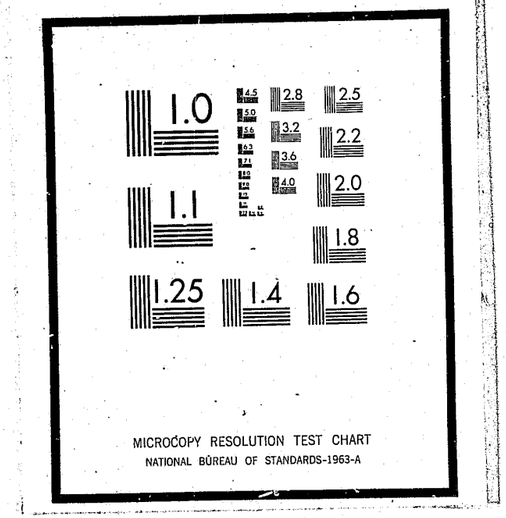

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NEW HAVEN CASE INCIDENT REPORTING SYSTEM

An evaluation of grants A70-93-28 and A70-93-28C for the Connecticut Planning Committee on Criminal Administration

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APPENDICES

Computer technology has been utilized in private industry, especially the aeronautics and space industry, since the early fifties. Because of shortages of money to hire technologists, computer use in law enforcement has lagged far behind its use in industry. The start of the Law Enforcement Assistance Administration (LEAA) in 1968 removed this obstacle for many police departments by providing hundreds of thousands of dollars for computer system development. Since 1968 the use of computer systems for law enforcement activity has grown steadily.

A survey conducted in 1970 found that about 39 percent of the departments sampled used an automated data processing system.[1] For the year 1974 more than 62 percent of the sampled departments planned to employ automated data processing techniques. The sample is somewhat biased since it includes departments too small to efficiently use a data processing system. An examination of responses made by cities of more than 100,000 population provides an even more dramatic picture of the growth of automated systems. According to a International City Manager Association Survey about 70 percent of these departments plan to employ computers by 1974.[2]

This growth in law enforcement computer systems affected the scope of computer use as well as the incidence. Not only are more departments using computers but they are using them to perform an increasing number of functions.[3] In the early sixties those few departments with computer systems used them almost entirely for traffic and crime reporting. The systems were little more than clerical aids. By the late sixties automated systems were being used in an on-line capacity by police field personnel, thereby contributing to the efficiency and safety of patrol personnel. In the early seventies, the potential of the computer as a planning, management and investigative tool has been recognized by a number of departments. Police administrators are in the process of experimenting with various methods of allocating, supervising, and evaluating field personnel utilizing computerized information. Detective bureaus are examining various formats of 'modus operandi', intelligence, and criminal history files to determine the one most efficient for specific types of criminal investigation. This new era in police data systems is by far the most exciting and offers the possibility of even further expansion of computer usage.

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[1] Whisen and Paul M., "Automated Police Information Systems: An Argument for Vertical and Horizontal Integration" The Journal of Criminal Law Criminology and Police Science, Vol. 62, No. 3, pg. 422-425

[2] Colton, Kent W. "The Use of Computers by Police: Patterns of Success and Failure" Proceedings of the International Symposium on Criminal Justice Information and Statistics Systems, October 3-5, 1972, New Orleans, La. pg. 139-166

[3] IBID

The development of police data systems in Connecticut parallels the evolution throughout the nation. In 1968, no police department in the state had an automated data processing capability. Currently, two departments have on-line computer systems and a third has a sophisticated batch operation. In addition to the local systems and the regional usage of these same systems, there are plans for a Connecticut On-Line Law Enforcement Communications and Teleprocessing System (COLLECT) and a Statewide Criminal Justice Information System (SCJIS). The former is a communications and data processing system which includes state and local law enforcement agencies. The latter is primarily an information system which will encompass the courts, corrections, and probation as well as those law enforcement agencies which comprise COLLECT. Studies are being conducted to ensure that the resulting systems are compatible with each other and existing resources at the local level.

The primary impetus for this development has been, of course, the needs and talents of the local and state police departments. The principle source of funds has been the Connecticut Planning Committee on Criminal Administration (CPCCA). From the beginning of fiscal 1969 to the end of fiscal 1972, the planning committee has allocated $668,699 for the construction of police computer systems. In fiscal 1973 about $776,000 has been allocated for the maintenance and construction of automated data systems. Though this expenditure is minimal relative to that of other states and even cities, it is a sizable commitment within the Connecticut State Plan and all indications are that this commitment at both the state and federal level will increase in years to come.

Less than one-half of all information system monies has been allocated to the New Haven Police Case Incident Reporting System under Grants A70-93-28, A70-93-28C and A72-93-28-3. In view of this investment and the increasing need for knowledge for intelligence planning, the CPCCA has selected the above grants as part of its 1972 Evaluation Component. The following evaluation will, therefore, address itself to the New Haven Case Incident Reporting System (CIRS) and to police use of computers.

This study does not emphasize the hardware and software configuration of the New Haven system but their utilization. Most often, systems evaluations expend pages describing and correcting the 'splinter' of mechanical failure while neglecting the 'log' of human inadequacies. Here the typical order will be inverted. Of primary importance is the extent to which the computer system has enabled the New Haven Police Department to more efficiently perform its functions. Software and hardware limitations will be discussed only to the extent that they affect departmental efficiency.

SYSTEM HISTORY

The New Haven Case Incident Reporting System was begun in fall, 1970 in conjunction with the UniRoyal Corporation under a grant (A70-93-28) from the CPCCA. At that time, the heart of the CIRS was a 360/model 40 IBM computer under D.O.S. using 2314 disk drives. This equipment was leased from the UniRoyal Corporation. During this initial period several crucial sub-systems were constructed and "debugged". Of primary importance was the development of a Case Incident Reporting Form. This partially formated form replaced a series of forms previously used and comprised the majority of the input to the system. A CIR form is completed for every incident and inputted into the computer. A quality control system was devised to ensure that the system contained complete and accurate information. In addition, quality control officers could code and input narrative data such as "dangerous offender" notifications. This first stage of development also saw the construction of the several basic files:

1) incident file
2) name file
3) address file
4) geographic file

These files will be discussed in-depth in the description of the current system.

One additional system introduced at this time was the centralized dictating system. This is part of the quality control system of CIRS. As conceived, each patrol officer would dictate his report into a tape machine and the report would be transcribed by secretaries. The intent was to improve the quality of reports in terms of legibility and informational content. Rather than providing more complete reporting, however, this system resulted in less complete reporting. Patrolmen would dictate reports and in the transcription process these reports would be misrepresented.

Patrolmen often misused the recording equipment resulting in incomplete or inaudible tapes. Reports were generally phoned in at the end of the officers' shift thereby overloading the transcribing staff. As a result, reports presented in court would often not be complete and since tapes were erased after transcription it was difficult to discover the source of the error. In view of these difficulties, New Haven Police administrators discontinued this system in all but the detective division where a small number of personnel permitted closer supervision and control (i.e.: quality control was more prompt and efficient).

During this initial period, the CIRS devoted the bulk of its resources into the construction of basic files and the major users were the Traffic Division of the New Haven Police Department and the City of New Haven's Traffic and Parking Division. The Traffic Division used the system primarily for the compilation of statistics for the National

Safety Council Reports that must be submitted monthly and annually. In addition, other clerical tasks and data collection necessitated by outside grant awards (e.g.: HUD, HEW) were performed by the computer. Traffic and Parking received mappings of accidents by intersections and mid-blocks by streets. These maps were used to determine where and what type of traffic engineering improvements could be made to increase traffic safety (e.g.: traffic light). To an extent some police traffic personnel were allocated on the basis of these mappings of accidents and mappings of the service of Uniform Traffic Tickets. A particularly troublesome intersection or street would be observed by city traffic or police personnel to determine if the high incidence of accidents was the result of poor engineering or violations of existing codes. If it was the latter, then mobile traffic units would be assigned to this location as part of their daily routes in order to stiffen enforcement. This application was sporadic, however, and could hardly be termed a regular policy. Generally, police applications of the CIRS were largely clerical and confined to the area of traffic reporting.

The second, and current, stage of systems development is characterized by a more equitable distribution of resources between system construction and maintenance activities. With the basic files and systems constructed not only is more energy required for their upkeep, but more and varied applications are available as well. (i.e., above and beyond traffic work) This expansion caused the New Haven Police Department to terminate its arrangement with UniRoyal Corporation and begin utilizing the newly purchased 360/model 40 IBM computer leased by the City of New Haven. The city computer gave the police department a more economical and dependable system as well as the additional storage capacity required. The exact configurations of this system as it existed at the time of this evaluation are detailed in appendices 1-1C.

The sophisticated organization of men and machines that comprises the CIRS was primarily assembled to improve the record system of the New Haven Police Department. The police, as any organization, thrive on complete and accurate information. Unfortunately, the definition of "complete and accurate" information has often been restricted to that information required by the courts or insurance companies. Even this limited data was often inaccurate. The reason for this restriction in scope and poor quality has not been unwillingness on the part of the police, but limited resources. With the facilities available police record divisions could maintain only the bare minimum required for daily operation. To complete the cycle, police administrators have not been forced to expand or upgrade their records because it was common knowledge that they are inaccessible. The CIRS was designed to interrupt this cycle at every point by increasing the scope, accuracy and accessibility of police information.

A second goal of the CIRS is the regionalization of the system to include Milford, West Haven, Hamden, Wallingford and Meriden. Because of restricted funding, however, only Hamden was included in the final proposal. Regionalization includes the planning and use of hardware, software and human configurations in surrounding towns so that they are compatible with the existing New Haven system.

The improvement of police record systems and regionalization are interim goals in the process of ultimately improving the management and enforcement objectives of the New Haven Police. Management can be described in hundreds of ways but basically it is the planning, supervision and evaluation of money, people and things. Making a budget, maintaining a fleet of vehicles, even promotions in grade all fall within the scope of management. Management's main purpose is to govern the expenditure of resources in a police department to ensure the maximum achievement of enforcement goals. The business of the police department is to enforce the law (i.e., to prevent crime, to apprehend offenders), to assist the citizenry (i.e., provide emergency aid, investigate non-criminal complaints) and to maintain order. The ultimate goal of CIRS then is more efficient enforcement and more informed management.

The goals of CIRS are evolutionary. The enforcement and management capabilities of the New Haven Police Department will be improved to the extent that the informational output of the Records Division is increased. It is essential therefore that the improvement of the New Haven Police records system be treated first, and secondly the effect on the functioning of the police department. Since regionalization efforts have been so restricted they will not be examined in the empirical section of this report but will be addressed in the conclusions.

EVALUATION

The improvement of the New Haven Police Department's record system encompasses the upgrading of input of processing procedures and of output. Input and output can be upgraded in scope, volume and complexity. The system may contain more types of information, more information and information sorted in more varied formats. Improving the processing of information can include more rapid, thorough, and economical transformation of input to output. Rigorous assessment of the change of the police records division in these areas is simply not possible due to the lack of sufficient documentation of conditions prior to the CIRS. As a result, the following discussion of the changes in the record system since CIRS relies heavily on the recollections of participants.

Currently, the New Haven Records Division receives incident reports, accident reports, central complaint bureau cards, warrants and uniform traffic tickets. Previously, the sole source of input was patrol or incident reports. The volume of incident reports has, according to record samples, nearly doubled since the beginning of the CIRS. To be sure, much of this increase is due to more efficient recording of reports, but, nonetheless, it is indicative of some increase in patrol reporting activity.[4] The quality of incident reports has also improved since the introduction of the partially formated CIRS form. The form contains precoded areas listing age, sex, race as well as special status indications

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[4]Wilson, James O., "Dilemmas in Police Administration"

such as the "arrestee dangerous" classification. By providing this minimal format, police records personnel are assured more complete and uniform information from the officers. The officers said this form is also much easier to complete. With the basic information pre-coded the officers claim that they are freer to provide more information in the limited narrative sections of the form.

The increased scope, volume and quality of input to the New Haven Records Division was made possible through certain innovations in the processing of information such as the CIRS Reporting Form which is one example of these innovations and the centralization of records is another. Prior to development of the automated system, each division relied more on its own records than on those kept by the Records Division. Each division catered to its own informational needs and the Records Division served the external publics such as the F.B.I., insurance co., employers etc. The Traffic Division processed and stored all accident reports and traffic tickets. The Detective Division maintained fairly extensive files not only of their own reports, but pertinent incident reports as well. All warrants were stored by those divisions charged with their service and no control record was kept. Currently, all information flows through the records division and is distributed from there. This centralization has tremendously improved the accountability and control of information flows in the department. The administration of warrants, for instance, can be referenced instantaneously through the centralized system. To a certain extent, centralization has also obviated the necessity of maintaining separate divisional files. The detective and youth divisions now keep those records pertaining to cases of immediate concern. All others can be accessed in the Records Division. Since this centralization has not resulted in any significant reduction in storage facilities or clerical staff it seems that separate divisions still maintain their own files to a greater extent than necessary.

A second significant improvement in the processing of information has been the implementation of a quality control mechanism. The quality control function permits the monitoring of the submission and comprehensiveness of reports. Prior to the CIRS it was effectively impossible, or at least impractical, to correlate patrol activity with the submission of incident reports. Computer-aided dispatch enables this correlation. The Central Complaint Bureau cards record information pertaining to incident investigations. These cards are processed and the resulting printout is juxtaposed to all CIRS reports submitted. In this process, quality control officers not only insure the receipt of reports, but also check completeness and even input data contained in the narrative sections of the CIRS Reporting Form. The result has been more complete and accurate police information.

More and more varied input as well as more efficient processing of information are significant only to the extent that they have increased the useful informational output of the New Haven Records Division. As with any system, output justifies those processes antecedent to it. Inadequacies in the preliminary processes will show up in the volume and quality of the output, and without sufficient output, the sufficiency of these processes is immaterial. The introduction of the automated

system has changed both the volume and the nature of information produced by the New Haven Records Division. In the manual system routine output was restricted to desk inquiries and reports to external agencies such as the F.B.I. or the National Safety Council. Both of these functions are largely services for external publics and not intended to improve the performance of the police department 'per se'. To a certain extent detectives used desk inquiries in their investigations. But, this service usually served the needs of employers, insurance companies and other police agencies. Since the development of the CIRS output has increased tremendously and is receiving much more use within the department itself.

In order to determine the magnitude of this change a simulation was conducted employing data on the output of the Records Division before and after the institution of CIRS. The "inquiry" was used as a standard unit of informational output. A single inquiry refers to the location of data in the files, recording the data and disseminating it. Producing the monthly F.B.I. report, for instance, would require one inquiry for each Part 1 crime recorded in that month. This conversion process was conducted for each written report produced on a routine basis. The volume of desk inquiries was estimated by several record division personnel. Using this format, the simulation indicated that output in January, 1973 under the automated system is approximately three times that of a simulated month in 1969.[5] A similar computation performed for the life of the automated system and an equivalent time period under the manual system indicated an overall production increase of 200 percent.[6]

This quantitative increase in production, impressive as it is, neglects the equally important qualitative improvements in output resulting from automation. Since all records prior to the CIRS were referenced just by name, it was extremely difficult to manually sort the data and produce it in a different format. To list all complaints or incident reports in a given month by the patrol car responding to the call would require the full time of one records clerk for one week. With automated processing and standard files such cross referencing is done and subsequently the variety of information formats has greatly increased. Crime, complaint and accident information can be produced in both lists and maps. These particular formats are referenced by time, location, defendant's or suspect's name, name of the officer, patrol car, age, sex, race of participants and virtually any other item of information which is introduced into the system. The significance of these qualitative improvements are more difficult to accurately measure than strict volume of output, but their potential impact on the police department is considerable.

Every improvement has its price, however, and the cost of the Case Incident Reporting System is by no means small. In the two-and-one-quarter

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[5]See Appendix 2

[6]IBID

years that comprise the period under study (November 1970 - January 1973) more than $200,000 in federal funds and $194,633 in local funds have been spent to construct and maintain the CIRS. Additional money has been spent simply to maintain the manual system existing before CIRS. Expenditures have totalled $641,476 for the period November 1970 to January 1973. This is more than double the expenditure for a similar period prior to the CIRS.

Automated systems are obviously more costly to construct, but generally believed to be more economical to maintain. This has not been the case in New Haven. There have been increases and not decreases in the number of staff and no reduction in storage space and equipment. In terms of real or tangible reductions, the CIRS has been more not less costly than a manual records system and there are no tangible reductions in sight.

Within the cost/benefit framework, however, the New Haven system appears in a more favorable light. A comparison of a hypothetical month in 1969 and January 1973 provides some indication of the impact of automation and its relative cost. In 1969, approximately 8,000 bits of information were provided to clients each month at the cost of $9,325. In January 1973 approximately 32,000 bits were made available for $25,291. The cost per bit per month in 1969 was $1.16. The cost in 1973 had dropped to $.767 per bit per month. To produce at '73 levels with the '69 facilities would require $37,541 or about $12,250 more than the monthly cost of the automated system in 1973. To be sure, this is a "paper" saving but it is a faithful projection of cost under a manual system given the present level of production.

This cost/benefit scheme cannot be used to estimate the total savings under the automated system because the relationship between production and expenditures is constantly changing. In the early stages of development the relative cost of information was much higher than that of January 1973. If this same measure was used for the month of October, 1973 the cost per bit of information would be even less than that for January, 1973. Gradually the initial costs of programming and machine purchases become a less and less significant factor in program costs. To simply multiply the savings in January, 1973 would therefore not account for those initial months in which costs were very high and production low.

In order to avoid this faulty extrapolation, a cost/benefit measure was constructed for the entire period under study.[8] During this period 667,900 bits of information were provided by the records division at the cost of $641,476 including $210,000 of federal money. For a

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[7]See Appendices 2 and 2A

[8]See Appendix 2A

similar period, extrapolated from 1969 data, 215,622 data bits were produced for $249,343. To produce the same volume in the manual system would require $774,824. The Case Incident Reporting System therefore has resulted in more than a 200% increase in information production and a "paper" saving of $133,348.

The improvement of the New Haven Police record system is the first goal of the grants in question, but only a means to the ultimate goal of increasing the effectiveness of police management and enforcement. The records system may provide the necessary data, but it must be used in a creative fashion to actually affect policing. The policemen involved must direct the computer technicians in designing the information that they most need. The technician has the knowledge of the machine but the policeman has the familiarity with police work. Only the effective marriage of the two will result in any significant impact on police performance.

The New Haven Police Departments' adaptation to and awareness of the potential of the CIRS has been inconsistent. Some individuals in middle level management positions are very much aware of the capabilities of the system and exactly how the information might improve the functioning of their divisions. Others have little knowledge and even less use for the CIRS. They contribute what they must and receive only that information forced upon them. In a series of interviews with divisional commanders, the majority did not know the exact nature or frequency of the outputs received by their division. More importantly, only two commanders had any suggestions for additional applications of computerized information beyond those which presently exist. The total impact of the CIRS is the sum of the division commanders' ingenuity and interest. In assessing impact, each division will be taken in turn and its use of the information evaluated.

The enforcement arms of the police department are the patrol, detective, and traffic divisions. Any improvement in the enforcement capabilities will be a result of efforts in these areas. In patrol, the two most prevalent uses of computerized information are on-line inquiries and patrol allocation. The Patrol Division of the New Haven Police makes no use of the system in these or any other capacity. A sample of the computer log indicates that fewer than 38 daily transactions are conducted through the Central Complaint Bureau on the dispatcher. Of these, fewer than one-third were motor vehicle file inquiries that originated in the field. The remainder were motor vehicle file updates. There is virtually no on-line use of computer to gain information on names or locations encountered on patrol. The impact of the on-line stolen car file usage does not seem to have had any positive effect on the auto theft clearance rate. And in view of the limited usage, it seems logical to assume that CIRS has had little effect on auto theft enforcement. In short, the patrol inquiry use of the system is nonexistent.

The single greatest obstacle to a viable patrol inquiry capability has been the reluctance of the upper level administration to provide

adequate manpower in the Central Complaint Bureau. The patrol inquiry capability, with the exception of a warrant file, could be made operational by simply adding a dispatcher's assistant to make the necessary inquiries. A patrol sergeant was used in this capacity for less than one month on an experimental basis. Due to the need for patrolmen on the street, however, this experiment was discontinued before it reached fruition. Since that time no personnel have been assigned to the CCB terminal.

In the long range, however, some more substantial changes will be required to make the patrol inquiry capacity operational. Any significant volume of calls cannot be accommodated without improvements in the organization of the Central Communications Bureau. Presently, the dispatcher and terminal operator must yell or pass notes in order to make inquiries. Not only is this mode of operation confusing, but it consumes a great deal of valuable air time. Some means of direct contact between the patrolman and the terminal operator must be devised. Some changes in software are also in order to allow more efficient access in inquiries. Under the present file structure an inquiry made to the address file will not indicate the name or status of individuals previously involved in criminal activity at that address. The type of incidents that have occurred will be available but not the individuals. In order to obtain information about individuals at that address, the files must be cross referenced by incident codes. This requires several inquiries and, of course, more time. An automatic, sequential search of the files would be much more efficient. The ideal would be a random access system but this would require a significant restructuring the basic files which is not possible with the IBM 360/40.

Increased use of the patrol inquiry component of the CIRS would also require a reexamination of the organization involved with input. Currently, there is a twenty-four hour lag between the incident and the input of the report into the system. Since the patrol inquiry capacity is not operative, it is impossible to say if this gap in information actually detracts from the effectiveness of the patrol inquiry component. Once the patrol inquiry system is "up", however, the effect of this lag should be determined.

The Investigative Services Division of the New Haven Police Department defends its need for the computer terminal more strongly than any other division and a sample of the log indicates consistent on-line usage. There are several dramatic cases in which the rapid access made possible through the computer has led to an otherwise impossible apprehension.[9] These qualitative indications of impact are valuable but they must be complimented by quantitative indications of persistent change. The capability of the computer as an investigative tool is not in question, rather, its use as such a tool.

Generally, clearance rates are used to assess the performance of detective divisions and individual detectives. Unfortunately, blanket usage of clearance rates as an indicator masks some of the management questions that infringe upon enforcement. Given limited resources,

[9]See Appendix 3

detective commanders must assign their men to "priority" crimes usually according to the mens', commanders' or crimes' severity or notoriety. Because of this, years with a high incident of low priority crimes such as auto theft or larceny will have a low clearance rate simply because detectives could not be assigned to them for any length of time. In order to correct for this deficiency only those "high" priority crimes of murder, rape and robbery will be compared before and after CIRS. The following table indicates the change in clearance rates over time.

COMPARISON OF OFFENSE CLEARANCES IN THREE CRIME CATEGORIES PRIOR TO AND AFTER CIRS

	Pre CIRS 1969	1970	Post CIRS 1971	1972
Murder	100%/11	60%/6	100%/13	77%/9
Rape	79%/27	68%/23	50%/23	70%/33
Robbery	67%/121	46%/51	58%/101	46%/115
TOTAL	71%/159	52%/80	58%/137	51%/157

There has been no consistent change in clearance rates since the advent of the CIRS. Rates often misrepresent activity because they respond to increases in occurrence as well as resolution. That 23 rapes have been cleared is less significant if 46 have been committed than if 34 have occurred. Comparing the number of clearances over time, however, results in the same finding. There has been no significant change in the number of clearances since the advent of the CIRS. The cases that illustrate the potential of the system as an investigative tool are impressive but the widespread impact of the present files on criminal investigation is not apparent.

The final division involved in direct enforcement activities is the Traffic Division. This unit keeps traffic lanes free and insures public safety through enforcing traffic and parking laws. In their activities, the traffic officers, like patrolmen, use the on-line system through the dispatcher. It is impossible for research purposes to differentiate traffic usage from that of the patrol division. However, since the on-line usage of officers in the field is so minimal, this question is academic.

The Traffic Division in conjunction with the Traffic and Parking Division of the City make extensive use of batch processing to monitor accident and enforcement activity in New Haven. This information is designed to permit the prevention of accidents through more stringent enforcement. Streets or intersections with extensive accident activity are investigated by the police and officers positioned in that area if it is determined that the accidents were the result of infractions.

The same information is produced by hours of the day and could be used to determine more efficient allocation patterns. To date, however, this is not done in any consistent fashion.

The Traffic Division employs the CIRS information largely to assist in management activities. The commander of the Traffic Division receives a list of traffic tickets and where they are issued. On the basis of this list supervisors monitor the performance of their men. If an individual's productivity, in terms of tickets, is low he will be asked to explain this discrepancy. This record of tickets can also be used to ensure that patrolmen remain in their assigned areas providing adequate coverage in crucial areas and time periods. Unfortunately, it was impossible to obtain adequate controls to measure the impact of this supervisory activity. Since there was no indication of supervisory effectiveness prior to the system it would be difficult to say in any objective way that the system has improved this capability.

Those divisions not involved in enforcement activities are devoted solely to the management activities of planning, maintaining and evaluating the actions of the police department. Roughly, these functions correspond to the Office of Planning and Budgeting, Supportive Services and the Office of the Deputy Chief respectively.

The deputy chief is responsible directly to the chief for the efficient functioning of the entire police department. Though he oversees the total operations of the department the deputy chief is most directly concerned with the supervision and evaluation of personnel and programs. Most personnel and programmatic changes in the department must be cleared through the deputy chief. In addition, he periodically reviews the performance of the individual divisions commanded by his immediate subordinates - the divisional commanders.

The bulk of the information provided to the deputy chief concerns the functioning of the Patrol Division. Each day he receives a listing of all incidents by car, location and type of complaint. These listings include the time of the complaint, dispatch time, arrival time, clearance time and a comparison of the intervals between dispatch-arrival and arrival-clearance. The deputy chief has set standards for arrival time and clearance time and any exceptions to these standards are recorded on the daily lists. In addition, the list or the "Time-Exception File" indicates the type of report submitted by the investigating officer.

An excess in response or clearance time and several "ooo" codes or failures to file a report would be noted by the deputy chief's staff and the officer concerned would be required to provide an explanation. The objective of this supervision is obviously to ensure prompt response to calls and complete information on each incident. Here again, the absence of pre-CIRS controls prohibits a precise measurement of impact. A sample of the "Time-Exception File" indicates that the mean response time for patrol cars is less than

five minutes. But there is no similar data for 1969 and 1970 which could serve as a benchmark. Similarly, prior to the CIRS, it was impossible to check complaints against incident reports to even determine failures to report, much less record them.

The Supportive Services Division is charged with providing for all the logistical needs of the police department ranging from salaries to gasoline. The director of supportive services directs the operations of the fleet garage, all purchasing within the department, maintenance of the physical plant and payroll. Generally, these functions can be reduced to the maintenance of accurate records of existing equipment and supplies, cash on hand and requested expenditures as well as the peripheral functions related to same (i.e., bidding, vender selection). Any request for an expenditure must be sent to the supportive services division where it is compared to resources on hand and on that basis accepted or rejected. The supportive services division serves as an internal office of management and budget.

The major tasks in this area are largely clerical and therefore readily adaptable to automation. The computation of payroll was a tedious task that used to require one man full-time for approximately one week. Now, with the aid of the computer, the same work is performed by one man in half a day. The same is true for the computation of overtime. The need for accurate records is paramount in this division and the computer provides a running account of cash on hand for each division of the department. Each week this account is sent to each division commander and to the supportive services to serve as a check against the manual accounting systems. In addition, a perpetual inventory is stored on tape and may be used to locate items, or to check requests against existing stock. There is no doubt that these applications save a great deal of clerical manhours and provide accuracy which would otherwise be impossible.

Nothing could be further from the role of the supportive services division than that of the Office of Planning and Budgeting. Rather than trying to conserve, Planning and Budgeting must be expansive and innovative, looking for new ways to approach old problems and new means of funding same. Their role is more akin to that of the artist than the bookkeeper. The data from the system is not an end in itself but a means of assessing and improving existing procedures and proving new ones. Though this division has been more intimately involved with the CIRS than any other, save records, it has not had any consistent pattern of usage which might significantly impact the operations of this division or the department. This division was too concerned with the construction of the system to extensively explore means of using it.

The only routine output received by the Office of Planning and Budgeting is crime specific maps of the city. These maps list the incidence of crime by type and by location. They were produced with the intention of using them in allocating patrol resources. This has not been done, however. The New Haven system is better equipped for patrol allocation than some older and more developed systems.

In a recent Rand Corporation publication several cities were rated on their amenability to patrol allocation experiments and development.[10] Of the data elements listed, the City of Los Angeles and other systems funded in the millions of dollars, could provide only three data elements and those only in a partial fashion. The CIRS could produce more than six of these data elements. The data is available but the police department does not have the capabilities to develop an allocation program. The Office of Planning and Budgeting is understaffed in general and does not possess the statistical expertise or sufficient systems analysis and computer programming staff to develop an allocation component. At any given time, Planning and Budgeting can assemble only three full-time and one part-time staff member to work on a project. Personnel from other divisions can be used but only as their regular commitments permit. The time and talents of these few individuals are often applied to crisis situations leaving few resources for the continuous business of planning. None of the present staff has statistical expertise. Systems analysis and program expertise is provided by Dr. Hannum on a full-time basis and sporadically by the city computer staff. To expect one full-time and one part-time programmer to maintain and to develop a system is unrealistic. There is no doubt that the lack of an adequately staffed planning division has been a primary factor in preventing the development of a patrol allocation scheme and other potential uses of computerized data.

In summary, the Case Incident Reporting System has dramatically increased, in both scope and volume, the informational capacities of the New Haven Police Department. Unfortunately, there is no demonstrable evidence that this expansion of information has led to any significant improvement in the management and enforcement activities of the police. This lack of evidence is due in part to the initiation of evaluation "in medias reis". Many of the present applications of automated data may, in fact, increase supervisory control, the incidence of complete reports, or patrol coverage but at this late date adequate controls cannot be constructed. More important, however, is the fact that the New Haven system has not reached the stage of development where an assessment of impact would be most fair and meaningful. Although a significant amount of effort may have been expended and a great deal of progress made, the CIRS is still in its early developmental stages. The present applications of the data are not extensive enough or sophisticated enough to have any significant impact on the performance of the department. In view of this, it would be more fruitful to compare the development of CIRS with the state of the art or similar cities rather than actual impact. The question of impact is crucial but it should be addressed only when system development and research related data systems are adequate.

The state of the art in police use of computers is constantly changing and therefore extremely difficult to define at any given moment. In addition to being dynamic it is also diverse. Applications of proven efficacy to some are regarded with skepticism by others in the field. The only means of isolating a stable center from the

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10 Larsen, op. cit.

periphery is to rely on the consensus of the developers themselves. The International Symposium on Criminal Justice Information and Statistical Systems, New Orleans, October 1972, provides the most current statement of consensus in the field. Kent Colton of the Massachusetts Institute of Technology, Department of Urban Studies conducted a survey of police use of computers throughout the country.[11] In his questionnaire, Colton listed twenty-three of the most common applications of computer information grouped in eight areas. These are presented in the chart below.

TWENTY-THREE COMPUTER APPLICATIONS	APPLICATION AREAS
1. Warrant File*	Police Patrol Inquiry
2. Stolen Property File	
3. Vehicle Registration File*	
4. Traffic Accident File*	Traffic
5. Traffic Citation File*	
6. Parking Violation File*	Miscellaneous Operations
7. Intelligence Compilation File*	
8. Jail Arrests	Computer Aided Dispatch
9. Computer Aided Dispatch	
10. Automated field interrogation reports	Investigation
11. Modus operandi file	
12. Fingerprint File	Criminal Statistical File
13. Criminal Offense File*	
14. Criminal Arrest File*	
15. Juvenile Criminal Activity File*	
16. Personnel Records	Police Administration
17. Budget Analysis and Forecast	
18. Inventory Control File*	
19. Vehicle Fleet Maintenance	Resources Allocation
20. Patrol Allocation and Distribution	
21. Police Service Analysis*	
22. Geographic location file*	
23. Communications switching	

*This indicates those applications made in the CIRS.

In comparing the CIRS to this standard, several qualifications must be considered. First of all, though the system may include files similar to those mentioned above they may not correspond exactly. In these instances, the spirit not the format of the file was the deciding factor. Secondly, the file both in Colton's study and here, is not necessarily on-line but includes batch operations as well. Thirdly, all data applications are accorded the same weight in this scale. Certain uses obviously have more impact than others but any weighting would be arbitrarily those of the researcher and not a suitable basis for comparison.

Relative to Colton's standard, the New Haven Case Incident Reporting System is operating at about 52 percent of its capacity. Of the twenty-three applications listed above, CIRS has twelve. Some of these standard applications are to the advantage of larger systems whose needs and resources far exceed that of New Haven.

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11 Colton, Kent W. op. cit.

Two files that are not being considered by the CIRS personnel are the stolen property file and the jail arrest file. Since the Criminal Justice Information System and Statewide Information Access System are soon to be "up", there is no need for a local police department to maintain either of these files. With this adjustment the CIRS is functioning at approximately 57 percent of its potential capability.

To put the CIRS's performance in perspective it must be compared to cities with similar needs and resources. Exact and reliable data on expenditures from these cities is not readily available, however. In lieu of this information city size will be used to control for both needs and resources. The Colton study surveyed 364 cities with 25,000 or more persons. The questionnaire used elicited the number of computer applications in each city from a list of 23. The average number of applications for cities more than 100,000 persons was nine or three less than that of CIRS. Using this standard, the New Haven system is superior to approximately 75% of all computer systems for cities of similar size.[12] The dangers of relying on a self-reporting study such as this are obvious, but it should be noted that if there are any errors they would be in over-reporting capabilities. Since the capabilities of the New Haven system were not self-reported, but recorded by a third party on the basis of field visits, any self-reporting error would be to the detriment of New Haven in the above comparison.

In summary, the Case Incident Reporting System is basically sound. The first 27 months of the system's existence have been devoted to the development of source files, human systems connected with the input and processing of information, and application of the resulting data. The incident, name, address, motor vehicle and geo-coordinate files developed in this period are sufficient in terms of information content and retrievability considering the logistical constraints at this time. The above files are multi-purpose and more flexible than the more specific special purpose file. A criminal history file, for instance, would not contain all the information found in the CIRS incident file. For the period under study, however, the incident file can adequately serve as a criminal history file, as well as an incident file. The "other" classification contained in the incidence file allows its use as an intelligence file of sorts. Admittedly, a special intelligence file would provide more information, but for the investment of time and funds, the incidence file will suffice. This flexibility has been advantageous in view of the uncertain status of the statewide systems. In early 1972 special conditions were imposed to prevent regional systems from developing criminal history files with the assurance that the statewide system would soon be up and contain this data. More than one year later the statewide system is not operational but the New Haven system has been able to use its incident file in the criminal history capacity because of the flexible nature of these files. To be sure, a random access system would be even more desirable, but the capacity of the IBM 360/40 does not permit random access. In view of these constraints, then, the CIRS has maintained

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[12]Colton, Kent W.

a balance between informational needs and hardware capacities in developing its basic files.

This initial period of development has also seen the construction and refinement of the basic human systems essential for processing. Organizing the Central Complaint Bureau operation, the quality control unit and the general flow of CIRS reports was prerequisite to a functioning system. The amiable working relationship between the city's data processing staff and the police department, though not included in the system description, is also a very crucial human system. Since the computer is owned by the City of New Haven, unless systematic cooperation is established the police department could be denied the access required in its daily operation and the input in planning the future of the system. The CIRS personnel have formed a data committee that provides a constant exchange with the city data processing center. The police have also been willing and able to use the computer at off hours thereby avoiding conflicts about access. These human systems, both those pertaining to the internal flow of information and the external flow of influence, are essential to the establishment of a sound system.

In addition to establishing the fundamental capabilities of a computerized system, the New Haven Police Department has developed several applications of the data to police work. Among these are: 1) traffic accident reporting 2) traffic accident analysis 3) monitoring of police service 4) on-line inquiry for investigation 5) reporting criminal statistics 6) on-line inquiry for stolen vehicles 7) monitoring traffic and parking citations 8) modus operandi file for criminal investigation and, 9) inventory control. Although the particular application may not utilize information to the optimum in each area some form usage does exist.

In spite of its achievements, however, CIRS has some basic deficiencies which must be corrected before the system can approach its full potential. The patrol inquiry capability has been developed in a spotty fashion. The motor vehicle or stolen car file is operative but the warrant file is not on-line. Existing on-line files must be accessed in a more economical fashion to provide adequate response to patrol inquiries. Eventually an extensive restructuring of the Central Control Bureau will be in order to facilitate the input and retrieval of data. In addition, the patrol allocation component is virtually non-existent and until the present planning staff is expanded or supplemented this capability will not be developed. The lack of an operative patrol inquiry component is especially glaring in that one of the major justifications for an expensive on-line system is the assistance it affords police field personnel.

By correcting the above-mentioned deficiencies, the CIRS will move significantly closer to its full capacity. In acquiring the new abilities, however, some attention must be given to the existing files. The CIRS is about to leave its adolescence. The few multi-purpose files now in use are becoming too large and they must be culled. A portion of the data can be destroyed without any loss to the system

(misdemeanor complaints) but other information must be retained and retained in a more efficient form. For this reason, specialized intelligence, criminal offense and modus operandi files must be developed in the near future. Though this is not a deficiency at the present time it could become one soon.

SUMMARY

In general, the Case Incident Reporting System has fulfilled expectations. The performance of the New Haven Police Department Records Division has improved both quantitatively and qualitatively since the advent of the system. Prior to the automated system, information was stored throughout the department and was very difficult to access. Since the CIRS, development of information is stored centrally and easily accessed in a variety of formats as the approximate 200 percent increase in informational output indicated. In terms of seeking ways to utilize this information, New Haven has been more energetic than other cities of similar size. Currently, the CIRS is operating at approximately 57 percent of its capacity. The average usage in cities of 100,000 to 250,000 is approximately nine different applications. With eleven applications the New Haven System is further developed than 75 percent of the systems in cities of similar size.

In spite of this relatively impressive record, the use of automated data in the New Haven Police Department is somewhat inconsistent. The CIRS is well developed in the area of traffic reporting possibly because this application has been operable longer than any other. The crime-related data capabilities of the system have tremendous potential impact on investigative, planning and management needs. To date, however, this remains largely potential and significant effort and some structural and policy alterations are needed before this potential can be realized. By far the most neglected areas of the CIRS have been police patrol inquiry and patrol allocation. Since on-line usage by patrol is a major rationale for an on-line system this deficiency is all the more significant.

RECOMMENDATIONS

The following recommendations will be presented in three segments. The first will deal with the question of funding in light of the achievements of the CIRS. The second will suggest certain areas in which the New Haven Police Department should make efforts to improve its performance. The third will include a discussion of the funding structure in general and how it aids and inhibits the development of systems such as the CIRS.

Funding 1973

The achievements of the Case Incident Reporting System to date and its significant potential are sufficient basis for funding in 1973. The system should receive $188,901 to meet operation and modification costs for the upcoming year. This figure differs from the advisory committee's recommendation by about $14,000. This money should be allocated for one year of systems analyst/programmer assistance. There are several minor modifications in existing software that warrant these services. These improvements include the development of special service files to supplement existing general files which are being culled, the adaptation of the criminal statistics module in order to make it more amenable to FBI reporting, the modification of software in the patrol inquiry module to allow for more efficient inquiry, the construction of a vehicle and fleet maintenance file, and putting the existing "off-line" warrant file "on-line" if the statewide warrant file is not operational by October 1, 1973. In granting this expenditure, the planner should request from the CIRS staff the exact nature of the modifications to be made with the analyst's services.

In addition to this funding under the 9.3 category, additional monies should be made available under the Patrol Improvement category (2.4). The New Haven Police Department has proposed the development of a patrol allocation module with consultant aid provided by CPCCA funding. The lack of a workable patrol allocation module is a glaring deficiency of the present system. Unfortunately, the Office of Planning and Budgeting is ill-equipped to develop this capability and consultant assistance is necessary. The informational capacity of the CIRS is ideally suited to patrol allocation.[13] This seems to be a great opportunity to assist in the development of the New Haven system.

New Haven Police Department Operations

Providing the above-mentioned funds will greatly improve the Case Incident Reporting System, but the ultimate quality of the system will be determined by the talent and energies of the New Haven Police Department itself. One immediate target for the department should be

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[13] Larsen, et. al op. cit., pg. 48

the development of a patrol inquiry capability. In the long run, some hardware modification might be required, but for the present the commitment of planning time and manpower in the Central Complaint Bureau would suffice. Currently there is no operator assigned to the terminal in the Central Complaint Bureau. The fact that the department has been unwilling to make this minimal commitment does not speak well for its interest in developing a functional patrol inquiry capability. The performance of the inquiry capability with the assignment of this one individual would provide information valuable to the future development of the system. In addition it will begin the "de facto" education of the patrolmen to the potential of the computer system.

Eventually, the department must correct several inadequacies if it is to fully develop and maintain its system. The Division of Planning and Budgeting must be expanded and upgraded if it is to develop the more complex and fruitful applications of computerized information. Consultant assistance can supplement the in-house planning staff, but, since LEAA money will not always be available and modifications will be required continuously, this is, at best, a temporary solution. At a minimum, one systems analyst and one statistician/researcher should be added to the existing staff.

Another area in which the police department must make some efforts is the education of middle level personnel about the various capabilities of the automated system. If the system is to become an integral part of the department, more frequent and open exchanges must take place between the planning division and those divisions involved in management and direct service. Divisional commanders with problems or ideas for potential improvements should present their case to the Planning Division. The planners, in turn, should be responsive to the needs of division commanders and all operations personnel. The inadequacy of the planning staff has undoubtedly contributed to this general lack of communication. Planning personnel did not have the time to service the divisions and the divisional personnel did not receive satisfaction in their request for aid. The ability of a strengthened planning staff will serve as a catalyst for a more vibrant exchange. By developing a number of pertinent applications of computerized data, the planning division will convince division commanders of the systems utility. Once convinced, they will undoubtedly be a more dynamic force in the development of the system. In addition to initiating exchange through proven performance, seminars and periodic meetings between divisional commanders and planning staff would hasten the exchange.

Funding Procedures of the CPCCA in general

Next to the internal structure of the New Haven Police Department and its interaction with the City of New Haven, no organization influences the development of the CIRS more than the CPCCA. It is only fitting, therefore, that we examine the norms or "ground rules" that structure

the interrelationship between the CIRS and the CPCCA and the impact of these procedures on the development of the system. The single most important contribution of the CPCCA is money and the decision-making process by which money is allocated profoundly effects the growth of the data system.

Funding decisions are made on the basis of six priorities. Only crime-oriented systems are considered under the 9.3 category. This restricts participation to police departments and excludes those agencies not specifically involved in the prevention and detection of crime and the apprehension of offenders. Preference is accorded applicants whose systems are automated rather than manual and regional rather than local. The level of funding for preferred projects is determined with emphasis on the innovative. System modifications are financed at 100 percent while allocations for operations costs decrease 25 percent for each year after the initial year of funding with a four-year maximum on financing operating costs. This mode of funding is intended to prohibit the construction of systems that cannot be sustained after LEAA funds stop and to permit more than one or two systems to be developed by limited LEAA funds. In short, this approach to funding was designed to create several adequate regional police information systems that could eventually be supported by local funds.

There are several inconsistencies in the application of this logic that serve to undermine rather than further the achievement of desired goals. The single greatest obstacle to the planning of efficient police computer systems is the manner in which the operation - modification distinction is made and the subsequent mode of funding for each function. The intention behind this mode of operation is valid but its execution is dysfunctional. First of all, the advisory committee has never defined modification and operation conceptually or operationally. The result being that every year systems must be planned around "ground rules" that continually and mysteriously shift. Informal preliminary negotiation sessions must take place in order to "feel out" the current definition of operations cost and modification costs. Even with this time-consuming negotiation process there is no guarantee that the definitions so achieved will remain the same ultimately.

This arbitrariness inhibits intelligent planning and often results in an application that bears little resemblance to the eventual product. To be sure, this confused state of affairs permits the possibility that operations costs may be financed to a greater extent than the CPCCA would have intended but it also permits needed modifications to be inadequately funded. To date, the advisory committee has been content to gamble with an arbitrary standard.

Applicants have been willing accomplices to this non-specificity. There has been little or no attempt on their part to correlate equipment, personnel and supplies with the conceptual design of a system. An applicant may indicate that he intends to put a warrant file on line, but he does not put this in perspective of programming or supply requirements, instead he simply includes in a budget - one programmer at $14,000, With this information, the planner cannot

possibly determine if this programmer is warranted as a modification cost. There is also no way that the planner can hold the system responsible to accomplish the modifications permitted in funding. The use of system development resources for operational needs is no doubt responsible for several of the deficiencies in the New Haven system.

Several alterations have been suggested to rectify the by-products of this confused mode of operation. One suggested solution has been multi-year funding for a three-year period at 100 percent of total cost. From the system developer's point of view, this would be ideal since it would allow for security in planning and hiring, obviate the wearisome task of reapplication and avoid the competition for resources between the development and maintenance functions of the system. This approach is not so advantageous for the planner, however. The control of the planner over the individual systems will be lessened considerably and he will be unable to enforce statewide priorities such as regionalization. He could employ special conditions, but this would re-create the insecurity that multi-year funding was designed to eliminate. Secondly, multi-year funding would lock systems into their initial designs which are formulated with only rudimentary knowledge of systems. The CIRS's conception of itself has changed drastically as its personnel have developed expertise in data processing. Multi-year funding would saddle a system with an outmoded design incapable of modification. Multi-year funding would also prohibit the funding of all but a few projects unless the amount of available funds was increased significantly (i.e., approximately doubled). Multi-year funding is also problematic because the CPCCA is not funded on a multi-year basis. A certain level of funding could be assured only at the potential loss of planning flexibility at the state level. In short, multi-year funding would not be advantageous for the CPCCA and the advantages for local systems are more apparent than real. It is obvious, however, that the CPCCA's present funding procedure does create the dysfunctions which multi-year funding advocates claim. It is also clear that some alteration other than multi-year funding would be preferable.

One such alteration would be the continuation of the present procedures but with a clearer definition of the criteria used in funding and a correlation of conceptual design with operational data in the application process. The explicit statement of criteria would remove a great deal of the insecurity resulting from CPCCA procedures at present. The applicants will know what expenses are allowed and can plan accordingly. It will not remove the insecurity resulting from the priority afforded police information systems in the city budget but this is not the concern of the CPCCA. Cities unwilling to adequately finance police systems should not have them.

The reorganization of the application form so that it resembles a program budgeting format would permit more rational allocation of funds to operation and modification. The present form or at least

the manner in which it is completed does not provide the planner with sufficient information to separate operations cost from development costs. The usual result is that many incidental development functions are subsumed under operations and the money is inadequate to support both operations and development. When these functions are differentiated more clearly in the application, all development will be funded at 100 percent rather than sapping limited operations resources. Not only would this format allow more precise funding but would also allow for continuous control by the planner to ensure that operation functions do not usurp development resources during the life of the funds.

The implementation of these changes would require significant effort on the part of CPCCA, the systems advisory committee and applicants under 9.3. They would provide a constructive first step in achieving a compromise between the inadequacies of the existing funding mode and the excesses of multi-year funding. After this initial delineation of parameters, further alterations such as the use of consultant assistance in development could be instituted in an effort to free the local system from the cost of development.

SUGGESTIONS FOR FURTHER RESEARCH

This study has addressed several questions concerning the development of the New Haven Police Case Incident Reporting System and in so doing has raised several others about the development of systems in general and specifically with respect to the CPCCA's current involvement. One glaring deficiency in the construction of systems at the local level and their financing at the state level has been the inability to answer questions of impact. Not only in this state but throughout the nation no one has thoroughly dealt with the impact that automated data systems have on the enforcement and management functions of the police. This study initially attempted such an approach, but the quality of existing data prior to the system was not amenable to this type of evaluation. With sufficient time, money and an "apriori" design of the evaluation such an assessment would be possible. Until this type of investigation is undertaken, all decisions of what, how, and when to fund or develop will be made on little more than assumptions and preconceptions. Some specific areas that should be examined are: 1) the relative impact on police functioning of a batch versus an on-line system 2) the effect of a patrol inquiry capability on the performance and safety of patrolmen 3) the relative ability of computerized patrol allocation modules to increase the police capacity to deter crime and apprehend offenders and, 4) the ability of computerized files to increase the effectiveness of detective bureaus. These and other potential research questions should be considered in the planning of data systems and where the situation permits, stringent evaluations should be undertaken.

FORMAT OF CENTRAL COMPLAINT BUREAU CARDS

CENTRAL COMPLAINT BUREAU CARDS (CCB Data)

The De artment of Police Service, Cit of New Haven utilizes a batch print-out s stem in its receipt of in-coming Central Complaint Bureau messages. These rint-outs re resent data gathered in the following areas:

1. Complaint number
2. Street number
3. Street
4. Inter-section, if no street number is stated or required
5. In-coming code
6. Clear code
7. Re ort re uired
8. Sector unit assigned
9. Date of incident
10. Time received at CCB
11. Time sector unit dispatched
12. Time sector unit arrived
13. Time sector unit cleared
14. Variance based on pre-determined formula

SYSTEM DESCRIPTION

Any computer system can be divided into at least three distinct elements:

1) Hardware
2) Software
3) The flow of information

A thorough knowledge of these components is necessarily antecedent to any evaluation of system efficacy. The following description will essentially follow this outline presenting first the hardware configurations (Appendix 1A) secondly the language, basic programs and other elements of software (Appendix 1B) and thirdly the human systems by which information is inputted, processed, and disseminated (Appendix 1C).

The mechanical heart of the CIRS is the 360/model 40 IBM control processing unit located in the City of New Haven Data Center. The Central Processing Unit (CPU) has several basic components:

1) An arithmetic-logic unit
2) Control units
3) A storage unit

The arithmetic-logic unit is the area in which all calculations are performed. In listing crimes by time of occurrence, for instance, the arithmetic-logic unit must compare times to ensure that certain offenses are not placed in the wrong area. The computer reduces this to an arithmetic operation which is performed in the arithmetic-logic unit. The coordination required to translate computer language into machine language, to activate the appropriate input and output mechanisms, and to supervise the computation of the arithmetic-logic unit is provided by the various control units within the system. Virtually, every function of the computer results from a control command. In addition to those controls pertaining to operations within the CPU, there are others which coordinate the activity between the relatively slow input/output devices and the faster CPU. These special controls are called channels. They tremendously increase the efficiency with which the computer system may handle inquiries by allowing input/output devices to function independently of the CPU control unit. Without this independence the CPU could process only one job at a time rather than processing several simultaneously in different stages. The CIRS has several such control units:

1) The IBM Model 2228
2) The IBM Model 222N multi-station control
3) The IBM 2224 mini-multi-control unit
4) The IBM systems 7 mini-computer (still in the experimental stages)

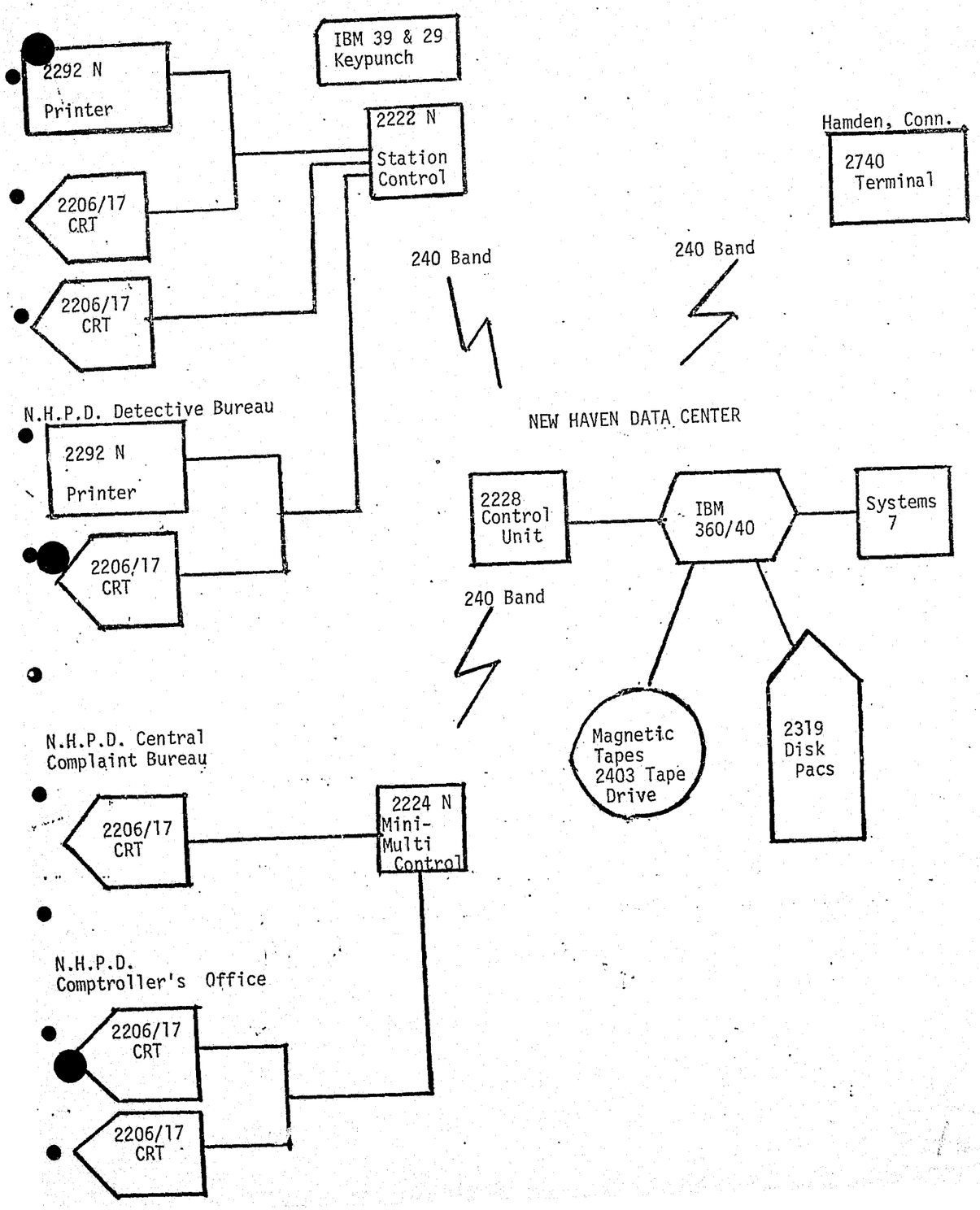
The third component of the CPU comprises the storage capacity of the system. Capacity is salient to computer users in that it dictates the extent of data collection and computation which can be performed by the computer. A computer with a very small core storage capacity is very restricted in the type of computation it can perform. On the other hand, an expansive storage capacity is usually economically infeasible. Storage can be divided into two basic types - primary and secondary - each of which has its own particular advantage. Primary or core storage refers to the storage capacity within the computer itself. This is more or less its working capacity (i.e.: the amount of words or characters which can be manipulated at one time). The CIRS has a core storage of 731,000 computer words. Core storage is advantageous because it allows for more rapid processing. The obvious deficiency in core storage is of course the added expense. Due to this expense most computer systems employ more secondary than primary storage. Secondary storage is distinct from primary in that it is external to the CPU. Data in external storage can be called into core storage and operated on there but no computations can be worked in secondary storage. The New Haven System utilizes four disc packs on an IBM 2319 disc drive for external storage. Disc packs are very similar to long playing records and in this case have the capacity to store up to 29 million data characters each. These discs are "on-line" or immediately accessible to the CPU. In addition, CIRS utilizes magnetic tapes as backup storage. These tapes are "off-line" and must be manually placed in such a position as to be accessible to the CPU. Though the capacity of off-line storage, due largely to its economy, is virtually limitless, a great deal more time is required to perform computation.

In addition to the various components of the CPU, every computer system requires a number of peripheral mechanisms through which information is inputted and retrieved. There are several common devices used to input data - card readers, magnetic tape readers, paper tape readers, terminals, optical scanners etc. The CIRS uses primarily an IBM Model 1403 Card Reader in the city Data Center. The majority of the keypunching is performed in the police records center on an IBM Model 39 Card Punch and Verifier and a Model 29 Card Punch. In addition, there are five Bunker-Ramo terminals - two in the records division, one in the detective division, one in the central complaint bureau and a monitor terminal in the Data Center. The bulk of the input is done via card punch though some additions can be made from the terminals.

Data retrieval can also be done through a variety of mechanisms - printers, visual displays, etc. The CIRS employs both printers and visual displays. There is one IBM Model 2292 Printer in the Records Division and one in the Detective Division and also a General Electric Printer in the Data Center. Each of the five terminals mentioned above are equipped with cathode ray tubes for visual display. Most batch processing output is done through the Printer (hard copy) in the data center. Stolen car inquiries and Detective Division inquiries also appear in hard copy form. Terminal inquiries in the Records Division and patrol inquiries to the CCB are generally displayed on the cathode ray tubes.

This hardware configuration is not static. Several changes have been proposed and will, no doubt, have occurred by the final preparation of this report. Basically, the changes involve the upgrading of the CIRS to an IBM 370 Model 35 computer with its accompanying configurations. It is also assumed that the Systems 7 control unit will be operational. The following chart however presents the New Haven System as of January 1973.

(See following page)



Software

The term "software" refers to both the language and programs used in a computer system. The hardware described above is useless unless the machines are instructed as to the functions that they must perform. The medium for these directions is the language. The content of the directions refers to the specific program used. The CIRS is addressed in several languages. For "batch" or off-line (i.e.: utilizing data not internal storage) processing the universal languages of COBAL or Fortran are used. On-line inquiries made through the terminals are addressed in a teleprocessing language - Basic Assembler Language, Faster.

The various programs used on a routine basis by the New Haven Police Department can be grouped in several functional types. The first basic distinction can be made between those programs designed to maintain the system and those designed to retrieve and present data in a specific format. The former will be called maintenance programs and the latter action programs. Maintenance programs generally check the sequency - a completeness of data, edit the data and update existing files. Action programs retrieve the data from storage, cross reference the necessary files and present the data in a specified format. Action programs can be further subdivided into on-line or batch processing. On-line programs are written in teleprocessing languages (i.e.: Bal Faster) and are generally referred to as inquiries. Batch programs are written in one of the universal languages mentioned above and are simply called programs. All maintenance programs are written in universal languages and conducted on a batch basis. The specific programs used in the New Haven system are listed by type below.

1.0 Basic File Structure

1.1 CIRS History Record

Recording Mode	Record Size	Blocking Factor	Block Size	Device Type	Organization	Est. File Size	Vol.
F	81	20	1620	2314	ISAM	42,000	1

Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.
40-1999	NHPDØ1				

Master Cyl Index Extent	Pack No.	Cyl Index Extent	Pack No.	Overflow Cyl Extent	Pack No.
		20-39	NHPDØ1	2000-2379	

(CONTINUED ON NEXT PAGE)

Item	Data Name	Description	Position From	Position To	Picture	Usage
1	DEL-CODE	Delete Code	1	1	X	
2	CPLT-YR	Year	2	2	X	
3	CPLT-NO	Complaint No.	3	8	X(6)	
4	REC-CODE	Record Code 1	9	9	X	
5	SEQ-NO	Sequence No. 01	10	11	99	
6	CPLT-MO	Month	12	13	XX	
7	CPLT-DAY	Day	14	15	XX	
8	CPLT-YR2	Year	16	17	XX	
9	FILLER		18	18	X	
10	CPLT-HR	Hour	19	20	XX	
11	INC-CODE	Incident Code	21	24	X(4)	
12	BADG-1	Badge #1	25	27	XXX	
13	BADG-2	Badge #2	28	30	XXX	
14	CAR-NO	Car Number	31	33	XXX	
15	ST-NO	Street Number	34	37	X(4)	
16	ST-NAM	Street Name	38	53	X(16)	
17	INT-ST	Intersecting St.	54	69	X(16)	
18	X-COORD	X Coordinate	70	74	X(5)	
19	Y-COORD	Y Coordinate	75	79	X(5)	
20	STAT	Status	80	81	XX	

1.2 CIRS NAME FILE

Recording Mode	Record Size	Blocking Factor	Block Size	Device Type	Organization	Est. File Size	Vol.
F	81	20	1620	2314	ISAM	95,000	1

Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.
40-1999	NHPDØ1				

Master Cyl Index Extent	Pack No.	Cyl Index Extent	Pack No.	Overflow Cyl Extent	Pack No.
		20-39	NHPDØ1	2000-2379	NHPDØ1

Item	Data Name	Description	Position From	Position To	Picture	Usage
1	DEL-CODE	Delete Code	1	1	X	
2	CPLT-YR	Year	2	2	X	
3	CPLT-NO	Complaint No.	3	8	X(6)	
4	REC-CODE	Record Code 2	9	9	X	
5	SEQ-NO	Sequence Number 01-99	10	11	99	
6	MV-ID	Marker Number	12	21	X(10)	
7	INC-CODE	Incident Code	22	25	X(4)	
8	STAT-CODE	Status	26	27	XX	
9	L-NAM	Last Name	28	40	X(13)	
10	F-NAM	First Name	41	51	X(11)	
11	M-I	Middle Initial	52	52	X	
12	SEX		53	53	X	
13	RACE		54	54	X	
14	DOB	Date of Birth	55	60	X(6)	
15	FILLER		61	81	X(21)	

1.3 INCIDENT CROSS-REFERENCE FILE

Recording Mode	Record Size	Blocking Factor	Block Size	Device Type	Organization	Volume
F	26	25	650	2314	ISAM	INDX..NHPDØ1 D&O...NHPDØ2

Data File Capacity	Records per Track	Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.
		780-1199 (420)	NHPDØ2	780-1199	NHPDØ2

Master Cyl Index Extent	Pack No.	Cyl Index Extent	Pack No.	Overflow File Capac	Records per Track	Overflow Cyl Extent	Pack No.
		25-29	NHPDØ1			2860-2919	NHPDØ2

ITEM	DATA NAME	DESCRIPTION	POSITION FROM	POSITION TO	PICTURE	USAGE
1	DEL-CODE	Delete code (x'FF')	1	1	X	
2	CODE-1	1ST 2 digits incident code	2	3	XX	
3	INC-YR	Year	4	5	XX	
4	INC-MO	Month	6	7	XX	
5	INC-DAY	Day	8	9	XX	
6	INC-TIME	Time-"D" or "N"	10	10	X	
7	CODE-2	Last 2 digits incident code	11	12	XX	
8	CPLT-NO	CIRS record key	13	22	X(10)	
9	INCD-CODE	Full incident code	23	26	X(4)	

(CONTINUED NEXT PAGE)

1.4 ADDRESS CROSS REFERENCE FILE

Recording Mode	Record Size	Blocking Factor	Block Size	Device Type	Organization	Est. File Size	Vol.
F	45	10	450	2314	ISAM	42,000	1

Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.
2900-3399	NHPDØ1				

Master Cyl Index Extent	Pack No.	Cyl Index Extent	Pack No.	Overflow Cyl Extent	Pack No.
		2880-2899	NHPDØ1	3400-3479	NHPDØ1

Item	Data Name	Description	Position From	Position To	Picture	Usage
1	DEL-CODE	Delete Code	1	1	X	
2	TWN-CODE	Town Code	2	3	XX	
3	ST-NAM	Street Name	4	19	X(16)	
4	ST-NO	Street Number or First Four Characters of Intersecting Street	20	23	X(4)	
5	YR	Year	24	25	XX	
6	CODE-1	First two digits of Incident Code	26	27	XX	
7	MO	Month	28	29	XX	
8	DAY	Day	30	31	XX	
9	TIME	Time	32	33	XX	
10	CODE-2	Last two digits of Incident Code	34	35	XX	
11	CPLT-NO	CIRS Record Key	36	45	X(10)	

(CONTINUED NEXT PAGE)

1.5 GEO-COORDINATE CROSS REFERENCE FILE

Recording Mode	Record Size	Blocking Factor	Block Size	Device Type	Organization	Est. File Size	Vol.
F	25	25	625	Disk	ISAM	42,000	

Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.
1020-1199	NHPDØ2				

Master Cyl Index Extent	Pack No.	Cyl Index Extent	Pack No.	Overflow Cyl Extent	Pack No.
		1000-1019	NHPDØ2	1200-1299	NHPDØ2

Item	Data Name	Description	Position From	Position To	Picture	Usage
1	GEO-DEL	Delete Code	1	1	X	
2	X-COORD	X Coordinate	2	4	9(3)	
3	Y-COORD	Y Coordinate	5	7	9(3)	
4	YEAR		8	9	XX	
5	MONTH		10	11	XX	
6	DAY		12	13	XX	
7	CPLT-NO	Complaint No. Record Code	14 21	20 21	X(7) X	
8	INC-CODE	Incident Code	22	25	X(4)	

(CONTINUED NEXT PAGE)

1.6 INTELLIGENCE FILE

Recording Mode	Record Size	Blocking Factor	Block Size	Device Type	Organization	Est. File Size	Vol.
F	52	20	1000	Disk	ISAM	30,000	1

Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.
1320-1499	NHPDØ2				

Master Cyl Index Extent	Pack No.	Cyl Index Extent	Pack No.	Overflow Cyl Extent	Pack No.
		1300-1319	NHPDØ2	1500-1599	NHPDØ2

Item	Data Name	Description	Position From	Position To	Picture	Usage
1	DEL-CODE	Delete Code	1	1	X	
2	L-NAM	Last Name	2	14	X(13)	
3	F-NAM4	First Four Char. of First Name	15	18	X(4)	
4	QUALIF	Sequence Number	19	21	999	
5	F-NAM-REST	Rest of First Name	22	28	X(7)	
6	DOB	Date of Birth	29	34	X(6)	
7	STAT	Status	35	36	XX	
8	DATE-ENT	Date Entered	47	52	X(4)	
9	IDENT-CODE	This can be either a license plate number, complaint number, or the file number now used.	37	46	X(10)	

(CONTINUED NEXT PAGE)

1.7 MOTOR VEHICLE FILE

Recording Mode	Record Size	Blocking Factor	Block Size	Device Type	Organization	Volume
F	80	10	800	Disk	ISAM	

Data File Capacity	Records per Track	Data Cyl Extent	Pack No.	Data Cyl Extent	Pack No.
5250	70	80,100	NHPD02		

Master Cyl Index Extent	Pack No.	Cyl Index Extent	Pack No.	Overflow File Capac	Records per Track	Overflow Cyl Extent	Pack No.
		20,1	NHPD01	620	31	3780,20	NHPD02

ITEM	DATA NAME	DESCRIPTION	POSITION FROM	POSITION TO	PICTURE	USAGE
1	REG-STATE	Registration State	1	2	XX	
2	REG-NO	License No.	3	8	X(6)	
3	VEH-MAKE	Make of Vehicle,	9	12	X(4)	
4	VEH-MOD	Model of Vehicle	13	15	XXX	
5	VEH-STYLE	Style of Vehicle	16	17	XX	
6	VEH-YR	Year of Vehicle	18	19	99	
7	COL1	Color 1	20	22	XXX	
8	COL2	Color 2	23	25	XXX	
9	TOWN-ID	Town Identification	26	27	XX	
10	VIN	Vehicle Identificat.	28	40	X(13)	
11	OWNR-LN	Owners Last Name	41	53	X(13)	
12	DOE	Date of Entry	54	59	9(6)	
13	GAR	Garage Code	60	61	XX	
14	BADGE	Badge No.	62	64	XXX	
15	TT-NO	Teletype Number	65	71	X(7)	
16	STAT	Status Code	72	73	XX	
		Unused	76	80	X(7)	
		K if Keys included	74	74		
		How recovered code	75	75		
		Town - State Tax Town	41	43		
		Town Name	44	53		

2.0 MAPS

2.1 Basic Map Program:

Read in cards with coordinate data and list on tape (or start with data tape already loaded). For each map, read a control card which sets the map scale and the area. The number of occurrences is summed in a matrix of 43 x 98 squares and the final totals are printed out line by line. The printout gives the number of occurrences in each of the 4000 small blocks, to a scale which can be overlaid on a map of the city.

2.2 Map with Cross-hatch:

Maps are plotted as in the basic program and density of occurrence in each small square is shown by a coded cross-hatch symbol, instead of a number. The symbols chosen and the range of numbers for each symbol are entered on data cards.

2.3 Maps from Disk Files:

Examine all CIRS records on the storage disk, select all with valid coordinates and transfer the numeric data to a scratch disk. For each map to be plotted, read in a control card which sets the map scale, the area mapped, the complaint codes, months and year for the data used.

2.4 Time-Variable Maps:

The data are sorted according to day of the week and time of day and several maps are plotted comparing, for example, distribution of incidents on Fridays from 4 to 8 P.M. with that on Mondays for the same hours.

3.0 PROGRAMS TO CALCULATE GEO-COORDINATES

3.1 Midblocks:

To locate a point 200 feet north of an intersection, for example, the program would first locate the intersection, then find which of the neighboring intersections is northward from it, locate a point 200 feet intersection, and punch a new data card with the coordinates of that point.

3.2 Street Addresses:

Several hundred address records are read into the computer core. A data tape lists the house numbers at intervals along each street, with the corresponding coordinates. The program finds the pair above and below the given address, calculates the coordinates as a fraction of the distance between the end coordinates, and punches out a new card. (This is similar to the Dime File Admatch program)

3.3 Intersection:

Several hundred address records are read into the computer core. A street data tape is run to check the spelling of all street names and assign identifying numbers. The numbers are combined to identify valid intersections. An intersection data tape is run to check the combination numbers and cards are punched with the proper coordinates.

4.0 TABLES AND FILES

4.1 Name File:

From the CIRS master disk file, take all address records with arrestee name records for certain crime categories. These records are stored on a tape and can be sorted in several different ways and printed out in arrest lists for various categories and periods of time.

4.2 Stolen Cars:

A complete list of stolen cars is taken from the storage disk and put on tape. Recent thefts are taken off, sorted by make, and printed on a "hot list". The complete line can also be printed out from the tape.

4.3 Lennie List:

Individual accident records are sorted geographically and then listed out for each square, 1000 x 1000 feet, over the area of the city.

4.4 Tommy's File:

Several hundred accident cards are read into core. The old tape of the file is read, listing all street intersections in geographic order with the old accidents cross-filed, and it is copied on a new tape, with the new accidents filed. Mid-block accidents are filed under both streets of the nearest intersection and those at a street address are filed geographically between the intersections on each side.

4.5 Table of Accidents and Traffic Tickets Vs. Time of Day and Day of Week

A table with 14 lines and 24 columns shows, for each day of the week and each hour of the day, the numbers of accidents and of traffic tickets given out, with totals for all rows and columns.

5.0 SPECIAL INVESTIGATIONS

5.1 Snatch:

Find CCB calls for various classes of crime on streets in the central part of the city. For those incidents, calculate coordinates to plot maps.

5.2 Kenny:

Find number of CCB calls to each patrol car for various classes of crime, for specified hours of the day and days of the week.

5.3 Cars:

Find number of calls and time spent on calls by each patrol car. (Time-Exception File)

5.4 Bikes:

Analyze CCB cards to find number of calls sent to 3-wheel bikes.

5.5 Accidents in Intersection File:

The names of two intersecting streets are entered on cards and the program sorts the list of all accidents and stores and prints out:

All accidents along the whole length of Street A
All accidents along the whole length of Street B
Accidents involving the two street names (near the intersection)

6.0 FILE MAINTENANCE PROGRAMS

6.1 Warrants on Tape:

Read warrant cards and list them on tape, with the record spread out for easier reading.

6.2 Drivers on Tape:

Read drivers cards and list them on tape, editing numeric data to avoid blank spaces.

6.3 Update Driver's Tape:

Transfer drivers list from an old tape to a new one with some cards deleted, then to a third tape with new cards added.

Several of these specialized programs for tape files have been written. They are used with the standard utility sorting and listing programs to give frequent listings of our files, sorted in various ways to emphasize different phases of the information.

7.0 DATA CHECKING AND EDITING PROGRAMS

7.1 Check Card File:

Inspect a list of cards to find which are missing and which are duplicates and print out text of bad ones or indicate those missing.

7.2 Check Combination Numbers:

The tape listing streets, with their assigned numbers, is read into core, and the intersection data tapes, with the combination number for each intersection, is read. The combination number is re-calculated, and if the old number does not agree, an error card is printed out.

7.3 Coordinates on Tape:

Read cards and list on tape with numeric date edited and digitized by replacing alphabetic errors with zeros.

7.4 Check Coordinates vs. Street Address:

A series of data records with street addresses and coordinates along each street is checked by calculating and printing out successive changes in house number, x-coordinate, and y-coordinate. An unusually large change or a change in sign of the increment in each one indicates an error.

Numerous small check programs of the above types have been written.

8.0 PROGRAMS FOR FACIT TYPEWRITER

8.1 FacitA:

Read a record of unspecified length from a 7-track tape, put into a format of 1024 characters, fill out with high-value symbols, and print on eight lines of 128 characters each.

8.2 FacitB:

Read a record of unspecified length from a 7-track tape, put into a format of 2400 characters, fill out with high-value symbols, and punch thirty cards of 80 columns each.

8.3 FacitC:

Read a record of unspecified length into a format of 1024 characters, filled out with high-value symbols. Edit and re-format as CIRS address and name records, using typewritten symbols to indicate new lines and words and data cards to specify record formats, with numeric data right-justified and alphabetic data left-justified. Punch address and name cards for each complaint.

8.4 FacitF:

Free-form program: Read a record of unspecified length into a format of 1024 characters, filled out with high-value symbols. Edit and re-format as CIRS address and name records, using the spacing of words in boxes on the typewritten form to indicate new words and records and data cards to specify record formats, with numeric data right-justified and alphabetic data left-justified. One address card and any number of name cards are punched for each incident.

8.5 FacitG:

Tabulation Program: Read a record of unspecified length into format of 4091 characters, filled out with high-value symbols. Edit and re-format in tabular form, using tab key and carriage return to indicate tabulated items and data cards to specify output formats. Numeric data can be right-justified and alphabetic data left-justified. A card is punched for each line of the table.

9.0 PUNCHING SPECIAL PURPOSE CARDS

9.1 Punch sequential numbers on CCB cards.

9.2 Punch asterisks to signify guide cards for Tommy's file.

9.3 Merge driver's names with address cards to make driver's name file for automobile accidents.

9.4 Edit cards with names punched together to separate first and last names and list in tabular form.

9.5 Examine total list of CCB cards and punch copies of those with certain code numbers to form a new file.

Several other special punch programs similar to these have been written.

APPENDIX 1C

HUMANS SYSTEMS

In much the same fashion, as hardware configurations computer systems require sophisticated human configurations to prepare the necessary data, to input the data, to supervise and maintain the machines, to retrieve the information, to distribute the data and finally to utilize same. The organizational changes necessitated by automated data processing (ADP) systems present a much more difficult problem to both the planner and researcher than mechanic systems. The state of the art in hardware is much more advanced than that pertaining to human organization. This knowledge is readily available through the army of salesmen who periodically descend upon any likely client. Hardware is also seldom perceived as a threat save in those areas directly affected by its appearance (i.e.: record rooms). There is no immediate impact on the more peripherally related divisions.

In contrast, human systems as noted above, do not have the extensive knowledge base of hardware systems. The knowledge that does exist is not extremely transferable. Organizational and personality factors of individual police departments render "universally applicable" human systems somewhat less than "universally applicable." In addition, the opposition of long-standing organizational structures to necessary change poses an even more frustrating problem. Not only is it more difficult to determine human system needs but it is also more difficult to gain acceptance of human systems.

The following pages will briefly describe the organization involved in the Case Incident Reporting System. Each input will be traced from its initiation throughout the entire system to its ultimate destination within the police department. This same description will be presented in flow charts at the conclusion of this section.

RECORDING DATA

Much to the chagrin of many police administrators, the majority of police activity comes in response to public requests for assistance. A tremendous volume of calls, many of them not dealing with law enforcement at all, is directed daily to a police department. These calls are most generally channeled through a command and control center or a Central Complaint Bureau. The bulk of the information stored in the CIRS began at one time or another as a call to the New Haven Police Department's Central Complaint Bureau. (CCB). The CCB has one and sometimes two dispatchers and six complaint clerks. The dispatcher(s) sits in the front of the CCB room facing a large map of the city complete with lights to indicate the availability of individual cars. Behind the dispatcher(s) sits the complaint clerks on each side of a conveyor belt which extends from the last clerk to the dispatcher. When a complaint is received, the clerks record on an IBM card the:

1) Street
2) Street Number
3) Incoming code or supposed nature of complaint according to criminal code
4) Date of the incident
5) The time received at CCB
6) An incident number (pre-punched)

The CCB card is then sent along the conveyor belt to the dispatcher. This process requires less than a minute. When he receives the completed complaint card, the dispatcher locates the available car nearest to the scene. He stamps the time at which the unit was dispatched on the CCB card. When the patrolman arrives on the scene he notifies the dispatcher who records the time on the CCB card. At the completion of the investigation, the patrolman radios in:

1) His unit number
2) The clear code or actual nature of the incident
3) Whether or not a report is required

The dispatcher records the information and the time at which the incident was cleared (i.e.: investigation complete). A similar procedure is followed when patrolmen break for meals and vehicle service. The dispatcher records the time when the car is out of service and the time at which it returns on an incident card. Each transaction or incident is handled in the same fashion. Even in cases where the action is initiated by the patrolmen they must notify the Central Complaint Bureau and receive a complaint number. The resulting CCB cards are the initial data to be inputted into the CIRS.

Each morning the CCB cards from the previous day are collected by Record Division personnel. The cards are examined to ensure that there are no cards from the current day and the remaining cards are brought to the City of New Haven's Data Processing Center. Here several additional sorts are made. Cards with previously assigned complaint numbers are rejected. Cards with newly assigned complaint numbers are separated into those pertaining to incidents and those completed for lunch and service exceptions. Incident cards are sorted into numerical order by complaint number. Both groups of cards are brought to the Records Division of the New Haven Police where all information is keypunched on new cards daily. These cards are returned to the data center where an IBM printout is made in three sections - a listing by complaint number, incident code or type and patrol car. The Record Division retains a copy of two sections in order to check incoming reports. The list by car number serves as a check that each officer has returned the appropriate number of incident reports. The lists by incident number are used as a check in the event of a mistaken complaint number or address.

The processing of CCB cards marks the first stage of data collection for the CIRS. The CCB card, while it does provide a rudimentary indication of daily activity and a basis for quality control, it does not furnish all the information essential for police work. It remains for the police field divisions (i.e.: patrol, traffic and the Detective Bureau) to elaborate on the incident cards in their daily reports. In the above description of the dispatching activity each patrolman is required to inform the dispatcher of the report required at the time of clearance. In all cases, the officer must provide a description of the incident and his role in same. In the New Haven System, patrolmen make their reports on the newly instituted Case Incident Reporting Form (CIR Form). This semi-structured form includes a complaint number, street number, street name, intersection, reported offense, cleared offense. sector unit, date of incident, time of complaint, time of dispatch, time of arrival, time of clearance and a small narrative section. The form has a carbon backing and provides the original and three copies. This arrangement was initiated slightly before the advent of CIRS in an attempt to improve the quality of reports by means of the semi-structured format and to reduce copying cost and effort through self-duplicating forms. Both administrators and patrolmen are pleased with this format.

QUALITY CONTROL

At the end of his tour of duty each patrolman brings his reports to the Records Division retaining one copy of the report for his personal files. The remaining copies of the report are sent to the Detective Division. It should be noted that detective and plain clothes reports are dictated, typed on CIRS forms and given directly to the Detective Bureau. From this juncture onward, however, they follow much the same procedures as patrol reports. A second copy of the CIRS Form is removed at the Detective Division and used both as a management tool in assigning cases and as an investigative tool to review the nature and volume of criminal activity in the city. The second copies are returned to the Record Division where they are sorted into felonies and misdemeanors. The reports on felonies and other serious crimes are transcribed to a 3" x 5" card file and the copies returned to the Detective Division. The second copy of the CIRS Form dealing with misdemeanors is discarded. This sorting by seriousness of offense is obviously not necessary for reports from the Detective Bureau. The third copy of the CIRS Form is sent to any other criminal division involved (e.g.: traffic on a crime with a motor vehicle violation). The final section of the form is kept by the Records Division quality control officer.

The quality control officers review the CIRS Forms and the CCB printouts to ensure that:

1) All incidents are reported upon

2) All information is complete and consistent and,

3) To make additional inputs from the report narrative

The first two functions are accomplished by cross referencing the CCB printouts with the CIRS Forms. If a form is incomplete or missing, the information is entered by the quality control officer from the CCB printout. A copy of the Missing Report Sheet on which this data is entered is sent to the appropriate Division Commander. On a routine basis the quality control personnel make additions on the basis of the CIRS Form narratives. One such addition is the "known resister" classification. If during the course of arrest the arrestee provides resistance to the arresting officer, this behavior is to be included in the report. The quality control officer notes this description and codes it for entry into the system. At several points in this research,quality control personnel have made additions far beyond their scheduled duties. In one instance, the officer in question associated two separate descriptions of one individual to aid in an ongoing investigation. One description pertained to an offender who was wanted,the second to complainant. The officer remembered the decriptions from his quality control duties and notified the Detective Bureau. In a second case, the same officer noticed a large number of similar complaints from the same address. He queried the system and found approximately twenty similar incidents for which there was no substantiation by the reporting officers. The officer reported this peculiar situation to the Patrol Division.

The Central Complaint Bureau and incident reports are only one source of data for the CIRS. Uniform Traffic Tickets (UTTs), parking tags, accident reports and arrest warrants are also inputed, though not into on-line storage. At the end of each tour of duty, the patrolman turns into detention all records of moving violations (UTTs) occurring in that period. The UTTs are then taken to the

Records Division where the information from ticket stubs is keypunched on IBM cards. The cards are then processed at the city data center and the traffic tickets sent first to detention and then to court. Two copies of the UTT printout are produced. The first is kept by the Record Division for checking reports. The second is sent to the Traffic Division for their files. The IBM cards used in processing are stored in the Records Division for possible use in future mapping programs.

Accidents reports are processed in a fashion similar to that of incident reports. All accident report terms and statements are sent from the Traffic Division to the Records Division where they are reviewed by quality control personnel. The officer separates minor and major accidents. All vital information is recorded in the Daily Accident Log and all reports are checked for accuracy and completeness. As in the case of incident reports, any erroneous reports are returned to the appropriate division for correction. Complete reports are transcribed onto IBM cards. The cards are verified and processed. The resulting printout is sent to the Records Division and the city's traffic and parking division. The accident reports are kept on file in the Records Division.

The processing of parking tags is more a function of the city than the New Haven Police Department but, here as in other cases, the time-sharing arrangement in the CIRS makes such distincts rather difficult. At the close of each tour of duty, traffic personnel submit ticket stubs to the Traffic Division where they are recorded in a ledger. The stubs are then forwarded to the data center where they are keypunched onto cards. A computer program correlates the tickets with the appropriate registration information from the city comptroller's files. The tickets are sent to the city's Tag Division for payment. When the fine is paid, the card is removed from the deck. If the fine is not paid the next processing will indicate those still in violation and notices will be sent. After the second warning, the tags are sent to the court and a summons issued.

The final source of input for the CIRS is the warrants from the Sixth Circuit Court. Upon arrival in the police Records Division, the warrants are checked for complaint number and type (e.g.: housing, health, probation, out of town, out of state, etc.). The warrants are made part of the defendant's record and assigned to the appropriate division according to severity of the offense. All misdemeanor warrants are sent to the Patrol Division where they are assigned and filed. All felony warrants are assigned to a detective whose name is included in the defendant's folder. All warrants are recorded on Warrant Index cards. An IBM card is punched from the index card and a printout produced indexing warrants by date, subject, officer or its "open" status (i.e.: yet to be served). The IBM and warrant index cards are kept on file.

PROCESSING

Once the data has been received, checked for completeness, keypunched and inputed, it is sorted and stored in the computer and secondary storage units. The incident reports are stored in several on-line files referenced by:

1) Incident code
2) Name
3) Address
4) Geo-coordinate location

The exact content of each file is explained under file inquiries in Appendix # 1B The accident reports, traffic tickets and warrants are stored off-line on cards or magnetic tape. The tasks necessary for file design, construction and maintenance are carried on by Dr. Hannun of the New Haven Police Department, the city data processing staff and an occasional consultant. File design requires weighing the potential information needs, available information, fiscal and human resources. The end product of this exercise should be a format specifying information form and content within the existing fiscal constraints. File construction entails the writing of programs which will direct the computer to perform the sorting and indexing necessary to comply with the file design. The various files are maintained by programs written to check, edit and update the data fed into them.

In addition to storing data, processing includes the manipulation of same into those forms most useful to the recipient. Storing data in files such as those mentioned above is one method of arranging data. It is used primarily for on-line accessing of information since teleprocessing language is too cumbersome to allow for extensive manipulation of data. Because of its relative economy most information is manipulated or processed by "batch" techniques. Batch processing can be differentiated from on-line access by both its method and its speed. On-line processing simply activates a program in core storage and can therefore produce information instantaneously. In batch processing the source program must be inputted into core storage. The computer must first read what it is to do and then do it. It is, therefore, somewhat slower than on-line processing. It is much cheaper however since it uses less core storage space.

The role of the police department's computer analyst in on-line processing is minimal save in the file design, construction and maintenance mentioned above. System users can manipulate data through various input and output mechanisms without utilizing the skill of the processing staff. Batch processing, on the other hand, requires the constant services of the Police Analysts. New programs must be developed and old programs must be adopted to keep pace with the expanding needs of the department. The development of new routines or programs usually begins with the presentation of a problem by the line personnel. The department analyst is charged with the development of a solution and the translation of this response first into machine functions and finally into computer language. Once developed, the program must go through an often tedious process of perfection or "debugging" before it can finally be used. Programs, once written, are subject to continuous adaptation in language and often logic as the user finds that the routine does not exactly fulfill his need or that the nature of his need itself has changed. Even those programs perfectly suited to a problem must undergo alteration at each processing since the changing data base must be described differently each time. In addition, the police analyst must "run" or operate the machine for programs both old and new. He must place both his control cards (i.e., program) and the essential data in the machine and supervise its processing.

OUTPUT AND USAGE

The demand for information within the New Haven Police Department is increasing daily. At present, more than five divisions of the New Haven Police Department, two city agencies and two federal agencies receive output from the CIRS on a routine basis. Countless additional clients such as employers, insurance companies,

and law enforcement organizations utilize the system for arrest record checks on a daily basis. The majority of output is designed for internal usage and is accessed directly through visual displays and terminal printers or on a batch basis through Dr. Hannum. The nature of information and the retrieval mode depends of course on the needs of the client division.

The Detective Bureau requires both direct inquiries and batch programs to assist investigative efforts. The terminal in the Bureau allows detectives to access a vast amount of information instantaneously rather than plodding through manual files. The most ambiguous of leads such as a first name, an address or alias can be pursued with a minimum of effort. Crime specific maps produced on a batch basis are used to identify crime patterns and thereby allocate detectives and most specifically special service undercover units such as the Street Crime Task Force. By following and even anticipating the movement of certain criminal activity these squads more effectively apprehend offenders. An available but seldom used resource from the system is a "modus operandi" (MO) file which lists all crimes of a certain type (e.g., rape). Actually a true M.O. file will not only list crimes of a certain type but also the criminal methodology or other characteristics peculiar to certain known perpetrators. The assumption being that for some crimes and especially the psychotic (i.e., rape, child molesting, etc.) or "professional" (i.e., burglary, robbery, 'safecracking') crimes these files would provide lists of suspects. In spite of its deficiencies the New Haven M.O. file could considerably facilitate the process of locating potential suspects.

Deputy Chief Hienz and his staff supervise the entire range of services provided by the New Haven Police Department. In doing so they rely on several printouts provided by the Records Division on a daily basis. The Time-Exception File lists all incidents or complaint calls from the previous day by patrol cars. This file also contains the nature of the complaint, the time the call was received, the time the car was dispatched, the time the car arrives and the time the complaint was cleared or settled. The time between the receipt of the call to the arrival of the patrol car at the scene (i.e.: response time) is recorded by the computer and compared against a standard (i.e.: 5 Min.) set by Chief Hienz. Any exception to this standard must be explained to the Chief by the offending patrolman. The same procedure is followed for 'clearance' time or the interval between arrival and reported clearance.

Aside from response to calls the only legitimate reasons for a patrolman to be "out of service" or not available to respond are lunch breaks or stops for car service. The Deputy Chief is kept informed of this activity through a Lunch and Service Report produced each day. Similar to the Time-Exception File, all cars are listed and the allotted lunch and service times are compared to the actual behavior of the patrolmen. Any deviation from the norm must again be justified to the Chief. Occasionally tow truck service is monitored in the same fashion. The dispatched and arrival time of tow trucks is recorded and any exceptional delays in service are noted.

The Traffic Division and the City of New Haven's Department of Traffic Engineering have the longest history of usage. The system began with a federal Traffic Grant and an arrangement with the UniRoyal Company. In general, the several listing and mapping programs are used to monitor accidents and traffic law enforcement throughout the city. The files listing accidents by intersection, mid-block and within 1,000 ft. of an intersection provide the traffic engineers with some indication of where engineering improvements might be warranted. Similar-

ly, the police are aware of locations which may be in need of stricter enforcement efforts. The mapping programs simply convert the lists into more easily interpretable form. In addition the Traffic Division receives a mapping of all tickets issued for moving violations at least three times each week. This program allows the division commander to oversee enforcement efforts city-wide and to encourage the recalcitrant. Another mapping program juxtaposes the enforcement efforts in the form of traffic tickets and accidents enabling the police and the engineers to determine whether engineering or enforcement is lacking.

The Patrol Division can access the data system by on-line inquiries through the Central Complaint Bureau (i.e.: dispatcher) and by batch processing through Dr. Hannum. On-line usage by patrolmen is generally restricted to stolen car inquiries. A sample of the computer log indicated that on the average approximately fifteen patrol inquiries are made daily and the majority of these are checks on suspected stolen cars. For a variety of reasons which will be treated in a later section there has been little use of the incident, name or address inquiries when patrolmen are dispatched to a call. Occasionally, the Patrol Division has received crime specific maps of the city for a twenty-eight day period (i.e.: one shift). This map is designed to assist shift and sector commanders in allocating men in their charge. The burglary activity during the past twenty-eight days will provide some indication of the pattern of offenses and allow the supervisors, within the restrictions of the patrol plan, to deploy their men in the most appropriate fashion. This is not done on a regular basis however. The Patrol Division receives no other data from the CIRS.

The Planning and Budgeting Division receives little data on a routine basis. Their needs are varied and constantly changing. The most consistent outputs used are crime specific maps for planning and evaluative purposes. Possible future uses and a detailed explanation of the existing patterns will be explored later in this work.

Far and away, the division most involved with the computer system and its output is the Records Center. In addition to supplying all the reports mentioned above, the Center must maintain the system and provide data for external agencies. The two terminals in the Records Division service approximately 85% of all police originated transactions. And 85% of those transactions undertaken from the Records Center are devoted to the maintenance functions of adding and updating existing records. The needs of external client agencies are generally serviced through batch processing. The National Safety Council's annual and monthly reports, for instance, are compiled with the aid of printouts listing all accidents by driver's name.

APPENDIX 2

COST/EFFECTIVENESS MEASURE FOR CIRS

This measure assumes that the total function of the Records Division can be reduced to the retrieval of information for clients. The receipt, quality control, inputting, storage, location and communication of data are subsumed in the retrieval of information. Failure in any one of these areas would be reflected to a greater or lesser degree in the volume of data retrieved from the system. In addition, since inaccessible information is useless, retrieval, in and of itself, is the primary function of the police Records Division. Given this assumption, the improvement of the New Haven Records system will be expressed in the change in the volume of records retrieved over time. The greater the volume of records provided to clients the better the performance of the Records Division.

In order to determine the monthly volume of information provided by the New Haven Police Department Record Division before and after the Case Incident Reporting System, two simulated months were constructed from annual statistics. The simulation was based on approximately one twelfth of the volume of records retrieved in 1969 and in 1972. Output from the Records Division was reduced to the common denominator of an inquiry. An inquiry describes the action of locating, retrieving and recording the data requested. Each time this operation is conducted constitutes an inquiry. Inquiries, so defined, are recorded in two specific formats - record checks and written reports. The volume of inquiries resulting from record checks is generally not recorded and therefore must be estimated by Records Division personnel and checked by observation of these same individuals. Written reports are generally available and the volume of inquiries can be obtained by examining them. Very often, however, the final reports do not indicate the number of inquiries required. The written statement that 5 percent of all murders occur between 12:00 A.M. and 8:00 P.M. for instance may have required some 600 inquiries. In order to translate reports into inquiries the incidence of each report per month was determined and weighed according to the average monthly volume of records required for its production. Tommy's file which is produced monthly would be recorded as 1 X average monthly volume of accident reports. The following table simulates the monthly volume of reports prior to and after the institution of CIRS.

(SEE FOLLOWING PAGE
FOR TABLE)

MONTHLY SIMULATION OF RECORD RETRIEVAL BEFORE AND AFTER THE CASE INCIDENT REPORTING SYSTEM

PRIOR TO CIRS				AFTER CIRS			
Report	Mo. Incidence	Volume	Total	Report	Mo. Incidence	Volume	Total
Record Checks	20	340*	6,800	Record Checks	20	340*	6,800
National Safety Council	1	530+	530	National Safety Council	1	622[2]	622
FBI(p.1) Reports	1	656[1]	656	FBI Reports (p.1)	1	629[3]	629
				Traffic Accidents	1	622	622
				"Modus Operandi" File	1/3	1,086[4]	362
				Crime specific maps	1/6	3,775	629
				Crime specific maps comparing year	1	629	629
				Uniform Traffic Tickets	12	78[4]	936
				Time Exception File	30	300[5]	9,000
				On-Line Usage	30	63[6]	1,890
				Harold's File	1	622	622
				Traffic Accident Map	1	622	622
				List of complaints	30	300	9,000
TOTAL			7,986	TOTAL			32,363

*based on estimates of daily volume by record division personnel

+based on the average yearly volume of accidents for 1968 and 1969

[1]based on the average number of Part I crimes for 1969,1970
[2]based on the average number of accidents reported in 1971 and 1972
[3]based on the average number of Part I crimes reported in 1971 and 1972
[4]based on the average number of "professional" crimes (i.e.: burglary)
[5]based on estimates of dispatching activity as recorded on CCB cards
[6]based on a sample of the CIRS log and including only file inquiries not updates, etc.

The data listed on page 2 indicates that the production of the New Haven Records Division has increased approximately 300 percent since the advent of the CIRS. To be sure, the reconstruction of the pre-CIRS production may be less than complete simply because it relies on the recollection of events several years prior to the research. This bias is more than compensated for by selecting only those reports which are produced on a routine basis. The significant volume of "one-time" or special request programs produced by the CIRS was not included both because it was not amenable to this type of simulation and it would compensate to some extent for the slippage of memory. This computation slights the CIRS further by not weighing the output by the complexity and readability of the various formats. The mapping of crimes, for instance, would not be done in a manual system simply because it would require too much time.

The cost of New Haven Records Division prior to CIRS was based on the police budget statistics for fiscal 1970. The total division budget ($110,819) was divided by 12 to arrive at the monthly figure of $9,235. The computation of total expenditure for January, 1973 is somewhat more complicated in that prior to CIRS since both local and federal funds are involved, initial expenditures must be taken into consideration. In order to determine the monthly cost of CIRS for January 1973, three factors were considered:

1) the current monthly cost paid by the grant
2) monthly budget allocation of the New Haven Police Department Record Division and,
3) the initial cost of permanent improvements prorated by the number of months that the improvement has been functioning

The following table outlines this computation.

(SEE FOLLOWING PAGE FOR TABLE)

MONTHLY COST COMPUTATION PRE AND POST CIRS

PRE-CIRS	POST-CIRS
New Haven Police Department Budget	New Haven Police Department budget + current grant + (item, cost/mo. in operation)
9,235[1]	16,322[2] + 7,648[3] + programming 6484/27[4] = 240 programming 12,000/18[5] = 414 storage expansion 7450/18[6] = 667 1321

=prorated cost=total
1321 17,938

[1]based on total budget for fiscal 1970 divided by 12
[2]based on total budget for fiscal 1972 divided by 12
[3]based on budget of grant A72-93-914 divided by 12
[4]based on programming expenditures from grant A70-93-28
[5]based on programming expenditures from grant A70-93-28C and rounded to nearest dollar
[6]based on storage expansion expenditures from grant A70-93-28C and rounded to nearest dollar

According to the above computations the average cost of producing a single response to an inquiry prior to the automated system is $1.16. In the automated system the average response cost would be $.55. Assuming that expenditures are directly related to output, then to have the manual system produce at the same level as the automated system would require an expenditure of $37,541 or $19,603 more than in the month of January 1973 under the automated system.

Obviously this simulation is not to be taken literally, but as a rough indication of performance. The saving discussed here is a hypothetical or "paper" saving based on projected cost not a real one. However, it does provide a much more interpretable standard of performance than the volume of information produced.

COST/BENEFIT COMPUTATION FOR THE LIFE OF THE SYSTEM

The following simulation employs the format of the monthly computations contained in Appendix 2 with some alterations. The product of the Records Division is again reduced to the common denominator of inquiries. The computation of transactions from written reports and inquiries is essentially the same except for the fact that the 'life' of the report in months must be taken into account. The table listed below indicates the procedures followed.

WHOLE LIFE SIMULATION OF RECORD RETRIEVAL BEFORE AND AFTER THE CASE INCIDENT REPORTING SYSTEM

PRIOR TO CIRS				AFTER CIRS			
Report	Incidence	Inquiries per month	Total	Report	Incidence	Inquiries per month	Total
Record Checks	27	6,800	183,600	Record Checks	27	6,800	183,600
	27	530	14,310	National Sfty.Council	27	622	16,794
	27	636	17,712	FBI Reports	27	629	16,983
				Traffic Accidents	27	622	16,794
				"Modus Operandi"File	4	1,086	4,344
				Crime Maps	2	3,774	1,258
				Crime Maps comparing yrs.	1	1,322	1,322
				Uniform traffic tickets	27	933	25,191
				Time-Exception File	19	9,000	171,000
				Harold's File	7	622	4,354
				Traffic Accident Maps	16	622	9,952
				On-Line Usage	24	1,890	45,360
				List of complaints to the detective division	27	9,000	171,000
TOTAL			215,622	TOTAL			667,952

In the two and one quarter years in which the CIRS has been operational, information production has increased approximately 130 percent from the volume produced in a similar period with the manual system.

The cost for the two and one quarter years of operation can be determined by adding the total federal expenditures from grants A70-93-28 and A70-93-28C and one-half of the total funds allocated under grant A72-93-28-3 as well as the Record Division budget during the period in question.

FEDERAL EXPENDITURES	+	LOCAL EXPENDITURES FY71 FY72 FY73	=	TOTAL COST
$210,000	+	($117,048+195,869+118,559)	=	$641,476

The cost for a hypothetical 27 month period under the manual system is determined by extrapolating from data from fiscal 1970.

DURATION OF SIMULATION IN YEARS	X	FISCAL 70 BUDGET	=	SIMULATED COST
2.25	X	110,819[8]	=	$249,343

A cost/benefit measure for the CIRS was constructed as follows:

(Production under CIRS X $\frac{\text{Production under manual system}}{\text{Expenditures under manual system}}$)

Expenditures under CIRS = Simulated saving

(667,952 X $1.16) - $641,476 =

$774,824 - $641,476 = $133,348

While the actual expenditures for the automated records division are nearly three times that of the previous manual system, when the comparison is made in terms of cost/benefit, there is a "paper" saving of approximately $133,348. To achieve the production level of the automated system in a manual system would require an expenditure of $774,824, assuming, of course, that production and expenditure are directly related to one another.

The following charts describe the human systems which comprise the CIRS. The first chart indicates the flow of data between the divisions and the general processes involved at each juncture. Each component of the chart is numbered. These numbers refer to subsequent charts which depict the function of each division in greater detail.

HUMAN CONFIGURATION - JANUARY 1973

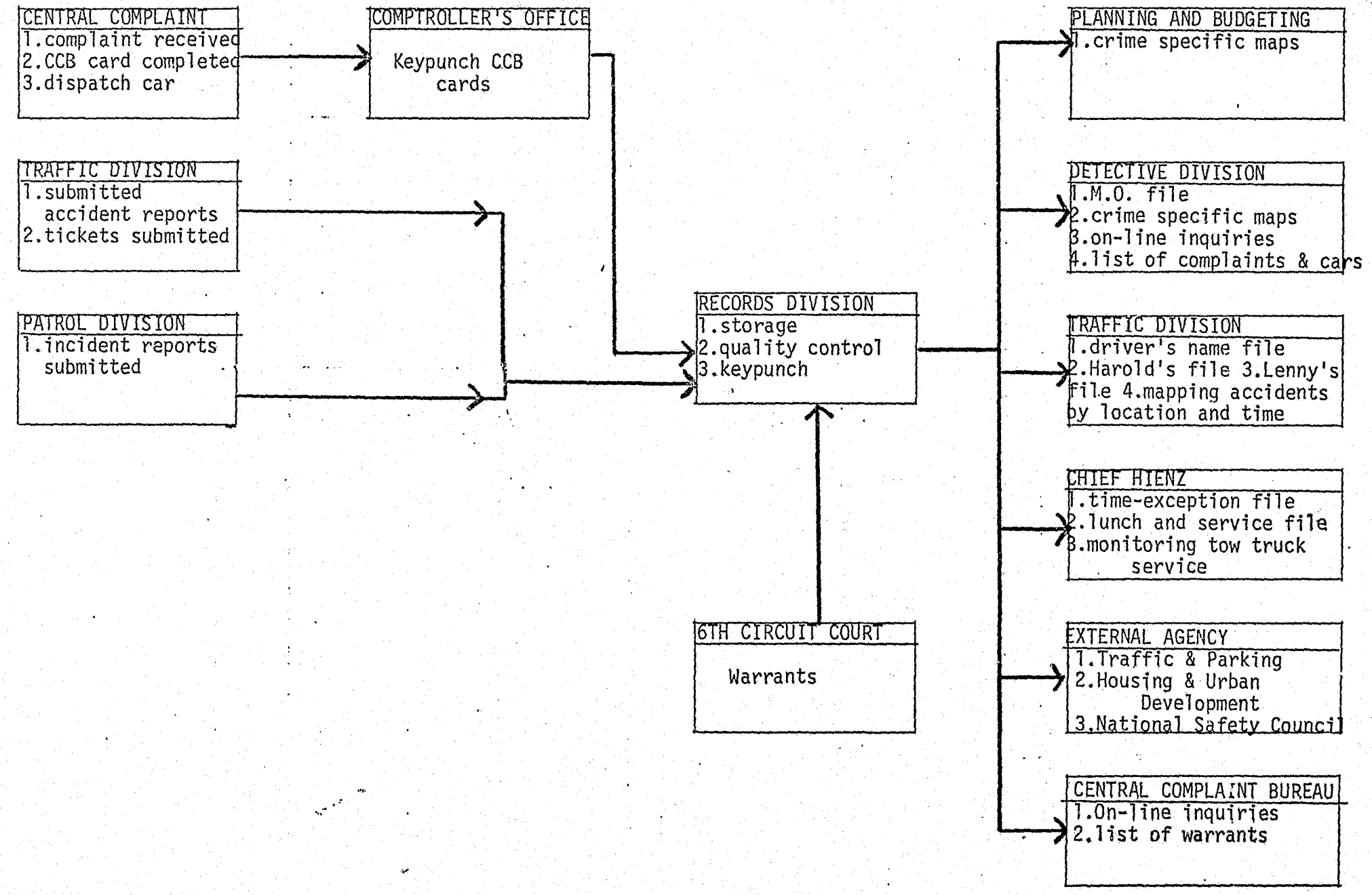


CHART #1

Processing Complaint Calls

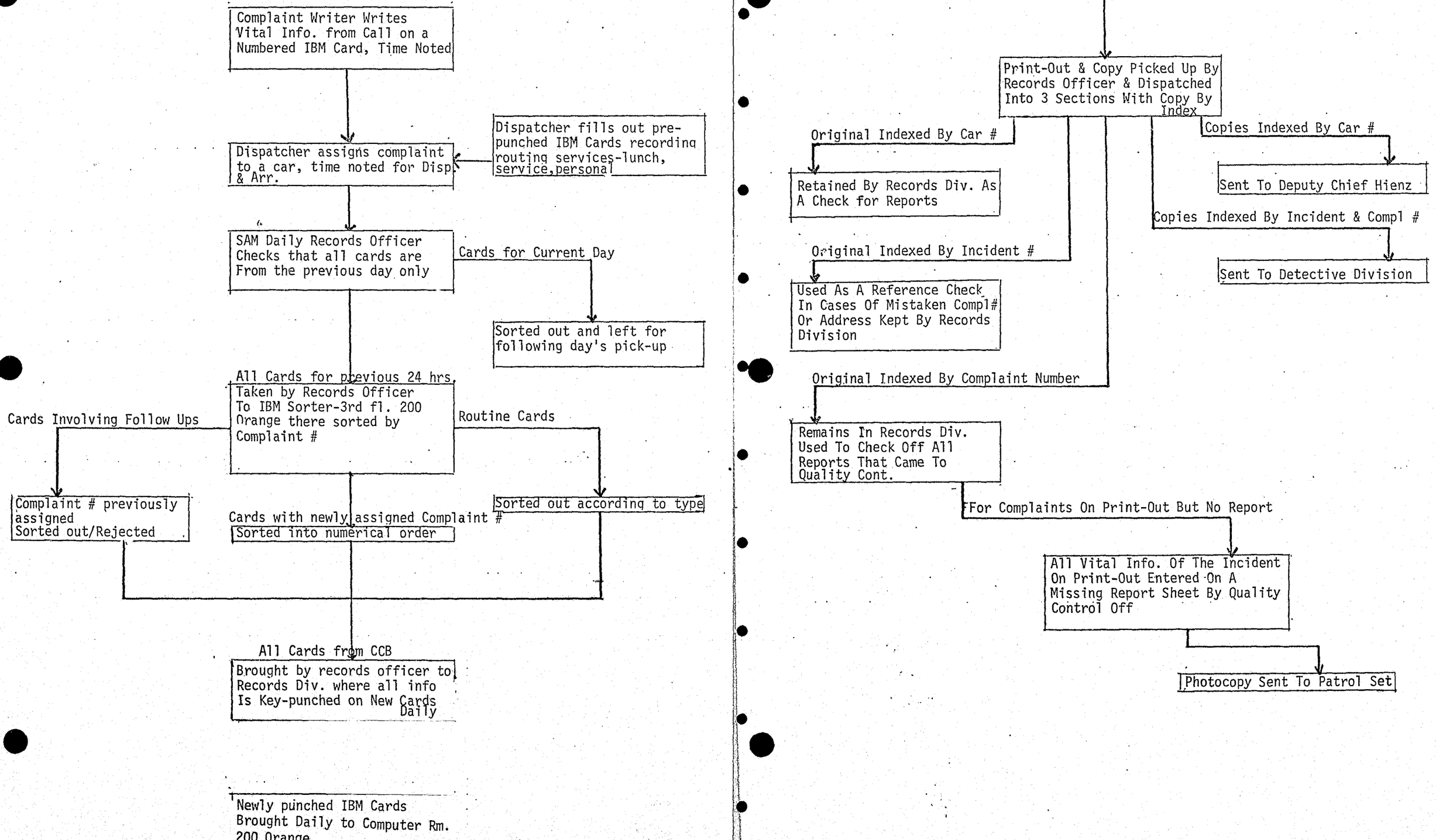
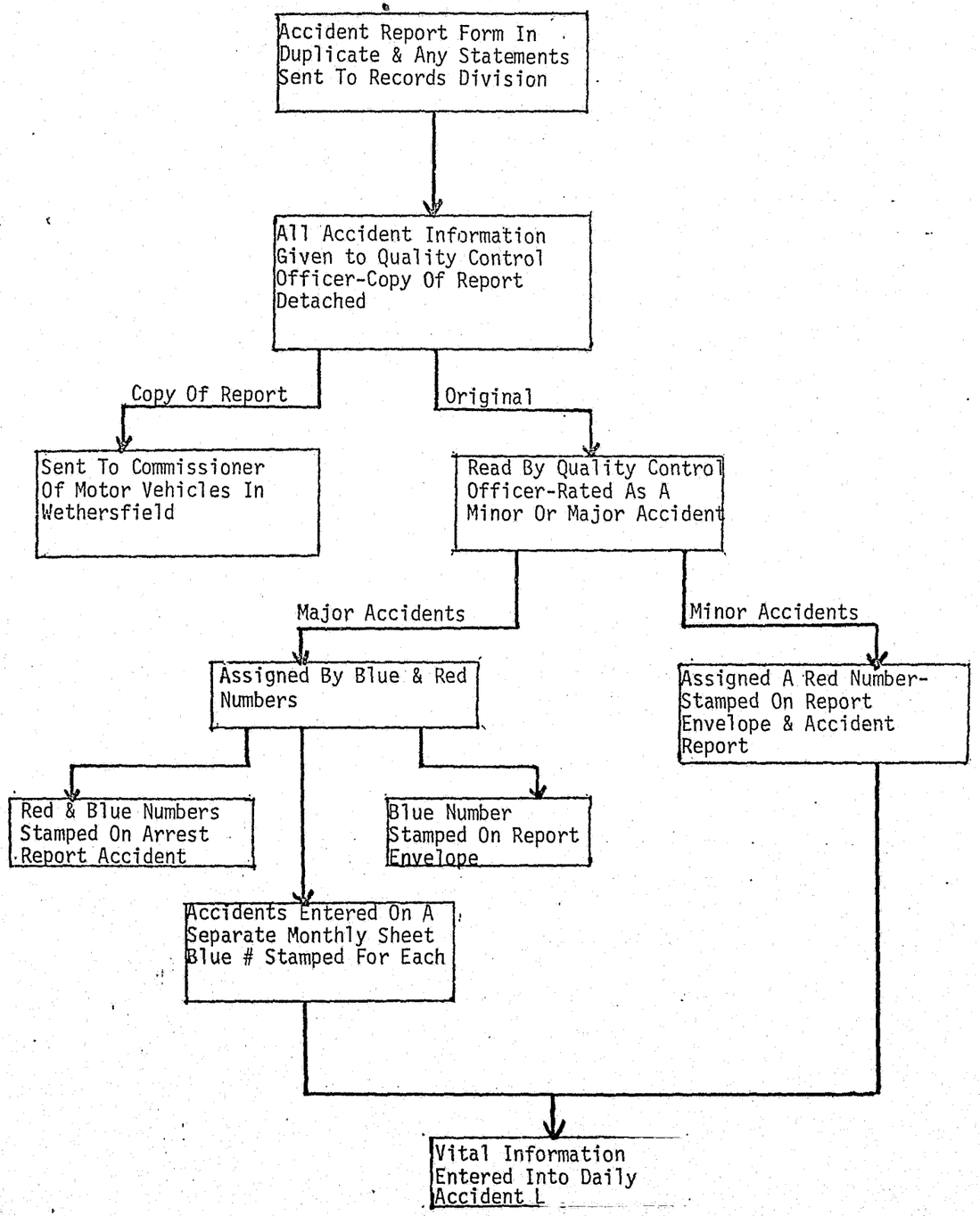
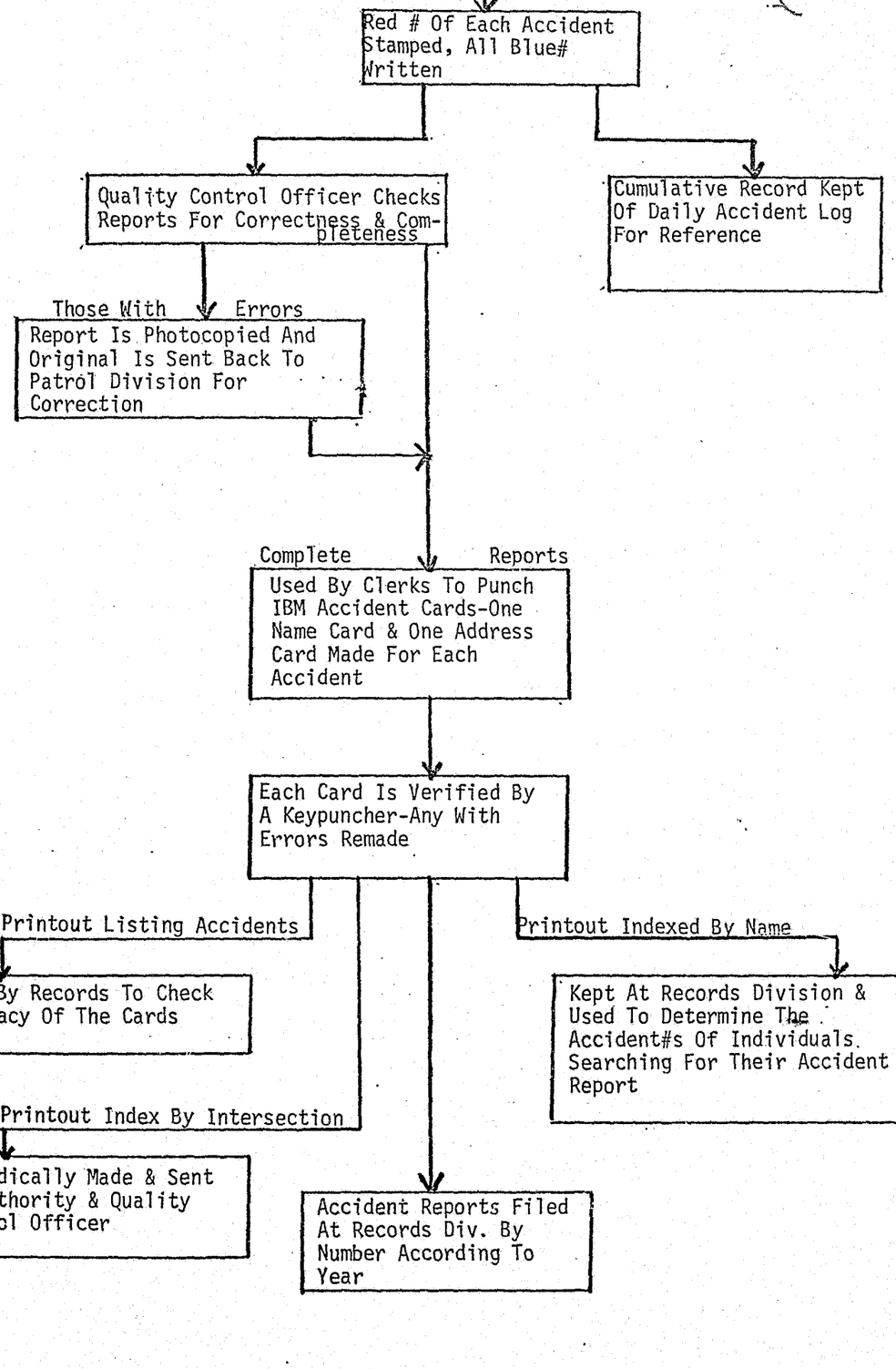


CHART #2

Processing Accident Reports





UTT Processing

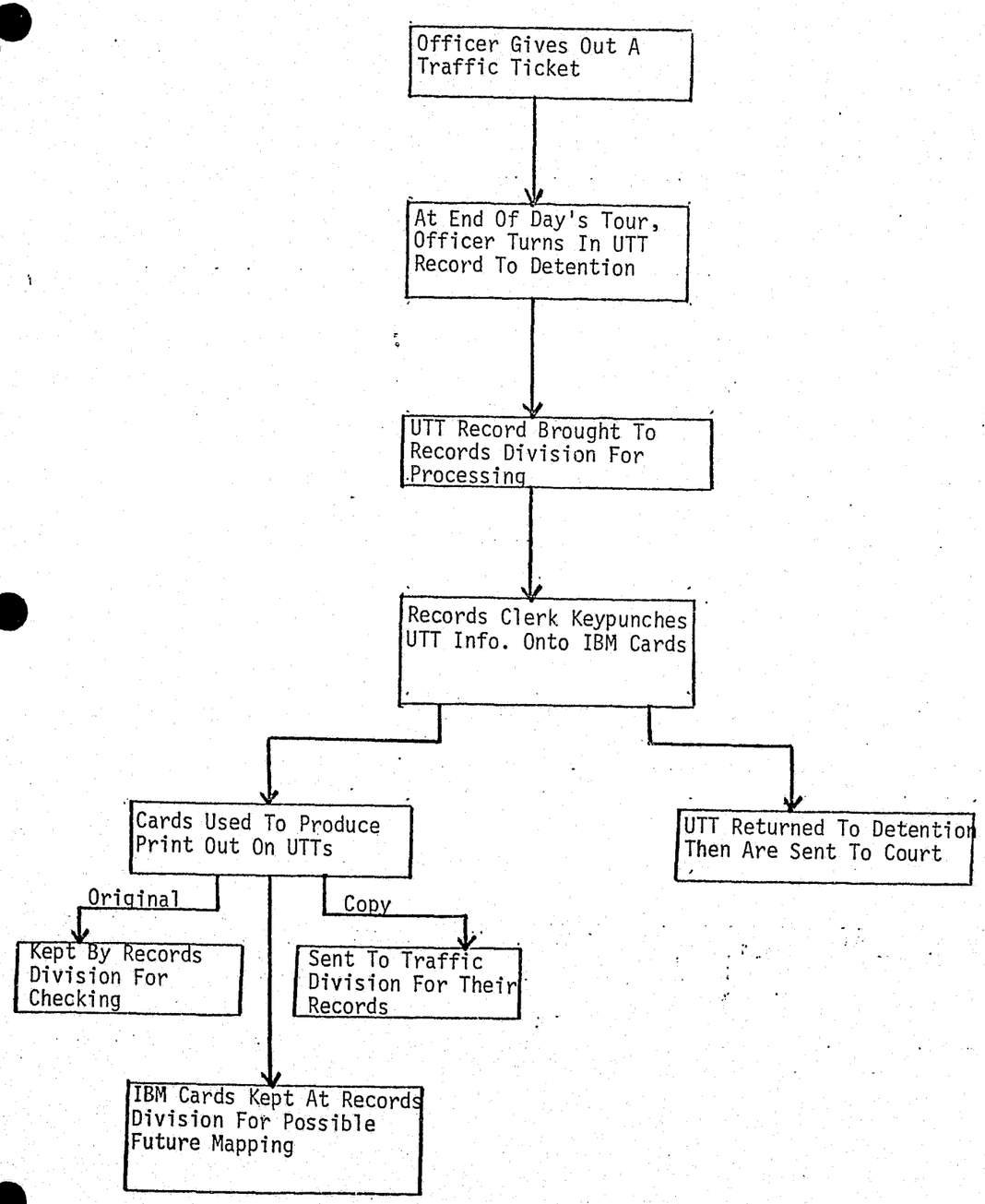
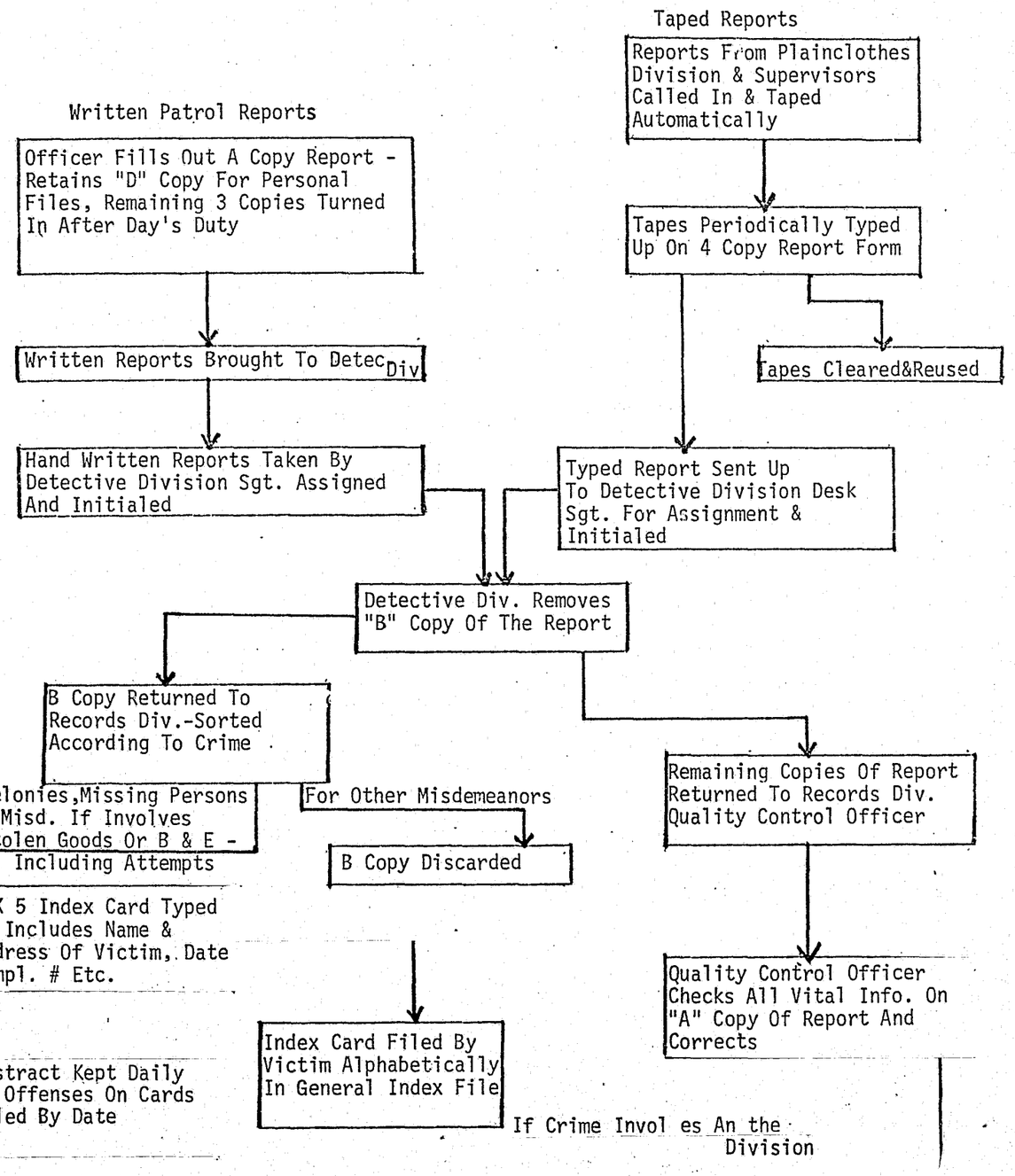


CHART #3

Processing Arrest Reports



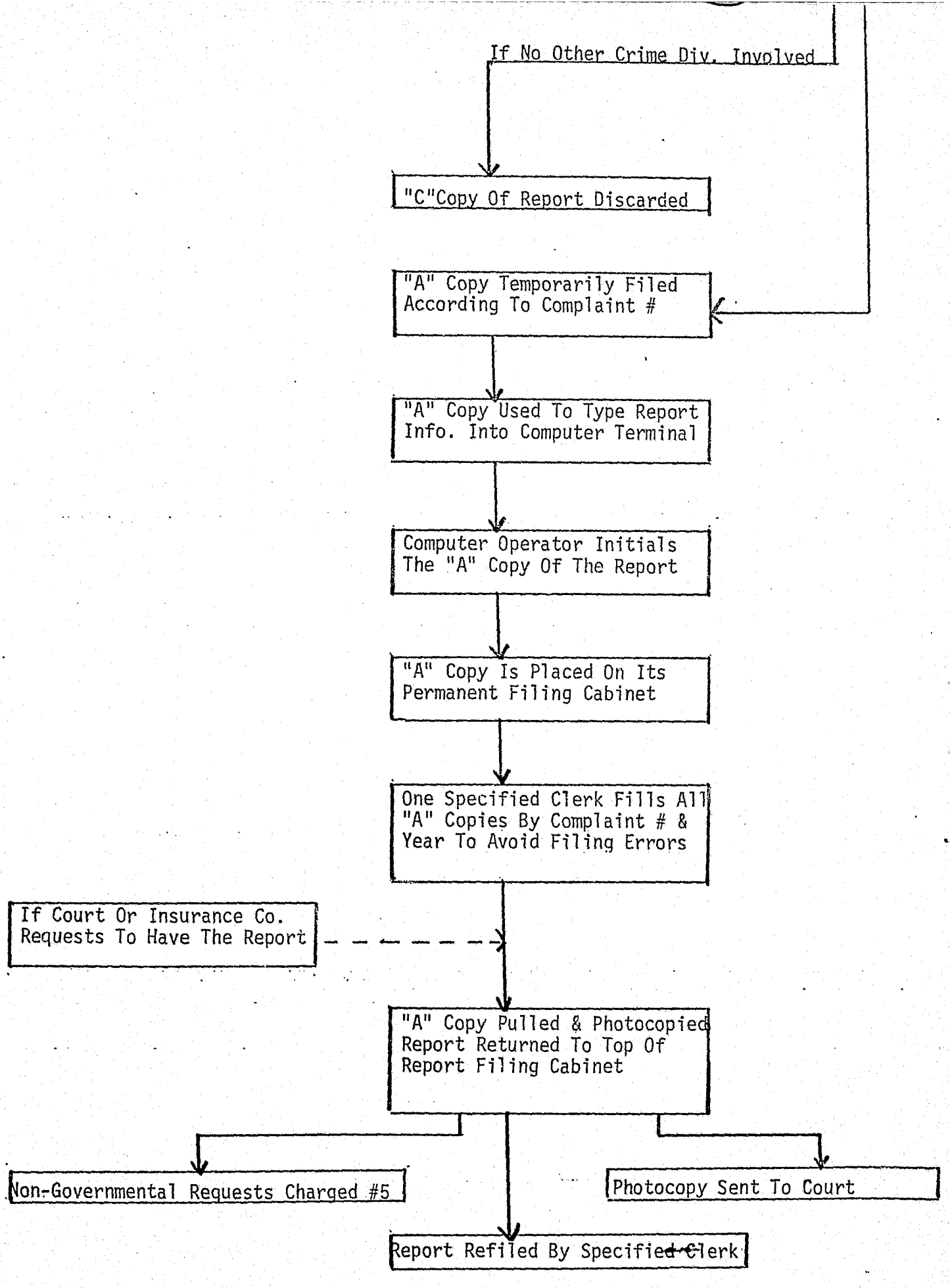
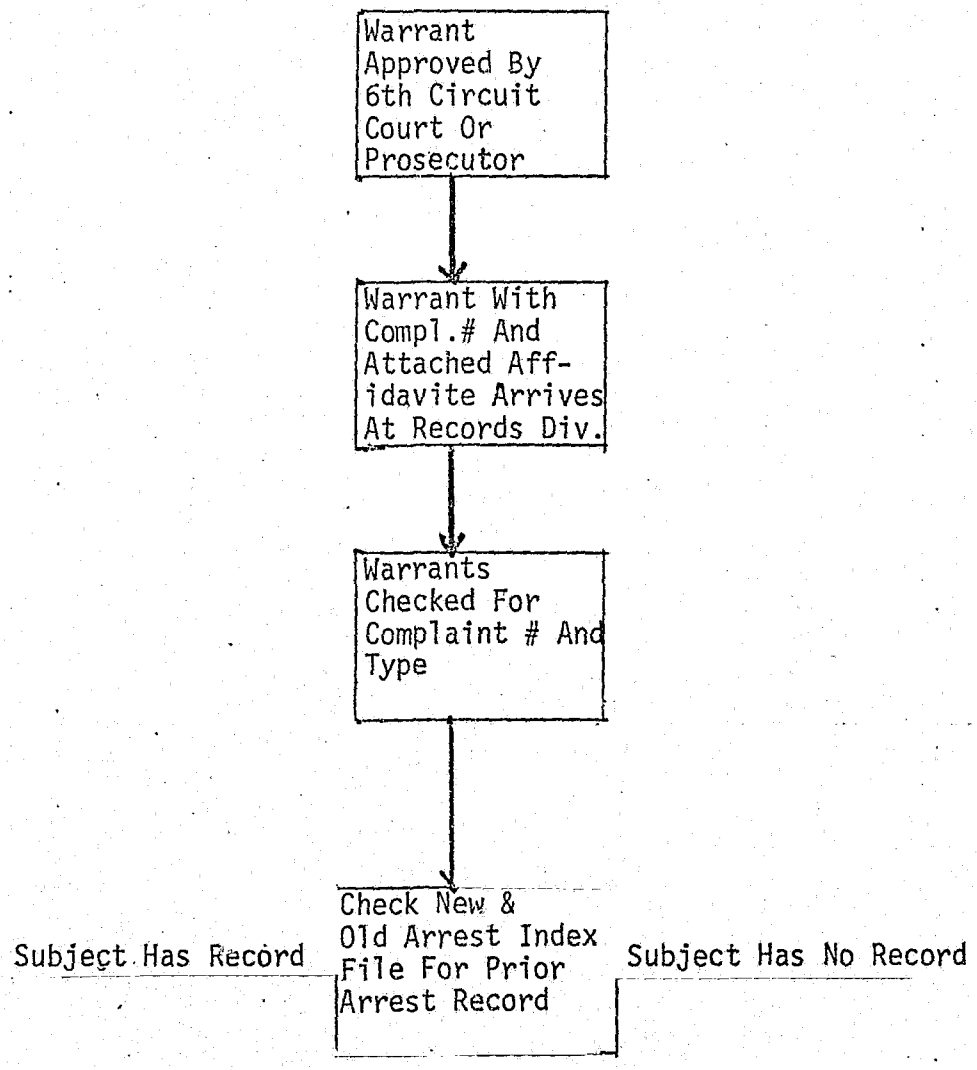
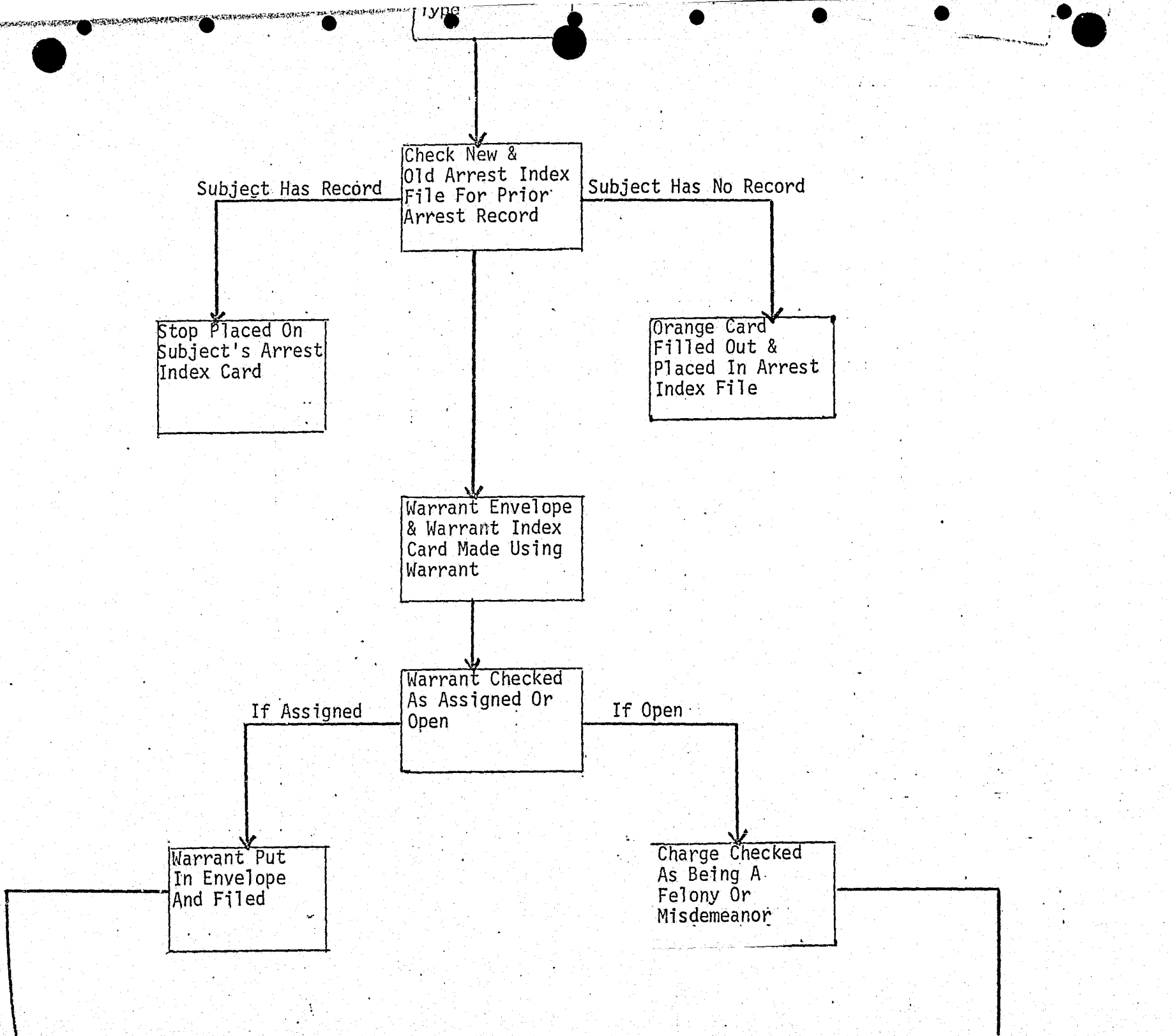
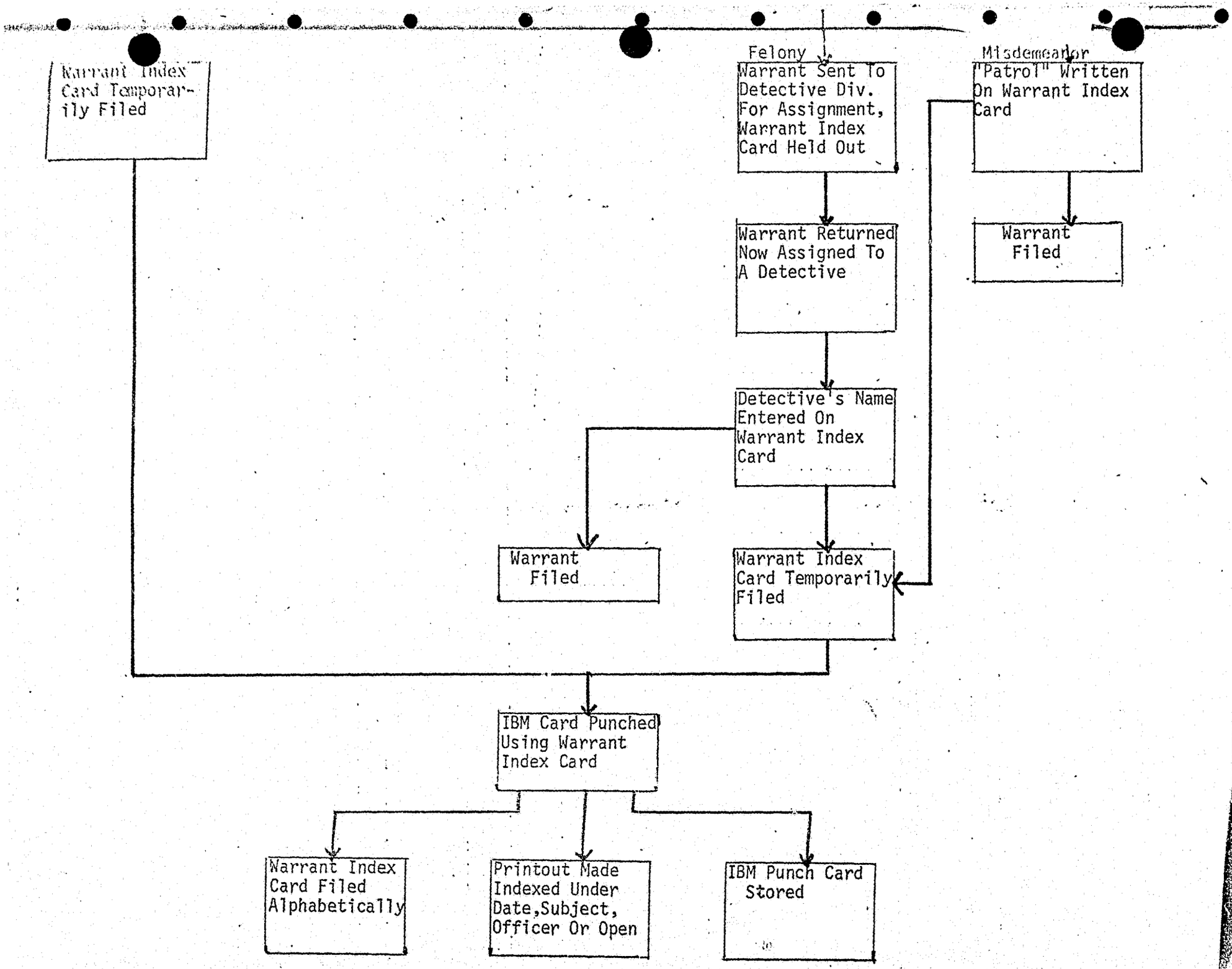

If No Other Crime Div. Involved
"C"Copy Of Report Discarded
"A" Copy Temporarily Filed According To Complaint #
"A" Copy Used To Type Report Info. Into Computer Terminal
Computer Operator Initials The "A" Copy Of The Report
"A" Copy Is Placed On Its Permanent Filing Cabinet
One Specified Clerk Fills All "A" Copies By Complaint # & Year To Avoid Filing Errors
If Court Or Insurance Co. Requests To Have The Report
"A" Copy Pulled & Photocopied Report Returned To Top Of Report Filing Cabinet
Non-Governmental Requests Charged #5
Photocopy Sent To Court
Report Refiled By Specified Clerk

CHART #4

Processing Warrants




Type
Check New & Old Arrest Index File For Prior Arrest Record
Subject Has Record
Subject Has No Record
Stop Placed On Subject's Arrest Index Card
Orange Card Filled Out & Placed In Arrest Index File
Warrant Envelope & Warrant Index Card Made Using Warrant
Warrant Checked As Assigned Or Open
If Assigned
If Open
Warrant Put In Envelope And Filed
Charge Checked As Being A Felony Or Misdemeanor


Warrant Index Card Temporarily Filed
Felony
Warrant Sent To Detective Div. For Assignment, Warrant Index Card Held Out
Misdemeanor
"Patrol" Written On Warrant Index Card
Warrant Returned Now Assigned To A Detective
Warrant Filed
Detective's Name Entered On Warrant Index Card
Warrant Filed
Warrant Index Card Temporarily Filed
IBM Card Punched Using Warrant Index Card
Warrant Index Card Filed Alphabetically
Printout Made Indexed Under Date, Subject, Officer Or Open
IBM Punch Card Stored

(An article written by Detective Lieutenant Edward Marrone,
New Haven Police Department)

APPENDIX #3

COMPUTER USE IN MAJOR CRIMINAL INVESTIGATIONS

The use of the computer terminal installed in the Investigative Services Unit is not limited to the most complex nor the most spectacular criminal investigations, but is rather a tool that is constantly demonstrating its utility in locating case data in the most efficient manner. Consequently, before embarking on a description of the terminal's use in the selected cases we will outline below, we must first acknowledge its routine use as being as important as its use in the less frequent major cases, even as a description of the use of handcuffs in a riot doesn't imply they are less useful in other events. With this information in mind, we will discuss a few current cases in which the computer retrieval of data provided important investigative leads.

One example frequently occurring in investigations is that of a subject whose method of operation is distinctive enough to suggest him as the subject in a series of cases under investigation. The computer terminal can be checked both in terms of addresses and types of crimes in such related cases. In the first of a half dozen cases to be detailed below, a subject was charged with a series of rapes and burglaries occurring over an eight month time span, with the computer serving to recall several rapes occurring before the relationship of incidents was suspected.

In this case, a succession of elderly females' homes were burglarized, with the complainants usually raped, tied, and money taken from their purses. A total of four cases occurred in July and August of 1971 with the same method of entry to the homes and treatment of the victims. From three of these crime scenes was fingerprint data obtained, but being fragmentary, was insufficient to produce a suspect. A computer check was run for all similar crimes, such as burglaries with violence, and rapes, with a rape case that occurred at Yale University in April of that year being one of the cases recalled.

The Yale report was examined, among others, and showed that the complainant had been attacked and robbed in her place of employment rather than at home. However, the victim's description of her attacker was similar to descriptions received from victims of the burglary-rapes. Another burglary occurred in November, with the method of entry to the house (through a partially opened window) fitting the known pattern of the burglar-rapist, but in this case the subject was apparently scared off after cutting telephone lines, a distinctive trait for this subject.

A print-out was made from the terminal for the areas around each of the victimized homes, using an AF11 inquiry, which disclosed that several months previously, in April, there had been a burglary and attempted rape in the same neighborhood apartment complex, from which fingerprint data had been recovered. This print data was added

to the other partial prints taken at three other scenes. When the eighth and final burglary occurred at 1499 Boulevard, same building as a previous burglary-rape, another piece of fingerprint data was recovered and added to the file.

The computer was then used to check the complaint numbers of each of the cases that fit the pattern, in an attempt to discern what day and time these attacks occurred. The results showed a general mid-week pattern that fit with information obtained about a service-man stationed at a military base two states away. A list of dates compiled from the computer check and submitted to military authorities showed the subject to have been absent from base at these times. His record was checked and indicated that he had been arrested in the same Yale building where the Yale secretary had been attacked in a ladies' room, and the subject had been arrested and charged with possession of articles stolen from a ladies' room in that hall. Fingerprints from his arrest record were compared with fragments from the five crimes, and the prints were identified as those of the same subject.

When the subject was arrested in December of 1971, he mentioned that he had been frightened away from one address before he could do more than enter the house and cut wires, and also mentioned several other streets he had "hit". All those mentioned were checked by computer with incident codes and address inquiries, and all four were among the burglaries with which the subject was ultimately charged.

As demonstrated by the above case, running a computer check for suspicious persons, prowlers, attempted breaks, and burglaries in the area around one or several criminal events can provide leads to possible witnesses, or disclose cases in which physical evidence was recovered and filed, awaiting the day when new information would make that data suddenly useful.

In the next case to be considered as an example of computer use in major crimes, we have a homicide file. In December of 1971, victim "ES" was found dead on his own bed in a Dwight Street rooming house, with the cause of death a single bullet wound of the chest, and no signs of any struggle having occurred. A twenty-two caliber bullet was found to have caused his death. In the course of the investigation, the deceased named was checked through the computer in an effort to get the names of possible associates.

In the subsequent course of the investigation, information was received that the subject "Pete Higgins" who was arrested and charged with the homicide had been offered, and accepted a ride on the night of the incident, and the onlooker who gave the information stated that the black male subject offering the ride was known to him as "Alfie", and hung around a Chapel and Howe Street bar. The person named as "Alfie" became potentially important for establishing a time and method by which the accused arrived at the homicide scene. For this reason, the addresses offered as possible hang-outs of this

unknown subject were checked on the computer by location in an attempt to locate any incidents involving this subject, so that his full name could be learned.

Using information that the subject had a girlfriend on Garden Street, an address check was made of Garden Street addresses, and an "Alfie Simmonds" was found to have reported a house-break at a Garden Street address. When the newly obtained full name of the subject was placed into the computer terminal, several incidents and associates were revealed in the area named by the informant as "Alfie's" hang-out area. The check also revealed the name of a girl associated with "Simmonds" who was also involved in the "ES" homicide investigation.

From this set of leads obtained by computer checking, the police records and photos of "Alfie Simmonds" were obtained and information began to develop. An informant reported the subject had tried to sell him a gun, and had described to the informant an argument leading to "Simmonds" allegedly shooting "ES". A check with a former roommate disclosed "Simmonds" had left the New Haven area and was possibley headed for Washington, D.C., having left pay that was due him. From the roommate, photos were obtained for comparison with police pictures, and a check of other police records disclosed an alias the subject had used in the past. A fingerprint check was made with the FBI, which disclosed that the subject named in the alias and the subject known as "Alfie Simmonds" were the same person. Using birthplace data from the alias record card, which turned out to be the subject's true name, the subject was traced to North Carolina. From that state he was arrested on a warrant that had existed for him under his true name, once thought to be an alias, and he was brought back for important questioning in the homicide investigation.

Another incident in which the computer terminal saved time and provided important investigatory leads was in a homicide occurring in October of 1971, when an altercation happened in a Chambers Street apartment and the victim was shot to death in the presence of several companions. As several persons were involved in the dispute leading up to the shooting, it became very important to locate all the participants quickly, in an attempt to locate and recover the murder weapon. The murder victim's name was computer checked regarding associates from his previous arrests. Coupled with information from witnesses, the names "K" and "S" were obtained as two of the three persons who fled the scene after the shooting. All involved subjects were computer checked for possible addresses where they might be located. The two first names were especially important in the computer check, for one of the witnesses gave information that subject "S" had a girlfriend by the last name of "Johnson", and lived on Bishop Street. All Bishop Street addresses were computer checked, leading to the identification of the family and address there. Detectives went to that location and found out from the girlfriend the last name of the male youth and now could look for "S" by his full name.

The newly developed full name of one of the fleeing subjects was computer checked for links to the victim, and his police records based on the incidents shown on the printout were checked, providing addresses where he might be located. He had been arrested several days prior to the homicide on a vagrancy charge, and a check of the bond sheet showed that he had been bonded out by a subject identified as "Henry Old", and the same address was listed for both men on the bond sheet. This data complemented the description given by witnesses of the subject who actually fired the fatal shot, a person whose description by witnesses and record sheets drawn from the name "Henry Old" were similar.

Less than six hours after the homicide, detectives were sent to the address listed to both "Henry Old" and "S", where they found both men and the girl identified by witnesses as "K". The three subjects were packing bags to leave the jurisdiction, and the murder weapon was recovered from a woman's handbag at that location. Without the speed of computer recall, the two subjects and the girl, all of whom were ultimately charged with murder, might have fled the jurisdiction and disposed of the weapon before "by hand" cross-checking could divulge the same data provided by the computer in a short time.

The computer was also used in the investigation of a $2,700 bank robbery in July of 1972, in which bank photos were obtained of the subject committing the crime. The photos did not resemble any subject that could be tied to the job, but a sequence of events utilizing the computer terminal provided a series of links that bound a name to the event. Information was received from an informant that the person sought in the bank job was the brother of a subject named "Joe Brown", who operated a trash removal business. With this name being such a common one, and hence difficult to cross-check by computer or police records, it was imperative that the first name of the bank robbery suspect be made known. There would be simply too many persons with the same surname to check them all.

The name "Joe Brown" was put into the computer terminal and an address developed from that name was shown as 19 Vernon Street. However, a check of that location revealed the house had been ~~torn down~~. Never the less, that criminal record sheet resulting from the computer scan for the "Joe Green" who had been listed as living at that location disclosed two important pieces of information. The first such piece of data was a motor vehicle listed on "Brown's" arrest sheet. This vehicle was checked through Motor Vehicles Department and came back listed to a "Joe Brown", same address, used in a trash hauling business. This clearly established that although the subject had moved, the informant knew at least one of the persons about whom he was speaking.

The second vital piece of information was a telephone number listed on his record. This number was checked, and a female

answering inadvertently confirmed that "Joe Brown" had a brother named "John Brown", although she would not give any address. This not only established that the informant also knew the second person he was talking about, but also gave the lead that this second subject's name was "John Brown", providing a full name that was then checked through the computer and police records for arrest data.

The information obtained provided a photograph of "John Brown" that could then be compared with the bank photos. The informant picked the picture of "Brown" from mug shots and identified him as the person about whom he was speaking when he referred to the subject that did the bank job. However, it was necessary to have someone else identify "John Brown" in the bank photos, as it was very difficult to match the police and bank photos, except for someone very familiar with the subject.

When "John Brown's" name was computer checked, the printout showed him to have been arrested in June for stealing clothes from two complainants, not the type of offense that on a record sheet might suggest a bank robbery suspect. However, the computer data was checked and the two complainants contacted. The complainants were shown a gallery of photos from files and the bank robbery, without being told that a major crime was involved, only that they were to identify the subject they knew, if they saw him. Both complainants picked the bank photo of the unknown subject and identified the subject as the person that had stolen clothes from them in June, known to them as "John Brown". They also picked the police mug shot of "John Brown" from a gallery and again identified him as the person known to them by that name. In this manner, the two photos, one from the mug shot files and one from the robbery scene were effectively linked. On the basis of this identification, information was obtained as to possible locations where the subject might have fled to, his activities traced, and a warrant for his arrest was issued. He was apprehended outside the local area and arrested on the bank robbery charge.

The next case we will consider in which the computer was used to advantage in a major crime investigation concerned the identification and apprehension of a subject mentioned by other arrestees as an accomplice in a series of robberies. The arrestee's gave this person's name as either "Bill Gordes" or "Bill Gorez". In each case, the standard Record Room check was run, without any such name on file, so that the accomplice remained unknown. A young woman was identified as being the girlfriend of this unknown subject, so the computer terminal was utilized to recall every incident in which the girl had been involved, regardless of any arrests occurring. Each resulting recalled incident was listed on printout paper and the case reports checked. In one of these reports, the name "Goardes" was found, which turned out to be the correct spelling of the unknown subject's name. When this name was checked with records, the person was found to be a "Bill Goardes".

The full named obtained by the use of the computer was the key to his previous arrest records, as well as the source for addresses on himself and his friend, leading to a location where he was found.

The investigation of this subject's part in several robberies was concluded with his arrest on several warrants for robbery, including a case in which an elderly blind man was robbed and beaten in his Adeline Street home by three attackers.

Finally, we consider the case of a $56,000 theft from the Brewery Street Postal Terminal. The large amount of cash had been shipped in a package that came partially open, and was seen and stolen by an employee. At the stage where the computer proved most useful, one subject was in custody and arrangements had been made with a second subject to leave the money at a service station under construction near Quinnipiac Avenue and Route 80. The subject took the money to that location and gave it to a person known to him only by the name "Tom", with instructions to place the parcel by the selected drop point. While the subject watched, "Tom" did as requested, and the subject then fled the scene.

When authorities went to claim the money at the drop point, they found no package there, and went after the subject with whom the arrangement had been made. The subject identified "Tom" as the person last near the money, but again the problem of a name too fragmented to be researched arose. A location check was made on the computer for all events occurring at that intersection for the past two years. One of the names that was turned up in the print out was recognized by a supervisor as a person fitting the description given by the subject making the money drop. Furthermore, the man with this name was known to frequent a gas station in that area.

With the first name "Tom" now tied to a last name by the computer check and the supervisor, the name was given an address by the check run on the name. Detectives responding to that home address recovered half of the $56,000. In order to determine where the other half of the money might be, a check was again made on the computer print of events occurring at the intersection of Quinnipiac and Route 80, and the name of the owner of another gas station on the same intersection was found. A check of the premises revealed that the station had suddenly closed up shop on the day of the money drop, and the owner had left the scene.

The service station owner's name was then name-checked for any past events and associates, and one of the names appearing in this print-out was that of a female from a previous complaint that happened in the station area. When the service-station owner was arrested, at the address obtained from the computer check on his name, his half of the money was not found. He did say that the cash was with a woman, but no other data was learned. Detectives then checked the woman listed on the print-out and found both the female friend of the gas station owner and the other half of the $56,000. She was found at an address shown on the print-out from the past incident at the station, with the money in her possession. All the money reported stolen from the postal shipment was recovered and three subjects apprehended.

In summary, the computer terminal in Investigative Services has already proven its worth in large and small investigations. However, the larger the investigative stakes, the greater the contribution to efficient and innovative investigation the computer provides.

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