NYSIIS (NEW YORK STATE IDENTIFICATION AND INTELLIGENCE SYSTEM) -

LATENT VALUE STUDY

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PREPARED BY:

Dr. C. R. Kingston — Chief, Criminalistics Research Bureau

F. G. Madrazo — Associate Research Criminalist

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TO: Robert R. J. Gallati, Director
New York State Identification and
Intelligence System

THROUGH: Adam F. D'Alessandro, Deputy Director
Division of Systems Development and
Operations

FROM: C. R. Kingston (On leave of absence at John
Jay College)
F. G. Madrazo

We are pleased to submit the following report on the Latent Value Study.

The principle goal of the study was to estimate how many reported burglaries might be solved through the use of latent fingerprints if an effective latent fingerprint processing system were in operation. The crime of burglary was chosen for detailed study for the following reasons:

1. Burglary represents a large percentage of reported crimes.

2. Latent fingerprints are likely to be left at burglary sites.

3. Only a small percentage (about 20%) of burglaries are cleared by arrest.

4. Only a fraction of a per cent (less than 0.1%) of reported burglaries are now cleared on the basis of latent fingerprints.

Since no single source of information could supply the required data, a number of different sources were surveyed for information pertinent to the principle goal of the study. Analysis of the data indicated that given an effective processing system, about 3.2% of all reported burglaries would result in identifications of the perpetrator on the basis of latent fingerprint searches (i.e., searches of latent fingerprints through a base file of fingerprints of known violators). This figure is comprised of identifications made on the first search of the file, and those made on re-searches. Re-searches would be made periodically for all unidentified latents. The estimates for each type of search identification are as follows:

Initial perpetrator identifications:	1.8%
Re-search perpetrator identifications:	1.4
Total:	3.2%

If we look at the total reported burglaries in New York State in 1968 (from Return A) which was 239,190, we see that perpetrator identifications would be made in about 7,758 burglaries (i.e., 3.2% of the total). This should be contrasted to the estimated 200 burglaries reported in New York State for which perpetrators are currently identified through latent fingerprint searches.

The figures derived in the report are first estimates based upon data from a variety of sources. More accurate figures can only be obtained by actually placing into operation a latent fingerprint system that approaches the "ideal" system described in the Latent Value Study Report. This can probably be modeled to some extent by small scale pilot studies conducted in selected geographical areas.

We believe that the estimates derived in the Latent Value Study show sufficient payoff to warrant further development of an improved latent fingerprint processing system. The pilot studies mentioned above should, however, be conducted in parallel to obtain more accurate estimates of potential perpetrator identifications.

C. R. Kingston

F. G. Madrazo

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INTRODUCTION

I

INTRODUCTION

Fingerprints have been used as a major means of identifying individuals for over sixty years, and still remain the major means of personal identification today, especially within the criminal justice system. There are two main ways that fingerprints are used within the criminal justice system. First, arrest/identification fingerprint cards are used to positively identify an individual when the person is available for fingerprinting. These cards contain all ten fingerprints, in addition to personal data such as name, weight, height, and so on. They are commonly used to make certain that any information coming into or going out of an identification or records bureau is pertinent to the correct individual. They can also be used for identifying amnesia victims, corpses, and so on. Second, chance (latent) fingerprints left at a crime scene or on some object associated with the crime can be used to determine who left the prints. If the latent print or prints were left by the perpetrator of the crime, they offer a very potent means of determining his identity. The searching of a file with these latent prints to discover the identity of a person is known as a latent fingerprint search.

With the present methods of classifying and searching latent fingerprints, a latent search can take days even in a relatively small file of fingerprints representing 20,000 to 40,000 individuals. The task of searching a file containing fingerprints from more than a million individuals would be possible, but would require considerable time and effort -- probably weeks of concentrated work. This is clearly not the sort of task that can be done routinely in a large identification bureau unless some significant changes are made in the entire process.

The basic information generally used for classifying and searching fingerprints is that derived from the determination of a pattern type (loop, arch, whorl, etc.), a ridge count between a core and delta, and a ridge tracing in the case of whorls. Filing systems based upon this information work reasonably well for 10-print searches, although definite improvement is needed if ten-print identification operations are to be modernized and made more efficient. But if we try to search a large file classified by pattern and ridge count on the basis of a single fingerprint, the number of records that would have to be visually compared with the fingerprint being searched would, on the average, be enormous. The reason for this is that the information contained in the pattern type and ridge count is not sufficient to narrow our search down to only a few records. As an example, the average number of records that would be retrieved for single fingerprints from right index fingers would be about 100,000 from a file of one million records; the maximum number retrieved would probably be on the order of 150,000. For the right middle finger, the average number retrieved would be about 250,000, with the maximum being around 350,000. If we had fingerprints from both the right index and right middle fingers, we might expect to retrieve somewhere around 40,000 to 100,000 records for visual comparison. If we do not know the hand or fingers that left the fingerprints the above figures increase considerably.

Attempts have been made to add more information to the classification system so that fewer records would be retrieved during a search with a single finger. Such additional information has included core types, delta types, and approximate locations of particular ridge configurations (such as eyelets) within a grid overlaid on the fingerprint. Many systems have been devised for single print searching using such additional information, but very few are found in continued operational use. Of all such systems that are currently in use, none is apparently capable of providing

a practical operation with current procedures when the base file being searched approaches 100,000 individuals. As far as can be determined, the largest base files that are being searched with a single fingerprint contain records for about 50,000 individuals.

As a general rule, the probability of associating a latent fingerprint with a record increases as the number of records searched increases. In other words, the more fingerprint records that are in the latent base file the better the chance of identifying the person who left the latent fingerprint. B. C. Molony of the Vancouver Police Department has said:

> "In comparing any individual crime scene print against those on file, the chance of making an identification is in proportion to the number of prints on file. Therefore, the greater the number of prints on file the better."[1]

The ideal system should therefore strive to perform a search through all fingerprint records on file in an identification bureau. As a second best goal, at least all fingerprint cards associated with criminal records should be searched. In the Bureau of Identification in NYSIIS, there are approximately 3.5 million fingerprint cards on file associated with persons with criminal records. No classification system has been devised yet that will allow us to search all of these cards routinely and practically on the basis of a single fingerprint impression.

In an attempt to remedy this situation and to provide law enforcement with a modernized fingerprint processing system, NYSIIS has initiated a program leading to the development of a fingerprint processing system which

[1] Molony, B. C., The Molony Four-Finger System of Fingerprint Identification, by the City of Vancouver, British Columbia, Canada; Modified version January 1, 1965; p. 5.

will permit a search of the main criminal identification file with a single latent fingerprint. Time and cost estimates for this program indicate that it will probably cost several million dollars and take more than five years to fully develop to an operational state.

In view of these estimates, it was deemed desirable to generate some rough figures to evaluate the potential usefulness of the fully developed system. There are two ways in which the system will serve to increase the identification of perpetrators. One, it will give us a capability of searching the main file on the basis of a latent fingerprint found at the scene of a crime. This will result in an increase in the percentage of submitted latent prints that are identified. The second reason the system will increase criminal identifications derives directly from the first. Investigative personnel of police departments should be encouraged to look more often for latent prints at crime scenes since there will be a higher probability of affecting an identification. This will result in an increase in the number of cases for which latent prints are submitted and thus an increase in total identifications. Under the current system, the limited ability of an identification bureau to make identifications from submitted latent prints feeds back to the investigators and tends to direct their efforts to more effective investigative techniques. With the improved system, looking for latent prints should become one of the more effective investigative techniques for specific crime categories as indicated in the report.

The method used to evaluate the increased effectiveness of the improved system and the preliminary figures used are presented in this report. The effectiveness evaluation is presented in terms of the percentage of the total crimes reported in a given category (e.g., burglary) for which we would expect to identify perpetrators using the system.

1. The Latent Fingerprint Operation

In order to make the relationship of the factors considered in this study clear with respect to a latent fingerprint operation, the process of utilizing latent fingerprints in crime investigation will be described as it was viewed for purposes of this study.

Fingerprint identification is possible because the surfaces of human fingers are covered with a skin structure that takes the form of ridged patterns. These patterns can be recorded on paper by applying a thin film of ink on the finger surface and then rolling or pressing the finger on the paper. Such impressions form the main fingerprint files in identification bureaus. Patterns from these ridges are also left in the form of traces of the oily secretions formed by the tiny glands under the surface of the skin when the finger touches a relatively non-porous object. Such impressions are typically the latent fingerprints left at scenes of crimes, although impressions in blood, grease, and other substances may also occur.

When an investigating officer is examining the scene of a crime, he must make an assessment of approximately what happened and decide on the basis of this whether or not there is a reasonable chance that latent fingerprints belonging to the perpetrator might be found. If there does seem to be a reasonable chance, the surfaces or objects that should be examined for latent prints must be specified. If the investigating officer is trained in searching latents, and has the proper equipment, he may do so without calling in an evidence technician from a specialized unit. Otherwise, a

specialist would be called in for the task. If latent prints are likely to be on a small object, such as a bottle or an ash tray, the object may be taken to the laboratory or identification unit for latent processing.

If any latent prints are found, there is always the possibility that they were left by a person or persons other than the perpetrator. For instance, they could have been left by the owner of the house or building where the burglary took place, by some visitor to the place, or by the investigator himself. Consequently, it is necessary for the investigator to obtain fingerprints from all persons known to have come in contact with the crime scene and who might have left the latent fingerprints. The sets of ten fingerprints so taken are referred to as elimination prints since they may eliminate the possibility that the latent prints were left by the perpetrator (or at least one who was not legally at the crime scene). Latent prints that have been identified as belonging to someone from whom a set of elimination prints were taken are generally called elimination latent prints. The investigator may also come up with one or more suspects for the crime, and will either submit their fingerprints, if available, or their names to the latent unit if it is known that they have been previously fingerprinted.

When all latent prints associated with a case are gathered, they are generally sent to a special latent section. There they are first compared with the elimination prints and suspect prints furnished by the investigator. Those latent prints that are not identified in this manner are classified by whatever means the particular latent

section uses and searched against the latest base file. Those latent prints that are not identified during the search are placed in an unidentified latent file.

Periodically, the unidentified latent prints can be searched through the new entries in the latent base file. If the person leaving a particular latent print happened to be someone who had not been arrested before, or someone whose fingerprints were not placed in the latent base file at the time of the first search, his fingerprints may have subsequently been added to the latent base file. This process of searching through the base file again with unidentified latent prints is called a re-search. The unidentified latents may also be routinely searched against incoming arrest/identification fingerprint cards.

There are a number of reasons why a latent print might not be identified during a search. The primary reason is that the fingerprints of the person who left the latent print are not in the latent base file. In most latent operations, the latent base file is relatively small compared to the total number of fingerprints on file, thus a person's fingerprints may be in the main file but the conditions necessary to transfer his fingerprints to the latent file may not have been met.

Reasons for the correct set of prints not being in the main base file include:

a. The latent print may belong to someone who was legally at the crime scene and who has no criminal record.

b. The latent prints may belong to a perpetrator who may be a juvenile under

fingerprintable age by law or may never have been arrested before. In either of these cases, the person's fingerprints would not be on file. In considering the New York State file, the person never may have been arrested in New York State, and thus would not be in the NYSIIS files. A certain percentage of these persons are likely to be identified during a re-search, since their fingerprints may eventually come into the identification bureau.

If the correct set of fingerprints is in the latent file (or the main file in an ideal system), it still may not be found. This may be for the following reasons:

a. The main file fingerprints may be coded or classified incorrectly with respect to the print corresponding to the latent print.

b. The latent print may be incorrectly coded or classified.

c. Distortion in the latent print may alter its classification sufficiently to cause the file print to be missed during the search.

If the correct set of fingerprints is in the file being searched and is not found during a search, the search results in a "miss." The term "miss rate" used in this report is the expected frequency that this happens.

2. The Ideal Latent System

The figures given in this report are based upon the future existence of an ideal latent system. The ideal latent system is not defined as a perfect one, but rather one where the full potential usefulness of latent prints is recognized and taken advantage of in the investigative process. Two major factors in an ideal system can be noted:

a. All crimes reported within specified categories (i.e., burglary, etc.) are carefully examined for the possibility that latent fingerprints might be found, and that latent prints are competently searched for in those cases where there is such a possibility.

b. The fingerprint processing system is developed to a point where the main fingerprint file (or at least the entire criminal fingerprint file) can be searched on the basis of a single latent fingerprint of sufficient scope and clarity to be used as evidence in court.

There is no evident reason why the ideal system as defined here cannot be attained within the next several years, providing sufficient research and development funds are available.

3. Objectives

The specific objectives of this study are as follows:

a. To examine the latent fingerprint system in order to identify those factors which determine the number of perpetrator identifications which can be expected if an ideal system were in operation.

b. To derive a first approximation to the percentage of reported crimes, by crime category, in which latent fingerprints could be used to identify the perpetrators of those crimes.

c. To identify those factors used in the above approximation for which more experimental data is needed to obtain a reasonable estimate of their effect on the derived percentages.

d. To design and specify those experiments needed to more accurately evaluate the factors enumerated in this study.

4. General Methodology of the Study

As stated in the objectives section above, the figures generated for this report represent only a first approximation to the actual figures required. Thus this report defines the overall model suggested for the analysis and evaluation of the potential value of an ideal latent fingerprint system and provides initial estimates of the results that would be obtained if accurate and detailed information were available for all figures estimated.

The proposed model may be used to consider specific crimes separately. For instance, each of the felony crimes of burglary, robbery, larceny-auto, larceny-non-auto, murder, rape, and arson could be studied independently. These crime types were suggested by persons experienced in police investigation and identification work as being most likely to yield latent prints.

We chose burglary as the specific subject of this study for the following reasons:

a. Persons experienced in police investigation and identification work indicated that investigations of burglaries offer the best opportunities to find a latent print of the perpetrator because of the breaking and entering generally required.

b. Preliminary information indicated that objective data would be available for burglary. Therefore, we felt that estimates for burglary would tend to be more accurate than estimates for the other crimes.

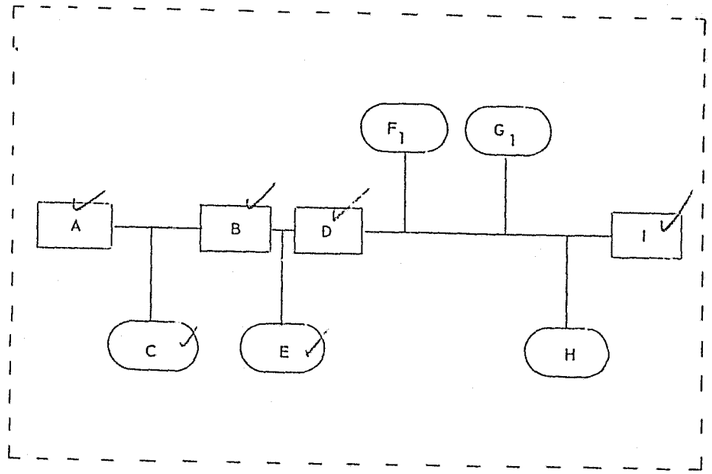
c. Since this study was undertaken to estimate the potential value of an effective latent fingerprint processing system in the investigative process, we wanted to study a crime that occurs in large volume and, at present, has a relatively low clearance rate. Burglary fulfills both of these criteria.

For purposes of the study, a flow chart (Fig. 1 on the following page) of the latent fingerprint operation was constructed. This flow chart follows the general sequence of operations in a latent case, starting from the reporting of the crime and continuing through all of the searching operations. The chart is divided into the following three groups:

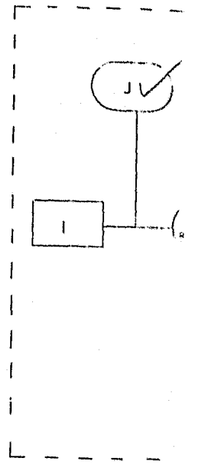
I - Field Operations
II - Initial Search Operations
III - Re-Search Operations

Numbers can be placed in each box to represent reported crimes during any particular calendar period. The numbers in the boxes on the heavy flow line (i.e., boxes A, B, D, etc.) enumerate the crimes or cases, that are flowing through the latent system at the indicated operational stage. The

GROUP 1 – FIELD OPERATIONS



GRC



LEGEND

A	CRIMES REPORTED	I	SEARC
B	CRIME SCENES SEARCHED	J	NON-P
C	CRIME SCENES NOT SEARCHED	K	UNIDE
D	LATENTS FOUND	L	PERPI
E	NO LATENTS FOUND	M	PERPI
F_1	ELIMINATION IDENTIFICATIONS	N_1	LATEN
G_1	SUSPECT IDENTIFICATIONS	R_1	PERPI
H	LATENTS NOT USABLE AS EVIDENCE	P	UNIDE
!	SEARCHES IN THE MAIN FILE		

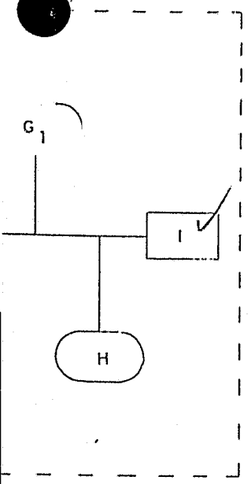
FIG. 1 – FLOW CHART II

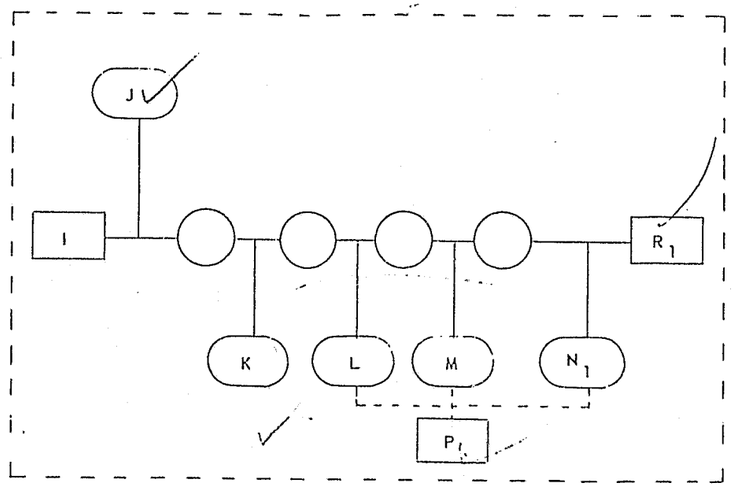
ONS

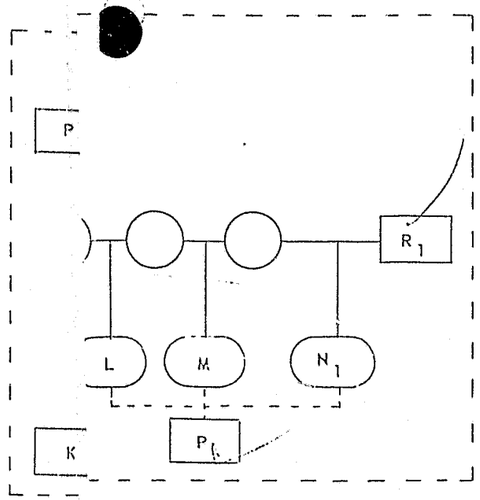
GROUP 2 – INITIAL SEARCH OPERATIONS

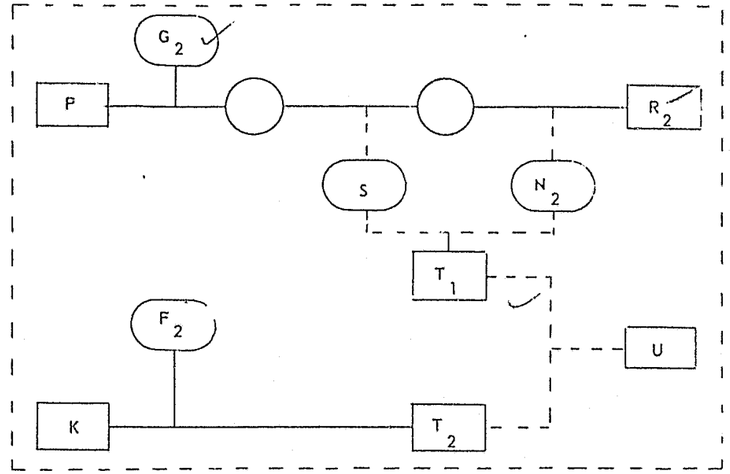
AL SEARCH OPERATIONS

GROUP 3 – RE-SEARCH OPERATIONS









D

NS

IDENCE

LEGEND

I SEARCHES IN THE MAIN FILE

J NON-PERPETRATOR IDENTIFICATIONS

K UNIDENTIFIED NON-PERPETRATORS

L PERPETRATORS UNDER FINGERPRINTABLE AGE

M PERPETRATORS NOT IN MAIN FILE

N_1 LATENTS UNIDENTIFIED DUE TO MISS RATE

R_1 PERPETRATOR IDENTIFICATIONS

P UNIDENTIFIED LATENTS AFTER FIRST SEARCH

GEND

P

ENTIFICATIONS

RPETRATORS

R FINGERPRINTABLE AGE

MAIN FILE

D DUE TO MISS RATE

CATIONS

AFTER FIRST SEARCH

G_2

S

N_2

R_2

K

F_2

T_1

T_2

U

LEGEND

P UNIDENTIFIED LATENTS AFTER FIRST SEARCH

G_2 SUBSEQUENT SUSPECT IDENTIFICATIONS

S PERPETRATORS NEVER ENTERING MAIN FILE

N_2 LATENTS UNIDENTIFIED DUE TO MISS RATE

R_2 RE-SEARCH PERPETRATOR IDENTIFICATIONS

K UNIDENTIFIED NON-PERPETRATORS

F_2 SUBSEQUENT NON-PERPETRATOR IDENTIFICATIONS

T_1 CONTINUING RE-SEARCH LOAD

T_2 CONTINUING RE-SEARCH LOAD

U LATENTS NEVER IDENTIFIED

FIG. 1 – FLOW CHART INDICATING THE SEQUENCE OF OPERATIONS IN A LATENT CASE

E OF OPERATIONS IN A LATENT CASE

numbers in the boxes off the heavy flow line (i.e., C, E, F, etc.) enumerate cases which are channeled away from the preceeding box on the flow line for the indicated reason.

Theoretically, the numbers derived for the various boxes represent a case that is completed with respect to latent prints by a given process. For example, consider a case having three latent fingerprints that are all identified as being from a person who had legitimate access to the scene of the crime. This case would be included in the elimination identification box.

If, however, one of the three latents could not be identified in this manner, the case would be carried on to the next box on the flow chart and ultimately be counted where the case was ended as far as latents were concerned.

In other words, a case is counted in a box only when it is completed by a given process as far as latents are concerned.

By systematically eliminating cases from the operational flow for which latent identifications will not be made, the number of latent cases that should result in identifications can be derived. Box R_1 contains this number for initial searches and Box R_2 contains the number for re-searches. The sum of R_1 and R_2 represents the total number of cases with identifications made by searching the base file. The value $\frac{(R_1 + R_2)}{A} \times 100$ is the percentage of reported crimes that we can expect to solve through latent searches based on the figures given in the flow chart, and is the effectiveness criterion that is suggested at this time.

The data from which the figures in the flow charts are derived were collected from a number of sources which are listed in a later section. For some of the figures estimated, specific data for the quantity being estimated were available. For example, the number of crimes reported in New York State during 1968 (Box A) was available from the Return A forms submitted to the Department of Correction. Although it is recognized that reporting practices are not necessarily standardized throughout the State, the figure is the best that can be obtained in a practical sense. Other figures were synthesized by using more than one source. For instance, the number of suspect identifications (Box G_1) was derived from actual latent case records in identification bureaus. In addition to this, information about the number of suspects that are available for certain crimes in general was checked, and it was found to correlate well with the data from latent cases.

In other cases, the data from different agencies or sources varied considerably, and some averaging had to be attempted. When this was done, the reasons for the variation were always considered and weighed in the process. Such variation was found between different agencies in the number of crime scenes searched for latents and the number of latent prints actually found. Upon checking, it was discovered that one agency, for instance, considered that latents were searched for in a burglary if any investigation had been done at all -- the actual process of looking for latents was not a requirement although it is assumed that the investigating officer at least cast a glance about the scene with latents in mind. Another agency was very selective in the cases for which

a crime scene search for latents was made, and showed a very high ratio of latents found to cases in which scene searches were made. Differences such as this had to be carefully considered and weighed with respect to potential investigative practice in an ideal but practical latent operation.

In still other estimates, no data was available at all. Such was the case for estimating the non-perpetrator identifications made during a latent search (Box J). In such cases all information pertinent to the estimate was considered and a subjective guess of the value was made. The estimates in Boxes J and K are the only ones which had to be treated in this manner.

The estimates derived in this preliminary evaluation represent the best that can be made with the data that was available for the study. The end results appear reasonable, and are probably not too different from what might actually be expected with a fully operational ideal latent system. However, the evaluation is a preliminary one, and many assumptions made during it are not amenable to direct verification. A true and accurate picture of the operation of an ideal latent system cannot be obtained until after the system is actually operating. Until that time, however, decisions about further expenditures in developing a latent processing system must be made. This report provides an important basis for making these decisions.

We hope that this working document will be reviewed by persons competent in the investigative and identification fields, and that any data bearing upon any of the estimates made herein that was not available to NYSIIS in the past will be made

available. Any comments, criticisms, objections, and support, are all equally welcome. This document will be revised after the experiments suggested in a later section are completed and the data has been analyzed. At that time any other data or information bearing upon the estimates that have been made available to NYSIIS will be reviewed and incorporated in the final report.

The next section will discuss the estimates made for the crime of burglary in detail, giving references for all data used. The specific considerations that went into each estimate will be discussed and analyzed. For ease in presentation, the discussion of the estimates will be divided into the following three parts to conform with the groups of the Flow Chart described previously:

I - Estimates for Field Operations
II - Estimates for Initial Search Operations
III - Estimates for Re-Search Operations

FIELD OPERATIONS

II

FIELD OPERATIONS

Block A on the flow diagram (Fig. 2, P. II-17) contains the total number of burglaries which were reported to the New York State Department of Correction by the police departments of New York State during the year 1968. This figure was obtained from a compilation of the "Reports of Offenses Known to the Police and Arrests" (Return A), submitted monthly by all police agencies in the State.

For purposes of the Return A form, police agencies list "...reportable offenses committed within the jurisdiction of the agency and first brought to the attention of or known to the reporting agency during the month of the report."[1]

As mentioned in the introduction, it is recognized that there is the possibility that reporting differences exist among the police agencies of the State. It is felt, however, that the figures obtained from the Return A compilation represent the most accurate total of known offenses in New York State that is presently available. The Return A compilation indicates that the number of reported burglaries in New York State is 239,190.[2]

Block B represents the number of crime scenes that would be searched for latent fingerprints given a maximum effort on the part of police departments. This maximum effort requires that all reported burglaries are carefully examined for the possibility that latent fingerprints might be found, and that latent prints are competently searched for in those cases where there is such a possibility.

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1 Return A Reports of Offenses Known to the Police and Arrests, New York State Department of Correction, instructions par. 7.

2 Cumulative Return A Year 1966, New York State Department of Correction, (column 1 - column 2).

It would be ideal if every crime offered a high probability of finding a latent fingerprint of the perpetrator. There are, however, several reasons why this may not be the case.

First, the nature of the crime must be taken into consideration. Certain crimes, by their very nature, offer a high probability of finding perpetrator latent fingerprints. Burglary, because of the breaking and entering generally required, offers many opportunities for the perpetrator to leave his fingerprints at the scene.

Other types of crimes might not offer as high a probability of the perpetrator leaving latent fingerprints. For instance, robbery is not a type of crime that requires the person-object contacts that are typical in burglary. It may be seen, therefore, that the nature of the crime determines the extent to which latent fingerprints are deemed an important part of the investigation of the crime.

Secondly, the facts surrounding the crime must be ascertained before it is decided whether latent prints might be of importance. Questions concerning where the crime took place, whether the perpetrator touched certain objects, and so on, have to be answered before it is decided whether or not to search for latents.

This involves knowledgeable selection on the part of the investigator or detective at the scene of the crime. Based on his experience and training, the investigator will select those crime scenes to search for latent fingerprints which offer a reasonable probability of yielding a latent fingerprint of the perpetrator. In an ideal system, a search will be made for every crime which has even a small probability of perpetrator latents being found.

The problem of estimating the number of crime scenes that should be searched in an ideal system lies in the fact that an ideal system does not exist at the present time

and thus the necessary data is not available. Due to manpower shortages and low identification rates, complete coverage is not given to every crime that should receive a thorough latent fingerprint investigation.

Two approaches were taken in deriving the estimate for this study. First, some general impressions were elicited from persons knowledgeable in police procedures. This provided a purely subjective estimate for the number of cases that should be searched for latents in an ideal system. Then, more objective data was gleaned from previous studies of police procedures and from data on the operation of latent fingerprint sections of several police departments.

It was a consensus opinion of experienced police and identification personnel that latent fingerprints might be found in a very high percentage of reported burglaries. Estimates ranged from 70 to 100% of the burglaries reported. These estimates were apparently based to a large extent on the nature of the crime of burglary. Since a break has to be made, the perpetrator is likely to touch many surfaces. Intuitively, it is reasonable to assume that in the process of accomplishing the break, the burglar would leave a latent fingerprint a high percentage of the time. (It might be argued that experienced burglars would use gloves and therefore not leave latents. However, there is no way for an investigator to know this before he makes his search, so this possibility should not affect his decision to make the search.)

It is notable that the subjective estimates are higher than the results from reported data and studies. One reason for this might be found in the selection process on the part of the investigators. A certain percentage of the reported burglaries presumably did not offer a high enough probability of yielding perpetrator latents to warrant the investigating officer expending his energy looking for latents. This factor, combined with the knowledge on the part of the

investigator that very little could be done with any latents that were found, would tend to make the operational figures lower than those which could be expected with an ideal system.

Several sources were explored to obtain data from routine operations and special study results. The Task Force Report on Science and Technology for the President's Commission on Law Enforcement and Administration of Justice contains the results of a study conducted in the Los Angeles (California) Police Department. It included data concerning the crimes committed and the factors affecting the clearance of those crimes during the study period.

It was found that approximately 43% of the burglaries reported in two of fifteen field divisions during the month of January, 1966, warranted the calling of a technical specialist (primarily fingerprint specialist) to the scene of the crime.[1] These figures do not indicate how many latent searches were actually done by the investigator at the scene without the need of a specialist, nor do they indicate how many times evidence was brought to the latent section by the investigator at the scene.

Data from latent sections of several cities were quite variable. The data from one city indicated that a search was made in nearly every burglary; those from another city indicated that a search was made in 3,003 burglaries out of 119,783 reported. In the former instance, a search did not necessarily mean that a latent fingerprint expert was called to the scene or that any "searching" other than a quick look around was made. In the latter instance, the data reflects the number of times that an expert from the latent, photographic, or identification sections actually visited the crime scenes.

[1] Task Force Report: Science and Technology, A Study of Communications, Crimes and Arrests in a Metropolitan Police Department, 1967, p. 99.

It may be seen from the data presented that there is great variability from police department to police department in what constitutes a case meriting search for latent fingerprints. The data presented in the Los Angeles study was used as an estimate for Block B since it represents an approximate average of the data from the operation of present latent fingerprint systems. Therefore, the figure appearing in Block B on the flow chart for burglary, is 43% of the number of burglaries reported in Block A of the flow diagram. This is subject to modification by the results of future experiments designed to estimate what the percentage would be under ideal, yet practical, conditions.

The number of cases which are deemed of no value to search for latent fingerprints is represented by "C" on the flow chart. The derivation of this figure is given by the following relationship:

$$C = A - B$$

Block D on the flow chart represents the number of cases that result in one or more latent fingerprints being found. Basic considerations in deriving this estimate must include the nature of the crime and the selectivity on the part of the investigating officers in choosing the crime scenes to search.

The nature of the crime under consideration plays the same role in the estimate for "D" that it did in the estimate for "B". That is, those crimes in which latents are most likely to be left should be those in which latents are most likely to be found. Therefore, one would expect the crimes of stealth, such as burglary and auto theft, to yield a higher ratio of latents found to scenes searched than crimes against the person such as murder and robbery. This is, however, quite dependent on the investigator's selectivity. If an experienced or well trained investigator is highly selective in the cases he chooses to search for latents, one would expect his rate of finding latents to be

high (i.e., a high ratio of latents found to scenes searched). If on the other hand his selectivity is low, the rate of finding latents might tend to be relatively lower. However, there is the possibility that the rate of finding latents could be high even with low selectivity due to a large number of non-perpetrator latents being found.

One of the primary sources of operational data in estimating "D" was a study done by the Oakland, California Police Department in 1961. Latent fingerprint procedures of thirty-five major United States cities were examined by means of a questionnaire. Included in the collected data were responses indicating the number of cases in which latent fingerprints were sought per 100,000 population and the percentage of these cases for which some latent fingerprints were obtained. Data usable for the purpose of this report appeared in the replies of thirteen of the thirty-five reporting cities.

In examining this data, it was found that there was considerable variability in the percentage of cases in which latent fingerprints were obtained. At the low end, latents were found in 8% of the scenes "searched"; the high figure was 80%.[1]

One reason for this observed variability might be differences in selectivity among the various police departments. That is, those that are very selective would tend to find latents a higher proportion of the time than those which are least selective (and perhaps somewhat casual about searching the scenes). One question in the survey attempted to ascertain which police departments try to give general coverage as a routine procedure to those crime scenes where any reasonable possibility of obtaining latents exists, and which police departments are selective in that they limit their searches

[1] Latent Fingerprint Procedures: A Survey and Report, Oakland, California Police Department, 1961, p. 25.

to crimes of certain types or crimes of a certain character. Of the thirteen police departments whose data was applicable to this report, only one answered that it was selective in its coverage of crime scenes for latents. That police department indicated that it found latents in 80% of the cases in which latents were sought. Of the other twelve departments, the range was between 10% and 80%. It appears then that selectivity may not be the only factor causing the variability from department to department.[1]

In analyzing the data in their study, the Oakland Police Department stated:

> "Another surprising fact indicated by data given in (items) #19 and #20 was the variation in percentage of crime scenes processed in which prints of some quality were obtained -- from 8% in one large city to 80% in two other large cities. While this value will vary with the capacity of the fingerprint unit to develop and evaluate prints at the scene (or on evidence items), these would appear to be unusually high and low values."[2]

The average value for the percentage figures (cases in which latents were found as a percentage of cases where crime scene searches were made for latent prints) among the thirteen police departments having sufficient data was 36.8%. This would appear to be a reasonable approximation to the value for Block D based on current techniques and practices. [The figure would presumably be higher in an ideal system due to better equipment (for instance, as in the test usage of Polaroid cameras by the NYCPD), better techniques and better training in the process of searching for latents.] Other sources were contacted to obtain further data as a check on the figures given in the Oakland study.

Correspondence with the Home Office, Police Research and Planning Branch, London, England, elicited

[1] Ibid., p. 12.
[2] Ibid., p. 25.

the information that of 10,752 crime scenes examined by experienced fingerprint officers of Scotland Yard during the year 1966, 5,686 or 52.8% yielded latent fingerprints.[1]

Data from the New York City Latent Fingerprint Section for the year 1966 indicated that 4,330 searches were made at scenes of the felony crimes that appear to be amenable to latent print investigation. Of these 1,374 or 31.8% yielded latent fingerprints.[2] The figure for just burglary was 28%. The Institute of Applied Science revealed data which showed that of 100 cases in which a member of an Identification Bureau made latent print searches, 60 resulted in the finding of identifiable latent fingerprints.[3] And data from the Nassau County Police Department indicated a figure of 41% for burglaries.

The foregoing data indicates that at least 40% of the cases searched might be expected to yield latents (on the average) in an ideal system. Although much of the data was based on all crimes, it is felt that an estimate based on such data may be used for burglary since burglary contributes, in terms of numbers, the heaviest of any of the felonies which are important for latent fingerprint investigation.

Therefore, an estimate that 40% of all latent searches at the scenes of burglaries will result in the finding of latent fingerprints will be used for Block D on the flow chart. This figure appears to allow for a balance of selectivity on the part of the investigators with thorough coverage in scene searching for latents. Controlled experiments would have to be run to make an accurate evaluation of the results to be expected with optimal balance.

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1 Personal correspondence with Home Office Police Research and Planning Branch, London, England.

2 Data from examination of the 1966 annual report data of the New York City Police Department Latent Fingerprint Section.

3 Personal correspondence with the Institute of Applied Science, Chicago, Illinois.

Block E on the flow chart represents the number of cases that are searched for latents which yield no latents. It may be seen that the number for this estimate is obtained from the following relationship:

$$E = B - D$$

Blocks F_1, G_1 and H represent cases in which searches through the main file would not be made. There are several reasons why those cases which yield latents (Block D) might not result in a search of the main criminal base file in order to effect an identification. First, the latent may be the impression of a person who has legitimate access to the scene of the crime. As was stated in the "Latent Fingerprint Operation" section of this report, these latents are termed "elimination prints." Secondly, the latent may be the impression of a named suspect. The suspect may be named at the scene or at a later date. Identifications made from suspects named at the scene or before a search has been made in the file are termed "suspect identifications." Suspect identifications made after an initial search in the file are called "subsequent suspect identifications" for purposes of this report, and are discussed in a later section. The third reason why a latent fingerprint found at the scene might not result in a search of the file arises because of the condition of the latent print itself. Poor prints cannot be searched in the base file. If the quality of the latent is such that it could not be used as evidence in a court of law, it is presumed at this time to be of insufficient scope and clarity for searching. The estimates of the effects of these factors on the flow are discussed next.

Block F_1 on the flow chart represents the number of elimination identifications which might be expected. The derivation of this estimate is based on the following considerations:

Experience of the investigator has a direct bearing on the magnitude of the contribution of elimination

prints to the system. An experienced investigator will try to minimize the number of elimination prints by limiting his search to those locations which the perpetrator was likely to have contacted.

A classic example of a limited search involves the case of a theft from the coin container of a juke box. The average juke box has many chrome and glass surfaces in front. These surfaces are ideal for retaining a latent fingerprint. However, during the course of the day, many people may have left their fingerprints on this surface in the process of depositing coins. The experienced investigator will realize this fact and will probably limit his search for latents to the back of the machine where access to the coin box may have been gained. The only people who should have touched this location of the machine would be the service man, possibly the owner of the establishment, and of course, the thief. In effect, the investigator has limited the number of elimination prints that might be expected, by confining his search to the areas where the perpetrator was most likely at work.

Another consideration which has to be made with respect to elimination prints is the type of area in which the crime was committed. For instance in a private residence where few people have access to the general area of the crime, elimination prints might be expected to be only a minor hindrance to the investigation inasmuch as those persons who may have left the latents might be readily located. If, on the other hand, the crime was committed in a public place, such as a restaurant or bowling alley, the problem of elimination prints may be severe due to the difficulty of locating all people who may have left the latents. Collection of latents from a large number of public places might also raise the number of non-perpetrator search identifications ("J" on the flow chart), and the number of unidentified non-perpetrator latent prints ("K" on the flow chart). Here again, the

experience of the investigator in choosing the locations at the scene for search will have a bearing on the number of non-perpetrator latents that are found.

In order to arrive at some estimate of the number of latent fingerprints which will result in elimination identifications, data was studied from the latent fingerprint sections of several police departments of New York State and from Scotland Yard in England. The following table summarizes this data.

Police Agency	Year of Report	No. Latents Found	Elim ID	%
New York City	1965	1,357	326	23.0
New York City	1966	1,208	270	22.2
Syracuse	1966	65	7	10.8
Nassau County	1966	320	62	19.4
Scotland Yard	1966	5,686	1,080	19.0

Average percentage: 18.8

These figures indicate that approximately 20% of the latents that are found at the scenes of crimes can be expected to be identified with elimination prints. Of course, these figures are based on actual elimination identifications effected. They say nothing about those latents which remain unidentified and are, in actuality, non-perpetrator latent prints. Such prints are accounted for in Block K.

The significant fact about the data, as presented, is that the figures are comparable for different police departments. For this reason, an estimate that 20% of the latents found will result in elimination identifications will be used for purposes of this report.

The second factor that tends to diminish the number of latent prints found that would result in a search of the main base file is represented by Block G_1 on the flow chart and is termed "suspect identifications." These identifications are made when the name of the perpetrator,

or the perpetrator himself, is made available by one means or another early in the investigation.

There are several ways in which a suspect may come to light during the course of an investigation. First, the victim may actually know the perpetrator, either by given name, nickname, or description. This possibility would arise especially in the crimes against the person such as murder, rape, or robbery. The crimes of stealth such as burglary or larceny would not be expected to generate named suspects in a similar high percentage of cases.

The second type of named suspect occurs when an arrest is made of an individual in the process of committing the crime. Identifications of latent fingerprints of these suspects would form valuable corroborating evidence during trial proceedings.

The third type of named suspect arises as the result of the experience of the investigator. It has been observed that after investigators have been stationed in one area for a period of time, they get to know the criminal element of that area quite well. Therefore, when a crime is committed, it is natural for the investigator to draw up a list of possible suspects based on his knowledge of the habits of the criminal elements in his area. In this instance, a latent print sent to the identification bureau would be accompanied with a list of suggested suspects. Past experience in identification bureaus has shown this to be an effective procedure. The magnitude of this factor might tend to be less in a large city, with its shifting population, than in a less populated area. Investigative informants might also play a role in the generation of this type of named suspect.

After considering the possible ways that suspects come to light during an investigation, it remained to find some data that would be of value in deriving the estimate of the number of named suspects that may be expected.

A Los Angeles study, cited in the Task Force Report: Science and Technology, included data on the mode of clearance of the various crimes that were committed during the study period. An analysis of the detective reports of each case was made to determine the number of times a named suspect led to the clearance of the case. The following extract from the report summarizes the results of the analysis:

> "The impact of the named suspect characteristic can be seen more specifically by examining some particular types of crimes. For example, assault cases tend to be cleared at a much higher rate than most other crimes. This is primarily because a large proportion of assaults involve named suspects. Out of a total of 154 aggravated assaults, 116 (or 75%) were named suspect cases. Of the 154 assaults, 123 (or 80%) were cleared.
>
> "A similar result is seen in rape cases. Out of 14 total cases in this category, 10 were cleared. Nine of the 14 cases involved named suspects. Burglaries on the other hand, generally involve unnamed suspects. Of the 626 burglaries, only 31 (or 5%) had named suspects. This significantly affects the clearance rate. While burglaries represent 34 per cent of the total number of cases, they comprise only 15 per cent of the total number of cleared cases."[1]

This data indicates that named suspect identifications will make a larger contribution to the system for crimes against the person than for crimes of stealth.

One problem in using the results of the Los Angeles study to estimate the number of latents that might yield suspect identifications is that the study dealt with all crimes investigated, not just those which had latent fingerprints associated with them.

In order to approximate how many times submitted latent fingerprints yield suspect identifications, the results of the New York City, Nassau County, and Syracuse

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[1] Herbert H. Isaacs, Appendix B Task Force Report: Science and Technology, U. S. Government Printing Office, 1967, p. 97.

Police Departments with respect to latent print suspect identifications were examined. The following table summarizes the data from this examination. The data is based on all crimes, but generally reflects a preponderance of burglaries.

Police Agency	Year	Cases where latents were found	Suspect Identifications	%
New York City	1965	1,102	74	6.7
New York City	1966	992	77	7.8
Nassau County	1966	320	52	16.3
Syracuse	1966	65	9	13.9
Institute of Applied Science	1966	60	9	15.0

Average percentage: 11.9

NOTE: For New York City, "Cases where latents were found" represents cases where usable latents were found.

As the figures indicate, about 12% of the cases in which latents are found should yield suspect identifications. This seems to be a reasonable estimate based on current latent fingerprint procedures. Corroboration of this estimate for G_1 awaits the operation of the ideal system.

The third factor affecting the number of searches in the criminal base file, the number of latents not usable as evidence, is represented by Block H on the flow chart.

As stated in the Latent Fingerprint Operation section (page I-9), one of the prerequisites of an ideal latent fingerprint system is a processing system developed to the point where a search can be made of the main fingerprint base file on the basis of a single latent fingerprint of sufficient scope and clarity to be used as evidence in court. We assume that any latent print which cannot be used as evidence cannot be searched in the file of an ideal system. Therefore, these latents will tend to diminish the number of searches in the file.

It is difficult to estimate the number of these latents that may be expected, since presently there is a difference between those latents which have enough information to be searched and those latents which are usable as evidence. A latent under present classification systems, might contain too little information to be searched, but still might be identified and subsequently used as evidence if a suitable suspect were named. Therefore, the data which was available did not truly reflect the situation that would be present with the operation of an ideal system.

Data from the New York City Police Department Latent Fingerprint Section indicates that for purposes of their annual report, a "no value case" is any case which turns out to have no latent fingerprints of value for searching in the file. This means that the figures correspond to the number of cases which might yield latent impressions of no use for searching with current systems.

The New York City figures indicate that in 1965, 18.8% of the cases that yielded latent fingerprints turned out to be of no value since they did not contain latent fingerprints of sufficient scope and clarity to be searched in the file. The corresponding figure for 1966 was 17.9%.

A study done by the FBI indicates that of 787 latent prints examined, 195 (25%) were of such poor quality that a pattern could not be discerned.[1] These prints would not have any value for searching purposes under current operations. It is unknown whether some of them might be of evidentiary value in a case where a suspect's name were available, and thus usable for searching in an ideal system.

On the basis of the available data, an estimate of the number of cases yielding no latent prints usable as evidence (H) is 20% of the number of cases which yield latents. No adjustment will be made to reflect a potentially greater number of usable latents in an ideal system.

[1] FBI Law Enforcement Bulletin, "Identify Latents Through A Single Fingerprint File," November 1951, p. 1.

The discussion of blocks F_1, G_1 and H, has led us to block I on the flow chart, which represents the number of latent searches in an identification bureau. The number of latent searches that might be expected for a period of one year may be obtained from the following relationship:

$$I = D - (F_1 + G_1 + H)$$

The chart that follows shows the first section of the latent fingerprint processing system. Each block contains a number which represents the number of applicable burglary cases estimated for the year.

We will now discuss the next section of the system.

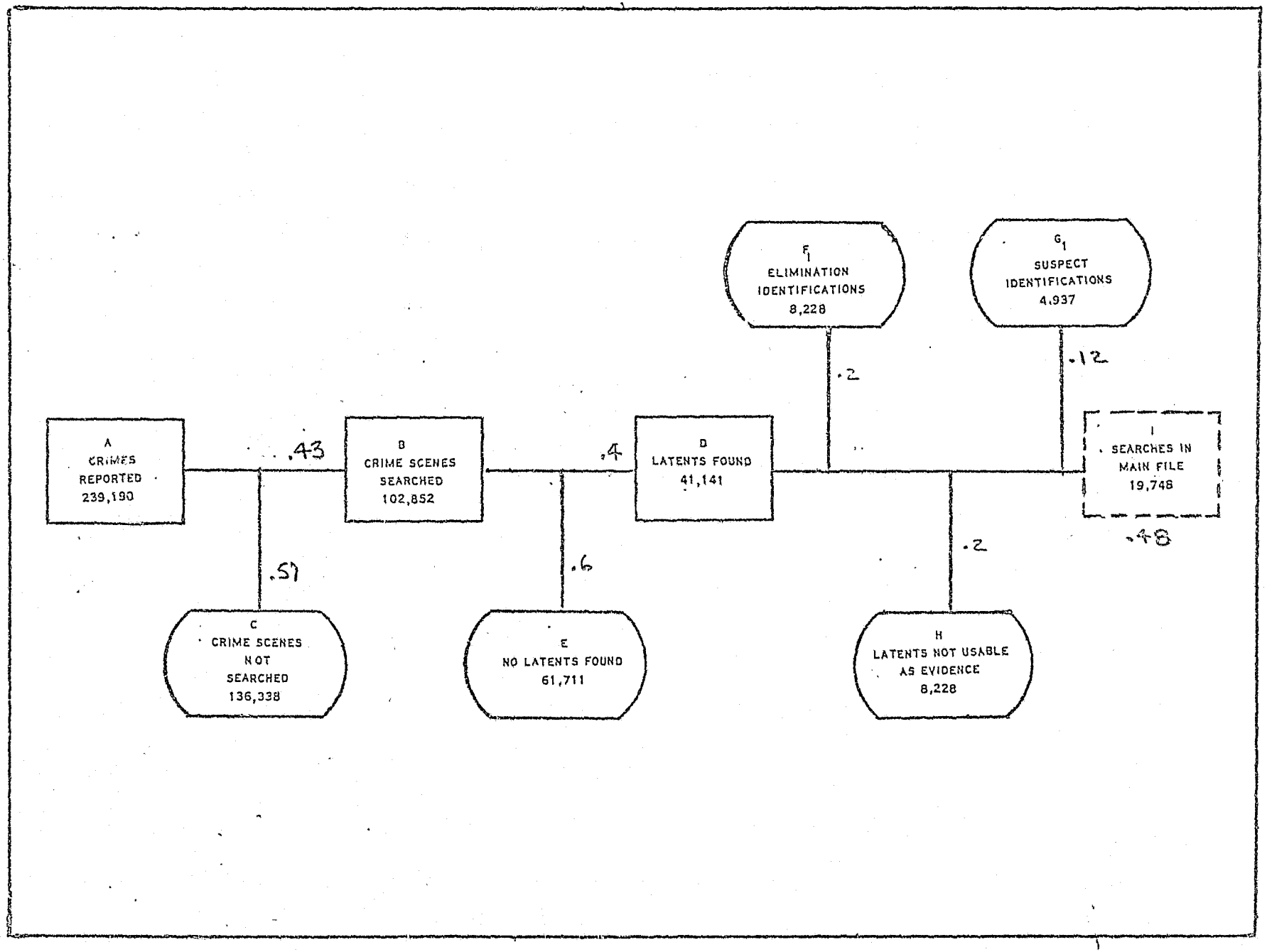

FIG. 2 CASE VOLUMES — GROUP I OPERATIONS

INITIAL SEARCH OPERATION

INITIAL SEARCH OPERATION

Block J on the flow chart (Fig. 3, P. III-10) represents non-perpetrator identifications. These identifications arise as a result of a search, and can be considered a type of elimination identification. They are identifications of persons whose fingerprints happen to be in the base file, but who are not perpetrators of the crimes.

Since no data could be found to provide an estimate of this factor, we will consider I to be a negligible factor in the system.

Block K on the flow chart represents unidentified non-perpetrator latents. There is, of course, no truly objective way at the present time to estimate what percentage of unidentified latents at identification bureaus are in fact non-perpetrator latents which have not been eliminated in the normal elimination procedure. Therefore, we will treat this estimate in a somewhat subjective manner.

The New York City Police Department Latent Unit reports the following statistics for the year:

1,227 cases with latent prints of value

637 cases -- no eliminations received

238 cases -- Elimination comparisons were made due to circumstances surrounding crime. Therefore, the remaining unidentified latents are possibly those of perpetrator of crime.

352 cases -- Latent prints have high probability of being perpetrator's.[1]

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[1] Personal correspondence with New York City Police Department Latent Unit.

These figures indicate that the latents in approximately 48% of the cases reported have a high probability of being perpetrator latents. It is reasonable to assume that some portion of the remaining 52% also have perpetrator latents. We will assume that this portion has between 20% and 50% of the remaining 52%, or about 10% to 25% of the total in Block I. We will guess the figure to be 12%. We will, therefore, advance a conservative estimate that 60% (48%, plus an additional 12%) of the latents in Block I represent perpetrator latents. Consequently, the number in Block K (non-perpetrator) represents 40% of the latents in Block I.

Block L on the flow chart represents the number of perpetrators under fingerprintable age. The fingerprints of this group of perpetrators might not be in the criminal file because there is no specific section in the New York State Code of Criminal Procedure which gives the arresting agency the right to take the fingerprints of a juvenile under sixteen years of age.

Article 940 of the Code of Criminal Procedure states:[1]

> "In order that the courts and public officials dealing with criminals may have accurate information as to the identity of persons charged with crime, there is hereby conferred and imposed upon the chief of police or police officers performing such functions, in each city, town or village, and upon sheriffs, members of the state constabulary, the railway police, the aqueduct police, the state park police and all other police officers making arrests, the power and duty of causing to be taken, upon arrest, fingerprints and thumbprints, and, if necessary, the blood grouping tests, of every person arrested and charged with a felony or with any crime which would be a felony if such person had been previously convicted of a crime, or with any of the misdemeanors and offenses specified in section five hundred and fifty-two of this code."

[1] New York State has adopted a new Code of Criminal Procedure to become effective in September 1971. The number of crime categories for which fingerprints are required has been increased. However, there have been no changes concerning juveniles.

This section of the code, therefore, gives the peace officer the right to take fingerprints of any person charged with certain felonies, misdemeanors and offenses.

Article 30 of the Penal Law states:

> "A person less than sixteen years old is not criminally responsible for conduct."

This statement means that a person under sixteen years of age cannot be charged or arrested for the crimes and offenses listed under Article 940 of the Code of Criminal Procedure.

The preceding indicates that since a juvenile, under sixteen years of age, cannot be charged with a fingerprintable crime, the peace officer has no specific right to fingerprint the individual. (This is not to say that the peace officer might not fingerprint anyway after obtaining consent from the arrestee).

As a result of this, even though a juvenile under the age of sixteen has been arrested for a crime, his fingerprints probably will not appear in the criminal file. Therefore, latent fingerprints left by this group of perpetrators would not be identified through a search of the file.

The data used to estimate the contribution of this factor to the system was derived from arrest figures appearing in the FBI Uniform Crime Report and the New York State Department of Correction Return A compilation for the year 1966.

The following table contains the percentages of arrestees for each crime that were juveniles under the age of sixteen for several years in New York State and for the nation in 1966.

Percentage of Arrests For Each Crime Type That Were Of Persons Under 16 Years Of Age:

Crime	FBI UCR	Return A NYS 1965	Return A NYS 1966	Return A NYS 1968
Murder	3.2	6.9	4.0	2.8
Robbery	16.9	24.7	23.5	24.3
Rape	7.1	8.7	9.4	6.5
Larceny Auto	33.8	22.4	23.8	19.5
Larceny Non-Auto	40.3	16.3	15.6	21.3
Burglary	36.8	36.4	35.5	33.5
Arson	60.3	51.2	46.4	40.6

As the figures indicate, juvenile arrests for crimes against the person were low compared with crimes of stealth. The seeming discrepancy between the FBI figures and the New York State figures for larceny non-auto may be explained by the fact that the FBI figures include all larcenies of dollar value greater than fifty dollars, whereas the New York State figures include only grand larceny, defined by the New York State penal law effective September 1967, as being larceny of dollar value greater than $250, and prior to 1967 as being larceny of dollar value greater than $100.

Further support for the assumption that crimes of stealth would provide a lower percentage of identifications (than crimes against the person) due to the perpetrators being under 16 years of age is provided by recidivism studies cited in the FBI Uniform Crime Reports. The data show a general trend toward the commission of more serious crimes as the career of the criminal progresses.[1]

The President's Task Force on Science and Technology studies a typical distribution of 1,000 first arrests by type of crime.

[1] FBI Uniform Crime Reports for the United States, 1966, pp. 39-40.

> "The criminal careers of these 1,000 individuals were then simulated by cycling through the model, taking the probabilities of rearrest over time, and the distribution among index crimes of each group of rearrested persons broken down according to the crime for which they were arrested."[1]

The simulation showed an eventual accumulation of 3,010 subsequent arrests. These include a greater proportion of the more serious offenses than the original offenses. Although this is only a model, and is not strictly looking at the age factor, the results do corroborate the opinion that perpetrators under 16 years of age would tend to be connected with crimes of stealth a higher proportion of the time than with crimes against the person.

In light of these studies, calculations of the number of juveniles under 16 years of age will be made for burglary based on the Return A compilation for 1966. An assumption will be made that the proportion of perpetrators under 16 in the arrest population, approximates the proportion of persons under 16 in the perpetrator population as a whole. The figures show that about 35% of the arrests made for burglary in New York State during the year 1968 were of juveniles under the age of 16. We will therefore take 35% of I-J-K as the number for Block L.

Block M on the flow chart represents those cases whose latent fingerprints are not identified on the first search because the perpetrators have no previous record in New York State. This can occur in the following two ways:

a. A New York State resident who has never been arrested in New York State for a fingerprintable offense, commits a crime and leaves a latent.

[1] Task Force Report: Science and Technology, President's Commission on Law Enforcement and Administration of Justice, 1967, p. 64.

b. A person from out of State, who has never been arrested in New York State, commits a crime in New York State and leaves a latent fingerprint.

Data pertinent to Block M from two large identification bureaus will be discussed -- namely, the New York State Identification and Intelligence System (Bureau of Identification), and the Federal Bureau of Investigation (Identification Division).

Experience of the NYSIIS Bureau of Identification indicates that approximately 60% of incoming arrest/identification fingerprints (we will use arrest/identification searches as a proxy for latent searches) are identified after a search of the file. This means that about 40% are not found because the fingerprints of the subject are not in the file by reason of (a) and (b) discussed above.

The FBI Uniform Crime Report for 1966 states: "Of 41,733 offender records, 36,506 were repeaters."[1] This means that the records of approximately 88% of the offenders showed a prior arrest, indicating that about 12% would not be found in the file. The UCR explains this seemingly high percentage of repeaters in the following way:

> "These 41,733 individual criminal records are made up primarily of Federal offenders who were brought into the program due to their involvement in the Federal process. The fact that most of the Federal crimes as defined by statute are also local in nature allows one to infer that statistics concerning local offenders would closely approximate those included in this study. The violators contained in this Program generally are serious offenders and, therefore, likely repeaters since common law enforcement practice is generally not to submit a fingerprint card on minor or petty crimes."[2]

[1] FBI Uniform Crime Report, 1966, p. 32.

[2] Ibid., p. 33.

This is a difference of about 28% in search identifications between the NYSIIS B/I and the FBI Identification Division. This apparent discrepancy in the figures is consistent with the following analysis of some limited mobility data.

Data from a study of the mobility of the criminal recidivist population in New York State show that a total of 25.7% of the sample of recidivists studied had arrests outside of New York State.[1] This suggests that about 26% of the incoming arrest/identification prints could be from out of state arrestees who have never been previously arrested in New York State for a fingerprintable offense, but who have committed crimes and been arrested in other states. These arrestees would probably be identified through a search of the national file. Thus, the difference in the percentage of arrest identifications made by NYSIIS and the FBI (as indicated by their study) could be due to the fact that about 26% of the NYSIIS incoming arrest prints are from out of state perpetrators whose record would probably be in the FBI file but not in the NYSIIS file.

Since we are discussing the potential latent fingerprint system for NYSIIS, the experience of the NYSIIS Bureau of Identification will be used to support the estimate for Block M. We will estimate that 40% of the first file searches of a latent fingerprint (conditional on the latent being left by someone over 16) will yield no identifications because the fingerprints of the perpetrator are not in the NYSIIS file. Thus 40% of I-J-K-L will be used as the number for Block M.

Mention must be made of another factor which might affect this estimate. Because of the general progression to more serious crimes in the careers of criminals, crimes against the person should have a higher probability of being committed by a person who has a prior record with the

[1] Mobility Study (Internal NYSIIS Report) C. R. Vitacco, 1965, p. 4.

identification bureau than the crimes of stealth. In other words, the nature of the crime should have an effect on the number of prints that cannot be identified because the subjects have no prior record. This factor is recognized, but since no objective data is available to support an estimate of how crime type would affect the estimate for Block M, no adjustment will be made in the estimate for Block M for burglary.

UCR 1972 M=.029 for burglary

We will now go on to Blocks N_1 and N_2. If the correct fingerprint record is in the main file (in an ideal system), it still may not be found when searching the file. The frequency of this occurrence is termed the "miss rate" of the searching operation. The "Latent Fingerprint Operation" section of this report (page I-8) enumerates the following reasons why a print that is in the file might be missed in a search against an incoming latent:

a. The main file fingerprint corresponding to the latent print may be coded or classified incorrectly.

b. The latent print may be incorrectly coded or classified.

c. Distortions in the latent print may alter its classification sufficiently to cause the file print to be missed during the search.

Prints not found for these reasons are represented by Blocks N_1 and N_2. The miss rate is applied to those cases where the perpetrator's fingerprints are expected to be in the base file on the first search. For purposes of this report, a miss rate of 5% will be assumed for the searching operations. Thus 5% of I-J-K-L-M gives us N_1.

The number in Box R_1 on the flow chart which follows represents the criminal identifications that might be expected

for the year as a result of the first search of the criminal file. This figure may be obtained through the following equation:

$$R = I - J - K - L - M - N_1$$

We will now discuss the third section of the latent fingerprint processing system.

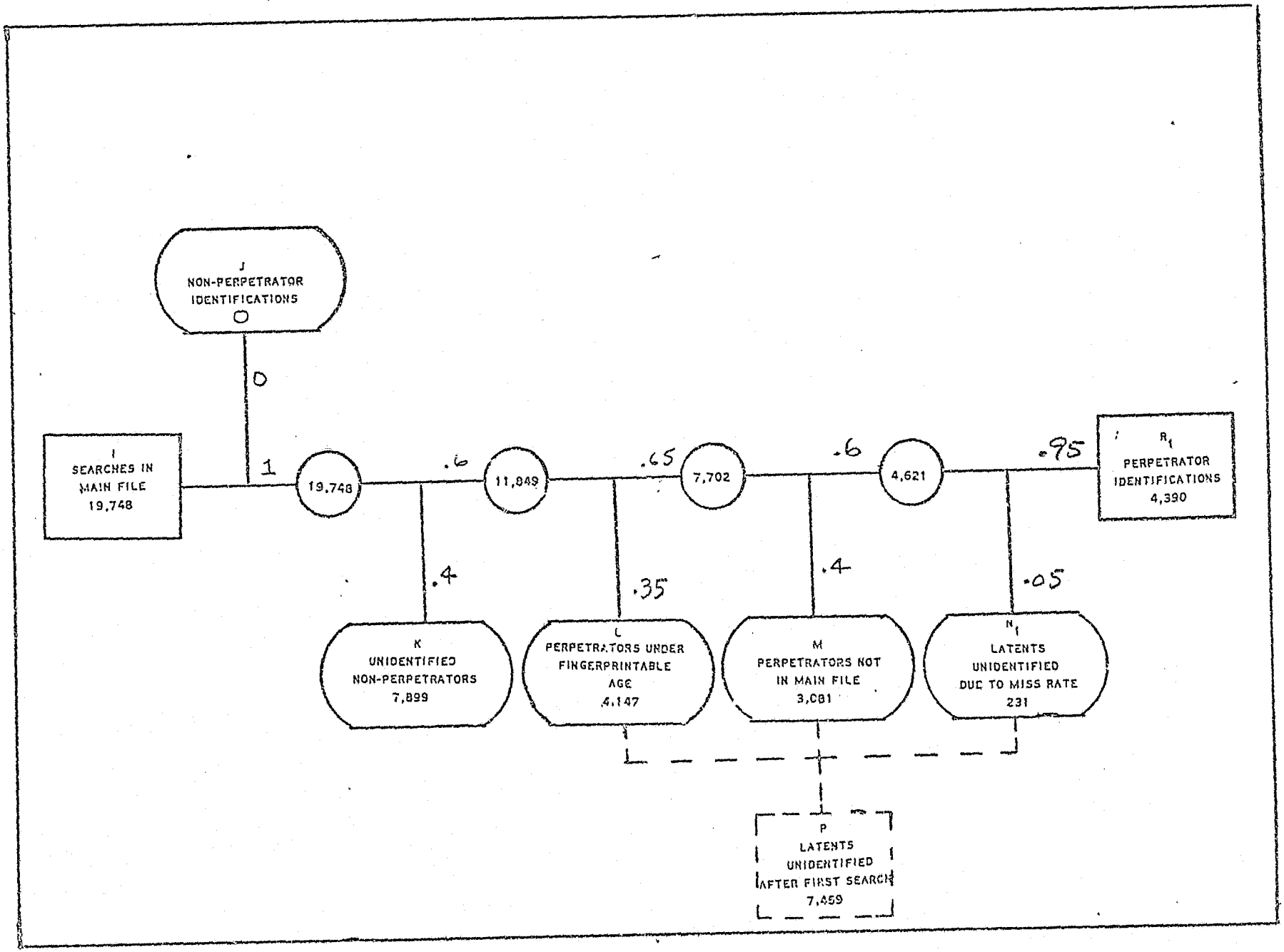

FIG. 3 CASE VOLUMES – GROUP II OPERATIONS

IDENTIFICATION BUREAU RE-SEARCH OPERATION

IDENTIFICATION BUREAU RE-SEARCH OPERATION

For convenience in representing the next portion of the model, the non-identified latent cases represented by L, M and N_1 are combined into Block P (i.e., $P = L + M + N_1$). Blocks K and P provide the input to the next part of the model, which is the re-search operation (Fig. 4, P. IV-7). K represents those cases which contain only latents of non-perpetrators. Thus K cannot contribute to either R_1 on the initial search or R_2 on subsequent searches. This is represented diagrammatically by placing K on a separate re-search path, although the cases represented by K must still be considered as part of the total re-search work load (i.e., P + K).

G_2 represents suspect identifications made after the intial latent search process -- these will be called subsequent suspect identifications. These identifications will generally be made from suspects generated by the investigating officers and the majority of them will probably be made prior to any significant re-search activity on the involved cases. There is no data available to us at this time that is strictly applicable to an estimation of how many such identifications might be made in an ideal latent system.

However, a study made with the cooperation of the Los Angeles Police Department, and reported on briefly in the Task Force Report: Science and Technology, attempted to determine how many named suspects come to light after the initial crime report. Of the 1,905 crimes reported, 142 (7.5%) had suspects that were not named in the original crime report, named in a subsequent report.

This indicates the number of subsequent suspects that might be expected. However, it does not provide the following information:

a. How long after the crime was originally reported the subsequent suspect was named.

b. Whether the suspect named after the original report had a previous criminal record. If these subsequent suspects had previous criminal records, they probably would have been identified during the first search of the file in a case where a latent print was left. This would generate a suspect for that case, and it would thus be up to the investigator to discover other information concerning the suspect and the crime.

The data from the Los Angeles study do not completely fulfill the requirements to estimate G_2. However, since this was the only data found which related to suspects generated after the initial crime report, and since it is relevant to G_2, it will be used as a basis for the estimate presented in this report.

A question that must also be answered concerning the subsequent suspect category is: Does the type of crime have any bearing on the number of subsequent identifications that might be expected in an ideal system?

The general data presented on named suspects in the Los Angeles study provides an answer to this question. The data reflects the fact that crimes of stealth should, on the average, provide fewer suspects than crimes against the person. Reference to this data was made in our discussion of suspect identifications (Block G_1).

The previous discussion has made the following points:

a. A subsequent suspect identification is an identification of a suspect generated after the first search of the file. The fingerprints of this suspect must not have been in the file, or they must have been missed on the first search.

b. The first search of the file can generate suspects. This provides the investigator with information of value in conducting his investigation.

c. Burglary-theft type crimes should provide a lower percentage of subsequent suspect identifications than crimes against the person.

With these considerations in mind, and using the results of the LAPD study, we will estimate G_2 to be 5% of P.

Block S represents the number of cases in which perpetrator latents will not be identified in the re-search process for the reason that arrest prints of the perpetrators do not come into the main file subsequent to the initial search of the latent prints through the file. Unfortunately, there is no data available to us for the direct estimation of S (as a percentage of $P - G_2$). In view of this lack of data, we will make some very general assumptions and try to arrive at a figure that at least seems reasonable.

The basic figure we will estimate here is the approximate percentage of those burglary perpetrators without a New York State record prior to the commission of the crime who will continue a career in crime and eventually be arrested and fingerprinted in New York State. We will assume that the same percentage can be applied to the subset of burglary perpetrators that leave latent prints at the burglary scene.

In a study of the "Projected percentage of U. S. population with criminal arrest and conviction records, "Christensen[1] said "it appears safe to conclude that if future arrest rates are as high as those in 1965, then the

[1] Ronald Christensen, Appendix J, Task Force Report: Science and Technology, U. S. Government Printing Office, 1967, p. 221.

lifetime arrest probabilities will be at least 40 per cent for males and 10 per cent for females and possibly even higher." These figures apply to the general population in the U. S. However, Wallerstein and Wyle[1] made a survey in which they found that 99 per cent of a presumably random sample of adults admitted to one or more of 49 offenses under the penal laws of New York State; each offense was serious enough to draw a maximum sentence of not less than one year. If this is at all representative, we are certainly warranted in applying Christensen's figures to the perpetrator population. The offenses considered in both studies included many that are not fingerprintable ones in New York State. It seems reasonable that if we restrict the perpetrator population to those committing fingerprintable offenses, which are the more serious ones, we could expect higher lifetime arrest probabilities than those given above.

As noted previously, in the study of criminal careers made by the F.B.I., it was found that 36,506 out of 41,733 criminal offenders were repeaters (i.e., had at least two arrests). Thus, about 88 per cent of the arrested population in the F.B.I. study had more than one arrest. The experience of the Bureau of Identification in NYSIIS has been that about 60 per cent of arrestees in New York State have some prior arrest in New York State. This 60 per cent, plus the 26% that have records outside of New York State, adds up to about 86 per cent repeaters among the arrested population in the U. S. (These data were used in the estimation of Block M.) Since there is probably some dependence of any given arrest upon the individual's previous arrest record (this was noted by Christensen in the Task Force Report Appendix referred to earlier), the percentage of perpetrators of fingerprintable crimes who have not been previously arrested and that will be arrested would probably be lower than 86 per cent for the U. S., or 60 per cent for New York State.

[1] James S. Wallerstein & Clement J. Syle, "Our Law-abiding Lawbreakers."

Information from other sources generally tends to support the figures shown here. This gives us an estimated range for the percentage of perpetrators of fingerprintable crimes that have not been arrested in New York State and that will eventually be arrested in New York State of from 40 per cent to about 60 per cent, or from 40 per cent to about 85 per cent for the U. S. We will use an estimate of 50 per cent for the New York State figure, which is about the mid-point of the estimated range. The value of S is then 100 - 50 = 50 per cent of $P-G_2$.

We have treated juveniles and adults alike in the estimation of S, and we have ignored the slight contribution made by Block N_1, on Block P. In view of the extremely rough estimating procedure used, consideration of these fine points could hardly make us more confident of our answer. The lack of significant data on the perpetrator population as opposed to the arrested population certainly points to this area as one for future research and study. There are many aspects of the criminal justice system that could be better understood if adequate data in this area were available.

Block N_2 on the flow chart represents the re-searches missed due to the inherent miss rate of the search and retrieval process. It applies to those cases where the perpetrator does eventually come into the file but is not found; it applies to $(P - G_2 - S)$. As before, it is estimated as 5 per cent. Block R_2 represents the cases in which perpetrator identifications are made during the re-searching phase.

Block F_2 represents cases in which elimination identifications close out the case during the re-search phase. The value of F_2 is probably quite small and will be ignored here.

Blocks T_1 and T_2 represent the cases which will not be closed as a result of latent identifications. T_1 is the sum of S and N_2, and T_2 is $K-F_2$. $T_1 + T_2 = U$, or the

total unidentified latent cases for the period of time considered. These cases will, however, continue to contribute to the search load (at least for a prescribed number of years) and therefore are termed "continuing re-search load."

This completes our discussion of the model of the ideal latent fingerprint processing system. The major outputs estimated for the model are, of course, the percentages of reported burglaries which result in perpetrator identifications, either suspect or search. These percentages are summarized in Figure 5.

The preceding discussion of the model of the ideal latent fingerprint processing system has clearly indicated areas where critical data are required but are simply not available. For instance, insufficient data are available for the initial sequence of the model field operations. Short experimental projects conducted in several cities scattered about the United States would serve to provide valuable information for the estimation of the model parameters, and it is recommended that such experiments be conducted.

The basic experimental structure is relatively simple. A specific crime category would be selected for study. Since burglaries dominate other crime types in terms of numbers committed, and since they are susceptible to latent investigations, they are a reasonable choice. A highly qualified team of investigative personnel would be selected for the study, and a short orientation seminar (one to four weeks, depending upon the time available each week) would be held as a preliminary step. This would introduce the team to the goals and methods of the study and to any special equipment or techniques that would be used.

The heart of the study would be a maximum effort on the part of the team to bring in latent prints from burglary scenes and associated objects. What constitutes

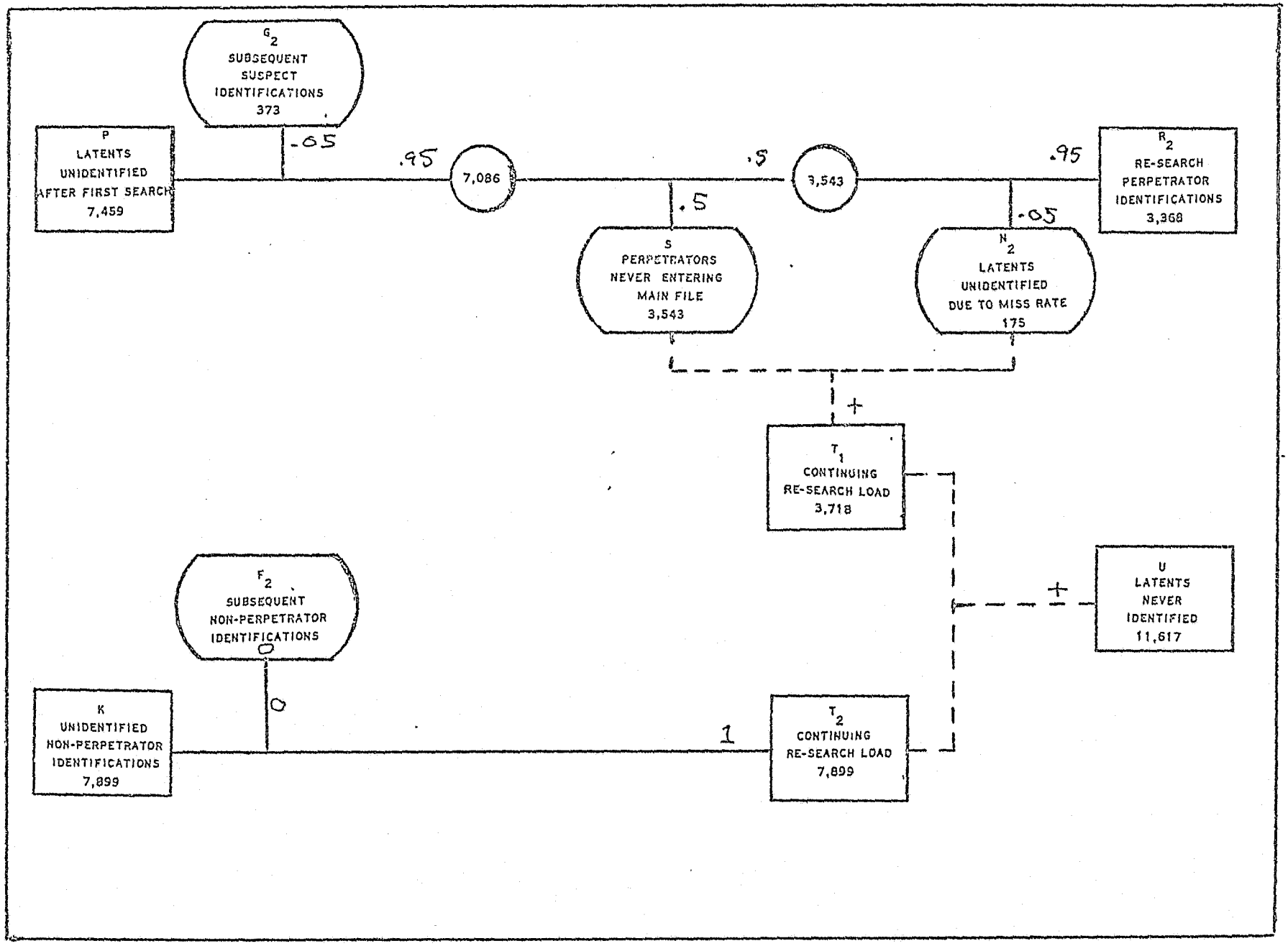

FIG. 4 CASE VOLUMES — GROUP III OPERATIONS

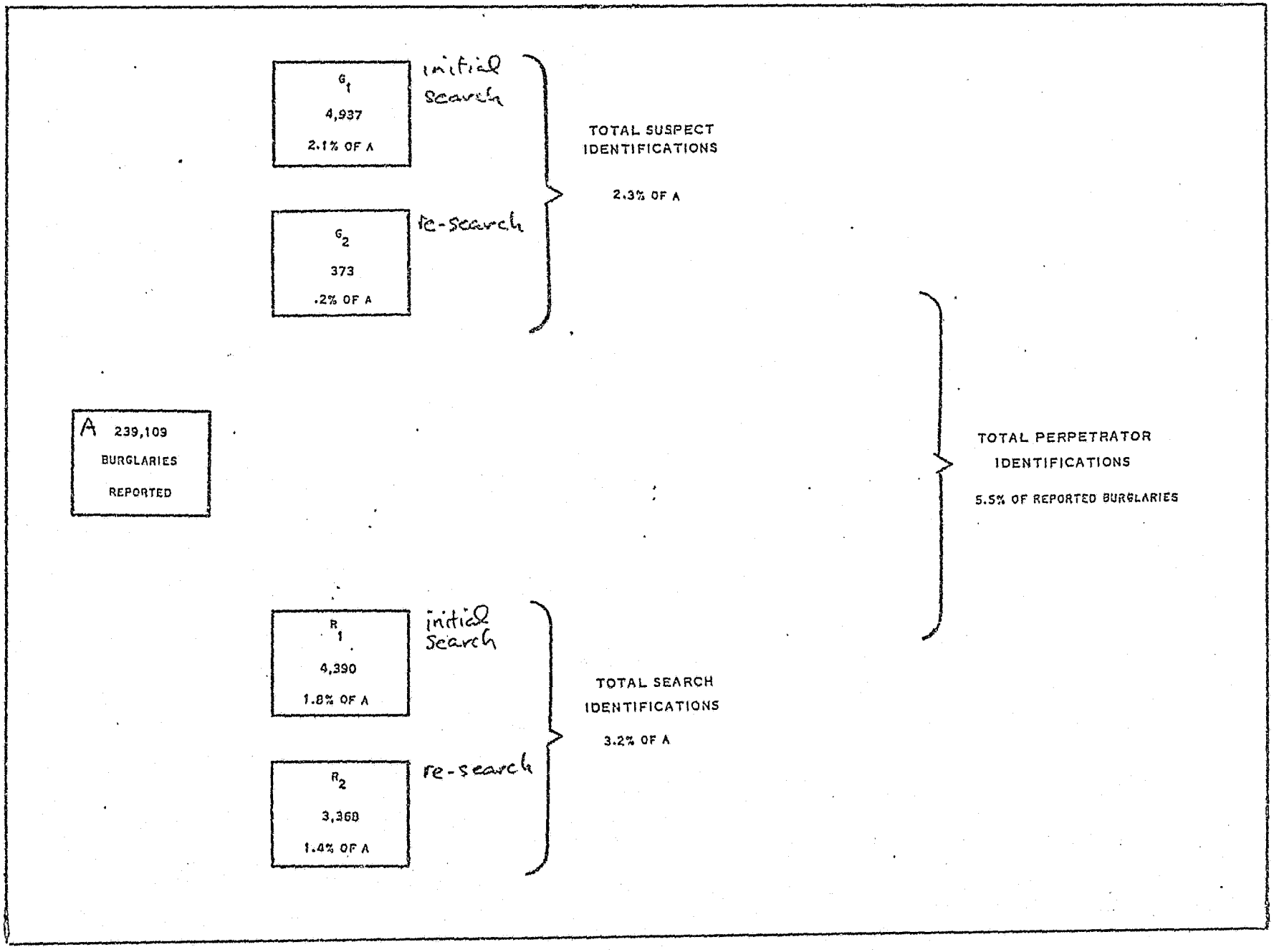

FIG. 5 — SUMMARY CHART INDICATING ESTIMATED LATENT IDENTIFICATIONS AS A PERCENTAGE OF REPORTED BURGLARIES

a maximum effort may vary depending upon the circumstances; ideally every burglary within the jurisdictional area of the team would be examined for latent prints. This would continue for one to three months. It is probably unreasonable to expect this maximum effort for a longer period of time since it represents a significant manpower drain on the agency.

The maximum effort period will result in estimates of:

a. The percentage of reported burglaries that have a sufficient probability of the perpetrator's latent prints being found to warrant an intensive scene search. This information may be classified on the basis of the type of burglary and the circumstances surrounding the crime.

b. The percentage of scenes searched that result in usable latent fingerprints. A usable latent print is defined as one that could be searched in a fingerprint file.

c. The percentage of usable latents found that belong to persons having a legitimate reason for being at the scene.

d. The percentage of usable latents found that are identified with suspects generated within a short period of time following the investigation.

This will lead us to an estimate of the number of latent prints that would be received at an identification bureau for file searching. By combining the results from several such studies we should be able to make some reasonable judgments about the first part of the latent process and its impact on the question triggering this utility study.

The remainder of the latent system model is somewhat dominated by a parameter that is difficult to measure without the envisioned latent system of the future. That parameter is the percentage of usable latent prints found that belong to non-perpetrators that have not been fingerprinted by the investigators for elimination purposes. Perhaps some bounds can be placed on this by information obtained by the above study. A second problem that we encounter in estimating some of the parameters is an uncertainty in the applicability of arrest data to the perpetrator population. For instance, we can use arrest data to determine the percentage of burglary arrestees that are under the legal fingerprintable age; but how well does this indicate the percentage of burglary perpetrators that are under the fingerprintable age? Within such limitations, the results of the continuing NYSIIS studies and the additional data that can be provided by the experimental projects recommended above will provide a picture of what we will be able to accomplish with an automated latent system.

END