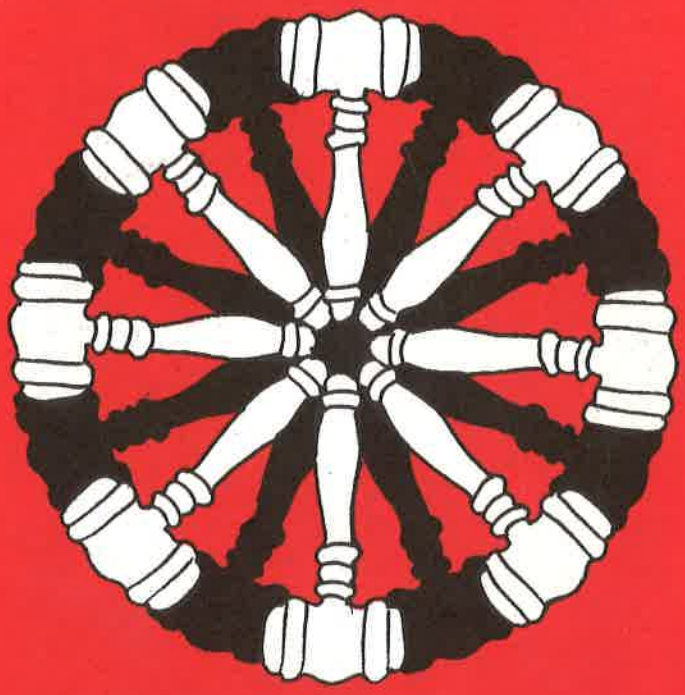
NORTH CAROLINA
POLICE INFORMATION NETWORK



STATE OF NORTH CAROLINA
GOVERNOR'S COMMITTEE ON LAW AND ORDER

RALEIGH
June, 1969

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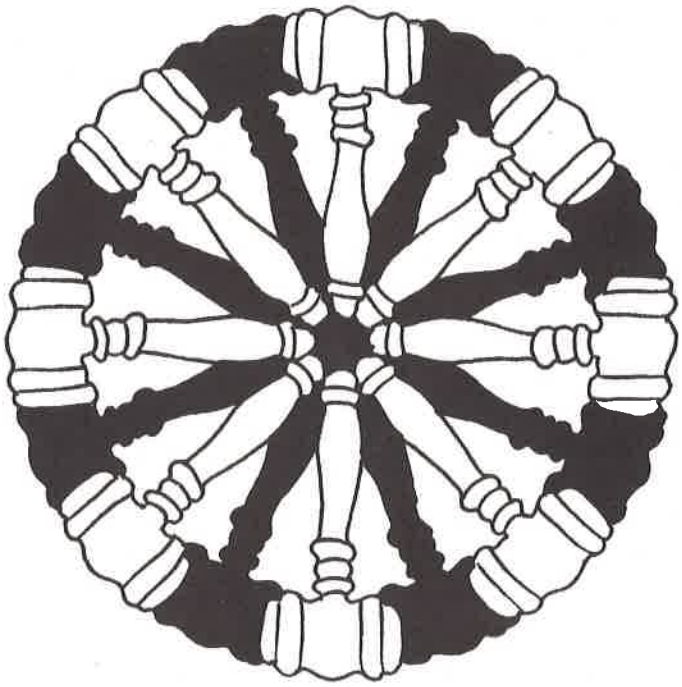

STATE OF NORTH CAROLINA
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Foreword

This is not a detailed system design. Time did not permit the extensive visits, surveys, and data collection necessary to the detailed design of a North Carolina Police Information Network.

What this report seeks to accomplish is to portray the broad outlines of the PIN System in sufficient detail to permit legislative and fiscal planning and Phase I implementation of a modest system meeting pressing needs. The recommended PIN staff will have as its first order of business the detailed design of Phase II and Phase III.

Although the Franklin Institute Research Laboratories, Philadelphia, Pennsylvania assisted with the preparation of this document, the report reflects the majority views of the Governor's Committee on Law and Order. The function of the Franklin Institute was to collect existing information from prospective users, from concerned State agencies, and from representative equipment suppliers. Any reference to the equipment of specific manufacturer is for purposes of illustration and cost estimation and there is no intended endorsement or implication that said equipment is preferred for the PIN tasks.

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SUMMARY

THE NEED

Like most other states, North Carolina does not have one central filing system for the collection and dissemination of various types of criminal records. As a result of the inadequacies of our decentralized manual system of records, our law enforcement officers frequently find that they have released someone arrested on a minor charge only to discover that he was wanted for more serious offenses in one or more neighboring jurisdictions. It is now totally impractical to use existing facilities to check each driver of a car stopped for a traffic violation and each arrested person or suspect against the individual files of all law enforcement agencies, even those that are nearby. The only means our law enforcement agencies have for communicating with one another are the telephone and telegraph and the voice radio network of the State Highway Patrol. Obviously, this is an inefficient method for our law enforcement officials to handle criminal information.

THE SOLUTION--THE POLICE INFORMATION NETWORK (PIN)

Organization and Administration

To solve the problems posed by totally inadequate statewide communications among law enforcement agencies and to provide for a timely and complete information flow among these agencies, the Governor's Committee on Law and Order recommends that the State establish a Police Information Network (PIN). After careful review of the organizational and administrative problems, we recommend that the administrative responsibility for PIN be vested in the division of Criminal Statistics in the Department of Justice already established under the provisions of Section 114-10 of the General Statutes. The Governor's Committee recommends further that the technical system development and operation be handled by the Data Processing Division of the Department of Motor Vehicles. We recommend that the Police Information Network should be separately budgeted with appropriate funds transferred from the Department of Justice to the Department of Motor Vehicles to cover the cost of services performed.

Operation of PIN

The heart of the Police Information Network will be a large scale electronic computer capable of storing millions of characters of information which can be retrieved in seconds. All responsible State and local law enforcement agencies throughout North Carolina will eventually have access to the

information contained in the system. Each participating agency will have in its communications center a telecommunications terminal unit connected directly into the computer by telephone line. The operator of the terminal will have the capacity of accessing the computer for the immediate retrieval of criminal information.

The primary initial role of PIN will be to provide that information which is required within a matter of minutes. During Phase I (to January, 1970), the following categories of information will be available to all terminal locations:

- Driver History Files
- Motor Vehicle Registration
- Stolen Vehicle Identification
- Conversion of Existing SBI Files
- Conversion of Existing Correctional Files
- Conversion of Wanted Persons File
- Conversion of Missing Persons File
- Conversion of Identifiable Stolen Property File

During this period, the system will also be connected into the National Crime Information Center (NCIC) of the F. B. I. which maintains files on stolen vehicles, wanted persons and stolen property on the national level.

In Phase II (from January, 1970 through June, 1971), these additional files will be implemented into the system:

- Wanted Persons
- Missing Persons
- Identifiable Stolen Property
- Outstanding Warrants of Individuals
- Arrest and Disposition Reporting
- Probation, Correction and Parole History Files

Message-Switching

In addition to all of the obvious advantages of having the above information readily available to our law enforcement agencies, a by-product of the network is that the computer will act as a message-switching device to provide North Carolina with Her first Statewide law enforcement communications network.

Terminal Locations

Terminals for Phase I (from July 1, 1969 to February 1, 1970) will be located in the eight metropolitan areas of Asheville, Charlotte, Durham, Fayetteville, Greensboro-High Point, Raleigh, Wilmington, and Winston-Salem; the six Highway Patrol base stations; the State Bureau of Investigation shared with the Department of Justice, Division of Criminal Statistics; and, the Department of Correction.

During Phase II (from February 1, 1970 to July 1, 1971), thirty-four additional terminals will be installed to serve areas of North Carolina having significant crime rates.

COSTS

The cost of implementing Phase I and Phase II during this biennium is $1,373,215. This includes salaries of the PIN staff, supplies, transfer of funds to the Department of Motor Vehicles for technical assistance and hardware and software modifications, and terminal and telephone line costs.

During Phase III, which will require approximately three additional years to complete (from July, 1971 through June, 1974), all law enforcement agencies and courts in the State will be tied into PIN.

1. THE NEEDS

There is much crime in North Carolina--more than is ever reported, more than is ever solved, too much for the health of our State. Assuming this is an average day, our police and sheriffs will be informed of the murder of at least one person, the forcible rape of one or two women, the robbery of four people, the aggravated assault of thirty-six citizens, the theft of eighteen cars, the occurrence of forty-five major thefts, and the commission of sixty-six burglaries. This is twice the number of such crimes reported on an average day in 1960.[1] Thus, there is justifiable concern over the crime problem in our State.

But mere statistics on the number of reported crimes like those cited above do not begin to convey the magnitude of actual crime committed in North Carolina, as illustrated in Figure 1. Surveys conducted for the President's Commission on Law Enforcement and the Administration of Justice revealed that there is far more crime committed than ever is reported. According to these studies, forcible rapes occur at more than three and a half times the reported rate, burglaries three times, aggravated assaults two times, and robberies one and a half times.[2] In fact, other similar surveys

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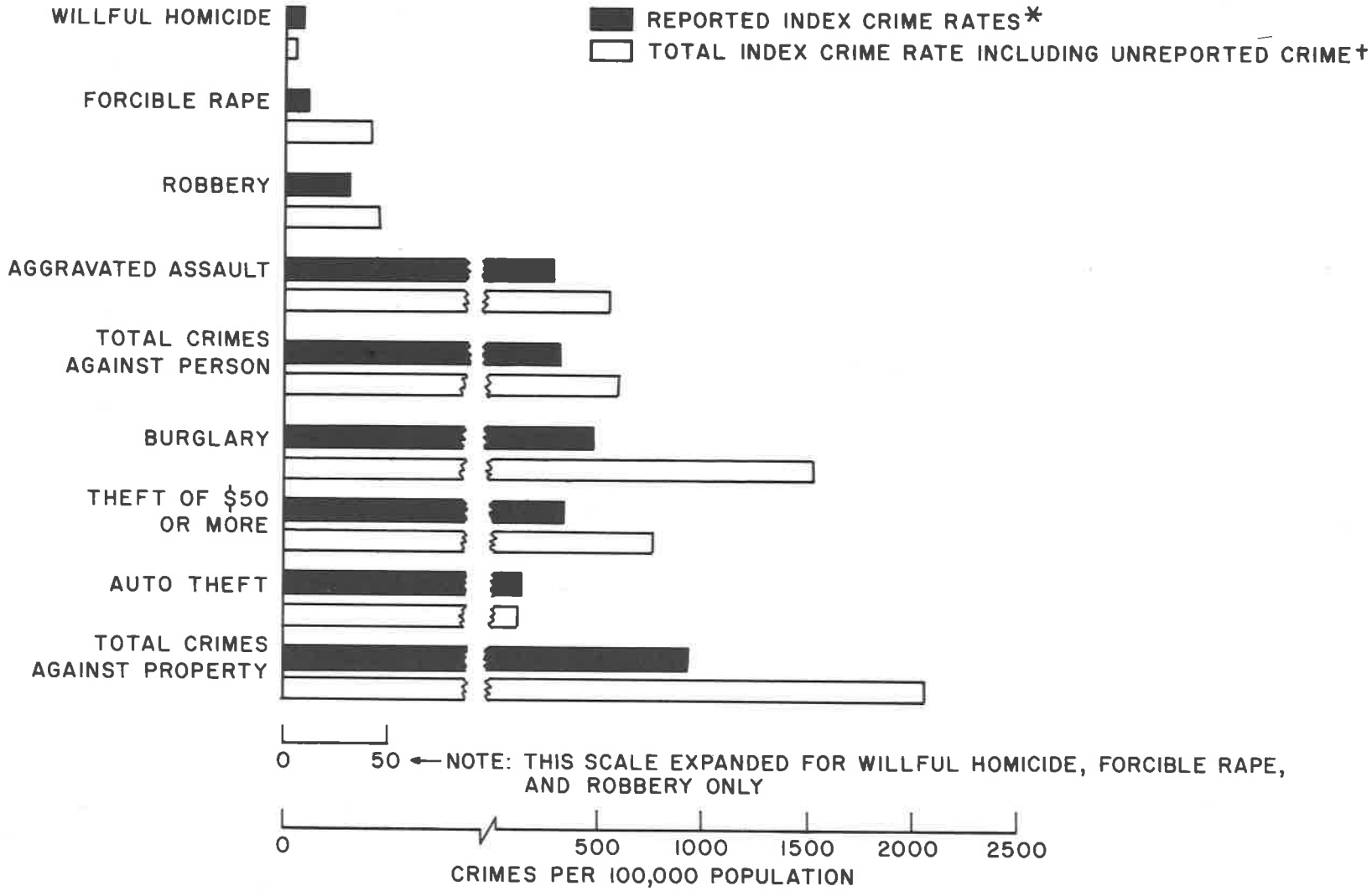
[1] United States Department of Justice, Federal Bureau of Investigation, Crime in the United States, Uniform Crime Reports, 1960, 1967, U. S. Government Printing Office, Washington, D. C.

[2] Based on National Opinion Research Center Survey for President's Commission on Law Enforcement and Administration of Justice, The Challenge of Crime in a Free Society, U. S. Government Printing Office, Washington, D. C., February, 1967, p. 21.

FIGURE 1

REPORTED AND ESTIMATED RATES OF INDEX CRIMES COMMITTED IN NORTH CAROLINA IN 1967



* SOURCE: FEDERAL BUREAU OF INVESTIGATION, CRIME IN THE UNITED STATES, UNIFORM CRIME REPORTS, 1967, P. 75

† BASED ON NATIONAL OPINION RESEARCH CENTER SURVEY FOR THE PRESIDENT'S COMMISSION ON LAW ENFORCEMENT AND ADMINISTRATION OF JUSTICE REPORTED IN THE CHALLENGE OF CRIME IN A FREE SOCIETY, TABLE 4, P. 21

NOTE: REPORTED AND TOTAL CRIME RATES INCLUDE INDIVIDUALS AND ORGANIZATIONS

showed rates of victimization that were from three to ten times greater than the official statistics show. Thus, the risk for a North Carolinian being a victim[3] of a serious violent crime[4] could range from 1 in 320 (if only the reported crimes are counted) to 1 in 168 (if unreported crimes are included). Similarly, the odds of being a victim of a serious crime against property[5] range from 1 out of 107 based on reported crimes only to 1 in 48 if unreported crimes occur at the national rate.

Just as statistics on reported crimes seriously understate the magnitude of crime, they also fail to convey the enormous scope of crime. An enormous variety of acts make up the "crime problem" in North Carolina.

Crime in North Carolina is not just the burglary of an affluent home, the mugging in a dark alley, the robbery in the corner store. It includes the teenager taking a car for a joy-ride as well as the professional thief stealing cars on order. It involves the dope peddler, the prostitute, and the bookie. But, it also encompasses the student who smokes marijuana for kicks and the public drunk, along with the businessman who conspires with competitors to keep prices high.

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[3]These odds are based on the assumption that each reported crime of the type cited involves only one victim; some crimes involve more than one victim, but this is not shown in the statistics.

[4]Murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

[5]Burglary, larceny $50 and over, and auto theft.

Crime in North Carolina--as in the United States--is not a single simple phenomenon that can be examined, analyzed, and described in one piece. It occurs in every part of our State and in every stratum of our society. Its practitioners and its victims are people of all ages, incomes, and backgrounds. Its trends are difficult to ascertain; its causes legion; its cures are speculative and controversial.

While there is no simple solution to the complex problems of crime in North Carolina, a new and powerful weapon in the war on crime has been conceived and is now being utilized by a few states in the collection and dissemination of criminal information. That weapon is the electronic computer. The computer, like the roving patrol car and the two-way mobile radio, is a valuable tool which has come at a time when it is greatly needed in law enforcement.

Policemen, attorneys, court officials, correctional administrators, and other experts familiar with the problems of crime control have long emphasized that the lack of adequate and timely information lies at the root of many of their problems. As the President's Commission on Law Enforcement and Administration of Justice pointed out

> "The importance of having complete and timely information about crimes and offenders available at the right place and right time has been demonstrated throughout... this report."[6]

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[6] The President's Commission on Law Enforcement and Administration of Justice, op. cit., p. 26.

As shown in Figure 2, at each stage of the law enforcement and criminal justice process, decisions are required from various authorities who must rely on the accuracy and sufficiency of the called information:

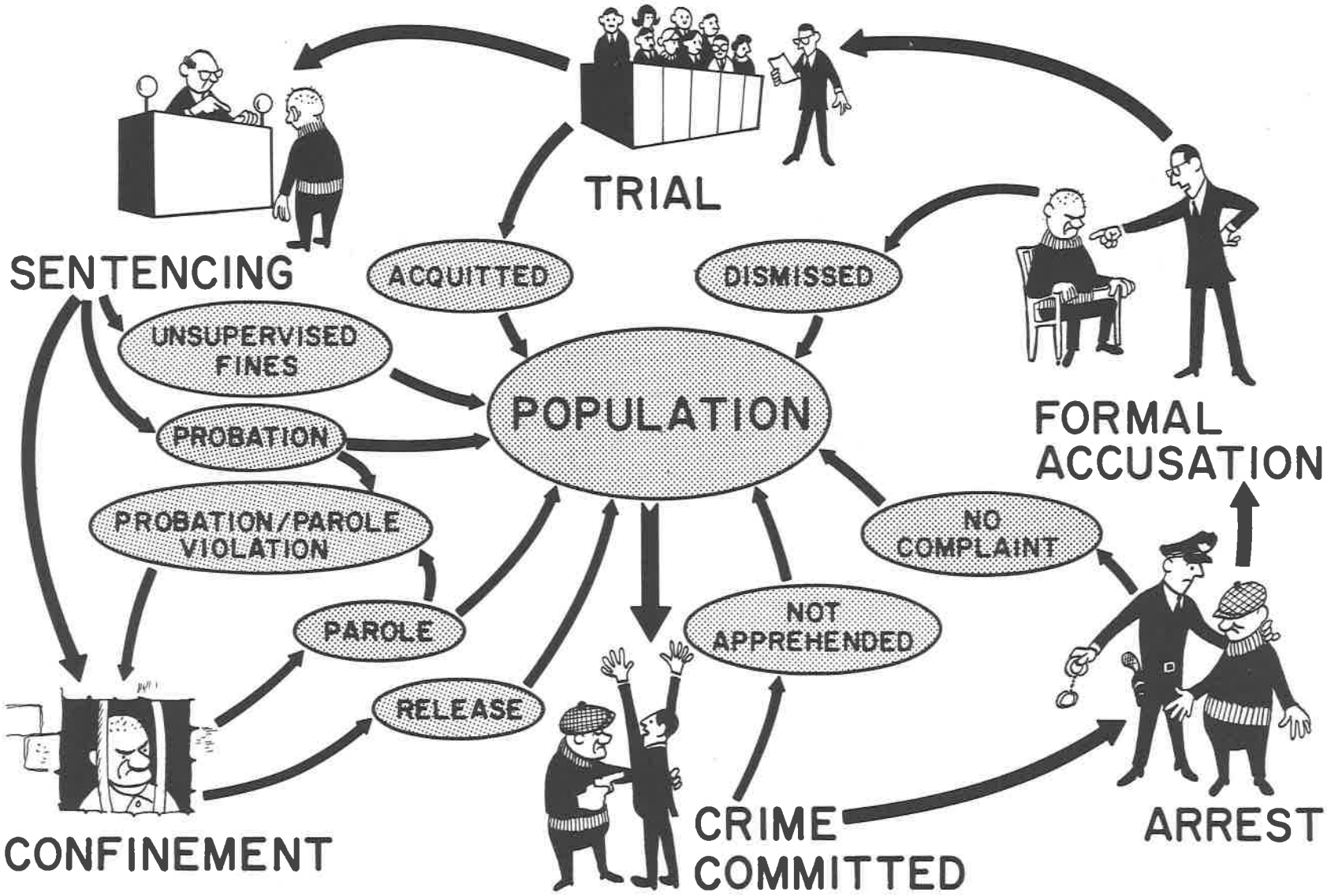
- The police officer must decide whether he has probable cause to arrest the suspect;
- The prosecutor must decide whether he has enough evidence to make a formal accusation and whether he should prosecute on the arrested or a lesser charge;
- Magistrates must decide whether to bind the defendant over to trial, whether to release him on his own recognizance, grant bail, or detain him in jail, pending trial;
- The prosecuting and defense attorneys must decide on trial arguments and strategy;
- Jurors must decide on credibility of evidence and questions of fact;
- Judges must decide on questions of law and determine sentences;
- Probation and parole officers must decide on post-trial and post-release recommendations, respectively.

The existing effectiveness of each of these steps in the law enforcement and criminal justice process can be evaluated by considering annual statistics

FIGURE 2

DECISION STAGES IN THE

LAW ENFORCEMENT AND CRIMINAL JUSTICE PROCESS



on serious crimes reported to the Federal Bureau of Investigation and their disposition illustrated in Figure 3. These Uniform Crime Reports show that for the almost three million crimes reported, only one arrest is made for each four crimes reported and only one court disposition is made for each four arrests. For the total process, only a single jail probation, or prison sentence is given for each seventeen crimes reported. Comparable statistics are still being collected by the Governor's Committee on Law and Order, but we believe that a similar funneling effect will be observed.

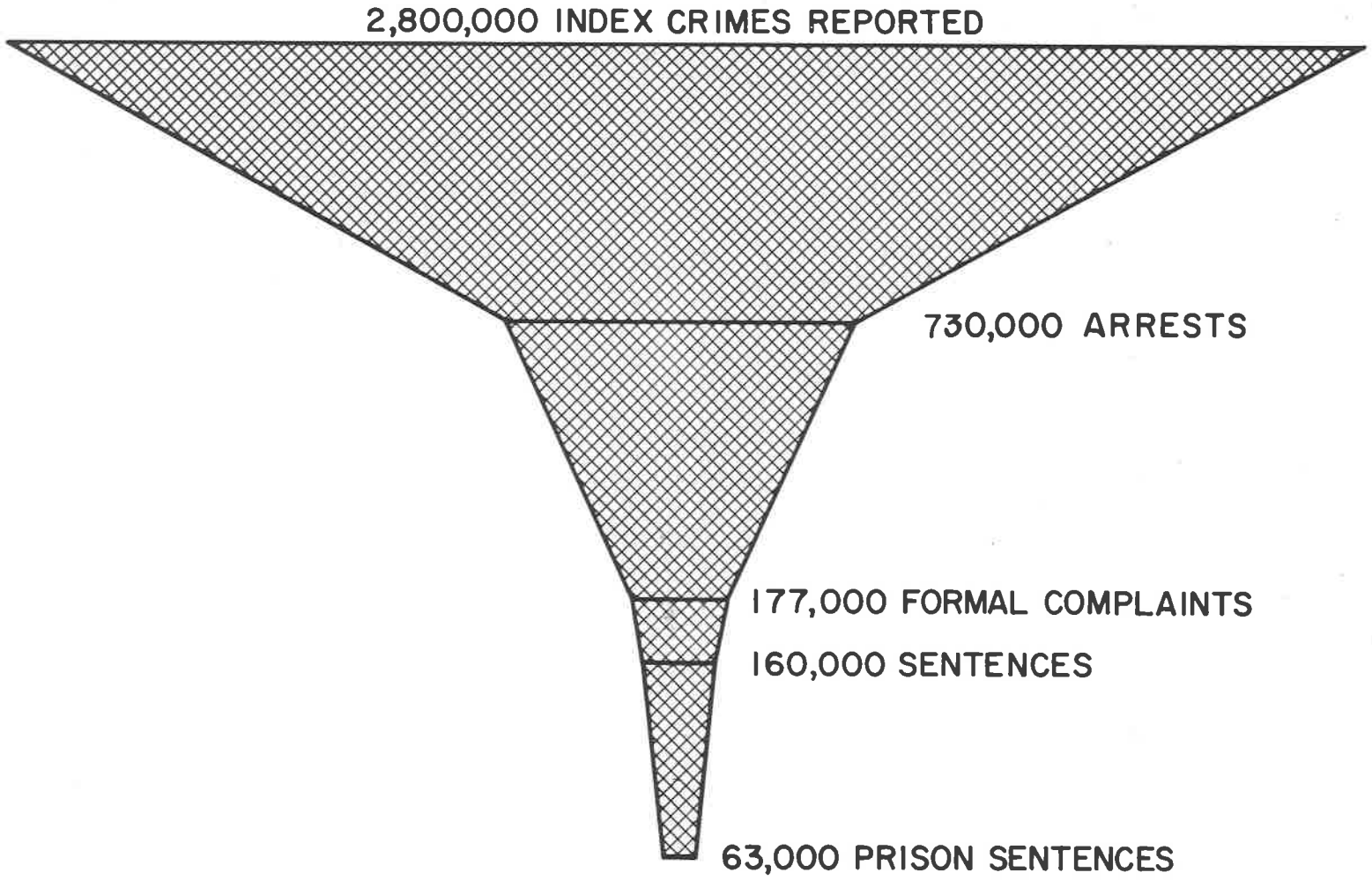
In order to make law enforcement and criminal justice decisions more effective, the individuals operating our agencies of police, courts, corrections, probation, and parole must be supplied with timely and accurate information about crimes, about suspects, about known criminals, and about the instruments of crime.

For example, with timely information a police officer in Winston-Salem could know that he should hold an arrested shoplifter for having committed armed robbery in Raleigh. A law enforcement officer in Macon County could know that the car he stopped for speeding was stolen a half-hour earlier in Jackson County. The three television sets found in the possession of a burglar arrested in Wilmington could be returned if their owners' names were known.

With timely information, case clearance rates--which reflect the percentage of solved crimes out of the total offenses known to the police--could

FIGURE 3

CRIME REPORTS, ARRESTS, COMPLAINTS, SENTENCES, PRISON SENTENCES: THE FUNNEL EFFECT



SOURCE: PRESIDENT'S COMMISSION ON LAW ENFORCEMENT AND ADMINISTRATION OF JUSTICE, TASK FORCE REPORT, SCIENCE AND TECHNOLOGY, U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C., 1967

be improved. At the present time considerable variation exists in the percentage of solutions achieved for different classes of crime, as shown in Figure 4. Currently, police are able to solve a higher percentage of crimes of violence, because generally the victim is likely either to have been acquainted with the offender or is able to identify him.[7] On the other hand, if the offense is one of theft or other property crimes in which the police can identify the offender only by investigation or apprehension during the act, then they are able to clear a much smaller percentage of the cases. In crimes of this category, the victims are less often acquainted with the offender than in the case of personal crimes. Information about the "modus operandi" of known criminals and the correlation among crime reports and criminal data is sorely needed to improve investigative effectiveness.

North Carolina law enforcement is similar to most other states in that we do not have one central filing system for the collection and dissemination of various types of records pertaining to crime and criminals. Local law enforcement in our State is the responsibility of some 375 municipal police forces and 100 sheriffs' departments. At the State level, no fewer

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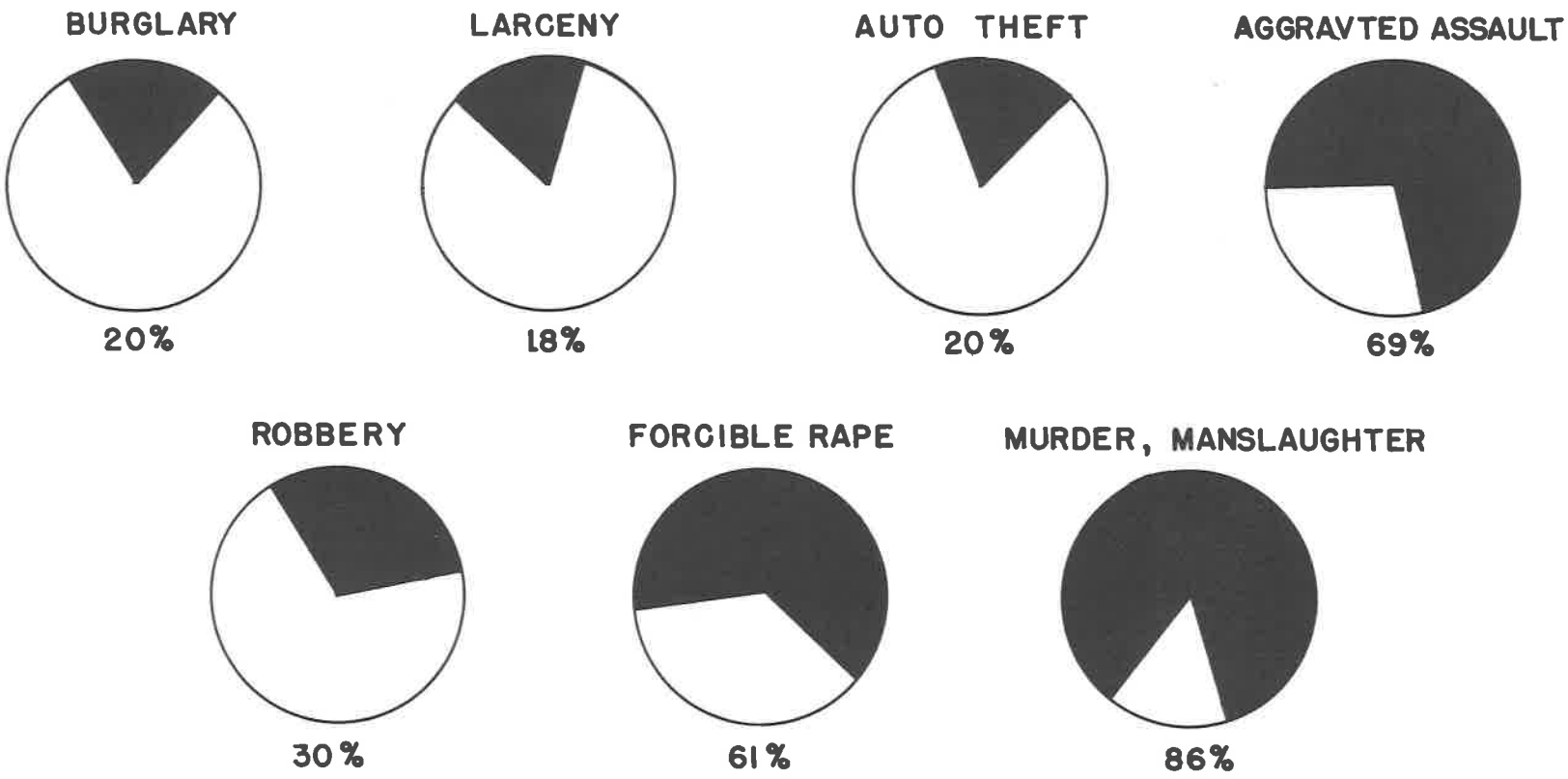
[7] According to the Uniform Crime Reports and studies conducted for the President's Commission on Law Enforcement and Administration of Justice, about 70 percent of all wilful killings, nearly two-thirds of all aggravated assaults, and more than one-half of all forcible rapes are committed by family members, friends, or other persons previously known to their victims. Among serious crimes of violence against the person only robbery usually does not involve a prior victim-offender relationship.

FIGURE 4

TYPICAL CRIME CLEARANCE RATES

FIGURE 4
TYPICAL CRIME CLEARANCE RATES



SOURCE: FEDERAL BUREAU OF INVESTIGATION, CRIME IN THE UNITED STATES, UNIFORM CRIME REPORTS, U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C., 1967.

than fourteen different agencies are involved in one phase or another of law enforcement, court, probation, correctional, and parole operations.

While law enforcement in the State is fragmented, the criminal is more mobile than ever before. In this day and time, when nearly every adult and most juveniles over sixteen have access to automobiles, it is easy for the criminal to travel out of his home area to commit a crime. Furthermore, a fleeing fugitive can travel large distances in a short period of time, with a total disregard for jurisdictional boundaries. F. B. I. studies have shown that over 60% of the repeaters charged with serious crimes were re-arrested in two or more states during the past four years.

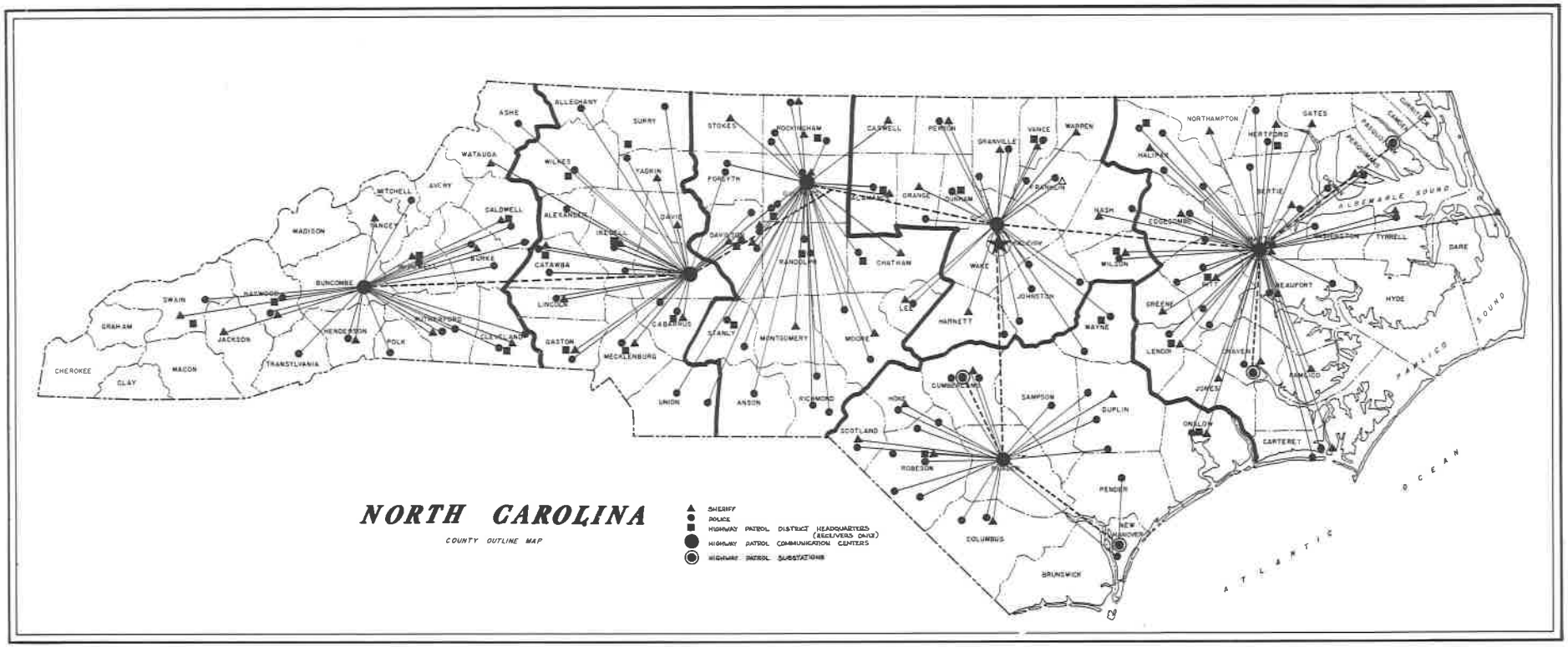
This means that law enforcement must keep pace with the increased mobility of the criminal. This is only possible if information can be communicated from one law enforcement jurisdiction to another at a faster rate of speed than the criminal can travel. For this to be the case, North Carolina requires a coordinated, statewide system for rapidly communicating law enforcement and criminal justice information. Such a system does not now exist.

As a result of the inadequacies of our existing de-centralized manual information systems, our law enforcement officers frequently find that they have released someone arrested on a minor charge only to discover that he was wanted for more serious offenses in one or more neighboring jurisdictions. It is now totally impractical to use existing facilities to check each driver of a

car stopped for a traffic violation and each arrested person or suspect against the individual files of all law enforcement agencies, even those that are nearby. Presently, the only means law enforcement agencies have for communicating with one another are public telephone and telegraph systems and radio network of the State Highway Patrol. Although the Highway Patrol's voice network, shown in Figure 5, is now the primary means of law enforcement communications, local law enforcement agencies in eight counties cannot be reached with this service. Furthermore, the heavy use of this communications system means that trained and able Highway Patrol Officers must, in effect, act as telephone operators relaying messages across the State. Obviously, this is an obsolete and inefficient method for our law enforcement officials to handle criminal information.

FIGURE 5

MAP SHOWING STATE HIGHWAY PATROL COMMUNICATIONS NETWORK



2. THE SOLUTION--THE POLICE INFORMATION NETWORK

Although the problems posed by totally inadequate statewide communications and lack of timely and complete information flow among law enforcement agencies were apparent to the Governor's Committee, the solution was not obvious. There are numerous technological possibilities for improving communications and information processing, and a determination had to be made of which of these would effectively and economically serve the purposes of law enforcement and criminal justice in our State.

Past experience has shown that no communications network should simply be duplicated with new equipment and demonstrated that no information system should simply put into a computer the data which is now being collected in existing reports and files. Instead, the basis for design of an integrated communications and information system should be a re-examination of the utility of the information currently transferred and recorded, a consideration of other items, and, by careful judgment, analysis, and experiment, a determination of what information is most important. Once a prototype installation is operating, evaluation of its performance will help highlight the critical information that should be kept and made available and the operational value in doing so.

Experience in other applications has also shown that in a new field it is more important to implement information systems by stages to gain practical experience and understanding in operating them, using the initial

installations to aid in the design of the following stages. Therefore, our design philosophy has been one aimed at the implementation of PIN in a program of phased growth, based on a compromise among the factors of user needs for information, availability of the needed data, and the maximum use of existing data processing and communications systems to provide for economical development of the system.

In order to decide what information files should be included in the PIN system and the order in which these should be implemented for computer retrieval, we have performed four brief studies. First, we have analyzed the functions and activities of the agencies of police, courts, corrections, probation, and parole in the State to determine their information needs. Second, we have surveyed the needs of the largest group of initial users of PIN, namely the police and sheriffs' agencies to determine their preferences and requirements. Third, we have examined the availability and status (with respect to machine retrieval) of the information items which were determined to be candidates for inclusion in PIN. Fourth, we have investigated the existing systems of data processing and communications in the State to determine the available facilities upon which a PIN system might be superimposed to provide for economical and swift implementation. Finally, based on these studies, we have recommended a program for PIN development in three phases.

2.1 What Information Will Be Included in PIN?

By relating agency activities with information generated and referenced in the law enforcement and criminal justice process, we have been able to identify the principal common information needs of the various agencies of police, courts, probation, corrections, and parole and their requirements on the allowable time for responding to an inquiry. This information has been collected and is displayed in Table 1. In addition, this tabular arrangement reflects the agency and activity which initiates the information.

On the basis of these considerations, we recommend that the following types of information be included in the PIN System in North Carolina:

- Criminal Identification Directory[8] and File--name and address index, aliases, personal appearance, fingerprints, directory of formal contacts with law enforcement and criminal justice agencies, including a directory index to probation, incarceration, and parole histories and an index to juvenile records and files;

- Repetitive Offender Registry[9]--name index, "modus operandi", criminal associates, personal history, such as education, employment, military service;

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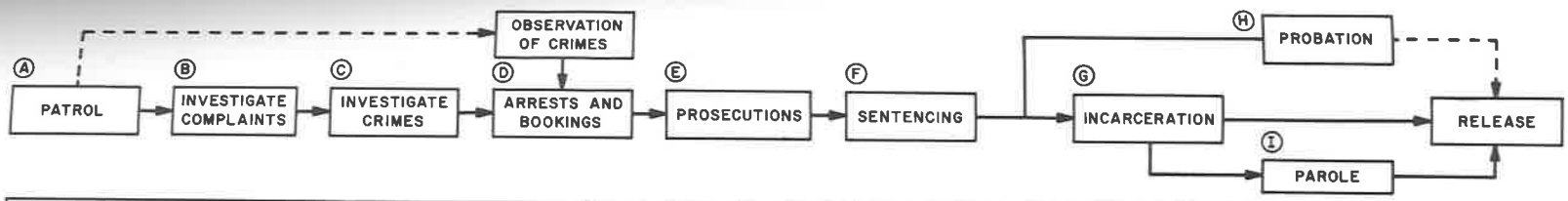
[8] Records of persons with no recent arrests could be placed in a more secure file accessible only for investigation of the most serious crimes by designated individuals. Policy decisions would have to be made on the minimum duration since the last contact with a law enforcement of criminal justice agency that would warrant transferring the records to the secure file; this time would depend on the types of crimes committed and the extent of the record.

[9] Ibid.

TABLE 1

PIN INFORMATION REQUIREMENTS



	LAW ENFORCEMENT				PROSECUTOR SOLICITOR	COURTS	PROBATION		CORRECTIONS		PAROLE
	Ⓑ Ⓒ IDENTIFICATION OF SUSPECTS	Ⓐ Ⓑ Ⓒ INTERROGATION OF SUSPECTS	Ⓐ Ⓑ Ⓒ REQUIREMENT FOR DATA ABOUT SUSPECTS	Ⓓ ARREST & BOOKING	Ⓔ RECORD CHECK ON WITNESSES	Ⓕ CONVICTION INVOLVING VEHICLE	Ⓕ PRESENTENCE INVESTIGATION	Ⓗ SUPERVISION MONITORING OF L.E. CONTACTS	Ⓖ RECEPTION GUIDANCE CENTER	Ⓘ PAROLE HEARING	Ⓘ SUPERVISION MONITORING OF L.E. CONTACTS
WARRANTS, WANTS, MISSING PERSONS STOLEN PROPERTY*	• INTELLIGENCE • MODUS OPERANDI • PERSONAL APPEARANCE • CRIMINAL ASSOCIATES • INVESTIGATIVE FILES	• WANTED STATUS • OFFENSE TYPE	• ORIGINATING AGENCY • OFFENSE TYPE • AKA	• ORIGINATING AGENCY • WARRANT • BAIL AMOUNT	• WARRANT STATUS • OFFENSE TYPE			• ORIGINATING AGENCY • OFFENSE TYPE			• ORIGINATING AGENCY • OFFENSE TYPE
ARREST DISPOSITIONS		• PREVIOUS FELONY TYPES • DANGEROUS BEHAVIOR	• AKA • DESCRIPTION • PREVIOUS ARRESTS & CONV. • BEHAVIOR • INTELLIGENCE	• PREVIOUS ARRESTS & CONVICTIONS • INTELLIGENCE	• PREVIOUS ARRESTS & CONVICTIONS • INTELLIGENCE		• PREVIOUS ARRESTS & CONVICTIONS • BEHAVIOR • INTELLIGENCE	• NOTICE OF ARREST • AGENCY • CHARGE	• PREVIOUS ARRESTS & CONVICTIONS • BEHAVIOR	• PREVIOUS ARRESTS & CONVICTIONS • BEHAVIOR • INTELLIGENCE	• NOTICE OF ARREST • AGENCY • CHARGE
PROBATION CORRECTIONS PAROLE RECORDS		• STATUS	• STATUS • RESPONSIBLE AGENCY • PERSONAL HISTORY	• STATUS • RESPONSIBLE AGENCY • TERMS	• STATUS		• FAMILY HISTORY • PERSONAL HISTORY		• FAMILY HISTORY • PERSONAL HISTORY	• FAMILY HISTORY • PERSONAL HISTORY	
DMV INTERFACE		• AUTO. MAKE LICENSE NO.	• TOTAL REGISTRATION DATA			• DRIVING RECORD		• NOTICE OF VIOLATION			• NOTICE OF VIOLATION
ANALYSES OF CRIME AND CRIMINAL DATA	• CRIME PATTERN AND CORRELATION REPORTS**						• DIAGNOSTIC PREDICTION		• DIAGNOSTIC PREDICTION	• DIAGNOSTIC PREDICTION	
RESPONSE TIME	30 MIN	15 SEC	30 MIN	30 MIN	15 SEC	15 SEC	24 HR	30 MIN	24 HR	24 HR	30 MIN

* ALSO REQUIRED FOR RETURN OF PROPERTY

** USED MAINLY IN PREVENTIVE ACTIVITIES, SUCH AS THE ALLOCATION OF PATROL FORCES

- Special Intelligence Files, e.g., sex and narcotics offenders;
- Wanted and Missing Persons File--name index, personal description, access to other files;
- Outstanding Warrant File;
- Crime Reports, Arrest Reports, Warrant Report, Disposition Report;
- Stolen Vehicle File--identification and status;
- Stolen Identifiable (Non-Vehicular) Property File--identification and status;
- Identification and Status File of the instruments of crime, such as stolen weapons, narcotics;
- Notice of Inquiry Activity File;
- Access to Motor Vehicle Registration;
- Access to Driver History;
- Ballistics Characteristics and "Trademarks" File;
- Analytical Studies--Crime Pattern Studies, correlation of wanted persons, crime, arrest, and field interview reports, etc.

2.2 What Are The Priorities for Implementation?

To determine the order in which the above categories of information should be included in the PIN System, we have undertaken a questionnaire survey of the local police and county sheriffs' departments in the State and the State Highway Patrol. At the present time replies have been received from all Highway Patrol Troops, approximately 32% of the sheriffs' departments and 33% of the local police departments[10] covering all high crime areas and representing geographic distribution throughout the State. Thus, we believe that these responses are a sufficiently representative sample to serve as a basis for system design.

Based on the results of this survey, we believe that the primary role of PIN will be "on-line" or "real time" applications, that is, those applications where information is required within a matter of minutes. For example, a sheriff or police officer may need to know whether an individual or vehicle is wanted somewhere else in the State; if the information is not forthcoming within one to five minutes, it may be too late--the criminal will have escaped, the vehicle vanished.

The primary categories of information for which a fast response is required are those describing wanted and missing persons and stolen property.

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[10] Responses are still being received and processed; between the time of preparation of this report and the present, replies have been received from approximately 60% of the local police and sheriffs' departments.

On the basis of the survey we can anticipate over 8,700 inquiries per day distributed among the different types of information as follows:

Type of Inquiry	Percent of PIN Inquiries
Motor Vehicle Registration	20.0
Driver's License	14.0
Wanted Person	8.0
Stolen Property	5.0
Warrants	11.0
Stolen Vehicles	12.5
Parole/Probation History[11]	5.0
Vehicle Registration (parking violation)[12]	15.5
Message-Switching (communications with other agencies in categories other than those above)	9.0

However, on the basis of experience with the planned versus actual use of all other law enforcement information systems,[13] the above estimates should be quadrupled or quintupled. This means that we can anticipate between 34,800 and 43,500 inquiries per day at the end of two years of operation. In addition,

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[11] Court and correctional officials who would probably make the greatest use of these files were not included in the survey. The reason that the needs for these types of data were not explored more fully is that the construction of master identification and repetitive offender files poses some difficult technical and policy issues which will forestall their immediate implementation.

[12] This category of information was separated from other vehicle registration inquiries since it would be of lower priority.

[13] The California and New York inquiry systems which provide immediate access to stolen automobile files; the Police Information Systems of Alameda County, California and St. Louis, Missouri which provide on-line information on wanted persons and stolen property; and the National Crime Information Center (NCIC) of the F.B.I. which provides immediate access to stolen auto, stolen property, and wanted persons information (in certain categories) nationally.

the percentage of use by information category will doubtless change from that shown above, since the availability of essentially new capabilities will alter police operating procedures.

Based on the survey responses, we anticipate that the following rates of use by different user categories:

Type User	Percent of Projected PIN Use
8 Major Metropolitan Areas[14]	19
Highway Patrol	13
Other Police and Sheriffs' Departments	68

2.3 What Are the Information Sources?

The primary sources for the types of information discussed above which will be included in the PIN System are at the State level: in the Department of Motor Vehicles, the Department of Corrections, and the State Bureau of Investigation (SBI).

Detailed driver history and vehicle registration data is available through a computer-based, remote access, "real time" system already in operation at the Department of Motor Vehicles. The computer-based files contain approximately six million records, accessible within seconds from terminals at various remote locations of the DMV. In addition, remote terminals are already installed in several city police departments and will be switched to PIN use.

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[14]Asheville, Charlotte, Durham, Fayetteville, Greensboro-High Point, Raleigh, Wilmington, Winston-Salem.

Data on every licensed driver in North Carolina includes name, address, physical description, and complete driving history back to 1955. Data on every registered vehicle includes name and address of owner, license plate number, title number, and vehicle identification data.

A computer-based Inmate Records File is currently in operation at the Department of Corrections. The file contains data on every person who has served a prison sentence in a State institution, including personal identification, sentencing data, complete prison history, and dates of any paroles. The data is used primarily for prison administration, but is updated daily and will be essential in implementing the criminal identification and repetitive offender files for PIN. However, Probation Commission data is not included in this correctional data system because all probation records are confidential under present law (G. S. 15-207). Nevertheless, some elements of the probation information will also be essential in implementing the criminal identification and repetitive offender files for PIN.

The SBI receives reports from each clerk of court in North Carolina concerning the disposition of each criminal case. In addition, the Bureau maintains five confidential punched-card files for internal use: a "modus operandi" file, a stolen property file, a personal description file, an intelligence file, and records of SBI investigations from 1939.

The information available from these primary sources is summarized in Table 2. Possible sources for other required data must be the subject of

further study and should be carried in conjunction with the establishment of a system of uniform crime reporting.

TABLE 2

PRIMARY STATE GOVERNMENT SOURCES OF AVAILABLE DATA FOR PIN

Type of Information	Medium	Approx. No. of Records	Agency
Driver History	Computer	3 million	Motor Vehicles
Vehicle Registration	Computer	3 million	Motor Vehicles
Active Prisoners	Computer	10,000[b]	Corrections
Parolees	Computer	3,500	Corrections
Escapees	Computer	1,000	Corrections
Inactive Inmate Records	Computer	11,000[b]	Corrections
Modus Operandi[a]	Punched Cards	--[c]	SBI
Stolen Property[a]	Punched Cards	3,000	SBI
Personal Description[a]	Punched Cards	50,000	SBI
Intelligence[a]	Punched Cards	5,000	SBI
Investigative Records[a]	Punched Cards	80,000	SBI
Active Probationers[a]	Manual Files	20,000	Probation

[a]Data is confidential.

[b]The growth of inmate records is at the rate of approximately 8,000-10,000 per year.

[c]File is in developmental stage.

2.4 What Existing Communications and Data Processing Facilities are Available?

There are five major data-processing facilities in State government. Two of these facilities, the State Highway Commission and the Department of Revenue, receive heavy use as a tool in highway planning and design and in

the maintenance of tax records and need not be considered in relation to PIN since no excess capacity is available.

Central Data Processing (CDP), in the Department of Administration, functions as a service bureau for those State agencies which do not have their own data processing facilities. It has been involved primarily with administrative applications in such areas as State employee payroll, welfare, retirement, and public instruction. In addition, a legislative bill-drafting system and a bill-status system currently are in use.

The Department of Motor Vehicles, as mentioned above, is currently operating an IBM 360 Model 40 with a core of 256,000 bytes, four 2321 Data Cells, one 2314 disc file, and one 2701 Line Control Unit. This system, in addition to performing the administrative tasks of the Department (which includes in-house video terminals), also supports remote teletypewriter terminals. Their experience and hardware configuration is very similar to that required for PIN operation.

The State Department of Corrections operates its inmate records system and other administrative applications on an IBM 360 Model 30. This system would in no way be supplanted by PIN since it is used primarily for purposes of Department management and inmate control. Rather, some of this information should be accessible (through the criminal identification directory and the repetitive offender registry) by PIN users who have an appropriate need to know.

Telephone, telegraph, radio, and microwave communications are available to governmental agencies in North Carolina, but on a fragmented basis.

Telephone service is operated by Southern Bell, twenty-eight independent telephone companies and several non-regulated companies. The State leases several WATS (Wide Area Telephone System) lines and utilizes government TELPAK[15] service (furnished by General Service Administration in Washington) between many of the major population areas. Although some of the existing TELPAK circuits are utilized to capacity, it will be possible to obtain the channels required for PIN either by loading existing circuits or by requesting new ones where existing lines are fully utilized.[16] The only statewide teletype network is the Civil Defense net.

There is no inter-agency coordination of all voice radio frequencies in North Carolina. Frequencies are assigned by the Federal Communications Commission, as a matter of policy, for use in specific services, such as police, fire, and highway maintenance in the Public Safety Radio Service frequencies, and, in practice, largely on the basis of individual agency applications. Such

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[15]Pricing method for discounting telephone service over a given route to large-volume users; the physical routing of the service is irrelevant to the price determination.

[16]Source: Mr. Frank Leatherman, State Communications Officer, in a meeting on March 4, 1969.

sharing as may exist, for example in the State Highway Patrol Voice Network, is a result of voluntary cooperative arrangements rather than a coherent overall policy.[17] As a result of these piecemeal assignment practices, all of the available (assigned) frequencies have been committed and although many are under-utilized, unused allocated frequencies are not available.

The State Highway Commission operates a statewide radio net, utilizing four low-band frequencies; it is utilized exclusively for highway maintenance and interfaces with the Highway Patrol through cross-monitoring of frequencies. In addition, the Wildlife Commission and the Forestry Department also maintain mobile radio networks to serve their own operations.

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[17] Various groups, such as the President's Commission on Law Enforcement and Administration of Justice, have urged that the FCC by rule establish a policy of assigning Public Service Radio Frequencies only to local government and not identified by user and not assigned directly to users, such as police or fire departments. The rationale is that there are two very different and very significant gains to be made by the designing of large-scale communications networks for police and public safety use as opposed to individual networks for each small user and small municipality. The advantages in scale, or more simply the advantages that derive from the more efficient and more even loading of the channels among users of the same kind in a large network are not available to a small network. The second feature is that gross differences in user habits provide advantages to all concerned. Thus, schoolbus frequencies and some highway maintenance frequencies are available for police and fire use in evenings, weekends, and during emergencies. With no increase in the number of radio channels, communication system users can get superior service if they pool their spectrum resources into a multichannel system. The outstanding example, of course, is the telephone industry which gets good channel loading and provides superior service because of the large number of users who share a common system.

The State Highway Patrol operates the only 24-hour statewide communications network in North Carolina, mentioned in Section 1 above. In addition to unmanned stations, it consists of ten manually-operated voice stations, seven of which are manned around the clock. Communication between these base stations occurs via point-to-point voice relay from one station to the next. Since it is the only such system available, it is utilized by many local law enforcement units as a focal point for inter-jurisdictional communications; Highway Patrol stations, therefore, spend a substantial amount of time relaying messages from one local unit to another. This is accomplished via a pair-wise cross-monitoring of frequencies between the Highway Patrol base station and each of the individual local law enforcement units.[18]

By September 1969, the Highway Patrol, in conjunction with the State educational television program, expects to have partially implemented a Statewide microwave system.

The important fact about these existing communications facilities insofar as PIN development is concerned is that none of them offer message-switching (communications) capability.

2.5 Proposed Phases of PIN Development

Based on the investigations summarized above, the Governor's Committee on Law and Order, with the cooperation of the North Carolina Police

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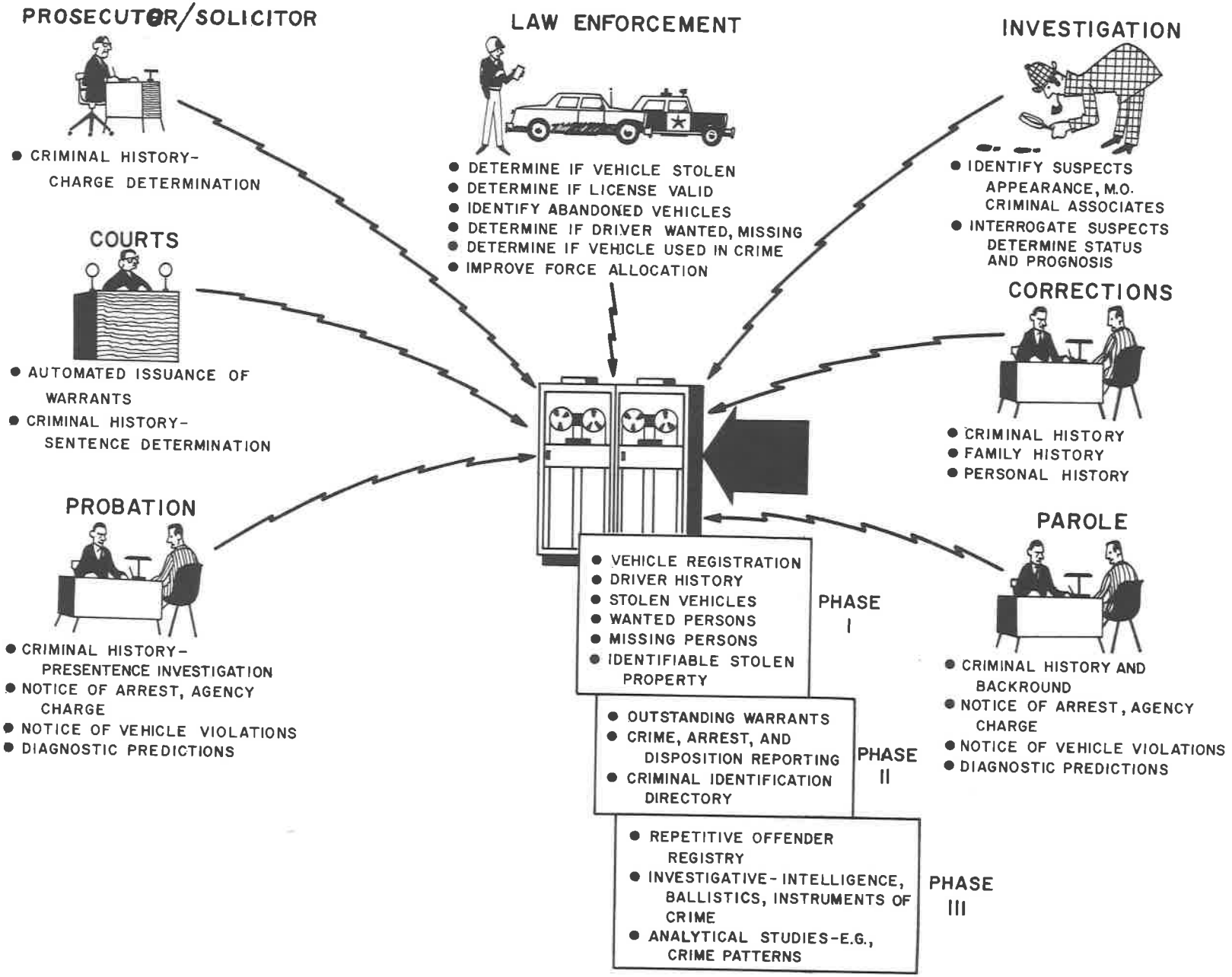
[18] About 50 cities and counties are tied into the network by the inter-system police radio net in which an assigned frequency of the Highway Patrol is shared with these users by means of selective calling.

Executives' Association, the North Carolina Sheriffs' Association, and all State law enforcement agencies, has developed the computerized Police Information Network (PIN) concept. This PIN System will provide a modern, efficient law enforcement communications system for the State. It will provide the police officer on the street with greatly needed information concerning stolen vehicles and property and wanted and missing persons. In time, it will become the repository of all law enforcement and criminal justice information as outlined. How this can be efficiently and economically achieved is described below.

The heart of the proposed Police Information Network will be a large-scale electronic computer capable of storing millions of characters of information which can be retrieved in seconds. All responsible State and local law enforcement agencies throughout North Carolina will have an opportunity to have access to the information contained in the computer. Each participating agency will have in its communications center a telecommunications terminal unit connected directly into the computer by a telephone line. The operator of each terminal will have the capability of accessing the computer for the immeidate retrieval of criminal information, as illustrated in Figure 6. He will also have the corresponding responsibility of entering relevant criminal information directly into the computer. At the same time, personal privacy will be protected by restricting access to items of information determined to be sensitive.

FIGURE 6

PROPOSED PIN FUNCTIONS



In accordance with the results of our studies, we recommend that PIN be developed in three phases or stages. Phase I should strive for early implementation of a modest system to provide actual operating experience upon which to base further system growth. Phase II should result in an orderly expansion of the initial system, adding both additional data files, additional terminals, and limited message-switching capability. Finally, Phase III should envision a statewide, coordinated message-switching system for uniform reporting and analysis of criminal justice data. These three phases are discussed more fully in the following paragraphs.

The initial Phase I PIN System should make available already existing or readily obtainable information to areas of maximum crime density. In this phase, police and sheriff's departments in smaller communities and counties will connect into PIN via the State Highway Patrol Voice Network or by telephone in order to make inquiries into the files and receive rapid responses. The above data should be made available to law enforcement and criminal justice personnel in the major metropolitan areas, which account for one-half to two-thirds of the State's criminal activity, and in State law enforcement agencies. Accordingly, vehicle registration, driver history and stolen vehicle files should be extended to the additional terminal locations designated for Phase I. Access to the FBI's National Crime Information Center should be available through one terminal located in a facility with 24-hours per day, 7 days per week operation. During Phase I the major activity will consist of detailed planning for Phases II and III. This will include conversion of existing computer

files (SBI files, Corrections files, Wanted Persons file, Missing Persons file, and Identifiable Stolen Property file) in order to facilitate their interface with the comprehensive system of Phase II, equipment acquisition and installation, and site preparation.

During Phase II, the initial system should be augmented by including a file of outstanding warrants on individuals and the initiation of a criminal identification directory and file[18] indexed by name which would access probation, corrections, and parole histories. Concomitantly, additional areas of the State should be brought into PIN. Phase II also should initiate a statewide system of crime, arrest, and disposition reporting and a limited amount of message-switching.

Phase III should include the following: the implementation of a repetitive offender registry incorporating modus operandi[19] data, information on criminal associates, and other items of personal history; the implementation of investigative files, such as special intelligence files, files on the identification and status of the instruments of crime, ballistics characteristics and trademarks, etc.; and analytical studies, such as crime pattern analysis and

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[18] Since research is still under way to determine the optimum method of implementing personal appearance data for computer retrieval for law enforcement purposes, this information may not be included in the Phase II implementation of the criminal identification directory and file.

[19] Questions concerning the content and organization of modus operandi files are still being researched; hence implementation of a computer retrieval capability for this type of information will be deferred until Phase III.

the correlation of wanted persons, crime, arrest, and field interview reports. In addition, all law enforcement and criminal justice agencies should be tied into PIN, and a statewide message capability should be provided.

Needless to say, all phases of PIN must include policies and procedures to improve file security and controlled file access in order to insure that only authorized persons will be able to obtain certain types of data.

A summary of the proposed PIN development is shown in Table 3 and illustrated details of the PIN System organization and administration are presented in the next section.

TABLE 3

PROPOSED PIN FILE DEVELOPMENT

Phase	File/Report	Available to
Phase I	Driver History Motor Vehicle Registration Stolen Vehicle Identification Conversion of Wanted Persons Missing Persons Identifiable Stolen Property Conversion of existing SBI Punch Card Files Intelligence Investigative Records Personal Appearance Conversion of existing Correctional Files Active Prisoners Parolees Escapees	8 Major Metropolitan Areas 6 Highway Patrol Substations Department of Corrections SBI and Division of Criminal Statistics in Department of Justice (jointly)
Phase II Limited Message-Switching	Access to Wanted Persons Missing Persons Identifiable Stolen Property SBI Files Correctional Files Outstanding Warrants Crime, Arrest, Disposition Reporting Criminal Identification Directory and File Name Index & Aliases & AKA Personal Appearance[a] Fingerprints[b] Record of formal contacts with law enforcement & criminal justice agencies, including access to Probation, Corrections, & Parole Histories	Other Areas of Significant Crime Activity

Table 3. Proposed Pin File Development (continued)

Phase	File/Report	Available to
Phase III Statewide Message-Switching	Repetitive Offender Registry Name Index Modus Operandi[a] Criminal Associates Personal History Special Intelligence Investigative - e.g., Ballistics characteristics & Trademarks, Identification & Status of Instruments of Crime, etc. Analytical Studies, e.g., Crime Pattern Reports	All law enforcement and criminal justice agencies

[a]To be implemented in Phase III if relevant research is completed; otherwise, when the research is finished.

[b]To be implemented when automated retrieval of fingerprints is economically feasible which is unlikely before the completion of Phase III. However, provision for facsimile transmission of fingerprints among law enforcement agencies in the State should be considered for the Phase III PIN implementation.

3. ORGANIZATION AND ADMINISTRATION OF PIN

The Police Information Network, like every other operational system, must have a place in the line organization of the State government. The location of PIN as an entity within the organizational structure of the State of North Carolina has been the subject of careful consideration by the Governor's Committee on Law and Order.

To the maximum extent possible, PIN must be located to avoid disruption of existing organizational lines. Because PIN should complement rather than supplant existing law enforcement services, it should be positioned so that it can achieve the maximum cooperation from existing law enforcement groups.

The establishment of PIN at the highest level of authority; i.e., reporting directly to the Governor, would appear to offer the greatest advantage for rapid development. However, this top location in the organization of State government would result in the most severe realignment of inter-governmental reporting relationships. It would also mean that PIN might be considered as an unwelcome auditor of local operations.

A second alternative location is within an existing data-processing operation. At this organizational level it is unlikely that PIN could become an effective law enforcement tool; PIN would present neither strength nor threat. Only marginal improvements would occur in the State's law enforcement system. This location would present no challenge to the existing hierarchy and PIN could easily be ignored.

Based on the foregoing considerations, we believe that organizational location of PIN within the Department of Justice offers the greatest chance for long-term survival and growth. While this position would not give PIN the advantages of reporting to the Governor in attempting to gather information, it would result in fewer changes in organizational relationships. It is also more likely to attract the cooperation of the various law enforcement agencies in the State than location in an existing data processing operation.

Section 114-10 of the General Statutes of North Carolina provides for a Division of Criminal Statistics within the Department of Justice. Such a Division would be the best organizational home for PIN. Accordingly, we recommend that the provisions of GS 114-10 be implemented, by activating the Division of Criminal Statistics within the Department of Justice.

ARTICLE 3.

Division of Criminal Statistics.

§ 114-10. Division of Criminal Statistics.--The Attorney General shall set up in the Department of Justice a division to be designated as the Division of Criminal Statistics. There shall be assigned to this Division by the Attorney General duties as follows:

(1) To collect and correlate information in criminal law administration, including crimes committed, arrests made, dispositions on preliminary hearings, prosecutions, convictions, acquittals, punishment, appeals, together with the age, race, and sex of the offender, and such other information concerning crime and criminals as may appear significant or helpful. To correlate such information with the operations of agencies and instiutions charged with the supervision of offenders on probation, in penal and correctional institutions, on parole and pardon, so as to show the volume, variety and tendencies of crime and criminals and the workings of successive links in the machinery set up for the administration of the criminal law in connection with the arrests, trial, punishment, probation, prison parole and pardon of all criminals in North Carolina.

(2) To make scientific study, analysis and comparison from the information so collected and correlated with similar information gathered by federal agencies, and to provide the Governor and the General Assembly with the information so collected biennially, or more often if required by the Governor.

(3) To perform all the duties heretofore imposed by law upon the Attorney General with respect to criminal statistics.

(4) To perform such other duties as may be from time to time prescribed by the Attorney General. (1939, c. 315, s. 2; 1955, c. 1257, ss. 1, 2.)

§ 114-11. Courts and officials thereof to furnish statistical data.--All courts, officers and officials thereof, shall furnish all statistical data with respect to such courts as is hereinbefore mentioned, such information to be furnished on forms provided by the Attorney General, and to be furnished at such time or times as may be required by the Attorney General. Any clerk or officer of any court in the State of North Carolina who shall willfully fail or refuse to furnish such statistical data, after demand therefore has been made by the Attorney General, shall be subject to be amerced, upon motion of the Attorney General, in the sum of two hundred dollars ($200.00) in the Superior Court of the county in which such officer resides. (1939, c. 315, s. 4.)

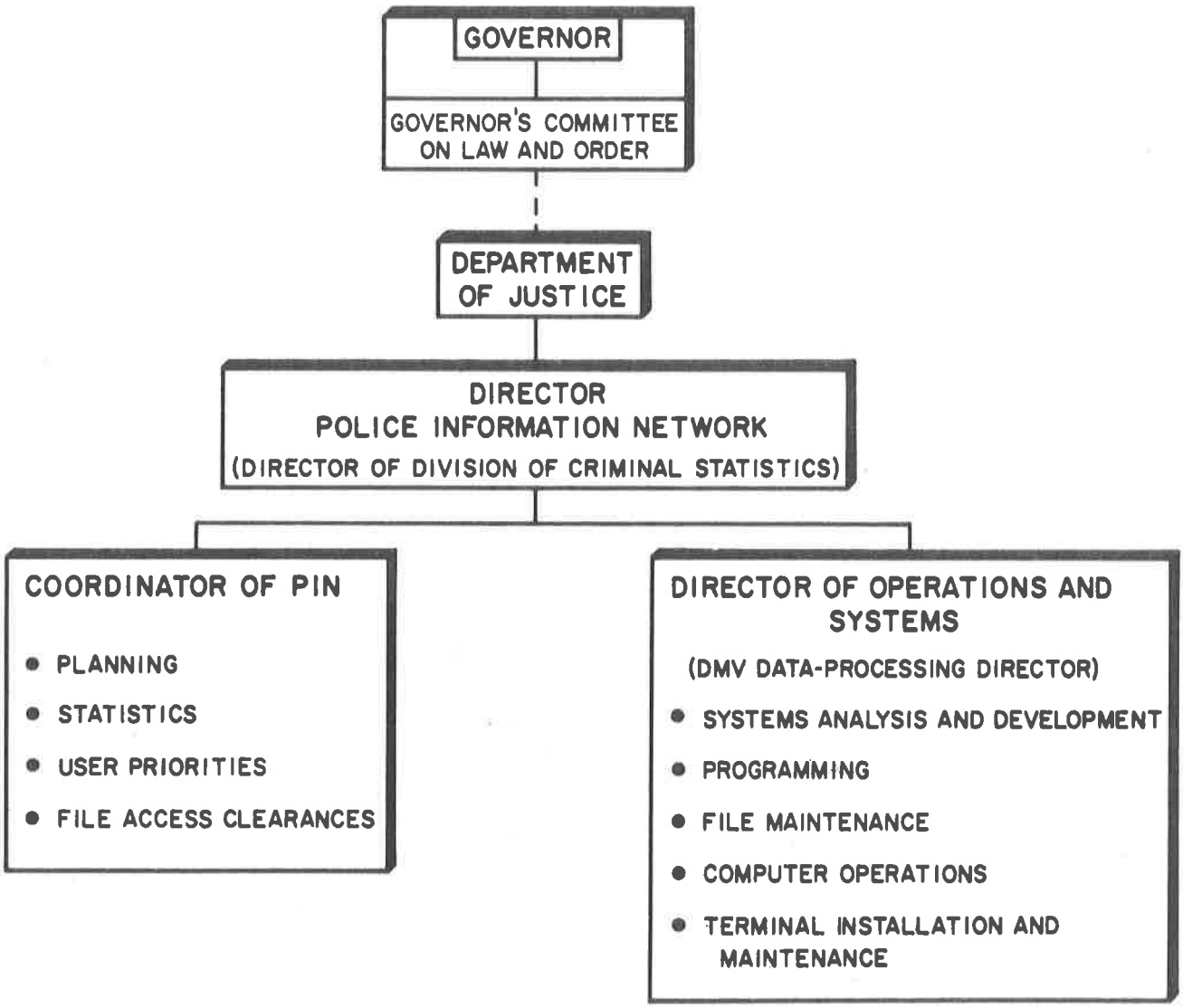
The proposed organization of responsibilities for implementing and operating PIN is shown in Figure 7.

Because PIN is designed to serve all law enforcement and criminal justice agencies in North Carolina, including State, county, and local organizations, we believe that overall PIN policies should reflect the views of as broadly representative a group as possible. Since the Governor's Committee on Law and Order is broadly representative of law enforcement interests throughout the State and has taken the lead in PIN planning, we recommend that the Governor's Committee on Law and Order, acting on behalf of the Governor, serve as a policy advisory committee to PIN.

Administrative responsibility for planning, design, implementation, and operation of PIN, with the advice of the Governor's Committee on Law and Order, should be vested in a line (operating) State agency. As recommended above, this should be a Division of Criminal Statistics, which should be activated within the Department of Justice. We also recommend that the Director of this new Division should serve also as Director of PIN so that responsibility for the collection, analysis, and dissemination of criminal information will be vested in one individual.

We further recommend that the day-to-day activities of PIN be carried out by two principal deputies: a coordinator of PIN and a Director of Operations and Systems. The Coordinator, serving in the Department of Justice, should have the responsibility for the functional development

FIGURE 7
PROPOSED ORGANIZATION OF PIN RESPONSIBILITIES



of PIN, including long- and short-range PIN planning, based on a continuing survey of user requirements and the collection and analysis of criminal statistics. Establishment of user priorities for terminal installation and system use and the determination of file access and purging policies and clearance procedures will be the responsibility of the PIN Director, advised by the Governor's Committee on Law and Order.

The Director of Operations and Systems should have responsibility for technical system development and operation, including terminal installation and maintenance, file maintenance, and computer operations.

We recommend that the services of the Director of Operations and Systems and his staff be purchased by PIN from the Data Processing Division (DPD) of the Department of Motor Vehicles, with the DPD Director serving also as the PIN Director of Operations and Systems.

DPD is recommended for this service based on the following criteria:

1. The DPD staff has had extensive operating experience with sophisticated on-line, real-time computer-based information systems, and, therefore, can offer the required services with a maximum of "learning."
2. The required services can be furnished by DPD with a minimum of disturbance to its on-going operations.
3. The motor vehicle system already designed and implemented by DPD will comprise more than 90% of the initial PIN System.

We further recommend that the services of DPD should be furnished under a contract from the Department of Justice to the Department of Motor Vehicles. This will give the Department of Justice not only the overall responsibility for PIN, but also the maximum control over its operations. To accomplish this, the PIN should be separately budgeted, with appropriate funds transferred by the Department of Justice to the DMV to cover the costs of services performed under the above mentioned contract.

4 PIN SYSTEM CONFIGURATION

4.1 Hardware

The three major hardware components of PIN will be the computer system, the terminals, and the telephone lines linking the terminals with the computer.[20] These are discussed in the following paragraphs.

4.1.1 Computer System

More than 90% of the proposed Phase I file content is already accessible through the Motor Vehicles system. Therefore, and inasmuch as the DMV staff will furnish technical services to PIN, it is logical that most of the remaining data required for PIN be stored in the DMV computer system, and we so recommend. However, we wish to emphasize the physical storage in the DMV computers does not mean access to PIN by users of the DMV system. Access to PIN information must be separately controlled for sensitive items in each file in order to safeguard the security of confidential information. Techniques for accomplishing this controlled access through computer programming are already well-known and have been used extensively by military agencies.

We therefore recommend that the existing SBI punched card files be stored in the DMV computer; that the DMV Vehicle Registration File be

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[20] For purposes of cost estimating and scheduling, it will be assumed that this additional hardware is of the same manufacturer as the existing system. During the detailed system design by the PIN staff, equipment of other manufacturers can be considered; the principal requirement, whatever hardware is selected, is compatibility with the overall DMV operation.

modified to identify stolen vehicles;[21] and that the SBI personal description file be modified to identify wanted or missing persons. We further recommend that the various inmate files remain in the Department of Corrections' computer system; however, this computer system should be interfaced with the PIN (DMV) computer through appropriate addition of hardware and control software. In addition, the data and services added during Phases II and III should be implemented on the DMV computer system. This proposed PIN configuration is illustrated in Figure 8.

The use of the DMV computer system (with appropriate transfer of PIN funds to cover the increased system costs) will result in substantial savings in hardware costs, lead time, and personnel and operating costs over those achieved using any other computer system.

4.1.2 Terminals

We recommend that terminals for Phase I of PIN will be located in the major metropolitan areas, as discussed above. Since the Highway Patrol base stations serve as focal points for local communications, we recommend that terminals also be installed in such base stations manned around-the-clock. We further recommend additional terminals be installed in each immediately participating State agency. This will result in a Phase I PIN configuration of 16 terminals, as shown in Table 4.

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[21] In addition, a small, separate stolen vehicle file may be maintained to respond to inquiries.

FIGURE 8

PROPOSED PIN CONFIGURATION

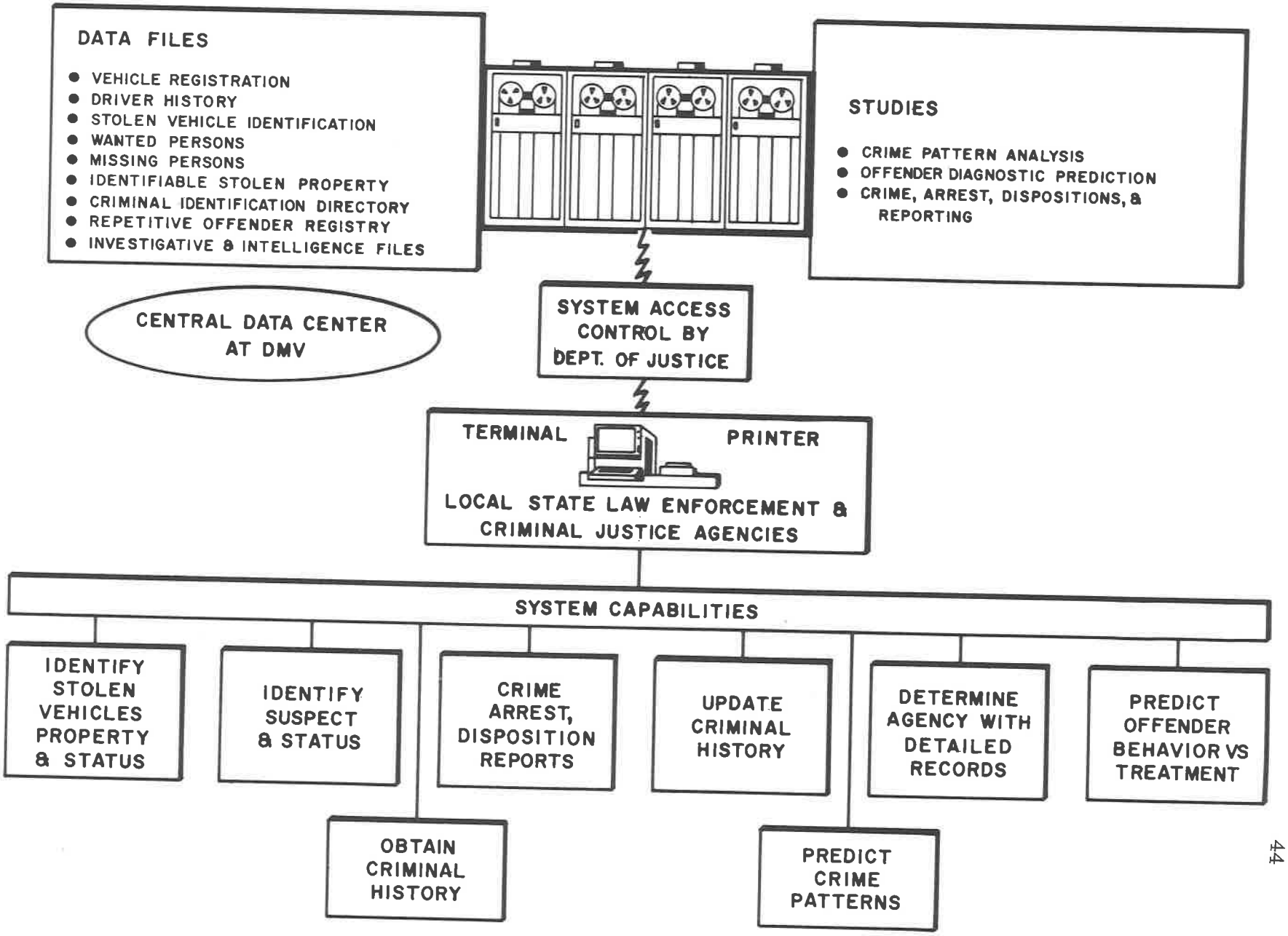

TABLE 4

SUGGESTED TERMINAL LOCATIONS FOR PIN, PHASE I

City Police Departments - 8

Asheville
Charlotte
Durham
Fayetteville
Greensboro-High Point
Raleigh (Communications Headquarters)
Wilmington
Winston-Salem

Highway Patrol Base Stations - 6

Williamston
Elizabethtown
Raleigh
Greensboro
Salisbury
Asheville

State Agencies (Raleigh) - 2

Division of Criminal Statistics, Department of Justice and SBI
Department of Corrections

The limitations of PIN Phase I to 16 terminals will permit the DMV computer system to handle Phase I PIN without upgrading its Model 2701 Line Control Unit, and without adding additional core storage (which would require a step-up to a 360 Model 50 computer). The limited available computer core storage, however, will require the use of buffered IBM 2740 Model 2 terminals at all locations, to avoid the necessity for additional line control programming.

During Phase II, terminals should be installed in all County Sheriff's Offices within SMSA's,[22] in other State agencies (such as the Board of Paroles and the Probation Commission), in clerk of court offices, and in other communities having significant crime rates. During Phase III, all criminal justice units and other State agencies with law enforcement responsibilities[23] in North Carolina should interface with PIN.

Phases II and III will require that the DMV computer be stepped up by adding a Model 2040 Central Processor and two Model 2702 Line Control Units as described in Section 4.1.4 below. At this point, terminals may be selected on the basis of cost and volume of use; low-volume locations (less than two hours use per day) may adequately interface with PIN via a low-cost non-beffered terminal (such as the Model 33 ASR Teletypewriter Terminals, whereas heavier users will require Model 35 ASR Teletypewriter Terminals.

4.1.3 Lines

A number of alternative line configurations are possible for PIN. For example, the lines may be dedicated or dial-up; shared or private; circuit-switched or message-switched; and low-speed or high-speed.

Police and law enforcement officials have an understandable preference for dedicated, 24-hour-a-day lines. Dial-up service has the severe disadvantage of being subject to the overall telephone load and is more easily disrupted

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[22] Standard Metropolitan Statistical Area.

[23] For example, the Adjutant General (National Guard), Civil Defense Headquarters, Wildlife Commission, ABC Board, Governor's Committee on Law and Order.

during times of civil emergency (for example, during hurricanes and riots). Dedicated line service, on the other hand, is considerably more expensive, except where GSA TELPAK service is available.[24]

To insure availability and continuity of communications during critical situations, it is recommended that dedicated lines be used for the 16 key terminals of PIN Phase I. Additional terminals added during Phases II and III should have available the choice of low-cost dial-up service or leased line service, depending on costs and the anticipated frequency of terminal use.

The question of shared vs private line service is essentially an economic one, dependent on volume of use, terminal characteristics, and required turn-around time on responding to inquiries. Theoretically, as many as six buffered terminals (such as the IBM 2740 Model 2) can operate simultaneously, full-speed on a single shared telephone line, with no loss of turn-around time. Non-buffered terminals, by way of contrast, seize and hold the line for longer periods of time, resulting in frequent waiting times during periods of heavy use. However, this problem can be circumvented by using cheap, dedicated GSA

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[24] TELPAK is a pricing technique used by the common carriers to provide lower-price line service to large users. The General Service Administration (GSA) of the United States Government passes these reduced TELPAK rates on to Federal, State, and local governmental units and their instrumentalities.

TELPAK circuits where available and by multiplexing[25] where GSA TELPAK is not available or the lines required are long (e. g., over 120 mi.) to obtain several telegraph-grade communication lines from a single voice-grade telephone line; each heavy PIN user can be assigned to his own private channel while light users can share channels, using a selector device which will address all messages and insure that each user receives only the replies to his own inquiries.

The Phase I PIN must share its four available lines among the 16 proposed terminals without imposing a requirement for additional core storage on the existing DMV computer. For this reason, it is essential that buffered terminals be utilized for Phase I. As mentioned before, Phases II and III should offer alternative levels of service for different classes of users, based on load studies undertaken during the Phase I PIN implementation.

Low-speed vs high-speed service is a function of volume of use and type of terminals. Low-speed telegraph grade service (150 Baud)[26] more

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[25] Multiplexing is the derivation of many low-speed telegraph-grade channels (of 150 Hertz bandwidth) from one high-speed voice-grade channel (of 3 kilo Hertz bandwidth), using one of several alternative techniques. In practice, the number of low-grade channels that can be so derived can be greater than simple division would indicate through the use of appropriate technology. However, it should be noted that the common camers are restric by their tariff conditions to deriving no more than four telegraph-grade chann from a voice-grade telephone line, whereas use of a multiplexer leased from another source would permit obtaining eight to eighteen telegraph-grade channels from such a line. Similar considerations apply to multiplexing of higher speed lines.

[26] 110 Baud lines suffice for Model 33 and 35 ASR (Automatic Send and Receive) TTY (Teletypewriter) terminal units and 180 Baud lines suffice for the IBM Model 2740 terminal unit.

than suffices for non-computer interaction through typewriter-type terminals. However, man-computer interaction, through video display terminals and computer-to-computer data transfer requires higher-speed service for maximum efficiency (2400 Baud). Because of the demonstrated needs in law enforcement for a written record of all messages transmitted and received, especially when they are to be used as a basis for arrest and warrant issuance, we do not recommend the use of non-teletypewriter terminal units, such as video displays.[27] Hence, low-speed (150 Baud) service will suffice during all phases. However, maximum use should be made of lines leased through GSA TELPAK and multiplexing should be employed for long-line runs at GSA TELPAK rates and on non-GSA TELPAK lines in order to reduce line costs.

The most difficult question is the switching technique to be employed. The message transmission function envisioned for Phases II and III can operate either by circuit-switching or by message-switching. In circuit-switching, a

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[27] The one principal advantage video displays have over teletypewriter terminals in law enforcement applications is the capability for rapid, human-aided file search. They can be used, for example, to call up rapidly and sequentially the records of individuals with similarly spelled names and personal descriptions so that the operator can select the desired record. However, this is achieved at the expense of paying for high-speed telephone lines. (In theory, a teletypewriter could receive data and print at the same speed given transmission over high-speed communication links, but page printing devices of comparable speed are not yet sufficiently reliable and economical.) In general, we believe that the need for documentation outweighs the advantages of speed and although video display units exist which can provide copies of displayed data, their cost is believed unjustifiable for PIN at the present time. In addition, the quality of the presentation on video displays is not now accurate enough for fingerprint identification, and facsimile transmission devices must be employed for this application. Thus, we foresee that teletypewriter devices will be supplemented with facsimile, rather than video, equipment.

complete message path is established from the originator to the receiver, as in a normal telephone system, before the transmission of a message begins. In message-switching, a complete message is transmitted from the originator to some point in the network where the message is temporarily stored and then forwarded when a suitable message path is open; thus, message-switching is called a "store-and-forward" operation.

Both switching techniques have been used commercially for many years. Telephone systems are typical examples of circuit-switched systems, and telegraph networks typify message-switched systems.

The PIN design objectives of information and communication present conflicting design objectives insofar as switching technique is concerned. The information-query capability is most economically implemented through a relatively limited number of terminals of relatively high volume-of-use, accessible by local users via voice contact (radio or telephone) with the terminal operator. This type of terminal configuration lends itself best to circuit-switching techniques. On the other hand, the design objective of message transmission requires a very large number of terminals, many with low utilization; these are best interconnected by means of a message-switched (store-and-forward) computer-assisted network.

The resulting PIN design is of necessity a compromise. The message communications initiated in Phase II will have the terminals circuit-switched to the central computer; the central computer will act in a store-and-forward

mode. As the message system expands in Phase III many of the low-volume users brought into PIN can be interfaced through regional store-and-forward centers.[28] Such centers should be implemented if the total line and computer costs can be reduced through their use.

In summary, it is recommended that the network for PIN Phase I consist of four shared, dedicated, 600-Baud telephone lines; Phase II should offer several alternatives to accommodate different classes of users; and in Phase III message-switching service should utilize regional store-and-forward centers to minimize the communications workload on the central computer.

4.1.4 DVM Computer System Modifications

Since the existing DMV computer file devices (data cells) cannot be expected to service the increased inquiry volume of Phase II, it will be necessary to install a more reliable and efficient array of file storage devices during Phase I as follows:

A. On October 1, 1969, replace one existing data cell drive with one 2314 disk drive to house the driver license history file.

B. On December 1, 1969, replace three data cell drives with four 2314 disk drives to house the vehicle registration and stolen vehicle files.

By January, 1970, the larger portion of the computer software development for PIN will have been accomplished by the DMV staff; the conversion of

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[28] The cost of two such centers would run to $24,000 per year for message-switching computer equipment and can be absorbed in the projected Phase III costs, provided they are located where 24 hours per day, 7 days per week staff is available and trainable to operate the relatively simple data processing devices.

Corrections, SBI, wanted persons, missing persons and stolen property files will be nearing completion. In the early months of Phase II, the PIN dedicated central processor with all necessary line control units and switching units should be installed. At that point, all of the above-mentioned files will constitute the PIN data base. The number of terminals can be expanded at that time to whatever limit is desirable (even beyond the planned 50, should the demand justify this expansion).

It is recommended that this hardware expansion be included as an integral part of Phases I and II. Phase II PIN, then, will include: the addition of a central processor (Model 2040) to the DMV computer to operate in tandem with the present processor and the replacement of the present Model 2701 line control by two Model 2702's. The replacement of the data cells by faster Model 2314 disc files will have been accomplished during the latter part of Phase I. During Phase II, programs will be adapted to permit the alternative use of non-IBM terminals (such as the Model 33 and 35 ASR Teletypewriter Terminals) for low-volume users, as discussed above. In addition, multiplexing of voice-grade telephone lines will also be used as justified economically.

During Phase III, the number of terminals will increase to two hundred or more. In order to free the main computer from large-volume message processing, special purpose computers may be utilized for message-switching; these might be located regionally, as discussed above.

4.2 Operating Procedures

The complete operating procedures of PIN cannot be spelled out prior to the detailed system design. However, the most important requirement is for a set of communications priorities. The military services discovered through unfortunate experience that the time an information and communications system is needed most--during a crisis--is precisely the time it is most likely to break down. During a crisis, the communication lines are invariably clogged with tremendous volumes of traffic. If the traditional "first in, first out" operating mode is retained, the system will cease to function.

Therefore, we recommend that a strict system of priorities be developed for terminal access, line access, and computer access. These priorities can be based on identity of user, purpose and nature of information, and length of message, as well as on a number of other criteria. They must be designed so that top-priority communications can proceed swiftly during even the worst imaginable crisis. The customary procedure is to have multiple levels of priority, with the more-or-less routine traffic relegated to a low priority and with the highest priorities being reserved for civil emergencies.

4.3 Training

One of the most serious problems facing PIN is that of user training. Even the most simple typewriter terminal appears complicated to the

unfamiliar user; it consists of a typewriter keyboard and a number of buttons and switches with strange-sounding names. If, in addition, the user does not know how to type, then terminal operation becomes a serious obstacle to user acceptance.

We, therefore, recommend that each installation of a PIN terminal be accompanied by a two- or three-day training workshop, at the site of the user. The training should include lectures, operating practice, and an opportunity to ask questions. Needless to say, terminal operating procedures must be carefully designed with the ultimate user in mind and should be as simple as possible.

Training should play another role in the orientation of the North Carolina law enforcement community to PIN purposes, functions, and procedures. This can best be accomplished through a series of half-day seminars throughout the State to which local law enforcement and criminal justice officials are invited. Seminar participants should be invited to offer comments and suggestions for improvement of the system concept. We recommend that these seminars be an integral part of Phase I PIN.

5. PIN IMPLEMENTATION PLAN

5.1 Schedule

The proposed schedule for implementing the PIN System is shown in Figure 9. As shown, the Phase I implementation will be completed seven months after the enabling legislation and initial appropriation has been passed and is scheduled from July, 1969 through January, 1970. Phase II will require seventeen months to complete from February, 1970 through June, 1971. Phase III will take three additional years to complete from June, 1971 through June, 1974.

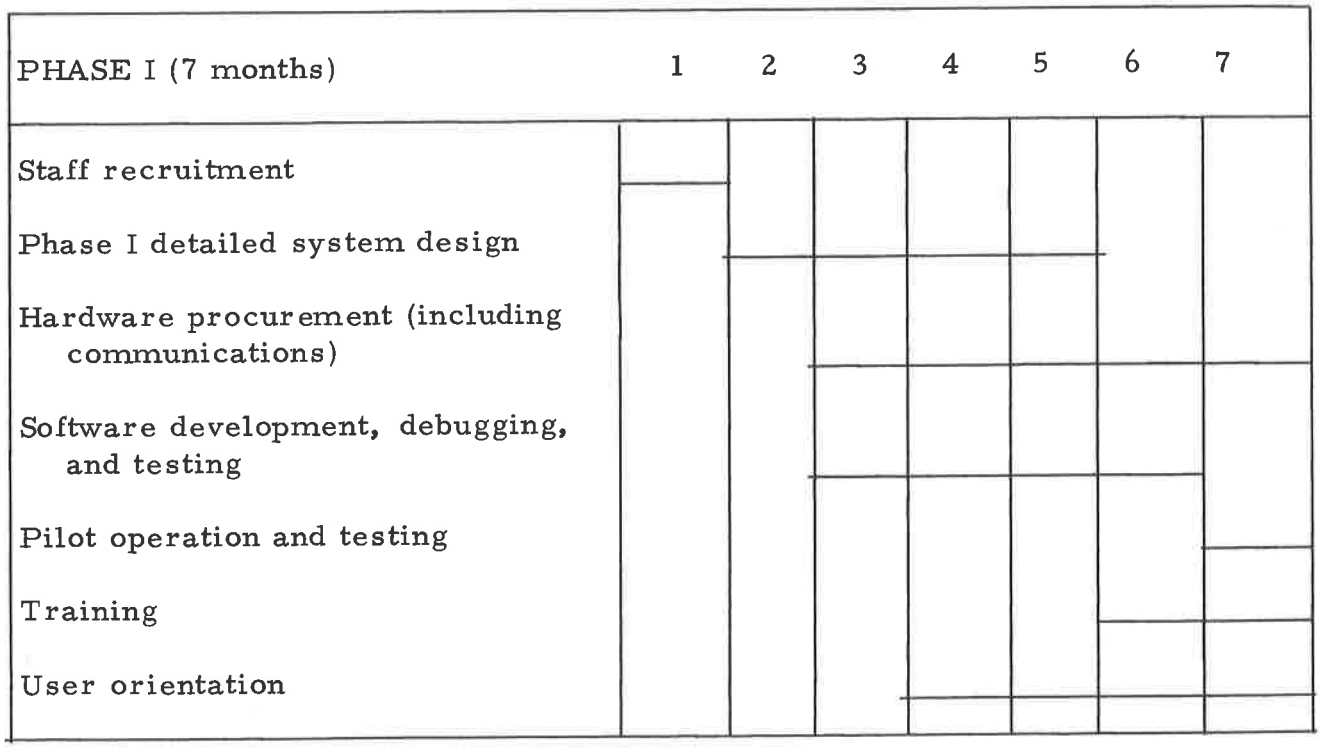
5.2 Estimated Costs and Proposed Budget for the 1969-1971 Biennium

Table 5 shows a proposed budget for the biennium from July, 1969 to July, 1971, and an estimate of the annual expenditure for subsequent years. We strongly recommend that PIN have a single, central budget, administered as part of the Justice Department budget. The funds required by another agency, such as Corrections or Motor Vehicles, should be transferred to the other agency from the central PIN budget under a formal contract for services executed between the Justice Department and the other agency. This will centralize the administration of PIN, avoid misunderstandings, and provide an avenue of recourse in event of impasse.

Since many local areas are unable to afford even a modest PIN terminal costing approximately $1,000 per year, we recommend that the entire cost of the PIN System be borne by the State as a whole through legislative

FIGURE 9

PIN IMPLEMENTATION SCHEDULE



PHASE II - Feb. 1970 thru June 1971 (17 months)

PHASE III - June, 1971 thru June, 1974 (3 years)

appropriation. After all, a fully implemented PIN will benefit the entire State, not merely the localities having remote terminals.

As shown in Table 5, our best estimate of the costs of Phases I and II to be incurred in this biennium is $1,373,215. This includes salaries of the PIN staff, supplies, the transfer of funds to the Department of Motor Vehicles for technical assistance and hardware and software modifications shown in Table 6 and terminal and telephone line costs.

Phase III will require approximately three additional years (from July, 1971 to June, 1974) to implement.

5.3 Personnel and Staffing

The most important priority for PIN implementation is to create a full-time PIN staff in the Department of Justice, as recommended above. During the seven months of Phase I, we believe that the initiation of PIN can be managed by the full-time Director of PIN (also Director of the Division of Criminal Statistics) with the assistance of two secretaries. However when Phase II is undertaken, we recommend that a Coordinator and Budget Officer be added to the PIN staff. We recommend that the Director be an experienced and well-known law enforcement officer who can solicit the cooperation of law enforcement and criminal justice officials in the State and who can manage the difficult task of determining PIN policies and priorities. We recommend that the Coordinator also have some law

enforcement or criminal justice experience as well as a broad knowledge of the capabilities, limitations, and procedures of computer-based information systems (although computer systems expertise is not required since the Director of Operations and Systems in the DMV will have this capability). The Director should be chosen from the standpoint of his capabilities to interface with PIN System users, while the Coordinator should be chosen for his capabilities to interface with the technical staff. The estimated costs of this staff is shown in Table 7.

TABLE 5

PROPOSED BUDGET FOR THE BIENNIUM
FROM JULY, 1969 TO JULY, 1971

POLICE INFORMATION NETWORK

	REQUESTED BUDGET		
	1969-70	1970-71	1969-71
GENERAL FUND APPROPRIATION	$536,510	$836,705	$1,373,215
SUMMARY BY OBJECTS:			
1100 Salaries	38,733	56,284	95,017
1200 Supplies	2,000	3,500	5,500
1900 General Expense	490,940	770,468	1,261,408
2411 Retirement Contributions	3,467	4,765	8,232
2412 Social Security	1,370	1,688	3,058
TOTAL	$536,510	$836,705	$1,373,215
ADMINISTRATION:			
1-1100 Salary - Director	$ 18,000	$ 18,000	$ 36,000
1-1120 Salaries - Staff	20,733	35,244	55,977
1-1170 Merit Salary Increments		3,040	3,040
1-1200 Supplies	2,000	3,500	5,500
1-1960 Contractual Services:			
Department of Motor Vehicles	389,920	569,953	959,872
Department of Correction	33,203	65,815	99,018
Total Contractual Services	423,123	635,768	1,058,891
1-1982 Rental - Equipment	67,817	134,700	202,517
1-2411 Retirement Contribution	3,467	4,765	8,232
1-2412 Social Security Contribution	1,370	1,688	3,058
TOTAL ADMINISTRATION	$536,510	$836,705	$1,373,215
GENERAL FUND APPROPRIATION	$536,510	$836,705	$1,373,215

POLICE INFORMATION NETWORK BUDGET

Justifications:

		1969-70	1970-71	1969-71
1.	Salary - Director	$18,000	$18,000	$36,000

The Police Information Network Director will manage and supervise all aspects of the development and use of PIN. Working with the various lar enforcement agencies involved, he will determine policies for PIN development and installation, priorities for PIN use, and policies for information access, file purging and security. In addition, he will serve as Director of the Division of Criminal Statistics and will be responsible for the collection, analysis and dissemination of information describing crimes, criminals and the administration of criminal justice in the State. In this connection he will prepare and publish reports describing the volume, variety and trends of crime, characteristics and recidivist tendencies of criminals, and the workings of law enforcement and criminal justice in processing crime reports and in the arrest, trial, conviction and disposition of criminals.

2.	Salaries - Staff:				
	Coordinator	(5 mos.)	$ 5,625	$13,500	$19,125
	Accountant II	(5 mos.)	4,740	11,376	16,116
	Steno III		5,556	5,556	11,112
	Steno II		4,812	4,812	9,624
			$20,733	$35,244	$55,977

The Police Information Network Coordinator will be responsible for the functional development of PIN based on a continuing survey of user requirements and crime and criminal information. That is, he will determine file content, inquiry procedures, and the order of implementation for the items and information in each file. He will also make decisions concerning the introduction of new types of information into the PIN files. He will work with the Police Information Network Director to insure that all information required for the maintenance of criminal statistics can be retrieved from the PIN system, and, in addition, he will be responsible for insuring that the technical staff executes the decisions concerning PIN policies and priorities.

3. Merit Salary Increments:

The amount included in this line item will allow for salary increments of 5% in 1970-71. The matching retirement and social security contribution is also included herein. Computation:

	1969-70	1970-71	1969-71
Increments (5% x $53,244)			$ 2,665
Retirement			240
Social Security Contribution			135
Total Merit Salary Increments			$ 3,040

4.	Supplies	$ 2,000	$ 3,500	$ 5,500
5.	Contractual Services:			
	Department of Motor Vehicles:			
	Salaries:			
	Director of Operations and Systems (50%) (11 mos.)	$ 6,325	$ 6,900	$13,225
	Assistant Director (50%) (11 mos.)	5,214	5,688	10,902
	Senior Analyst (11 mos.)	4,972	5,424	10,396
	Senior Programmer (11 mos.)	8,602	9,384	17,986
	4 Computer Operators (11 mos.)	25,828	28,176	54,004
	Total Salaries	$50,941	$55,572	$106,513
	Merit Salary Increments*		3,167	3,167
	Retirement contribution	4,559	4,974	9,533
	Social Security contribution	2,176	2,384	4,560
	Floor Space Renovation (5500 sq. ft. @$15.00)	$82,500		$82,000
	Data Processing Equipment:			
	Additional Equipment: (Oct. 1, '69-Jan. 31, '70)			
	1 IBM Model 2314 disc file @$5410/mo. (4 mos.) $21,640			
	4 IBM Model 2314 disc files @$5410/mo. (2 mos.) 43,280			
	Total Additional Equipment $64,920			

		1969-70	1970-71	1969-71
Less Replaced Equipment:				
4 IBM Model 2321 data cells @$3175				
1 for 4 mos. = $12,700				
3 for 2 mos. = 19,050	$31,750			
Total Additional Equipment less Replaced Equipment	$33,170			
Overtime (20% of base cost) on equipment	6,634	$39,804		$39,804
Additional Equip:				
(Feb. 1, '70) (per mo.)				
1 IBM Model 1925 Switching Unit @$700	$ 700			
2 IBM Model 2702 line control units @$2,000	4,000			
1 IBM Model 2040 Central Processing unit @$12,500	12,500			
1 IBM Model 2911 switching unit @$240	240			
5 IBM Model 2314 disc files for modified driver & vehicle files @$5410	27,050			
½ IBM Model 2314 disc unit for housing additional PIN file @$3200	3,200			
Total Additional Equipment	$47,690			
Less Replaced Equipment:				
4 IBM Model 2321 data cells @$3175	$12,700			
Total Additional Equipment less Replaced Equip.	$34,990			

		1969-70	1970-71	1960-71
Overtime (20% of base cost) on equip.	$ 6,998			
Total Additional Equipment and Overtime cost	$41,988 (5 mos.)	$209,940	$503,856	$713,796
Total - Dept. of Motor Vehicles		$389,920	$569,953	$959,873
*Merit Salary Increments				
Increments (5% x $55,572)			2,779	
Retirement contribution			249	
Social Security contribution			139	
Total Merit Salary Increments			$ 3,167	
Contractual Services:				
Department of Corrections:				
Salaries:				
Senior Programmer		$ 9,384	$ 9,384	$ 18,768
Computer Operator	(5 mos.)	2,935	7,044	9,979
Total Salaries		$ 12,319	$ 16,428	$ 28,747
Merit Salary Increments**			937	937
Retirement contribution		$ 1,103	$ 1,471	$ 2,574
Social Security contribution		516	743	1,259
Data Processing Equipment:				
Additional Equip.: (Feb. 1, '70) (per mo.)				
Additional core storage of 40K @$1650	$1,650			
1 IBM Model 2311 disc drive @$590	590			
1 IBM Selector Channel @$221	221			
1 IBM Model 2701 line control unit @$750	750			
Total additional Equipment	$3,211			

		1969-70	1970-71	1969-71
Overtime (20% of base cost) on equip.	642			
Total Additional Equipment and Overtime Cost	$3,853 (5 mos.)	$ 19,265	$ 46,236	$ 65,501
Total - Dept. of Corrections		33,203	65,815	99,018
Total Contractual Services		$423,123	$635,768	$1,058,891
**Merit Salary Increments				
Increments (5% x $16,428)			$ 822	
Retirement contribution			74	
Social Security contribution			41	
Total Merit Salary Increments			$ 937	
6. Rental - Equipment:				
Terminal Cost:				
16 IBM Model 2740 2 terminals @$206/mo.		6,592		6,592
Lines to connect terminals to computer @$50/terminal/mo.		1,600		1,600
Additional facilities costs for 50 terminals @$35/mo.	(7 mos.)	12,250	21,000	33,250
Additional Costs:				
50 ASR terminals @$139.50/mo./terminal	(5 mos.)	34,875	83,700	118,575
Line & Facilities @$50/mo./terminal		12,500	30,000	42,500
		$ 67,817	$134,700	$202,517
7. Retirement Contribution		$ 3,467	$ 4,765	$ 8,232
Social Security Contribution		1,370	1,688	3,058

The amount in these line items represent matching retirement and social security contributions.