testimony often requires that a variety of experts be called and that various locations be visited to demonstrate and prove evidentiary data to the jury. The presentation of evidence could be improved in some cases by laboratory test demonstrations which are difficult to perform in court, thus requiring the entire court to adjourn to a suitable site. Similarly, the crime scene may have to be visited by the court to permit the observation of evidence which cannot be brought to the court. Hospital wards are visited to take testimony from bed-ridden witnesses. These procedures are costly and time consuming and means for remotely viewing such evidence, if permissible within established court practice and constitutional constraints, would be very desirable. Closed circuit TV techniques are available from current technology to meet such requirements if acceptable and economical systems and methodology can be developed.

This project will review LEAA grants in this area. Currently available equipment will be evaluated for application to remote court viewing systems, with emphasis on security systems to assure validity of evidential data presented over closed circuit TV. A demonstration test system will be assembled to permit operational evaluation of the concept.

EVALUATION CRITERIA:

MITRE PROBLEM AREA	TECHNICAL FACTORS			APPLICATION/ECONOMIC FACTORS			R&D FUNDING	CIVIL FACTORS
	TECHNICAL RISK	TIME TO DEMONSTRATE	DEGREE OF IMPROVEMENT	EXTENT OF MARKET	MANUFACTURING BASE	USER ACCEPTANCE		
2	2	3	2	2	2	2	A	1

COMMENTS:

The time to demonstrate factor for this, as well as other trail conduct projects is high because demonstration and test could be immediately undertaken.

END