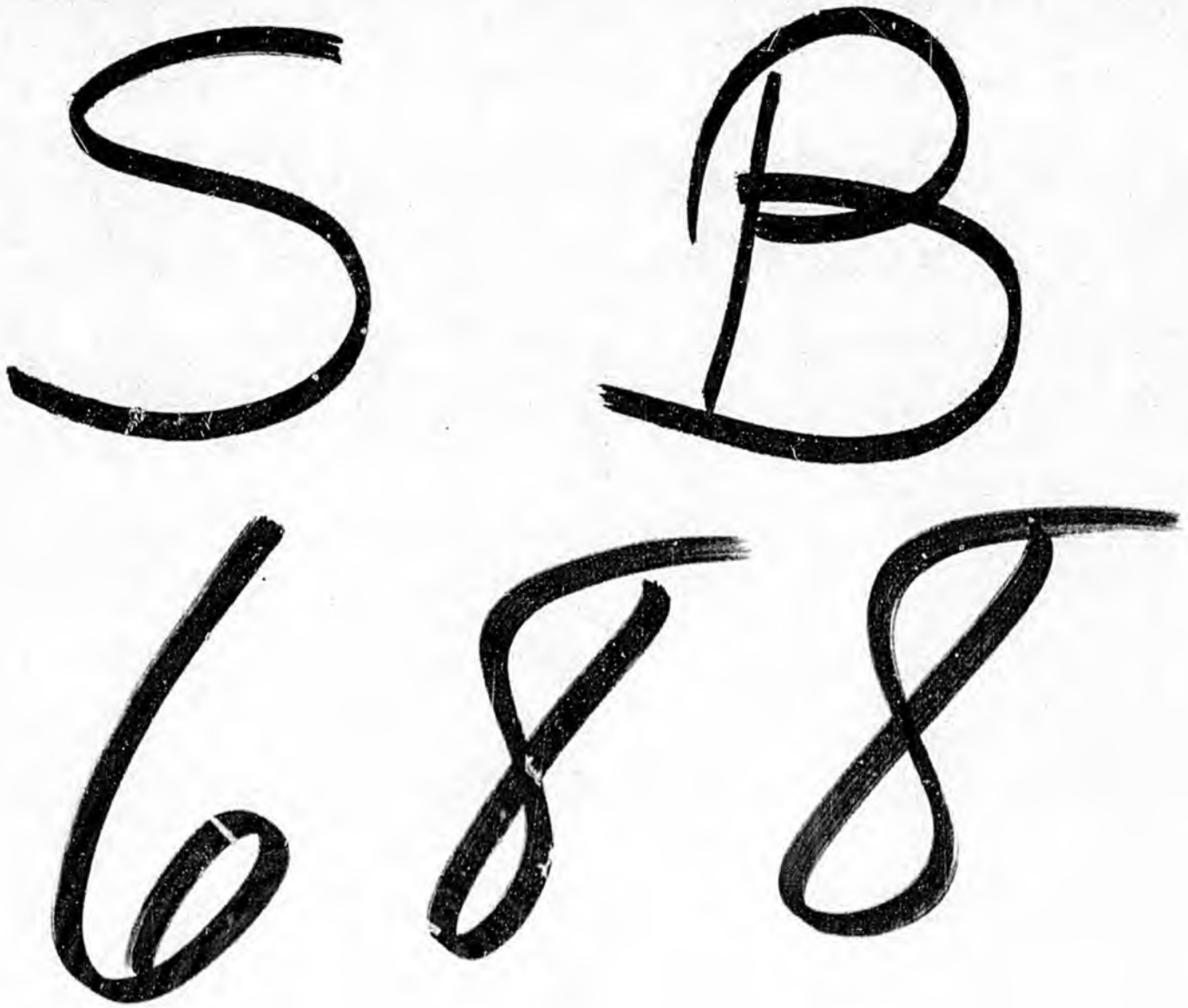

SB
688

COMMITTEE REPORT

SENATE

1/27/82

FURTHER: Finance

Date: Feb 3, 1982

Mr. President:

The Committee on JUDICIARY has had SB 688

making a special appropriation to the Dept. of Public Safety for a computerized fingerprint system

under consideration and (a majority of the committee) (the committee) reports it back with the following recommendations:

[X] do pass [ ] do not pass

[ ] do pass with attached amendments(s)

[ ] replace with CS for _____ [ ] same title [ ] new title

and recommends _____

[ ] AND attaches a "Letter of Intent" [ ] New Fiscal Note

[ ] reports it back without recommendation

[ ] referred to the _____ Committee

MEMBERS SIGNING
DO PASS

MEMBERS HAVING
OTHER RECOMMENDATIONS:

_____

CHAIRMAN

S 60 (Rev. 12/78)

Official Business

Alaska State Legislature

Senate

Committee on Judiciary

Pouch V
State Capitol
Juneau, Alaska 99811

MINUTES OF THE SENATE JUDICIARY COMMITTEE

OF

FEBRUARY 3, 1982

Butrovich Committee Room, State Capitol Juneau, Alaska

Legislation Before Committee:

SB 688 - "An Act making special appropriation to the Department of Public Safety for a computerized fingerprint system; and providing for an effective date."

SB 687 - "An Act relating to the issuance of search warrants; and changing Rule 37, Rules of Criminal Procedure."

SB 299 - "An Act relating to elections."

The meeting of the Senate Judiciary Committee was called to order by Chairman Rodey at 1:45 P.M. Committee members present were: Senators Rodey, Ray, Parr, and Bennett. Senator Hohman was absent.

The first item on the agenda was SB 687. Barry Stern, representing the Department of Law was called before the committee to testify. Mr. Stern expressed the Department's support for this SB 687 and suggested an amendment to this bill which would require persons who request warrants to first contact the District Attorney to avoid any warrants be inappropriately issued.

Mr. Bruce responded to Mr. Stern's suggested amendment, stating that he had spoken to several District Attorney's and they had expressed concern that by having to contact the District Attorney, it would delay the issuance of the warrant.

The committee declined to adopt Mr. Stern's amendment.

Chairman Rodey next called Mr. Korhonen, representing the State Troopers, before the committee. Mr. Korhonen testified, expressing the State Troopers support for SB 687.

Senator Ray moved that SB 687 be moved from committee with individual recommendations. There was no objection, and the bill was passed. Senator Rodey, Ray, Parr, and Bennett all signed do pass.

Senator Bennett was excused from the committee due to Finance Committee responsibilities.

The next item on the agenda was SB 688.

Chairman Rodey recalled Mr. Korhonen before the committee. Mr. Korhonen expressed the State Troopers support for SB 688 and gave a detailed explanation of the system's capabilities.

After brief discussion of the bill, Senator Ray moved that SB 688 be passed from committee with individual recommendations. There was no objection and the bill was passed. Senators Rodey, Ray, and Parr all signed do pass.

The last item before the committee was SB 299. Chairman Rodey called Patty Ann Polley, Division of Elections, to testify. She spoke in favor of three specific sections of the bill; Sec. 6, Sec. 9, and Sec. 20, and asked that the committee consider moving these three sections through the committee as expeditiously as possible to allow for them to be in effect for the 1982 election.

Senator Ray moved that the committee delete all sections from SB 299 except Sec. 6, Sec. 9, and Sec. 20. There was no objection and the amendment was adopted.

Senator Ray moved that the committee move SB 299 from committee. There was no objection and the bill was passed. Senators Rodey and Parr signed do pass. Senator Ray signed no recommendation.

Chairman Rodey adjourned the meeting at 2:30 P.M.

THE LEGISLATURE OF THE STATE OF ALASKA
TWELFTH LEGISLATURE

FISCAL NOTE

I. REQUEST
Bill/Resolution No. SB 688
Title Spec. Approp. for a computerized fingerprint system
Requested by SEN. Judiciary Date 2-2-82

II. FISCAL DETAIL
Agency Affected Department of Public Safety
Program Category Affected Administration of Justice
BRU, Program, Or Subprogram(s) Affected Laboratory Services
(Note: If more than one budget component is affected, separate line-item amounts and funding for each component in the analysis section.)

EXPENDITURES (Thousands of Dollars)

	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87
100 PERSONAL SERVICES			105.3	115.8	127.4	140.1
200 TRAVEL		20.6	21.2	2.2	2.4	2.7
300 CONTRACTUAL		38.2	480.4	103.5	103.9	104.3
400 COMMODITIES		5.3	4.5	9.3	10.2	11.2
500 EQUIPMENT						
600 LAND & STRUCTURES						
700 GRANTS,CLAIMS,ETC.						
TOTAL		64.1	611.4	230.8	243.9	258.3

FUNDING (Thousands of Dollars)

GENERAL FUND		64.1	611.4	230.8	243.9	258.3
FEDERAL FUNDS						
OTHER (Specify Source)						

POSITIONS

FULL TIME			2	2	2	2
PART TIME						
TEMPORARY						

III. ANALYSIS (See Fiscal Note Preparation Instruction, Section III)
The proposed legislation would create the Automated Fingerprint Identification Network which would utilize a Rockwell 250 S Printak Central System in AST Headquarters with a Read/Edit Sub-system in the Anchorage Police Department.

In acquiring this tested, proved and highly reliable system, law enforcement agencies can automatically search their already existing extensive fingerprint files to locate matches and print out identities of respondents. Search time will be reduced and match rate increased by at least 15%.

The initial cost of $3,042,200 as provided by this bill would provide all cost of the equipment and its installation through the end of FY 83 (see attached schedule "Capital Project Cost Estimate"). The FY 83 - FY 87 cost noted above is the expected operating cost for these years including the cost for two positions.

IV. DATE February 2, 1982 PREPARED BY Marcia Lynn McKenzie
AGENCY Department of Public Safety
PHONE 465-4349

Original: Legislative Finance
cc: Budget and Management
Prime Sponsor (First Legislator Named)
30-001 (Rev. 12/81)

AUTOMATED FINGERPRINT IDENTIFICATION NETWORK
OPERATING COST ESTIMATE

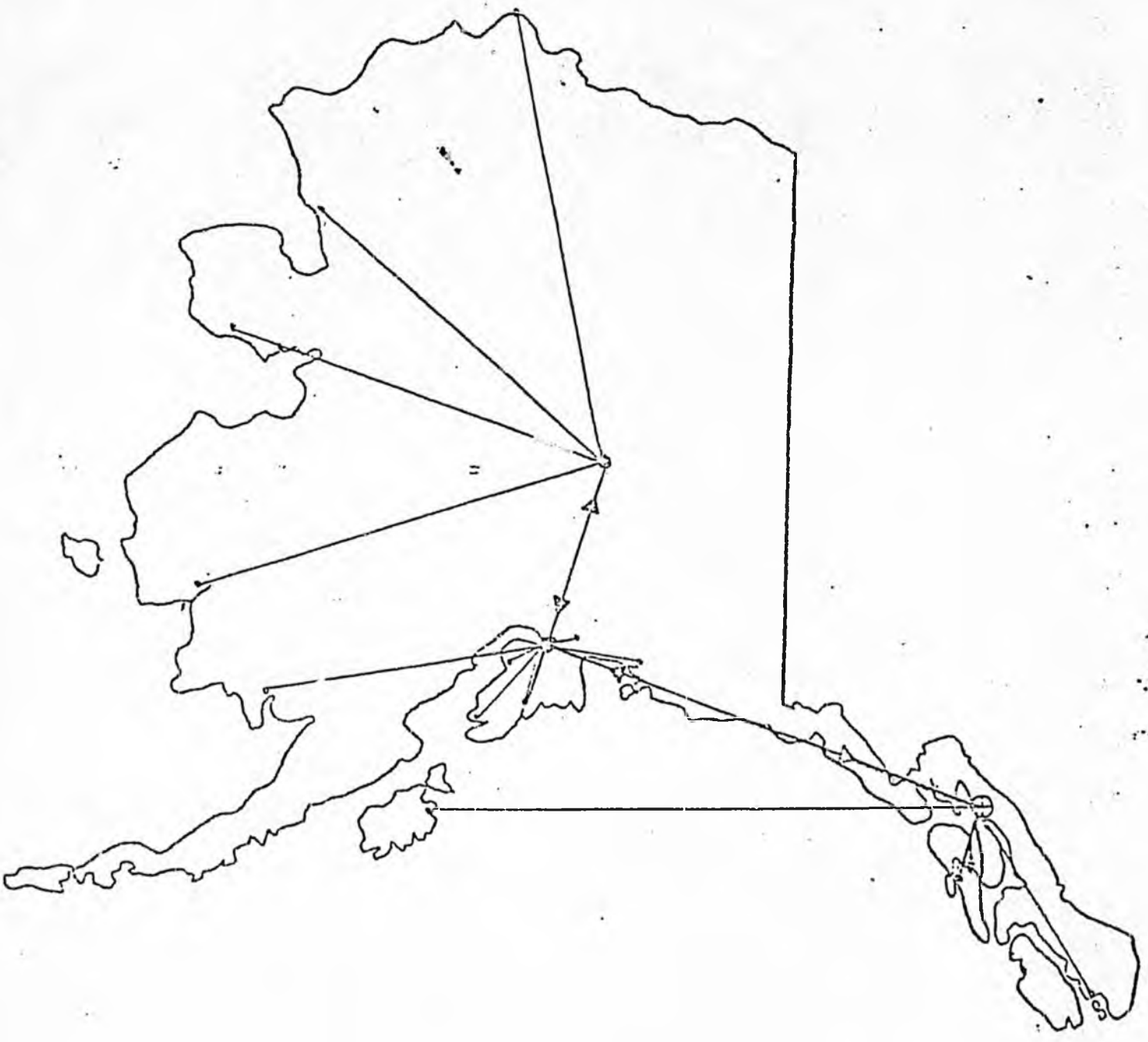
CODE		DESCRIPTION		FY 83	FY 84
100		Personal Services			
	111	Reg. Comp. (2x19AGGU)			74.9
	121	Overtime (180 hrs. X 26.19)			5.2
	121	Shift Differential (19AX3.75)			1.4
			Sub-total		81.5
	VAR.	Benefits (17.67%)			14.4
	184	FICA (6.65%)			5.4
	185	Group Medical (1800X2)			4.0
			100 TOTALS		105.3
200		Travel and Moving			
	211	In-State Travel		2.4	
	212	In-State Per Diem		3.2	
	223	Out-of-State Travel		5.6	6.8
	224	Out-of-State Per Diem		5.3	14.4
	291	Transportation		2.5	
	292	Technician Per Diem		2.2	
			200 TOTALS	20.6	21.2
300		Contractual Services			
	311	Phone		.7	5.1
	314	Postage			.4
	326	Subscription & Info.			.2
	349	Main. Contract & File Conver.		22.3	424.7
	*389	Training		3.6	50.0
	394	Conference Registration		.3	
	397	Freight		11.3	
			300 TOTALS	38.2	480.4
400		Supplies and Materials			
	425	Janitorial Supplies		.9	.9
	481	Stationary & Supplies		4.4	
	483	Computer Commodities			3.6
			400 TOTALS	5.3	4.5
		PROJECT TOTALS		64.1	611.4

*Contractor training of state employee to maintain the system.

AUTOMATED FINGERPRINT IDENTIFICATION NETWORK
CAPITAL PROJECT COST ESTIMATE

250S Central System - unit cost including air shipment	$1,700.0
250S Subsystem (A.P.D.) - unit cost including air shipment	696.0
Installation cost	200.0
Site preparation	177.4
Spare parts inventory	207.3
Fingerprint file conversion	61.5
CAPITAL PROJECT TOTAL	$3,042.2

AUTOMATED FINGERPRINT IDENTIFICATION NETWORK OF ALASKA



WE HAVE A PROBLEM.

Law enforcement agencies in Alaska are like all law enforcement agencies everywhere, large and small. Our prime concern with every crime is: "Who committed this crime?"

Most - around 60% in fact - of the crimes committed in the State are perpetrated by "recidivists". That is, they are committed by people who tend to be arrested and re-arrested repeatedly as the years go by. Thus, when a crime takes place, our expereienced investigators may sometimes have a good mental list of suspects.

If Alaska police investigators were like the detectives in paperbacks, movies, and TV shows, they would solve every crime they encounter - by an unerring combination of ESP, James Bondian scientific gadgetry, and a set of unbelievably fortunate coincidences. In real life, however, detectives' lives are not so smooth.

Increasingly, police are forced, by such Supreme Court rulings as the Miranda and Escobedo decisions, to rely on physical evidence. Most real-life cases are cleared as a result of on-the-scene identifications by victims or witnesses, with the remainder being cleared through administrative investigatory methods such as fingerprinting.

Every time an arrest takes place in Alaska the alleged lawbreaker's fingerprints are rolled onto a 10-print file card. Altogether, the State files in 1980 contained a total of around 110,000 ten-print cards, also Anchorage had on filed more than 90,000 such cards. Thus, the city and State police departments had on file a total of 200,000 ten-print cards (or 2,000,000 individual prints) of known offenders. In addition the combined agencies have on file more than 25,000 individual, unidentified "latent prints" "lifted" at the scenes of crime.

When a police officer is able to find a good latent at a crime scene, it is possible in many cases to pull from file the cards of all those on his mental list of likely suspects and, try by manual handling and simple visual examination of the prints, to achieve a "hit" - that is, a match between the latent and a file print - in only a few hours. In 1979, around 3% of all the latents picked up by law enforcement officers in Alaska were identified by means of such manual processing.

Latent prints are found at just about 50% of all crime scenes, but, on the average, only a very small portion of the evidence is matched against a known print and results in a clearance. Even so, the matching of latents with known prints represents the majority of clearances that we make through administrative investigatory methods.

Why aren't more of the latents matched and more crimes cleared thereby? The answer lies in the time it takes to match a single unknown print against files containing literally millions of prints. To look for a match, by manual methods, among the more than 2 million fingerprints in the combined files would require a total number of hours and dollars obviously beyond the limits of practicality. It is not too surprising that, unless the police investigator has a pretty good idea of where to look before he starts, he usually simply doesn't start the time-consuming search.

Our problem in Alaska - is to find a way to search for matches with latents, through hundreds of thousands, even millions, of prints, in a practical amount of time, and at a practical expenditure of the dollars to pay for that time - is not our problem alone. It is still the problem of almost every law enforcement agency throughout the world. Its solution has the potential to dramatically increase crime clearance rates ... to slash law enforcement costs and, eventually, to act as a powerful deterrent to the commission of crimes.

A SOLUTION TO THE PROBLEM...

Our solution will save us hundreds of manhours and thousands of operational expense dollars - while upping our "hit" rate by more than 30% annually.

By acquiring an automated system - a tested, proven, highly reliable system that's faster, more efficient, and less costly to operate. The system would automatically search our extensive files in only minutes ... automatically find the most likely matches ... automatically print out identities of respondents, listed in descending order of their match probabilities.

By a conservative estimate, our search time will be reduced and our hit rate will be improved to at least 10 to 15%.

But ... reduced search times and more hits are not the only benefits of the automated system.

The automatic search techniques of this new system will also tend to eliminate the part that investigators play in the analysis of fingerprint evidence, since their input is no longer necessary to create lists of suspects. This will free investigators for their prime purpose - investigation. As a corollary, it will cut the amount of investigator costs involved in the fingerprint process.

SELECTION OF AUTOMATED EQUIPMENT

Fingerprints are universally recognized as the most positive means of identification in existence. In the first place, no two fingerprints in the entire world are alike. Furthermore, the "minutiae" within any given fingerprint remain unchanged throughout an individual's lifetime.

In 1980, Alaska law enforcemnt agencies were obtaining "latents" at approximately 50% of all crime scenes. The combined files of the Alaska State Troopers and Anchorage Police Department held a total of 25,000 unidentified latent prints, and more than 2 million identified, rolled prints.

And yet - in spite of the extensive fingerprint file resources, the ability to lift latents at least half the time, and the unquestioned ability of fingerprints to positively identify, Alaska State Troopers and Anchorage Police Department were unable to put fingerprints effectively to work to solve crimes and to cut crime-clearance costs. With existing manual fingerprint processing, it simply takes too long. To find a match for a single latent, with no other clues to the criminal's identity than the print itself, it is more difficult than finding the proverbial haystack needle - and certainly a lot more expensive!

The crying need is for a way to search the files and obtain a match rapidly. It is increasingly evident that the only way to achieve the necessary search speeds would be by means of some sort of computerized system - in other words, through automation of the existing search-and-match process.

HOW DOES IT WORK?

The approach taken by the automated fingerprint identification equipment to fingerprint identification is based on the use of minutiae data consisting of the location and orientation of fingerprint ridges at points of termination (ridge endings) or branching into two ridges (bifurcation). Patterns of such minutiae uniquely characterize individual fingerprints and are the universal means whereby fingerprint experts are able to positively identify specific persons.

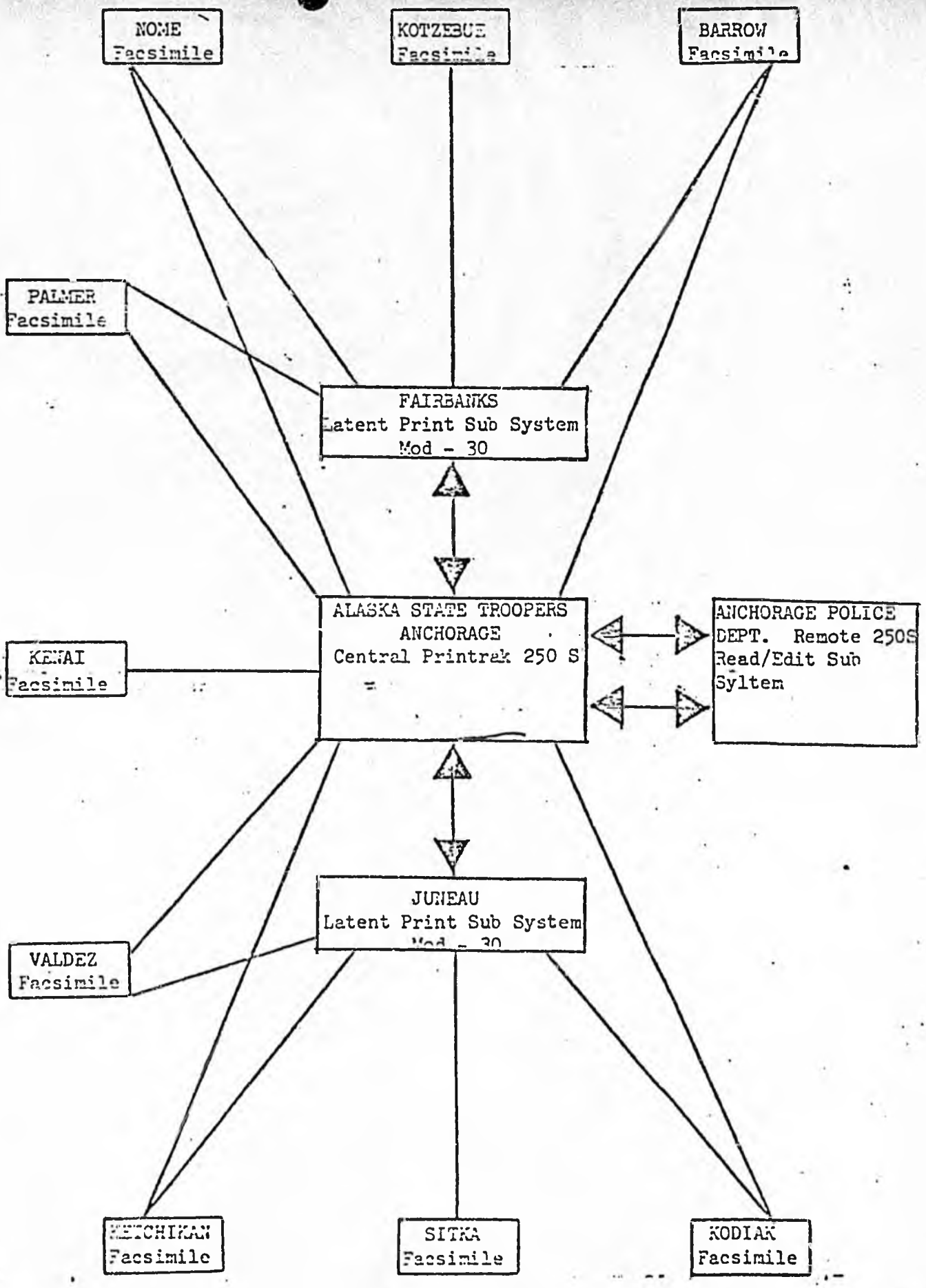
The equipment reads directly from card or paper input, which means there is no need for costly and time-consuming photographic processing of input information. The data which is stored for each fingerprint, and which is subsequently used for matching, are digital, binary-encoded descriptors, and is amenable to high-speed computer processing. In addition, sophisticated algorithms and dedicated processors make possible an extremely high processing speed which, in turn, makes the system highly cost-effective.

The minutia-based approach for automatically processing and matching fingerprints offers many significant advantages over other approaches. Foremost among these advantages is the discriminability of minutia-based systems which permits them to select with high accuracy one person, or a very few candidates from a very large file. All other current approaches must identify a large number of candidates in order to provide any reasonable assurance that the individual of interest is among them.

Because the automated system uses digitally encoded data and only 2500 bits of information are needed to uniquely describe a fingerprint, the system provides a means for transmitting fingerprint data both rapidly and inexpensively over ordinary telephone lines.

Another valuable feature of the system is its ability to maintain its own file of fingeprints for subsequent comparison with unknown prints. Conversion from card or paper format to digital records for permanent storage in system files is performed at the rate of up to sixty 10-print sets per hour. Once established, the file can be developed and updated on a continual basis.

Not least among the system's features are its compatibility with the minutia based system hardware/software of a rapidly growing number of users throughout the U.S.A. and abroad ... including the Federal Bureau of Investigation, a number of major U.S. cities, and the Royal Canadian Mounted Police. It is possible to tie these units together at selected times for cross-jurisdictional searches, if such are necessary.


NOME
Facsimile
KOTZEBUE
Facsimile
BARROW
Facsimile
PALMER
Facsimile
FAIRBANKS
Latent Print Sub System
Mod - 30
ALASKA STATE TROOPERS
ANCHORAGE
Central Printrak 250 S
ANCHORAGE POLICE
DEPT. Remote 250S
Read/Edit Sub
Syltem
KENAI
Facsimile
JUNEAU
Latent Print Sub System
VALDEZ
Facsimile
KETCHIKAN
Facsimile
SITKA
Facsimile
KODIAK
Facsimile

THE ALASKA SYSTEM....

At present Alaska has two departments that have fingerprint files and the personnel to maintain them. The Anchorage Police Department and the Alaska State Troopers in Juneau and Anchorage, have Certified Fingerprint Examiners to maintain their fingerprint and latent print files. With possible expansion in mind and the number of trained fingerprint personnel, Anchorage, Juneau and Fairbanks are the most effective areas to place processing equipment.

The Rockwell 250S Printrak "Central" System would operate from the Alaska State Troopers Headquarters in Anchorage. All fingerprint cards taken by police departments and jails throughout Alaska would be entered.

Anchorage Police having the second largest files and trained personnel to maintain these files, would have a Rockwell Printrak 250S Read/Edit Sub-system. This would give A.P.D. the same ability as A.S.T. to enter it's files and search it's latent cases using the data storage at A.S.T. Head- quarters.

In Fairbanks and Juneau there should be a Rockwell Printrak Model 30 Remote Latent Subsystem in addition to the Anchorage Systems.

Making a truly Statewide Network that would bring every community in the State minutes away from fingerprints identifications a network of facsimile machines throughout Alaska. Using commercial phone lines, or micro-wave communication, fingerprint cards and latents can be sent from anywhere in the State to any latent system or subsystem in a matter of minutes. Communities like Sitka, Ketchikan, Valdez, Seward, Kodiak, Kenai, Nome, Kotzebue, Point Barrow and Palmer could be getting responses on their latents as well as those communities with main system components. Also, portable units can be obtained that would permit investigators to go to a crime scene any where in the State and be able to send latent information to be searched in the Central files.

OVERALL DESCRIPTION OF HARDWARE/SOFTWARE

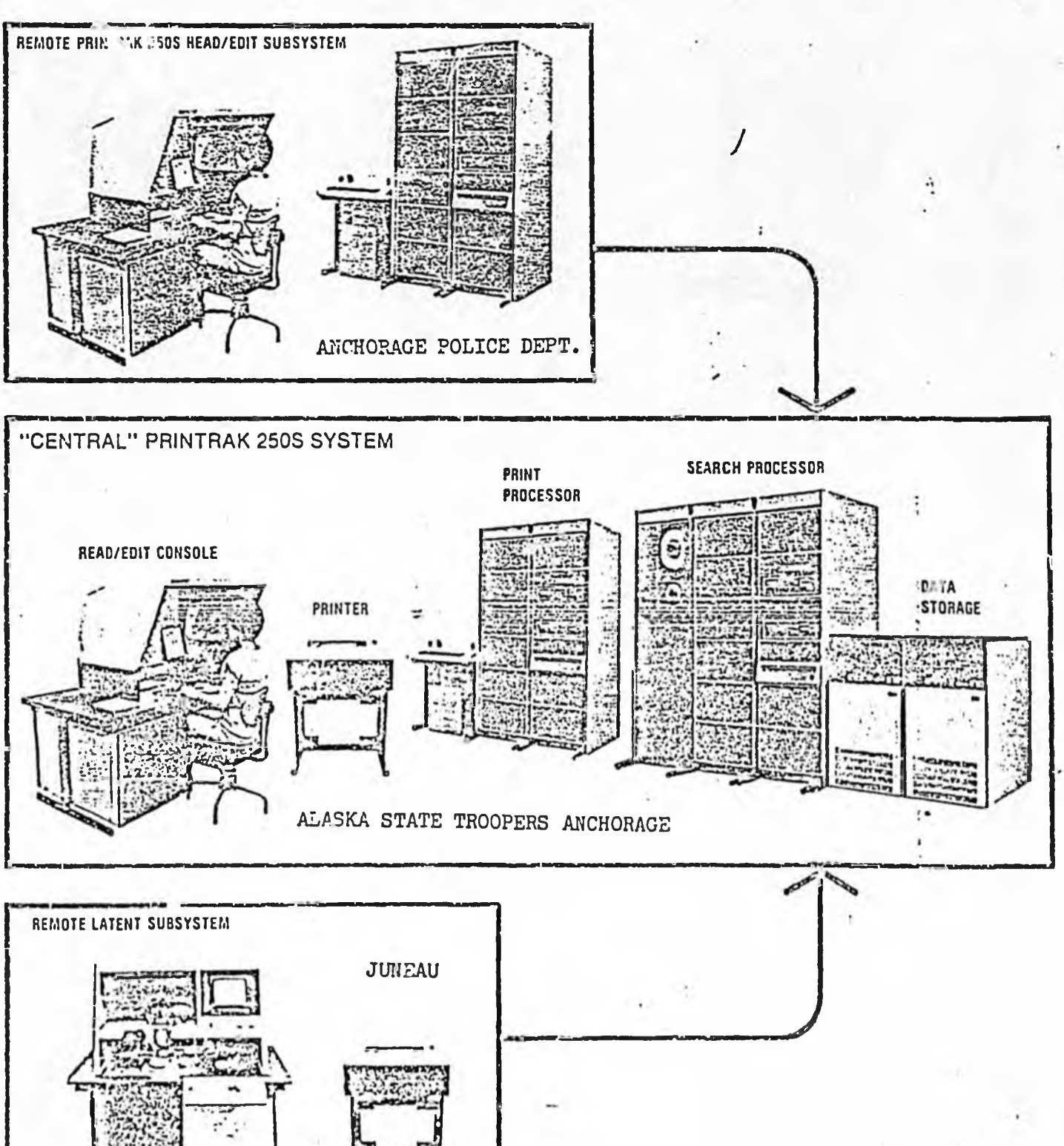
Hardware

Three types of subsystems:

Read/Edit Subsystem; is made up of a Print Processor, a Read/Edit Operator Console, and a Printer. The subsystem is used to automatically examine fingerprints, extract their minutiae, enter descriptor data, initiate search requests, and obtain search requests. One Read/Edit Subsystem is located in the "Central" facility, A.S.T. Anchorage, and another at the Anchorage Police Department facility would be connected to the Search-and-Match Subsystem at A.S.T. Anchorage via voice-frequency telephone lines. The Read/Edit Subsystem is capable of processing both rolled prints and latents. This subsystem can enhance the quality of the prints using the Processor's computer.

Latent Subsystem; which includes a Latent Terminal and a Printer, gives the user automated assistance in entering descriptor data via keyboard, in encoding locations of minutiae in latent fingerprints, and in receiving results of file searches. A Latent Subsystem would be located at Juneau and Fairbanks facility and would be connected to the Central Search-and-Match Subsystem via a voice-frequency telephone line or microwave communications.

Search-and-Match Subsystem; consists of a Search-and-Match Processor, Data Storage, and a Line Printer. There is only one Search-and-Match Subsystem in the entire network. Located in the Central facility, the Subsystem controls overall system operation, maintains the files, performs search-and-match functions, and reports results of searches to system operators at the various terminals.


REMOTE PRINTRAK 250S HEAD/EDIT SUBSYSTEM
ANCHORAGE POLICE DEPT.
"CENTRAL" PRINTRAK 250S SYSTEM
PRINT PROCESSOR
SEARCH PROCESSOR
READ/EDIT CONSOLE
PRINTER
DATA STORAGE
ALASKA STATE TROOPERS ANCHORAGE
REMOTE LATENT SUBSYSTEM
JUNEAU
FAIRBANKS

Software

Automated operation is achieved via its software, that contains all the necessary programs for controlling and coordinating the systems's processes. The software is human-operated-oriented and makes extensive use of display messages, in ordinary English language, to "cue" (i.e., "prompt") the operator with questions which help him in following the proper operational procedures at all times. Thus, no complicated code needs to be learned, and operators need no software experience in order to operate the system.

The software programs, as executed by computers in the Print Processor and Search-and-Match Processor (see drawing), provide an orderly sequential control of all data flows between the hardware equipments, including those to the operator interfaces.

THE SEVEN "MODULES" ... WHAT EACH DOES AND HOW IT DOES IT

Read/Edit Operator Console

The Read/Edit Operator Console serves as the "interface" between the Automated Fingerprint ID System and the human operator. The console contains a keyboard, a TV-type CRT (cathode-ray tube) display and video mixer, a card indexer, a video scanner, a cursor control, and console electronics.

Upon receipt of a latent print or a 10-print card, the operator selects the desired mode of operation and interactively enters data through the keyboard in response to "cues" displayed to him on the display. Ten-print cards are placed on the card indexer platform, and the video images of the prints are transmitted to the Print Processor, which returns to the automatically encoded locations and orientations of the minutiae for each print, overlaid on a magnified image of the print on the display screen.

The console provides the operator with the capability to edit the displayed image by adding or removing minutiae. Encoding of poor-quality prints may be performed manually, if desired, by means of the console controls.

Printer

Each Read/Edit and Latent Console operator is provided with a Printer unit to print out the lists of respondents and other data required in operation of the system.

Line Printer

The Line Printer is a 300-line-per-minute, dot matrix printer/plotter, capable of printing alpha-numeric text. Its function is to print out, when so commanded by the System Files Supervisor, records from the Data Storage disks and other file-related data, e.g., minutiae patterns.

Data Storage

Data Storage contains the records of all data that have previously been encoded. In addition to the encoded minutiae for each fingerprint on file, these records include personal descriptors (e.g., suspect's sex, date of birth, etc), identification numbers and classification data for each print.

Records in Data Storage are grouped by single-finger classification, by finger number, and by descriptors. This data organization decreases the number of separate accesses to the file, and thus reduces the time required for any given latent search. An index provides file location information to individual finger records, and also provides the means whereby card searches can be performed. Employing four movable-head, direct-access disk units, Data Storage has an on-line storage capacity of

350,000 persons (3,500,000 prints). In addition, 25% of one of the four disks is available for storage of latents. Total capacity of Data Storage can be increased by the addition of more disk sets.

A particularly notable feature is the fact that unidentified latents can be stored on disks on-line, and subsequently can be compared against all new 10-fingerprint cards entered into the system. Thus, it is only a matter of time until hits can be obtained for almost all crime "repeaters".

Print Processor

The Print Processor works with the Read/Edit Operator Console in the Read/Edit Subsystem. Its functions are to receive video fingerprint images from the scanner in the Read/Edit Operator console, to process the images, and to locate minutiae. The Print Processor also accumulates a file of minutiae records on disk for later transfer via telephone line to the Search-and-Match Processor as a search inquiry or for distribution to the Central Data Storage fingerprint files. The Print Processor includes video storage, an image processor, a minicomputer, a disk memory, and a multiplexer, all contained in a single, upright cabinet.

Search-and-Match Processor

The Search-and-Match Processor is used in conjunction with the system's Data Storage and a Line Printer to form the Search-and-Match Subsystem. The Search-and-Match Processor consists of a minicomputer (PDP 11/34), a magnetic tape unit, an operating disk set, a computer console, a high-speed minutiae matcher, a multiplexer for communicating with the Read/Edit and Latent Subsystems, and a disk controller for communicating with the Read/Edit and Latent Subsystems, and a disk controller for communicating with Data Storage.

The Search-and-Match Processor uses a general-purpose minicomputer to perform all data processing not specifically assigned to special-purpose subsystems. It handles all transfers of data among major system elements, and coordinates and controls all system operations. Among it's functions are: placing data in Data Storage files, retrieving data from Data Storage files, sorting minutiae records by descriptor data, feeding sets of minutiae to the high-speed minutiae matcher, sorting match-score data into the sequence of descending match-score values for presentation of search results in compliance with the selected decision rule, sending and receiving data and commands over the telephone line interconnections to and from remotely located Read/Edit and Latent Subsystems, handling data transfers, and performing diagnostic tests on itself and on other system components.

Latent Terminal

The Latent Terminal handles latent prints only. Encoding of the prints is performed by the operator manually, rather than automatically as with the Read/Edit Subsystem. The encoding is accomplished by means of controls on the Latent Terminal console which permit the operator to locate, relocate, and erase minutiae that appear on the console's TV-type CRT display screen.

In addition to providing all of the functions necessary for encoding a latent fingerprint, the Latent Terminal also permits the operator to have an automatic search made of Central Data Storage from a remote location. The Terminal's self-contained, high-resolution TV camera scans each fingerprint presented to it, and then shows the operator an enlarged image of

the print on the console display. Brightness and contrast controls may be adjusted to provide an enhanced TV image of the latent print. The operator sends both descriptor data and commands to the Search-and-Match Processor from the Latent Terminal by means of the Terminal console's typewriter-type keyboard. The Search-and-Match Processor, in turn, can write text on the Latent Terminal's display screen - including data formats, input keystrokes, status messages, and search results.

COST

The Rockwell 250S Printrak system was developed with only one purpose; FINGERPRINT IDENTIFICATION! Because the equipment is custom made, the cost is high. Each machine is made to specifications of fingerprint identification as required by the Department.

Rockwell 250S Central System With extra Latent Terminal		$1,700,000.00
Rockwell 250S Remote Read/Edit Subsystem		$ 696,000.00
Two Rockwell 250S Latent Subsystems	#1	$ 126,000.00
	#2	$ 122,000.00
17 Facsimile Machines		$ 320,000.00
Conversion of Fingerprint Files		$ 200,000.00
Maintenance: Facsimile (per year)		$ 40,000.00
250S (82-83) 9 months		$ 282,825.00
Installation Cost		$ 200,000.00
Miscellaneous Cost (electric, travel, supplies etc.)		$ 300,000.00

This system could be operational by 1983. The facsimile machines could be operational before 1983 and could be used for transmission of fingerprint evidence, photos, mugshots, and reports long before the Rockwell system is operational.

This system should be considered a State system similar to the Alaska Justice Informatin System (AJIS) in that a central area of responsibility is needed to control the effectuality of the system. This system should be financially maintained by the State as a State system. Even though the Anchorage Police have a subsystem at their Department their files are being made availabe to the rest of the State by the entry of their files

into the "Central" system. This responsibility of future maintenance by the State would ensure that all areas of the State benefit equally from the Automated Fingerprint Identification Network of Alaska.

AUTOMATED FINGERPRINT IDENTIFICATION NETWORK OF ALASKA

COST ANALYSIS

250S Central System	unit cost including air shipment		$ 1,700,000.00
	Maintenance Fiscal (82-83) 9 mos.		$ 204,300.00
250S Subsystem (A.P.D.)	unit cost including air shipment		$ 696,000.00
	Maintenance Fiscal (82-83) 9 mos.		$ 35,480.00
250S Latent Sybsystem Juneau and Fairbanks		Unit #1	$ 126,000.00
		Unit #2	$ 122,000.00
Maintenance Fiscal (82-83) 9 mos.		Unit #1	$ 20,880.00
		Unit #2	$ 18,435.00
Facsimile Bush Systems	unit cost @ 11,137 x 13		$ 144,781.00
Maintenance Fiscal (82-83) 12 mos. @ $1,480 x 13			$ 19,240.00
Facsimile Main Units	Anchorage P.D., Anchorage AST Fairbanks & Juneau AST @ 32,112 x 4		$ 128,448.00
Maintenance Fiscal (82-83) 12 mos. $5,300 x 4			$ 21,200.00

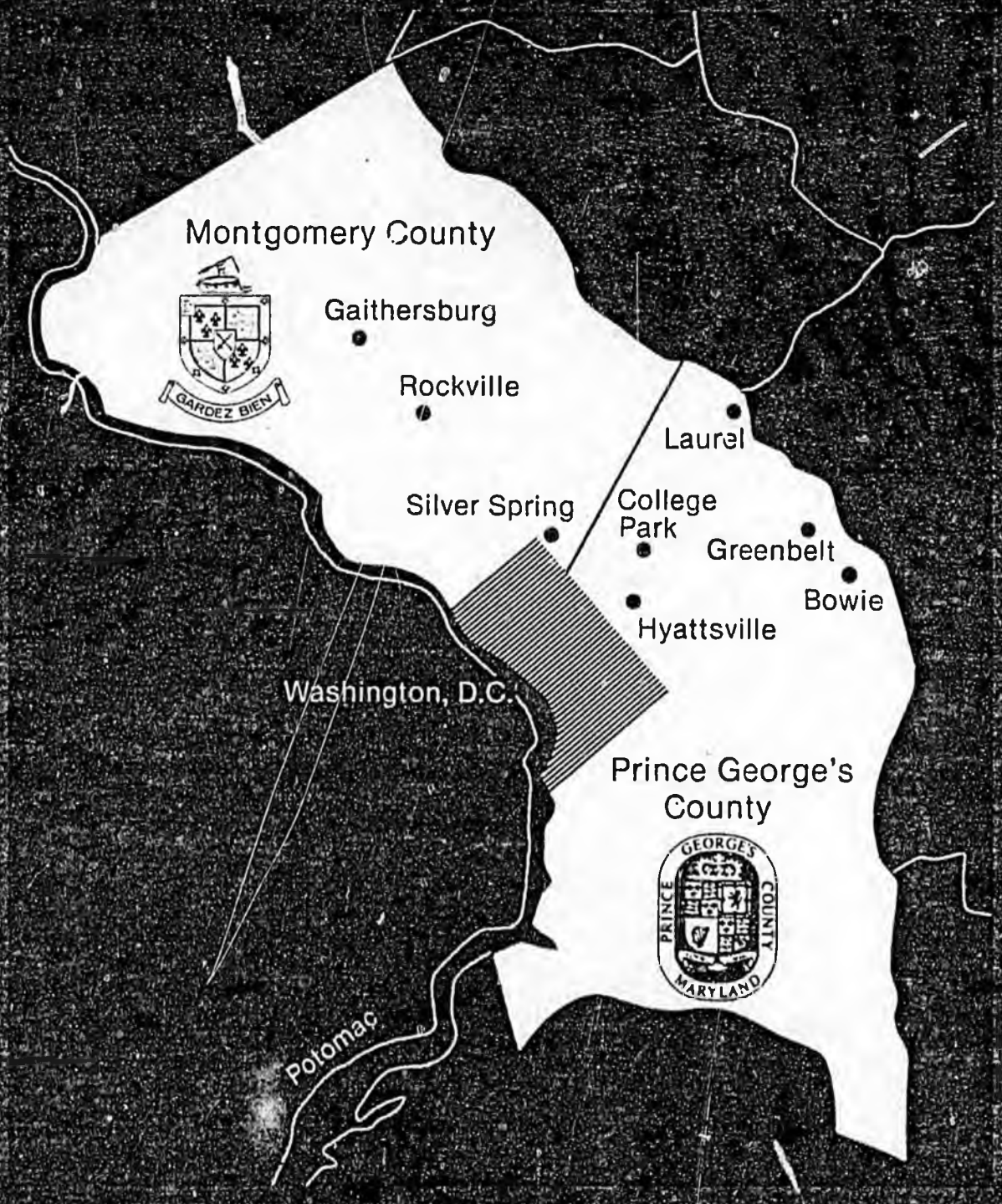
Installation cost 250S and Facsimile	$ 200,000.00
Conversion of Fingerprint Files	$ 200,000.00
250S System Cost Total	$ 2,840,000.00
Facsimile System Cost Total	$ 320,000.00
Maintenance Fiscal (82-83)	$ 338,900.00
Miscellaneous Cost	$ 300,000.00
TOTAL	$ 4,282,900.00
Maintenance Fiscal (83-84)	$ 412,540.00
Miscellaneous Cost (83-84)	$ 100,000.00

If A. S. T. or D. P. S personnel trained on the maintenance of the Rockwell system and the facsimile system, a savings of $300,000.00 could be saved a year.

Training	$ 50,000.00
Maintenance fiscal (83-84)	100,000.00
Miscellaneous Cost (83-84)	100,000.00

Montgomery and Prince George's Counties, Maryland

Automated Fingerprint Identification System



FOR EFFECTIVE LAW ENFORCEMENT: A *PROBLEM* ... AND TWO MARYLAND COUNTIES' *ANSWER*

The "Gap" Between *Acquisition* and *Use* of Fingerprints

The burgeoning fingerprint files of the Police Departments of Montgomery and Prince George's Counties, Maryland, are no more, no less, voluminous than the fingerprint files of Police Departments of most similar-sized areas, with similar-sized populations, throughout the United States.

For each individual booked into either of the two Counties' Police Departments, the arrestee's fingers are inked and "rolled" onto a 10-print file card. At present, the combined Montgomery-Prince George's files contain more than one hundred thousand 10-print cards, carrying a total of more than one million fingerprints. One of the main purposes of the cards is, of course, to provide *known* prints for comparison with *unknown* prints ("latents") that are "lifted" at scenes of crimes – in order to help identify criminals, retrieve stolen property, and clear crimes.

Increasingly, police are forced, by such Supreme Court rulings as the Miranda and Escobedo decisions to rely on physical evidence ... and fingerprints are universally accepted as one of the most positive means of identification obtainable. Even so, there has been a tremendous gap between the knowledge of the value of latents as evidence, and their actual use. And, most real-life criminal cases continue to be cleared as a result of on-the-scene identifications by victims or witnesses, with the remainder being cleared through administrative investigatory methods.

According to an in-depth study by The Rand Corporation,* latent fingerprints are picked up from at least 50% of all crime sites. Montgomery and Prince George's Counties acquire a combined total of around 14,000 such prints each year. Highly illustrative of the gap between acquisition and use of latents, however, is the fact that, of a recent year's actual total of 13,700 latent prints collected, three technicians, working full-time, were able to identify only 371 suspects. At present, the two Counties have a combined backlog of around 50,000 unidentified latents.

The Montgomery and Prince George's Counties' Police Departments are efficiently managed and capably staffed. Why, then, has the latent print ID rate typically been less than 3%? The answer, of course, is *time* – and the corollary of time, *cost*.

The Reason for the "Gap" – Slowness of Manual Processing

Manual methods, generally used by police departments for checking latents against identified prints in fingerprint files, are extremely time-consuming. With no suspect to give the search a "head start," the process requires, in Montgomery and Prince George's Counties, an average of around one man-week per print! As we are all aware, there are only 52 weeks in a year. To *manually* search-and-match the approximately 14,000 latents received each year by the Maryland Counties against their combined files of one million inked fingerprints, would obviously be an impossible task. Only a system operating with the speed of an electronic computer could conceivably ever accomplish this formidable chore.

*The Criminal Investigation Process, Volume I: Summary and Police Implications (LEAA-R 1776-DOJ), The Rand Corporation, October 1975.

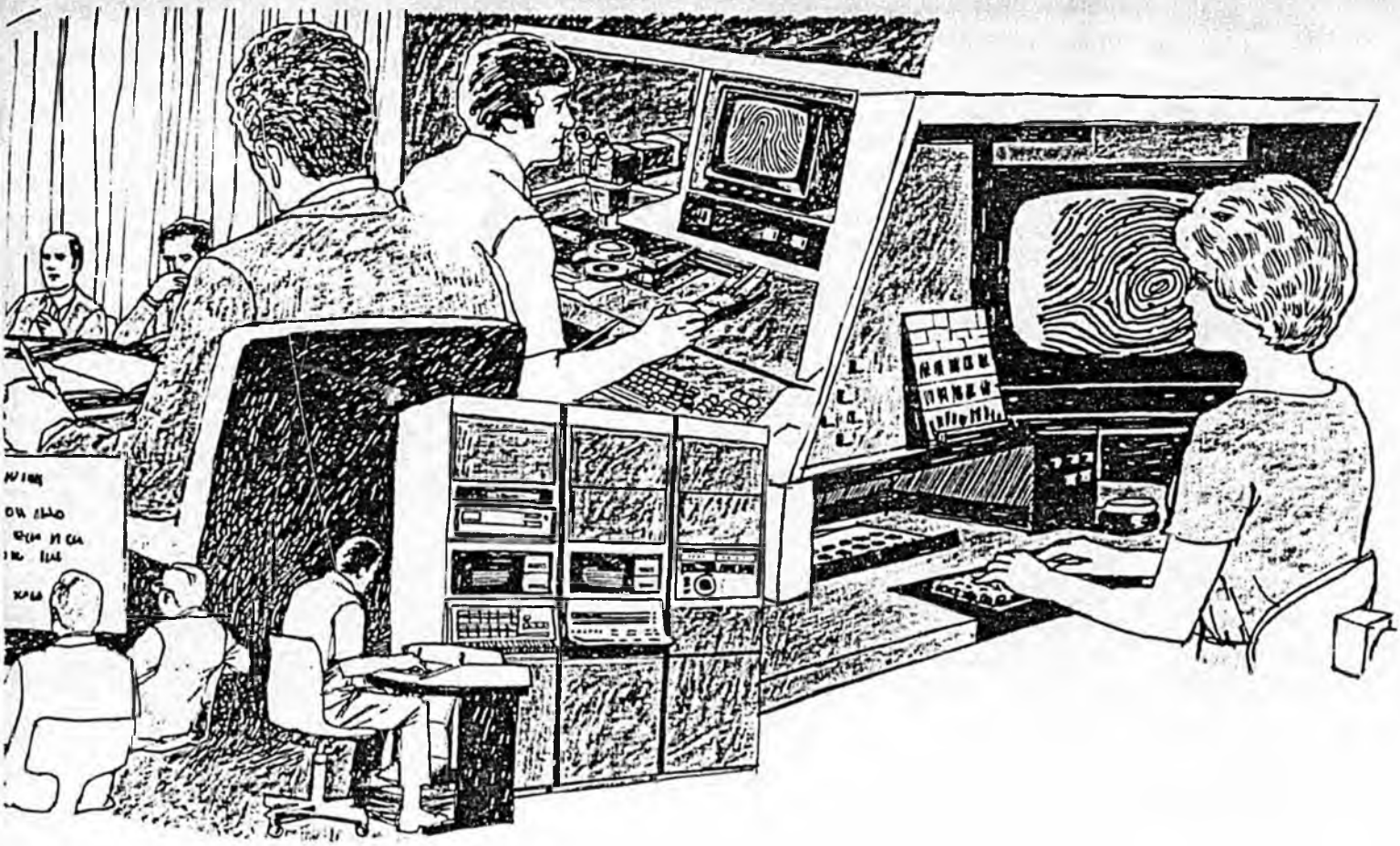
A Cost-Effective Solution -- An Automated System

Working together on a joint project supported by both State and local funds, augmented by a grant from the national Law Enforcement Assistance Administration (LEAA), Montgomery and Prince George's Counties in mid-1977 began an in-depth study and comparative cost-and-performance analysis of available computerized fingerprint systems. As a result of these efforts, which included extensive tests of the actual equipment, the two Maryland Counties selected an automated system produced by Rockwell International, Inc., and in early 1978 contracted with Rockwell to procure such a system.

The Montgomery/Prince George's system is similar to equipment supplied by Rockwell to the Minneapolis and St. Paul Police Departments (Minnesota Regional System), the Houston, Texas, Police Department, and the New York State Identification Bureau — as well as to the Federal Bureau of Investigation and the Royal Canadian Mounted Police.

Purchased as part of Maryland's Statewide Criminal Justice Information System Master Plan, the *automated, computerized* system is capable of performing in *minutes* the latent print search-and-match functions requiring *days* by *manual* methods. The system will play an increasingly important role in helping clear the backlog of latents in the two Counties' police files, and in identifying new latents.

The automated system provides for entering and maintaining "in storage" fingerprint information obtained from 10-print fingerprint file cards. In addition, the system will store, along with the fingerprint's own data, offender-related "descriptors" designating the County in which the offense was committed ... the age, sex, and race of the offender ... and the date and location of his or her last arrest.



Automated System Advantages for Montgomery and Prince George's Counties

Speed is one of the new system's prime advantages. Another is its *ability to conduct "cold searches"* -- that is successful search-and-match processing without a suspect list.

Most of the 371 suspect identifications referred to previously were achieved in cases where the fingerprint technicians were furnished with names of likely suspects -- making it a simple matter to go to the files, remove each suspect's file card, and visually inspect the prints on the card to see if any one of them matched the latent of concern.

The automated system has the capability to "cold search" all of the crime scene latents in the Montgomery/Prince George's files against the complete bi-County fingerprint card files in a matter of just minutes!

The impact of the automated system's capability becomes dramatically obvious when we consider that the manually obtained 371 identifications referred to above helped to clear 1,830 separate criminal incidents. At this rate, if it had been feasible -- time-and-costwise -- to identify all 13,700 of the latents obtained during the year, a total of more than 65,000 criminal incidents might have been cleared thereby! With the new automated system, such accomplishments become practical and economical.

THE SEVEN "MODULES" ... WHAT EACH DOES AND HOW IT DOES IT

While the present Montgomery/Prince George's Counties automated fingerprint identification system is all located in the same building and interconnected by cables, remote subsystems could readily be added and could communicate with the "Central" or Headquarters facility, in the form of multiplexed signals, over ordinary telephone lines. The system is designed and built by one firm — Rockwell International — utilizing standard, commercially-available subassemblies wherever possible. The various modules are capable of being combined to form a broad variety of system configurations. This system modularity lends itself to economical, easily achieved system growth and functional expansion. Maryland can thus expand the basic system into a "network" with remote "stations," by adding Read/Edit and Latent Subsystems without extensive modification of existing system hardware or software. Capacity of the Data Storage files is also readily expanded, simply by adding more disk packs and/or disk drives.

Read/Edit Operator Console

The Read/Edit Operator Console serves as the "interface" between the Automated Fingerprint ID System and the human operator. The console contains a keyboard, a TV-type CRT (cathode-ray tube) display, an automatic card indexer, a video scanner, a cursor control, and console electronics.

Upon receipt of a latent print or a 10-print card, the operator selects the desired mode of operation and interactively enters data through the keyboard in response to "cues" displayed to him on the display. Ten-print cards are placed on the card indexer platform, and the video images of the prints are transmitted to the Print Processor, which returns the automatically encoded minutiae and classification for each print for viewing on the display screen.

The console provides the operator with the capability to edit the displayed image by adding or removing minutiae and/or changing classification. Encoding of poor-quality prints may be performed manually, if desired, by means of the console controls.

Printer

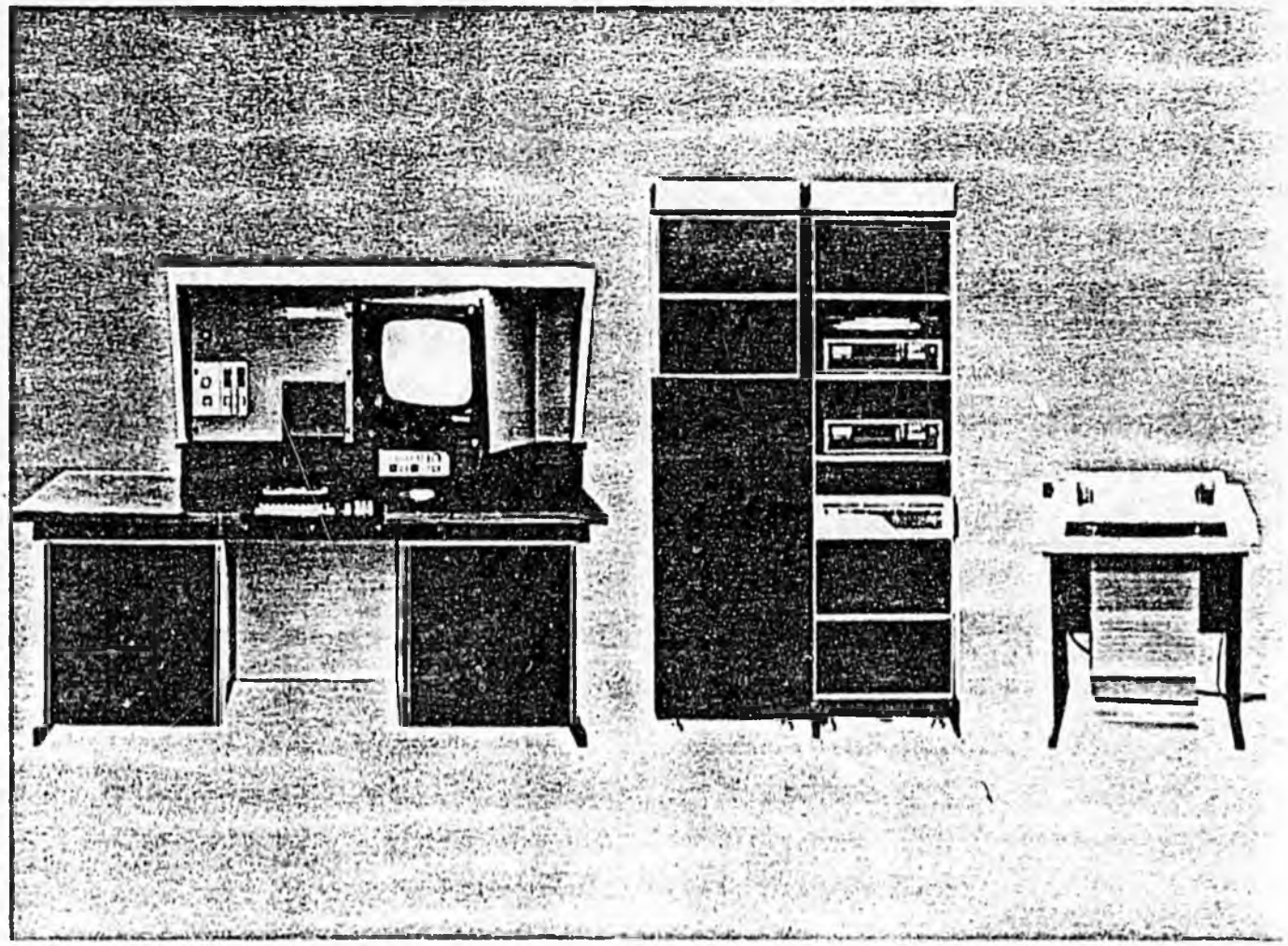
The operators of the Read/Edit and Latent Consoles are provided with a Printer unit to print out the lists of respondents and other data required in operation of the system.

Line Printer

The Line Printer is a 300-line-per-minute, dot matrix printer/plotter, capable of printing alphanumeric text. Its function is to print out, when so commanded by the System Files Supervisor, records from the Data Storage disks and other file-related data.

Data Storage

Data Storage contains the records of all data that have previously been encoded. In addition to the encoded minutiae for each fingerprint on file, these records include personal descriptors (e.g., suspect's sex, race, year of birth, etc), identification numbers, agency, and file category for each print.



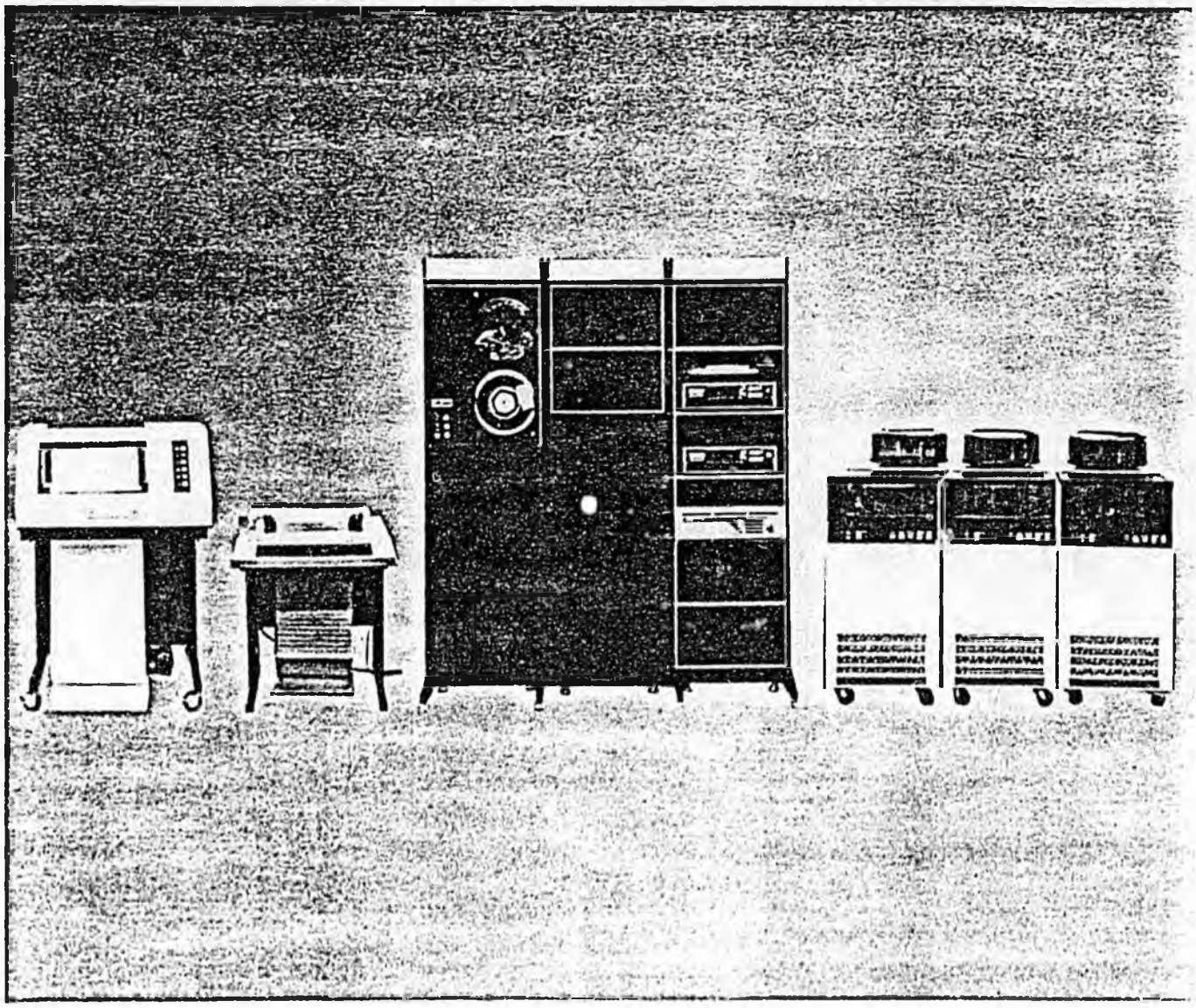
Read/Edit Subsystem

Records in Data Storage are grouped by single-finger classification and finger number. This data organization decreases the number of separate accesses to the file, and thus reduces the time required for any given latent search. An index provides file location information to individual finger records, and also provides the means whereby card searches are performed. Employing three movable-head, direct-access disk units, Data Storage has an on-line storage capacity of 250,000 persons (2,500,000 prints). In addition, 25% of one of the three disks is available for storage of latents. Total capacity of Data Storage can be increased by the addition of more disk units.

A particularly notable system feature is the fact that unidentified latents can be stored on disks on-line, and subsequently can be compared against all new 10-fingerprint cards entered into the system. *Thus, it is only a matter of time until hits can be obtained for almost all crime "repeaters."*

Print Processor

The Print Processor works with the Read/Edit Operator Console in the Read/Edit Subsystem. Its functions are to receive video fingerprint images from the scanner in the Read/Edit Operator console, to process the images, to extract minutiae, and to determine fingerprint classification. The Print Processor includes an image processor, an automatic classifier, a minicomputer, a disk memory, and a multiplexer, all contained in a single, upright cabinet.

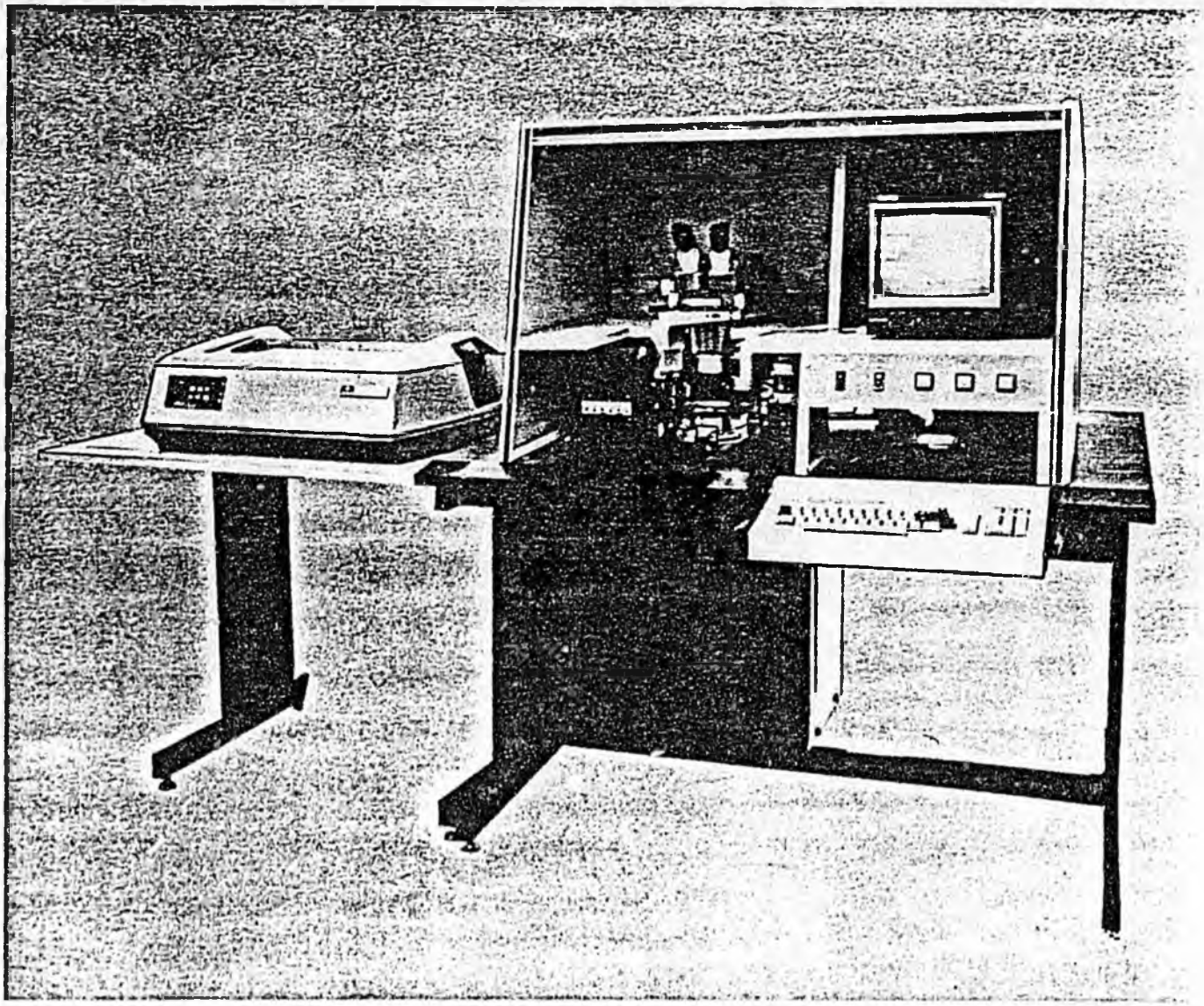


Search-and-Match Subsystem

Search Processor

The Search Processor is used in conjunction with the system's Data Storage and a Line Printer to form the Search-and-Match Subsystem. The Search Processor consists of a minicomputer, a magnetic tape unit, an operating disk set, a computer console, a high-speed minutiae matcher, a multiplexer for communicating with the Read/Edit and Latent Subsystems, and a disk controller for communicating with Data Storage.

The Search Processor uses a general-purpose minicomputer (identical to the Print Processor's) to perform all data processing not specifically assigned to special-purpose subsystems. It handles all transfers of data among major system elements, and coordinates and controls all system operations. Among its functions are: placing data in Data Storage files, retrieving data from Data Storage files, sorting minutiae records by descriptor data, feeding sets of minutiae to the high-speed minutiae matcher, sorting match-score data into the sequence of descending match-score values for presentation of search results in compliance with the selected decision rule, sending and receiving data and commands to and from Read/Edit and Latent Subsystems, handling data transfers, and performing diagnostic tests on itself and on other system components.



Latent Subsystem

Latent Subsystem

The Latent Terminal is intended for handling latent prints only. Encoding of the prints is performed by the operator manually, rather than automatically as with the Read/Edit Subsystem. The encoding is accomplished by means of controls on the Latent Terminal console which permit the operator to locate, relocate, and cancel minutiae that appear on the console's TV-type CRT display screen.

In addition to providing all of the functions necessary for encoding a latent fingerprint, the Latent Terminal also permits the operator to conduct an automatic search of the Data Storage. The Terminal's self-contained, high-resolution TV camera presents the operator with an enlarged image of the print on the console display. Brightness and contrast controls may be adjusted to provide an enhanced TV image of the latent print. The operator sends both descriptor data and commands to the Search Processor from the Latent Terminal by means of the Terminal console's typewriter-type keyboard. The Search-Processor, in turn, can write text on the Latent Terminal's display screen — including data formats, input keystrokes, status messages, and search results.

FIVE MODES GIVE THE MONTGOMERY/PRINCE GEORGE'S COUNTIES SYSTEM COMPLETE FUNCTIONAL CAPABILITY

Complete functional capability is available to the Automated Fingerprint ID System through its five modes of operation -- 10-print search, latent print search, file conversion, file update-and-purge, and diagnostic. The five modes make it possible for the system to perform rapid, automatic search-and-match processing for print identification ... to build its own files ... to maintain, update, and clear the files of duplications and poor-quality prints ... and to perform both on-line and off-line self-checks and testing.

10-Print Search Mode

The 10-print search mode is used to determine the classification and locate the minutiae for each print on a fingerprint card ... to search the fingerprint file for duplicate cards ... and to add the new information to the fingerprint file.

Latent Print Search Mode

The latent print search mode permits the operator to encode minutiae on a latent print "lifted" from the scene of a crime and, then, using those minutiae together with any known "descriptors" (suspect's sex, race, age, geographical area, etc) or print classifications, to have an automatic search made of the fingerprint file for matching prints.

File Conversion Mode

In the file conversion mode, the system performs rapid, automatic minutiae encoding and classification of fingerprints, together with storage of data generated in the fingerprint file. The file conversion mode is similar to the 10-print search mode, except that in the file conversion mode no editing of minutiae or assistance with classification is performed. All cards requiring manual intervention are reported for subsequent processing at a time convenient to the operator. The file conversion mode is used primarily when a large number of cards must be processed to build the initial fingerprint file.

File Maintenance Mode

In the file maintenance mode, update and purge activities are performed on the fingerprint file. Poorest duplicates are eliminated, and obsolete information is purged from the file. During this mode, also, the file can be reorganized to avoid overcrowding, or can be restored from backup magnetic tapes or disks if it has been inadvertently destroyed.

Diagnostic Mode

Performance verification of the Automated Fingerprint ID System is achieved with both on-line and off-line tests. On-line self-tests of the system are conducted automatically during regular operation of the equipment. They are designed to ensure that the system is performing correctly, and that bad data do not pass through the system. The off-line tests consist of diagnostic software routines that the system operator initiates in the system's "diagnostic mode." The tests produce a series of test conditions, the results of which are, for the most part, automatically assessed. Man-machine interfaces are verified through interactive cues. The end result of this process is identification of the fault, which is subsequently isolated to a replaceable assembly. A replay of a portion of the diagnostic program verifies repair.

OPERATION OF THE MONTGOMERY/PRINCE GEORGE'S SYSTEM IS STRAIGHTFORWARD ... EASY AND FAST

IN THE 10-PRINT SEARCH MODE the operator uses the Read/Edit Operator Console keyboard to enter the identification number and descriptor data for the fingerprint card, after which the following steps are taken for each print on the card:

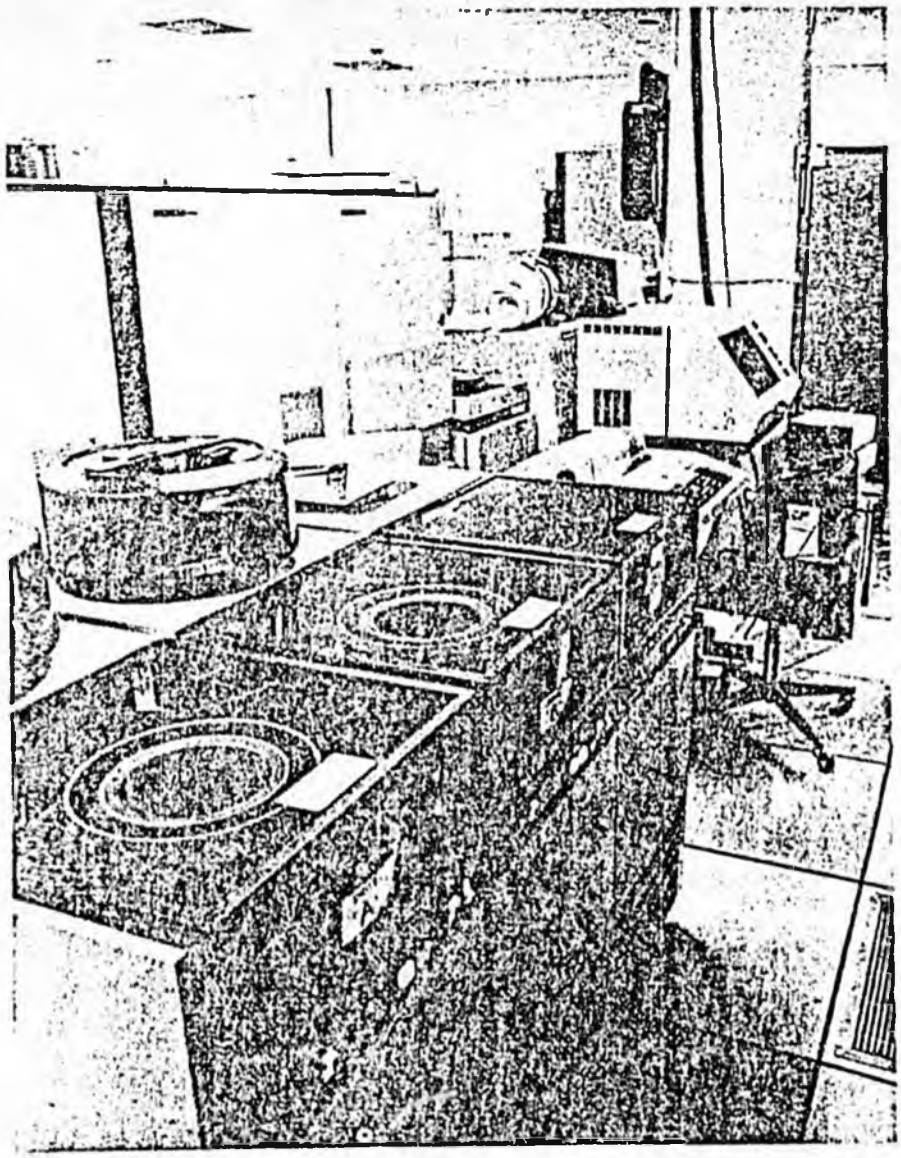
- Prior to positioning the card, the operator enters the suspect's descriptors.
- The operator positions the card on the automatic card positioner, the video image of the print is scanned, and minutiae data and print classification are extracted.
- If the print is of poor quality, due to scars, blisters, poor inking, or other such conditions, the operator may be computer-prompted by a "cue" on the display screen to assist the machine in extracting the fingerprint data. The automatically extracted data are displayed for editing by the operator in this case.
- When the entire fingerprint card has been entered, the system conducts an automatic search of the file for duplicate fingerprint sets. The operator is given a listing of the ID number(s) of potential duplicates for subsequent verification. If no match is found, the fingerprints are stored in the file.

IN THE LATENT PRINT SEARCH MODE the operator enters any known descriptors and/or fingerprint classifications, and then positions the latent print under the Read/Edit (or Latent) Terminal's self-contained camera. If the print is of adequate quality, it can be automatically read. If print quality is not adequate, the operator manually encodes the minutiae. The fingerprint file is then automatically searched for all prints of similar classification and descriptors, and any such prints are automatically matched against (i.e., compared with) the latent print. Prior to start of search, the operator may establish search criteria, to limit the respondent list by selection of a "decision rule," or by narrowing the search to a particular agency or file category.

Operational Features

- *Operator capability to edit minutiae after fingerprint reading and encoding*
- *Encoding time of approximately 1 minute per card*
- *Automatic real-time display of encoded minutiae*
- *Operator-controlled cursor for minutiae designation*
- *Ability to incorporate programmable decision rules*
- *Latent print enhancement*

California's Automated Latent Print System



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Automated Latent Print System
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EDITOR'S NOTE

This system is the outgrowth of technology actually developed and funded by the FBI in its implementation of automatic fingerprint reader systems and algorithms to match computerized fingerprint characteristics for the FBI's Automated Identification Division System (AIDS).

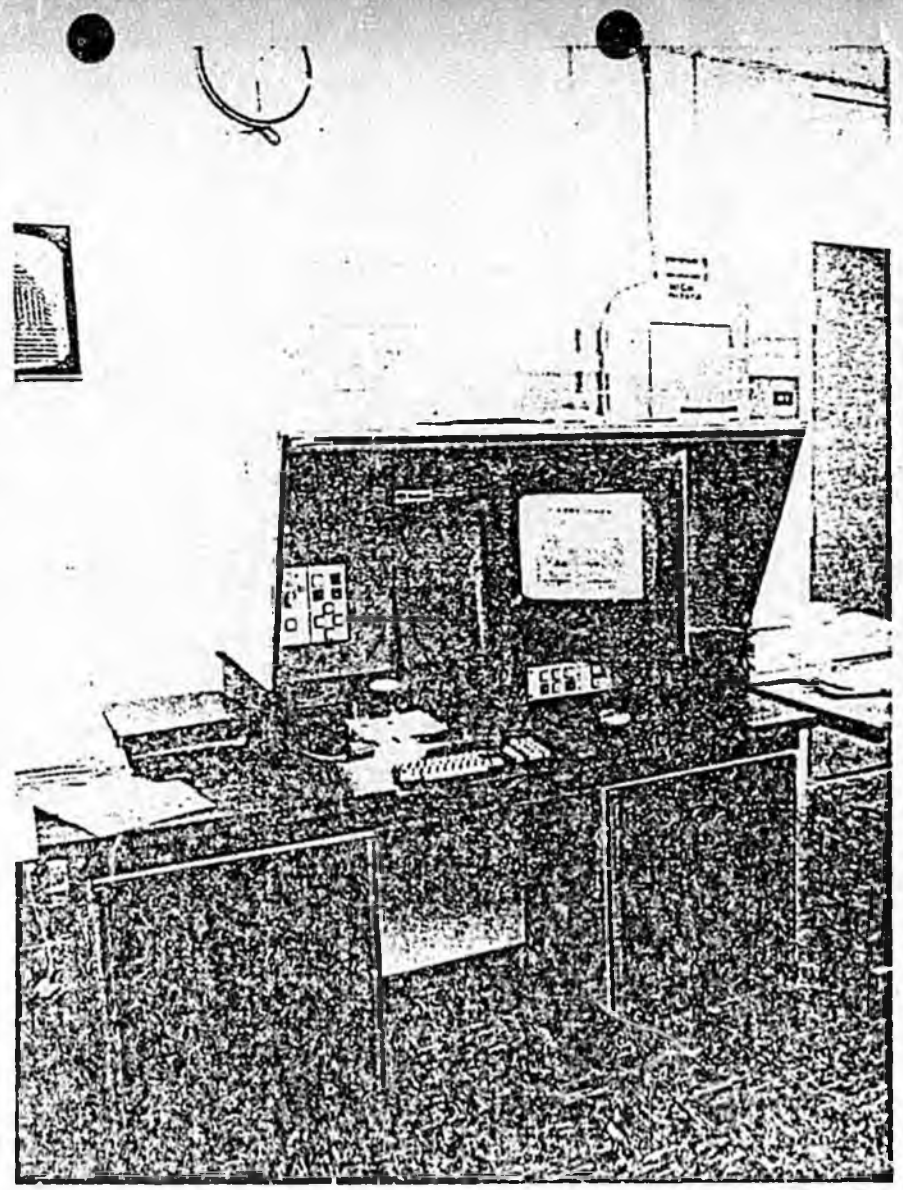
A latent print identification is one of the finest forms of physical evidence that can be presented in a court of law. Until now, practical limitations of fingerprint classification and searching have minimized the investigative application of latent fingerprints. By harnessing the speed and accuracy of the computer, the Automated Latent Print System (ALPS) now promises to be a valuable investigative tool for law enforcement personnel.

The impact of ALPS was illustrated during the initial months of operation when a brutal rape occurred in a small California city. Latent prints taken from the crime scene were matched against possible suspects, with no results. After several months of unsuccessful investigations, an ALPS search identified the subject as an individual who had been released from prison 2 weeks prior to the perpetration of the crime. The ALPS "hit" led to the arrest, prosecution, and return of this person to a State prison.

Background

In the past, latent prints have been considered practically worthless without known suspects to identify or eliminate. Since the files of the California Department of Justice (DOJ) contain approximately 6 million fingerprint cards, a manual search of a single latent print is nearly impossible. With the advent of ALPS, the department can now identify unknown suspects from latent fingerprints through a technique called a "cold search." At the local level, this can result in the solution of otherwise unsolvable crimes, reduction in investigative time, and often, recovery of stolen property.

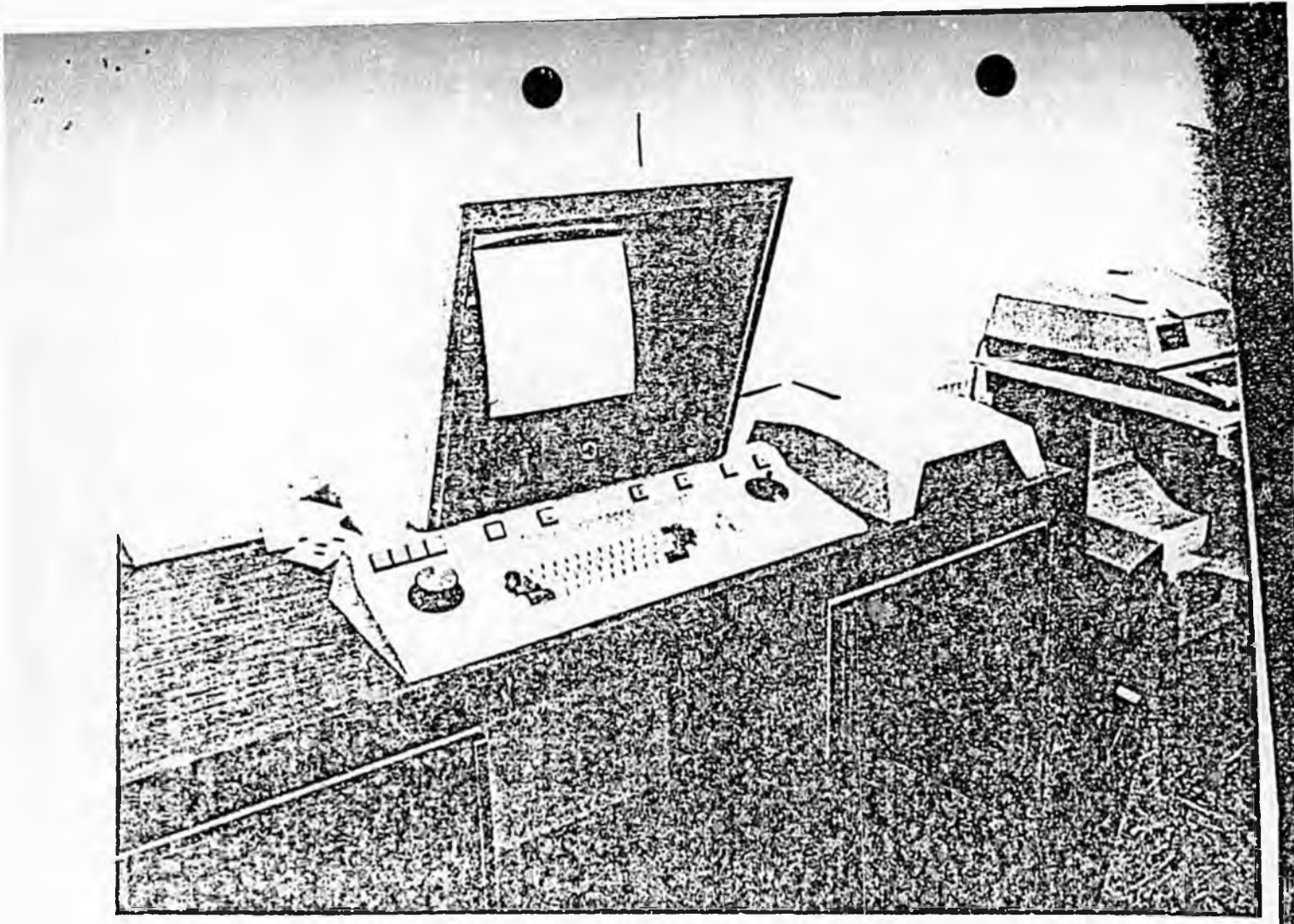
In 1975, a "pilot" automated latent print operation was undertaken with prototype equipment. The success of this pilot program, indicated by nine cold-search identifications, proved the operational theory to be sound. Nine "core" counties were selected for the pilot program on the basis of their prior use of the manual latent program and ability and willingness to develop a list of data base candidates. A 10th core county was added in October 1980.



Read-edit terminal

In June 1979, the department purchased a data bank that has a maximum data base capability of 500,000 10-print sets. Between January and December 1980, 70 cold search identifications were made. This success was particularly significant since the project, in terms of data base size and system application, was in its infancy. These identifications led to arrests and successful prosecutions in felony cases, including homicide, armed robbery, grand theft, and burglary. In some instances, several case clearances have resulted from a single ALPS hit.

The data base consisted of 65,000 subjects in January 1980, and grew to approximately 116,000 subjects by December 1980. Service is extended to law enforcement agencies in the 10 core counties for all felony cases and statewide for selected crimes which correlate to the data base. It is projected that the data base will ultimately include 500,000 subjects.



Latent encoding terminal

Objective

The objective of the Automated Latent Print System is to provide California law enforcement agencies with a latent print cold-search capability. The sophistication of electronic data processing hardware has only recently reached the point where an electronic mass scan of subject (data base) fingerprints can be made. Therefore, this is a new service provided to law enforcement agencies in California—a service that will impact crime clearance rate and offer a new investigative tool to California law enforcement.

Instituting this system at the State level ensures the ultimate extension of the service to all California law enforcement agencies and provides a statewide repository of offenders. Additionally, because offenders cross jurisdictional lines to perpetrate crimes, individual law enforcement agencies do not have the necessary resources to coordinate a program of this type. Establishing a statewide data base also enhances the probability of apprehending the "professional criminal."

Data Base Selection and Criteria

The nine core counties selected to participate submitted fingerprints of known offenders in seven major crime areas: Homicide, robbery, rape, assault, burglary, larceny, and motor vehicle theft. In addition, the California DOJ added from its own files, fingerprints of registered sex offenders, known terrorists, forgery rings, prison gang members, and outlaw motorcycle gangs.

Prison gang members were selected for inclusion because of the high potential for serious crimes in institutions and because of the increasing incidence of criminal activity by gang members outside the institutions. Finally, outlaw motorcycle gangs were included because of their frequent involvement in criminal activity. The prints of approximately 20,000 persons released from the California Youth Authority and the California Department of Corrections in 1978 and 1979 have also been entered.

The intent is to ultimately expand the data base to the maximum machine capacity of 500,000 subjects. This figure was derived through extrapolation of data previously gathered concerning the DOJ fingerprint identification file. While the file is comprised of almost 6 million individuals, approximately 50 percent are applicants who are not considered suitable for inclu-

sion in an investigatory file such as ALPS. Of the remaining 3 million subjects, over half are misdemeanants, most of whom are not eligible for entry into the system. Finally, the age of over half of the remaining 1.5 million files indicates that the subjects are no longer criminally active. Based upon these assumptions, it was determined that a file of 500,000 would provide a significantly representative segment of the active criminal population in the State of California. The success or failure of this system will be largely dependent upon the quality of the data base; therefore, we are concurrently developing criteria governing both eligibility and purging procedures.

During the development of criteria for inclusion of prints in the data base, the question arose concerning whether the prints of juveniles could be included in the California file. Legal research determined that prints of juvenile offenders may be entered into the data base if there is an arrest, a criminal identification (CII) number, and a disposition. An adult offender, in contrast, has to have only an arrest record and a CII number. One of the key elements in this decision was that ALPS makes subject identifications—it does not disseminate criminal history information. However, since juveniles commit a significant portion of all felony crimes—including over 50 percent of all burglaries—their inclusion is believed to be essential.

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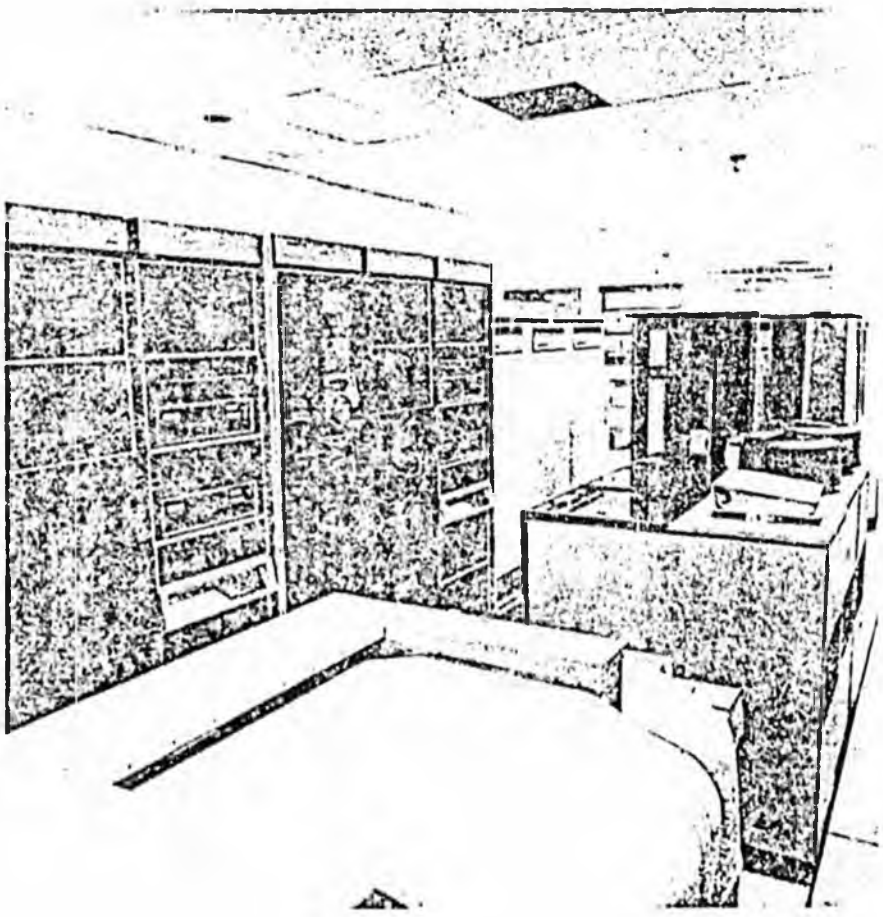


As the system expands, service will be provided to additional counties. This will be accomplished through the "ripple" effect (adding counties immediately adjacent to core counties). Eventually, all counties, representing over 591 agencies, will be provided with ALPS service. System features include the capability for local agencies to request direct entry of specific subjects into the data base. This is particularly important since it allows each local jurisdiction the freedom to identify their active offenders for inclusion.

Program Operation

In initiating this program, it was essential to elicit local agency interest and cooperation. Contacts were made at administrative and working levels to explain the program and gain confidence and support. Training on system usage and application was extensive.

Agencies are now encouraged to submit latent prints from felony cases. To qualify for an ALPS search, a latent print must be of a quality surpassing that required for a manual identification. Procedurally, the agency is required to submit latent prints with at least 12 points of minutiae; however, in exceptional cases, such as homicides and other major cases, latent prints may be accepted with fewer than 12 points.

Prior to submitting the case, agencies are asked to eliminate prints of victims and any others not relevant to the case. This reduces the possibility of excessively large numbers of latent prints being submitted on a specific case, the majority of which may have little relevance. The agency then mails a photograph, not the original, of the latent prints to the DOJ. It is important that the photograph be taken at a one-to-one ratio. This is a critical requirement since any enlargement or reduction in the latent image distorts the relationship of the comparison points.

Use of photographs removes the DOJ from the chain of custody of evidence and negates the necessity for special handling required in processing and returning the evidence. It also allows the photograph to be kept by the DOJ for subsequent searches as significant data base additions occur.

Under current procedures, three priorities have been established for searching latents. First priority is given to cases where the submitting agency, believing the case to be of critical importance, hand delivers the prints. This is generally done for significant cases, such as homicide, or when the agency itself has established a high priority. The number two priority is assigned to crimes against persons; the number three priority is assigned to crimes against property.

When submitting the prints to the DOJ, the agency uses a transmittal form developed specifically for ALPS cases. This form provides information that is important to the analyst in processing the case. Examples of this include physical descriptors, crime information, urgency, and other pertinent factors. After a quick screening for acceptability and priority, minutiae from the fingerprints are coded and entered into the system by latent analysts. In a matter of minutes, the system compares relative positioning of the characteristics on the latent print and other search factors, such as descriptor data, to the data base fingerprints and produces a candidate list in rank order of probable matches.

The actual comparison process of the candidate list involves a very time-consuming comparison by a latent print analyst of the hard copy arrest prints of top candidates on the list with the latent prints. The fingerprints of candidates selected by the computer may be very similar, making this process extremely sensitive and difficult. Also time-consuming is the actual location and retrieval of candidate records. Micrographics retrieval of the data base cards is currently being investigated in order to reduce this problem.

Latent analysts are encouraged to use their professional expertise and experience in terms of using descriptors and the application of search techniques based on the latent prints submitted. The analysts are given some latitude in the number of candidates to be manually compared; however, in crimes against persons, the top 15 candidates are usually checked. The reliability of the search may vary depending upon the quality of a given fingerprint. The importance or seriousness of the offense would also have a bearing upon the length of the candidate list.

"... the Automated Latent Print System is an important technological advance for the law enforcement community."

A "hit" (identification) results when the latent print and data base prints are successfully matched. A "hit" or "no hit" report is then sent to the submitting law enforcement agency.

An after-action report is sent to agencies approximately 3 months after an identification is made. The letter seeks information concerning the clearance and/or disposition of the case, property recovered, and any other information that will assist in future decisions relative to data base composition and the nature of ALPS service.

The final step in any investigative process, of course, is testimony. Again, local law enforcement agencies are encouraged to provide their own testimony when expertise is available. It is important to recognize that in the use of an Automated Latent Print System, the final identification is always manually made. When local capability is not available, the Department of Justice stands ready to assist local law enforcement agencies with testimony. Testimony relative to ALPS hits has been accepted in California in all cases which have gone to trial to date.

Conclusion

In the 1 year of operation, ALPS has contributed to the solution of over 70 felony cases which, otherwise, would not have been solved. The resulting support and enthusiasm from California law enforcement agencies have been very rewarding. Developing and implementing this program has been a long and arduous task and much remains to be done. The full impact and advantages of this technological innovation will not be tabulated until the much larger data base is developed and has been in operation for a longer period of time. Furthermore, improvements in technology and processes will expand the usefulness of the program. There is, however, little doubt that the Automated Latent Print System is an important technological advance for the law enforcement community. **FBI**

USER GROUP QUARTERLY REPORT

LATENT IDENTIFICATION INFORMATION

(Include unsolved latent identification)

System: Miami Police Department

Date: 2nd Quarter - 1981
Apr - May - Jun

	Quarter	Year
Number of suspects identified on individual cases	68	133
Number of latents searched	427	987
Number of hits in unsolved latent file	7	7
Number of hits	73	141
Hit rate %	17	14

Crime Types: (Quarterly information only)

(1)	Homicide	3	(6)	Auto Theft	1
(2)	Rape	4	(7)	Theft	2
(3)	Robbery	9	(8)	Forgery	0
(4)	Assault	2	(9)	Other	1
(5)	Burglary	46			

Latents Identified:

(1)	Suspect	68
(2)	Victim	3
(3)	Other	2

Position of Hit on Respondent List:

1st Place	44	11th - 20th	5
2nd - 5th	14	21st - 50th	0
6th - 10th	3	51st - 100th	0

USERS GROUP QUARTERLY REPORT

LATENT IDENTIFICATION INFORMATION

(Include unsolved latent identification)

System: HOUSTON POLICE DEPARTMENT Date: OCTOBER 1980

	Quarter	Year
Number of suspects identified on individual cases	12	34
Number of latents searched	78	263
Number of hits in unsolved latent file	1	1
Number of hits	12	38
Hit rate %	15.4%	14.2%

Crime Types: (Quarterly information only)

(1) Homicide		(6) Auto Theft	1
(2) Rape		(7) Theft	
(3) Robbery	2	(8) Forgery	3
(4) Assault		(9) Other (escapee)	1
(5) Burglary	5		

Latents Identified:

(1) Suspect	9	
(2) Victim	2	
(3) Other	1	(unknown at this time what this person's role was)

Position of Hit on Respondent List

1st Place	6	11th - 20th	
2nd - 5th	5	21st - 50th	
6th - 10th	1	51st - 100th	

USER'S GROUP QUARTERLY REPORT

LATENT IDENTIFICATION INFORMATION

(Include unsolved latent identification)

System: HOUSTON POLICE DEPARTMENT Date July 1980

Number of latents searched 107 *

Number of hits 14

Hit rate % 13.1%

Crime Types:

(1) Homicide	1	(6) Auto Theft	1
(2) Rape	0	(7) Theft	
(3) Robbery		(8) Forgery	1
(4) Assault		(9) Other	
(5) Burglary	0		

Latents Identified:

(1) Suspect	14
(2) Victim	
(3) Other	

Position of Hit on Respondent List:

1st Place	10	11th - 20th	
2nd - 5th	2	21st - 50th	
6th - 10th	2	51st - 100th	

Houston Police Department

On Monday, June 2, 1980, between the hours of 1:00 PM and 7:00 PM, a young white female was raped and murdered at her boyfriend's apartment. Entry into the apartment was gained through a window which had a broken pane. The young woman was asleep in the loft of the apartment and apparently did not hear the intruder come inside the apartment. After committing the crime, the intruder stole the young woman's car.

Officers were called to the scene at approximately 7:30 PM that evening. The Latent Print Examiner for Houston Police Department developed many prints at the point of entry. During his investigation, he also developed a palm print on the banister leading up to the loft. The prints gathered by the Latent Print Examiner were submitted to the Automated Fingerprint System at noon on Tuesday, June 3, 1980. In approximately 2 minutes and 16 seconds, the system searched/matched against 5,244 respondents placing the suspect #1 on the respondent list. The young woman's car was later found and examined for latent prints.

A total of 23 prints, 20 fingerprints and 3 palm prints, were identified to be those of the suspect who was later charged with capital murder.

Prints identified came from the point of entry, point of exit from the banister leading to the loft where the young woman slept, and the remaining prints were identified in the young woman's vehicle.

Without the use of the Automated Fingerprint System, it is very doubtful the suspect would have been apprehended and charged. The speedy identification of the suspect led to other fruits of the crime and will enhance the case when it is tried in court.

Incidentally, the charged suspect was released on parole from the Texas Department of Corrections approximately 33 days prior to the murder.

USERS GROUP QUARTERLY REPORT

LATENT IDENTIFICATION INFORMATION

(Include unsolved latent identification)

System: MAFIN- St. Paul, Minnesota Date: April-May-June 2nd Quarter 1981

	Quarter	Year
Number of suspects identified on individual cases	8	18
Number of latents searched	93	174
Number of hits in unsolved latent file	2	4
Number of hits	11	22
Hit rate %	10%	13%

Crime Types: (Quarterly information only)

(1)	Homicide		
(2)	Rape		
(3)	Robbery		
(4)	Assault		
(5)	Burglary	8	
(6)	Auto Theft		1
(7)	Theft		1
(8)	Forgery		
(9)	Other (traffic)		1

Latents Identified:

(1)	Suspect	10
(2)	Victim	1
(3)	Other	

Position of Hit on Respondent List:

1st Place		11th - 20th	2
2nd - 5th	1	21st - 50th	
6th - 10th		51st - 100th	

Fingers Identified:

Right Thumb	2	Left Thumb	
Right Index		Left Index	1
Right Middle	2	Left Middle	
Right Ring		Left Ring	1
Right Little		Left Little	1

Pattern Types Identified:

Plain arches	1	Whorls	2
Tented arches		Loops	4

Minimum number of minutiae in hit	10
Maximum number of minutiae in hit	26
Average number of minutiae	16

Comments:

One of the latent hits this month involved a forgery case where the investigator submitted a forged check along with the names of three suspects. Latent prints were developed on the check, and the three suspects were compared with negative results.

One of the developed latent prints on the check was placed into the computer, and the 1st place respondent was identified. Suspect had no prior arrests for forgery. The suspect has been charged and is awaiting trial. The check used in the forgery was made out for $350 and was one of 453 taken in a commercial burglary in Minneapolis.

INTERESTING ITEMS

Oct. 22, 1980 St. Paul Dispatch

Fingerprint network is successful

The Minnesota Automated Fingerprint Identification Network (MAFIN) operated by the St. Paul and Minneapolis police departments is highly successful, particularly in solving burglary cases, a report by federal state Crime Control Planning Board showed today.

The study found, however, that the computerized system is not being used to its capacity.

The system was started in December, 1978, funded primarily by money awarded from the Crime Control Planning Board.

The first such operation in the world, it is headquartered in the St. Paul police crime lab, with additional terminals in the Minneapolis Police Department and the Minnesota Bureau of Criminal Apprehension.

In its first year, St. Paul police were able to identify 90 criminal suspects from latent fingerprints, a 40 percent increase over results by manual procedures.

The majority of crimes solved were burglaries, traditionally the most difficult crime to solve because there is usually no known suspect.

The 1980 Legislature asked the planning board to evaluate the program and make recommendations for its future.

The board suggested that the state purchase equipment with the same capabilities for the Bureau of Criminal Apprehension and contribute a larger share of the system's continuing expenses.

Robert Griesgraber, the board's executive director, said that unless the state makes a financial commitment to ensure a statewide system, cooperation between local and state agencies will decline. "If that happens, the system will become a service available only to residents of Ramsey and Hennepin Counties," he said.

USERS GROUP QUARTERLY REPORT

LATENT IDENTIFICATION INFORMATION

(Include unsolved latent identification)

System: Montgomery/Prince George's Counties, Maryland

Date: 2nd Quarter Apr. May. June

	Quarter	Year
Number of suspects identified on individual cases	30	89
Number of latents searched	470	829
Number of hits in unsolved latent file	11	26
Number of hits	43	106
Hit rate %	9.1 %	12.8 %

Crime Types: (Quarterly information only)

(1)	Homicide		(6)	Auto Theft	7
(2)	Rape	1	(7)	Theft	1
(3)	Robbery	1	(8)	Forgery	0
(4)	Assault	1	(9)	Other	2
(5)	Burglary	30			

Latents Identified:

(1)	Suspect	33
(2)	Victim	3
(3)	Other	7

Position of Hit on Respondent List:

1st Place	29	11th - 20th	2
2nd - 5th	7	21st - 50th	0
6th - 10th	5	51st - 100th	0

'(Computer) allows us to take a single fingerprint and find the suspect within minutes'

Crime lab vet thanks a machine

For more than two years, police crime lab expert Ken Moses stayed with it. Each day he went hunting in the fingerprint files. Every day was a frustration until ...

He got his man.

"I probably looked at over 50,000 prints and all for naught," the 11-year veteran said yesterday. "Then some marvelous machine did in three minutes what took me all those years to do without success."

The state's special crime fighter — a computer that can take a single fingerprint and match it to a full set of prints — hunted down the alleged killer of Raymond J. Jordan, a one-time security guard for the Rev. Cecil Williams of Glide Memorial Church.

It found him in Soledad prison.

The files on that case had been sitting on Moses' desk since the killing on Nov. 16, 1978 — haunting the crime lab inspector, nagging him like some Simon Wiesenthal (the famous Nazi hunter) to go to the fingerprint files each day to search by hand for some lead to the prints he had of Jordan's killer — just two fingers.

"It's easy to get motivated," said Moses, "when you go to the crime scene and see the victim. This man Jordan had been brutally killed. It seemed the very least I could do for him."

Moses, 35, a criminology graduate of the University of California at Berkeley, said he kept the files of some 100 unsolved cases on his desk. They were as close to him, he said, as a suit of clothes.

"The point is," said the highly respected crime scientist, "that we're trying to get this same computer for San Francisco. It allows us to take a single fingerprint and search it and find the suspect within minutes."

It costs $2 million.

"It's a question of priorities," said the inspector.

Jordan, 45, was bludgeoned to death in his apartment at the Central Towers, 450 Eddy St., after a savage battle. The apartment was a mess — completely ransacked. Jordan had evidently just fumbled jogging.

Still intact on the walls were photographs of Jordan, a handsome, sparkling-eyed man, with such public figures as the late Mayor George Moscone, Gov. Brown and Sammy Davis Jr.

Only Williams said he knew Jordan.

"In this case, as I said, we had only the two [illegible] of the [illegible]," Moses said. "It was not enough to go to our files because our files are classified on the basis of five fingers. I still tried for an ID identification. I looked one by one through the files."

There are 2 million plus prints on file in the records room at the Hall of Justice.

"Then toward the end of December 1980 I sent the two fingerprints to the state Department of Justice's automated latent print system in Sacramento on the outside chance the guy ... may have been arrested in one of the nine California counties in the data base.

"Luckily, he'd been arrested in one of those counties and they made an ID on him. I found out Jan. 7, 1981."

Examiner / Chris Hardy

Police expert Ken Moses spent years going through files in search of the clue a computer turned up in minutes

Moses said it was a last resort action. With only nine counties in the system, he really didn't anticipate success.

Yesterday Soledad prisoner Bruce A. Ford, 21, appeared briefly before Municipal Court Judge Ray Williamson. Ford was scheduled to be back today — to enter a plea on murder-robbery charges.

Ford is in Soledad for parole violation after conviction on a robbery count.

The man Moses who had put Ford in front of the judge did not know about yesterday's arraignment.

"Oh, that's delightful," he said. "That's very nice news."

In a guest column in The Examiner on Jan. 20, 1977 — not long after he had solved another murder by his skill and diligence — Moses wrote:

"The San Francisco Police Department is in the Dark Ages of criminal investigation ... Most of the tools and equipment which investigators need to do their job must be either crudely improvised or purchased out of their own pocket."

"The computer would be the most important thing San Francisco could get in fighting crime," he said yesterday. He said he respectfully hoped Mayor Feinstein was listening.

MIS News

APPLICATIONS

St. Paul Police Dept. Computer Helps Finger Suspects

By DAVID STAMPS

ST. PAUL — Police here are able to solve about 100 crimes a year that likely would have gone unsolved, thanks to a computerized fingerprint identification system, according to Sgt. Joseph Corcoran, fingerprint expert at the department.

As more fingerprints are placed into the systems memory file and more specialized fingerprint reading terminals installed at other locations in the state, Corcoran said, the number of solved crimes could go much higher.

The fingerprint-reading computer is a turn-key system made by Rockwell International Corp. Called the "Printrak 250s", the system is available with different fingerprint-reading terminals that vary in sophistication and a Digital Equipment Corporation (DEC) "PDP 11/34" minicomputer which drives the parallel processors used to do the matching of fingerprints.

Using special matching algorithms developed by Rockwell, the system searches a disk file of binary-coded prints and will produce a list of likely suspects whose fingerprints closely match a latent print taken from the scene of a crime.

Before the computer system was installed in 1979, the matching of latent prints to those stored in police records was a slow process that produced only about a three percent success rate, said Sgt. Corcoran, who noted that, by success, one means only a match between a latent print and a stored print, not necessarily a conviction.

340,000 Cards in File

As part of normal police procedure, everyone who is arrested is fingerprinted on a ten-print card. The St. Paul Police Department has a file of 340,000 such cards, or a total of 3.4 million individual fingerprints. When a single latent fingerprint is found at a crime, a detective may or may not know which finger it is and usually doesn't know whose fingerprint it might be, Corcoran explained.

Only if the detective can supply a list of likely suspects — 10 or 15 people who operate in the neighborhood or with that modus operandi — can the fingerprint examiner undertake to pull those suspect cards and attempt a match.

When no suspects are supplied, it is impractical to undertake the search. At a rate of one to five minutes for even a trained examiner to do a visual comparison, it would be futile to search an entire file. Even though the prints are filed in arch, whorl, loop or combinations of these classic descriptive categories, an examiner might be faced with trying to match any given print with several hundred thousand. Consequently, all police departments develop files of unsolved latent prints over the years. At St. Paul this file contains 25,000 latent prints.

The computer, which works about 150,000 times faster than a human examiner, can easily search the entire file in a matter of minutes and print out a list of the fingerprint cards whose coded identification matched that of the latent print. The computer can be instructed to search the file for a particular print type, as would the human examiner, or to search according to age, race, type of crime or modus operandi, all of which are contained with the prints in the disk file.

"Minutiae" Help

The actual identification is done on the basis of minutiae, which are the points where a fingerprint ridge ends or branches into two separate ridges. The Rockwell fingerprint terminal contains a high resolution TV camera which reads the prints directly from the card or the piece of cellophane tape used to lift it at the scene of the crime. It then displays an enhanced image of the print on a CRT and automatically identifies the minutiae details. Once these details are identified, the systems assigns them three digital coordinates based on their location and orientation.

From the matches or "hits" between these coordinates, the computer can tell the police which suspect cards to pull for a visual examination. "The computer is a great tool, and it has raised our hit rate to nearly 15 percent," Corcoran said. "But the actual match still has to be done by a human examiner on the basis of a visual comparison because the computer can't testify in court."

Besides raising the hit rate from 3 to 15 percent, the system has helped the police to crack about 30 crimes that they could not solve before, at least not with fingerprint identification.

One of the things the system can do is to store the latent prints on-line. When an arrest is made and a new 10-print card put into the system, the search processor can routinely search the latent print file to see if this person has been leaving latent prints at any unsolved crimes.

Using this method of search, Corcoran said, the system recently matched the prints of two juvenile housebreakers to those left at a rash of truck thefts. The young offenders then confessed to a total of more than 20 such truck thefts.

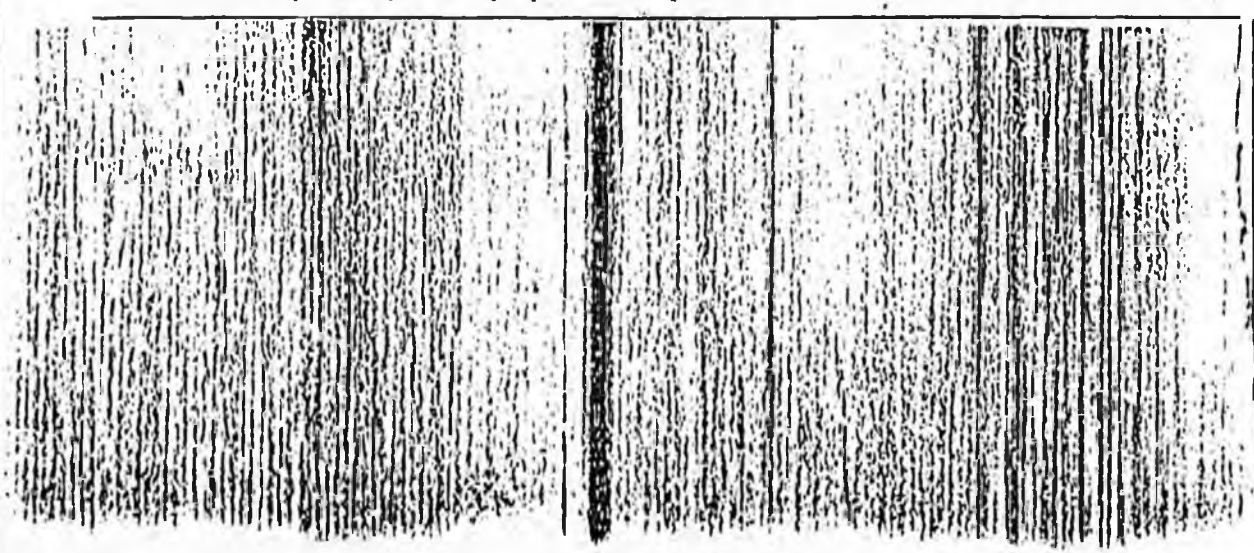
Impossible Previously

Under manual procedure, Corcoran said, that kind of search wouldn't have been possible because of the size of the latent-print file.

A unique application of the computers search ability was also used to apprehend a bank robber with a missing ring finger. Several tellers gave descriptions in which the missing digit was the only common feature. The computer was instructed to search the files for all prints containing no minutiae for that particular finger. From the mug shots of the suspects whose cards were pulled, the tellers were able to identify the robber.

Corcoran claims that the computer system has also enabled police to return about $30,000 in stolen property by identifying the criminal so quickly that police caught him before he disposed of the goods.

The fingerprint computer is even being used to clean up the files at the police department in Minneapolis, where a Rockwell terminal is installed and is on-line to the disk file in St. Paul via a dedicated phone line.



The Law Officer's Magazine

POLICE

PRODUCT NEWS

OCTOBER 1981
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TIPS

Computerizing the Fingerprint for Positive ID

By Krist Boardman

Though fingerprint computer technology remains a thing of the future for most police departments, preliminary reports from several key districts in suburban Washington, D.C., indicate that with its help, police are much hotter on the trail of burglars and other felons than ever before. Patrolmen have greater access to criminal's fingerprint algorithm numbers, and that means fewer unsolved cases — and more convictions.

Aside from the fingerprint computer shared by Maryland's Montgomery and Prince George's counties, there are just three others currently operating in the United States — at the California Department of Justice in Sacramento, the Houston, Texas police department, and in Minnesota — shared by the Minneapolis and St. Paul Police Departments and the Minnesota State Bureau of Criminal Apprehension. By late 1980, the Miami, Florida, Police Department will have received one, and two state police agencies -- Oklahoma and Colorado — will have applied to their respective state legislatures for the necessary funds. Outside the country, two states in Brazil, and the mounted police in Canada have the computers, though as many as a dozen other foreign law enforcement agencies have expressed a strong interest in obtaining them.

The automated fingerprint system plots fingerprints with exacting detail, indicating the direction and location of some 120 ridge endings and bifurcations (forks) for each fingerprint. After the ridge ending or bifurcation has been plotted it is encoded with a number, depending on its location within a numerical grid. The composite of all the numbers on the grid is the fingerprint algorithm.

Since each department using the computer must establish a data base to work from, each print on 10 print cards within that department's identification section must be plotted and coded, assigning an algorithm to each finger. Fortunately, the computer does its plotting and coding automatically; if the process was not automatic, computer programmers would encounter a frustrating and time-consuming bottleneck just establishing their data.

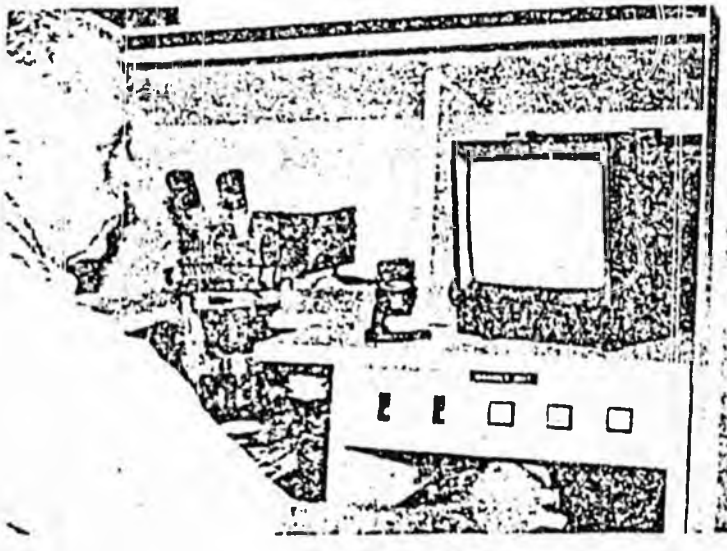
Once a data base has been established, examiners compare latent prints with the 10-print algorithms on the computer file. In the space of a few minutes, the computer delivers several hundred-thousand fingerprints which closely resemble the algorithm of the latent. With the field narrowed dramatically, the probability of making a positive I.D. are vastly improved.

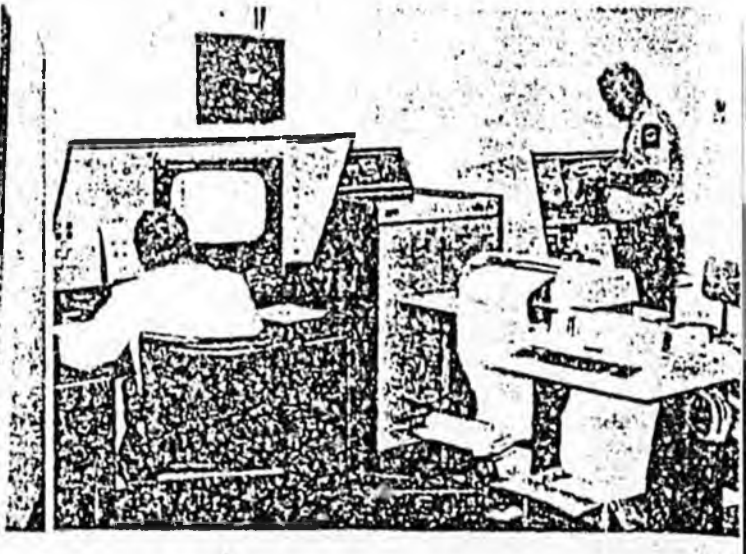
"With a good latent we've got a 50 percent chance of getting a hit," says Sgt. Paul Smith, director of the Montgomery portion of the Prince George's/Montgomery counties Regional Automated Fingerprint Identification System.

That is under the best conditions. More commonly, the latents lifted are incomplete, smudged, or there is no 10 print card on file, so its chances of being identified are far less. Sgt. Smith reports that of the latents collected at crime scenes, those from one third of the cases are entered into the computer. In Montgomery County that amounted to 89 out of 282 cases in a recent month. Of those 89 cases, nine hits or identifications were made. But those nine hits led to over 40 additional identifications made and 107 cases closed.

While the initial identification rate by the computer is about 10 percent of all latents entered, the multiplier effected by those identifications act as if the computer had actually identified a much greater percentage. Compared to a one to three percent latent identification rate by the manual means, the computer can make an enormous difference in the crime-fighting efforts of a department.

In addition to latent print identification, the computer is also being used to compare duplicate 10-print cards in the data base, thus helping to screen out aliases. In Montgomery County,





two recent cases were found where single persons had eight separate arrest records on file. "We've never been able to search like this before," says Smith.

Beat patrolmen working in precincts where the system is already on line have already noticed the difference. Having the computer and staff to run a high speed search for I.D.s on latent evidence has prompted patrolmen to be more careful to collect and preserve latent evidence at crime scenes, which they might have ignored previously when their chances for a hit were typically poor.

In the Silver Spring District of the Montgomery County Police Department, for instance, each shift has a patrol officer qualified to lift latents, says Lt. J. D. Lee, acting commander. Previously, the identification section had to send out a fingerprint expert to do the dusting. Now that district gets to the crime scenes faster, prevents more tampering with the physical evidence by burglary victims, and submits many more latent prints to the computer for identification.

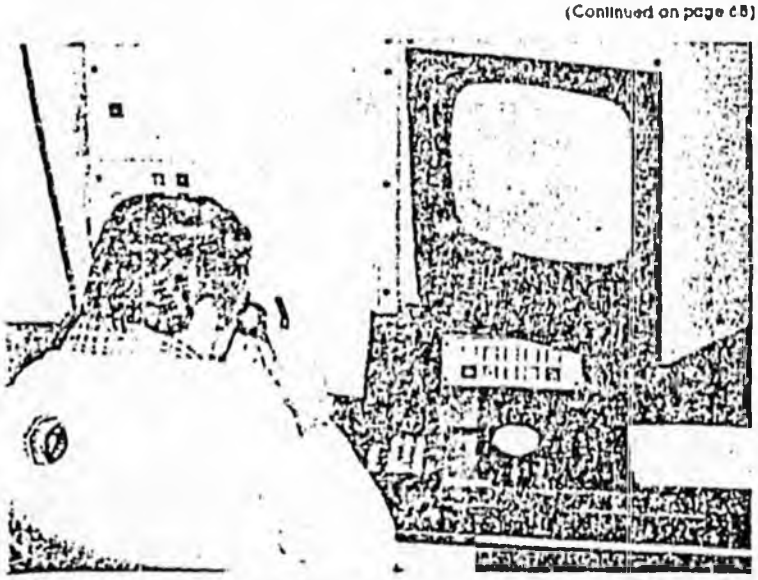
"Even if it's only one hit, it's worth it because it's one we wouldn't have gotten," says Lt. Lee, whose men have scored 17 direct hits and many more indirect ones in the past nine months. "Having been a detective and been on the street, I think it's good. But it's only as good as the information you put into it. That's why people are trained to increase the quality of the latent. Our specialists just can't get out to every place."

In the first nine months of 1980, Officer Crichton made six hits on latent evidence fed into the computer. In a previous year he obtained only one hit. "And that's only because I developed a suspect," he says, referring to additional evidence. "I think it's the greatest system that's come down the pike."

Officer Crichton does have some qualifications, however. "I think after the arrest it makes the criminal a little smarter. I had one burglar who was arrested through a latent I.D. and he said, 'Well, you'll never get me like this again. I'll just wear gloves.'"

Officer William Patterson, a 10-year veteran with the Wheaton-Glenmont District, has solved four cases using the automated fingerprint search system. The solution to one burglary in his district led to the solving of an unrelated crime in another

(Continued on page 68)



(Continued from page 25)

distinct: the pistol-whipping of a seven-year-old boy in nearby Potomac, Maryland.

In that pistol-whipping case, the computer operators did something different. Rather than attempting to match their unsolved latents against the entire data base, they took the prints of Officer Patterson's identified burglar and ran those against the file of the unsolved latents. They got a hit on the pistol-whipping incident, which resulted in the burglar being charged with assault with intent to maim.

Officer Patterson is characteristically enthusiastic about the spread of this new technology: "Nationwide, it would be incredible and would boggle the mind on the number of cases that would get cleared out. You could pick up a guy on a shoplifting charge and find he had done something in a neighboring state."

Even at this early stage, this has already happened. Sgt. Smith tells the story of a man released from a Maryland correctional institution last year whose prints were identified in a subsequent Washington-area burglary. Because the man was originally from the Chicago area, when the police failed to locate him in Maryland they notified Chicago police. He was picked up in Chicago and charged with burglary, as well as several crimes committed there. The solution of those multiple crimes in Illinois and Maryland all began with the single hit on the computer.

Fingerprint computers still have a long way to go, as many departments simply lack the funds to invest in these million-dollar systems, especially now that federal funding is no longer available. Despite their initial expense, persons such as Sgt. Smith are convinced they are cost effective.

"Before we got the automated system, the operating expense for the I.D. section (in Montgomery County) was $250,000. Out of that we were spending only $32,000 to utilize that evidence," he said, noting that annual shared operating expenses with Prince George's County are only $110,000.

Lewis Broiman, marketing manager for Rockwell International's automated identification systems, says the cost effectiveness of the system is something each department will have to evaluate individually. "I think the trade-off which has to be made is the cost effectiveness of the crime itself," he says. "How much can the computer reduce court time and investigative time?"

While administrators ponder these questions over the next several years, experts such as the FBI's John Milton Jones, section chief for latent identification, take on the long term perspective. Over the next 30 years he sees his agency's inventions, developed for this field, leading eventually to computer fingerprinting terminals for beat patrolmen. In this scenario, a policeman will simply press a suspect's fingers into an electronic plate at a call box on the street or in his vehicle to get a high speed search of the prints on file, much the same as he now gets an immediate check on drivers' license records.

Krist Boardman is the editor of Police News, a bimonthly publication dedicated to serving Maryland's law enforcement community.