HB

344

Original sponsors: Anderson, Adams, Grussendorf, et al

Offered: 1/29/82
Referred: Rules

Funding Information	
General Fund	$2,718,200
Other Funds	-0-
	$2,718,200

IN THE HOUSE BY THE FINANCE COMMITTEE

CS FOR HOUSE BILL NO. 344 (Finance)

IN THE LEGISLATURE OF THE STATE OF ALASKA

TWELFTH LEGISLATURE - SECOND SESSION

A BILL

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

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. The sum of $2,718,200 is appropriated from the general fund to the Department of Public Safety for a computerized fingerprint identification system.

* Sec. 2. The appropriation made by this Act is for a capital project and is subject to AS 37.25.020.

* Sec. 3. This Act takes effect immediately in accordance with AS 01.10.-070(c).

4.2 Million - Original Request

- Ties all of Alk together -

Now - Fingerprints are manually filed -

Central Computer w/ Alk State Troopers in

Much - Substations - Much/Bks/Pun

State of California
Department of Justice
George Deukmejian
(PRONOUNCED DUKE-MAY-GIN)
Attorney General

P.O. BOX 13417
SACRAMENTO, CA 95813

March 23, 1982

Printrak, Inc.
2121 So. Manchester Ave.
Anaheim, CA 92801

To Whom It May Concern:

The California Department of Justice, Automated Latent Print System (ALPS) was installed in November, 1979, tested during December, 1979, and went on-line on January 1, 1980. Initially, ALPS h[illegible] data base of [illegible]proxi-mately 75,000 subjects. The current data base [illegible]pproximat[illegible] subjects. DOJ's Automated Latent Print System p[illegible]des cold-search (no suspect) service for the State of [illegible] two service levels currently being utilized by counties were selected as "core" counties. agency in one of the ten core-counties may su[illegible] crime f[illegible]which there are "good" quality latent prints available and no suspects developed for an ALPS search. A non core-county may submit only homicides, rapes (sex offenses) or cases relating to "organized crime" data base for searches.

Because of the high degree of system success (283 cold-search "hits"), ALPS has witnessed a significant case load increase. The rate of case submissions has increased by 219.2% since the first quarter of 1980. Unfortunately, resources to process the case load increases have not been made available because of the State's fiscal condition. The net result is a significant backlog (approximately 1,000 cases) and extended turnaround time on cases (1-2 weeks on person crimes, 2-3 months on property crimes). Additionally, during the latter part of 1981, and early 1982, a series of system malfunctions occured that precluded normal system operation levels. Although the system was repaired and has been functioning properly, the lack of sufficient personnel resources has prevented ALPS from reducing the case backlog accrued during the system's downtime.

The Department of Justice has initiated a reallocation of resources that will reduce ALPS case load levels substantially during 1982. Additional improvements in case turnaround and reduced ALPS backlogs will occur in 1983.

Kirby Vickery

KIRBY VICKERY, Program Manager
Automated Latent Print System (ALPS)

KV:dy

THE LEGISLATURE OF THE STATE OF ALASKA
TWELFTH LEGISLATURE

FISCAL NOTE

I. REQUEST
Bill/Resolution No. CSHB 344 (Finance)
Title Special Appropriations for a computerized fingerprint system.
Requested by _____ Date _____

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						
AND & STRUCTURES						
NTS, 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 would be reduced and match rate increased by at least 15%

The initial cost of $2,718,200 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 non-commissioned positions.

IV. DATE February 26, 1982 PREPARED BY Francis C. Allan
AGENCY Department of Public Safety
PHONE 269-5691

Original: Legislative Finance
cc: Budget and Management
Prime Sponsor (First Legislator Named)
33-001 (Rev. 12/81)

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		5.0	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 & Information			.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.

FCAAST
22682

AUTOMATED FINGERPRINT IDENTIFICATION NETWORK
CAPITAL PROJECT COST ESTIMATE

250S Central System - unit cost including air shipment	$1,700.0
Subsystems - 3 units - (APD, Fairbanks & Juneau)	372.0
Installation cost	200.0
Site preparation	177.4
Spare parts inventory	207.3
Fingerprint file conversion	61.5
CAPITAL PROJECT TOTAL	$2,718.2

FCAAST
22682

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$1,700,000 in budget

Sen Rodey has similar bill
We both spoke to Anchorage Policeman
Rodey is not going any place
because of cost.
I recommend we go with present
Senate Budget entry.
I don't believe we are ready for
it, but should get equipment
& stimulate better fingerprints. I
have heard that a larger percentage
of prints will not be worth
while in the AFINA.

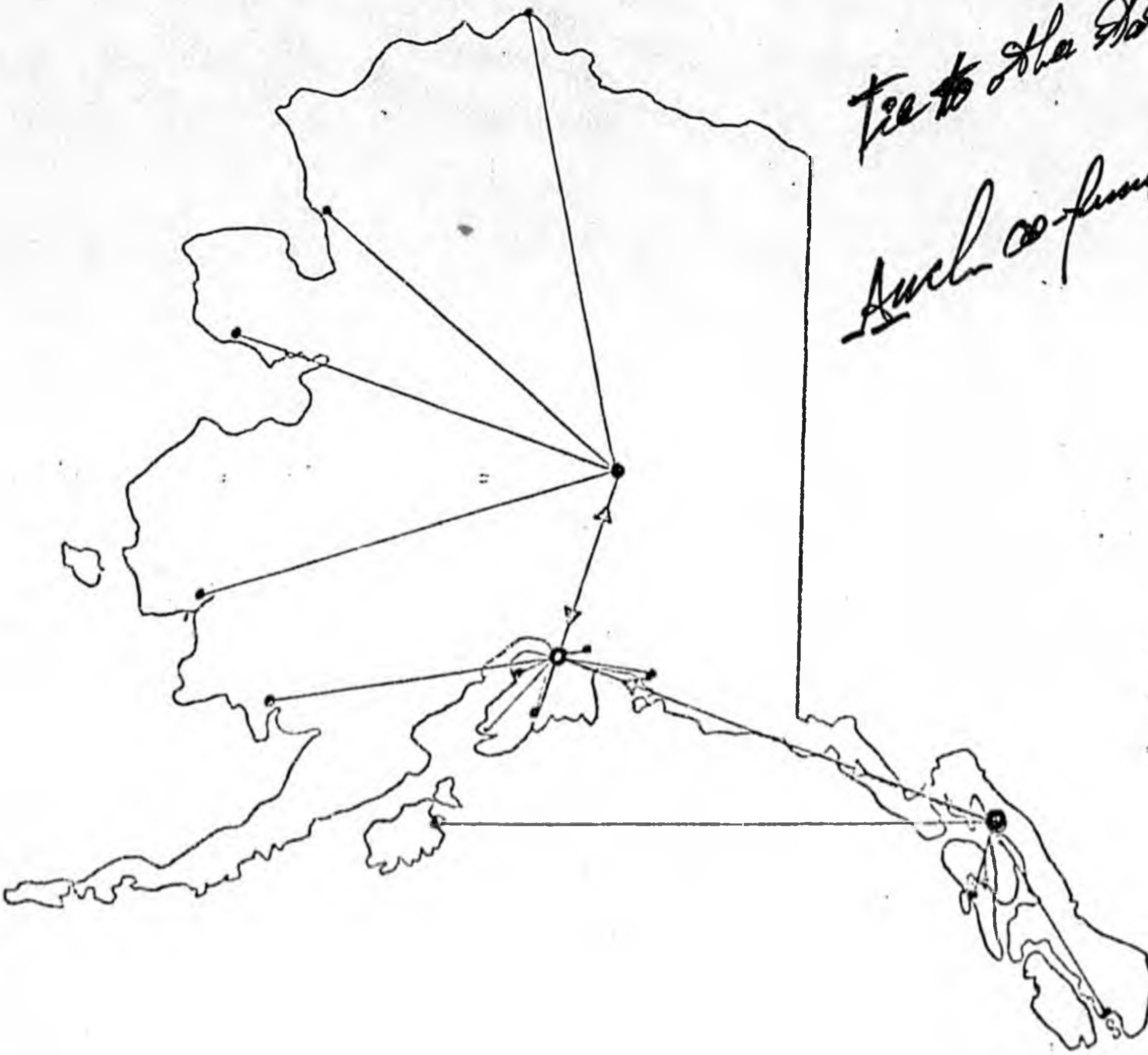
4-20-87
Bradley

PLEASE NOTE: THE FOLLOWING PAGES WERE TREATED AS A UNIT IN THE ORIGINAL DOCUMENT

AUTOMATED FINGERPRINT IDENTIFICATION NETWORK OF ALASKA

Tie to other States

Anch co-fund



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.

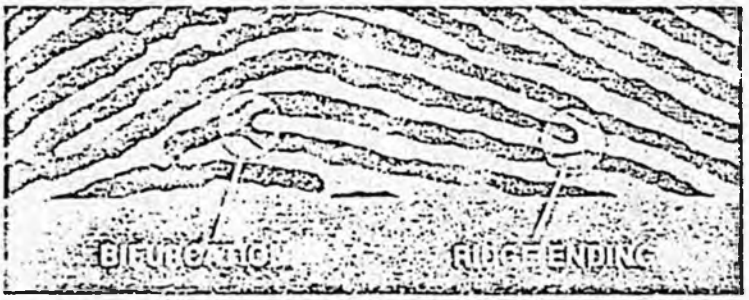
And yet - in spite of the extensive fingerprint file resources, the ability to lift latents at least half the time, and the unquestioned ability of fingerprints to positively identify, Alaska State Troopers and Anchorage Police Department were unable to put fingerprints effectively to work to solve crimes 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.

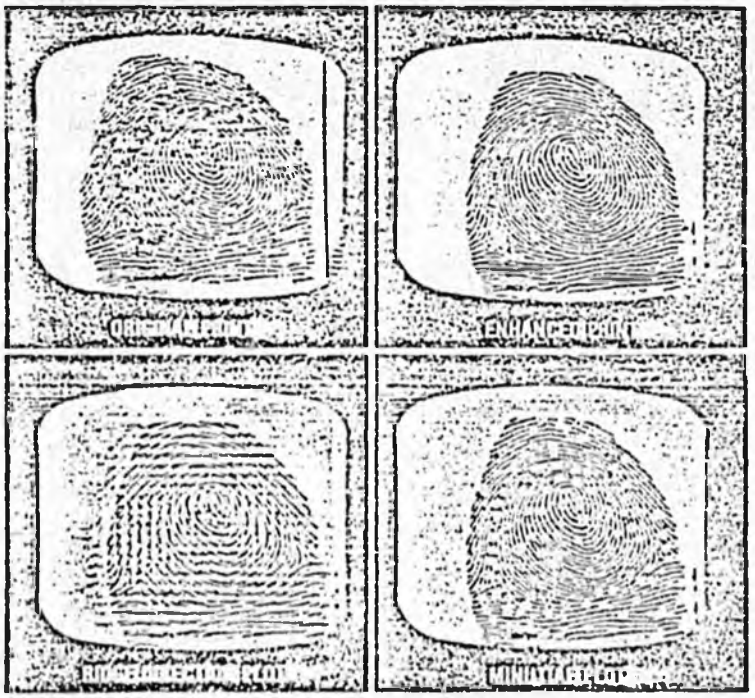
HOW DOES IT WORK?

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.

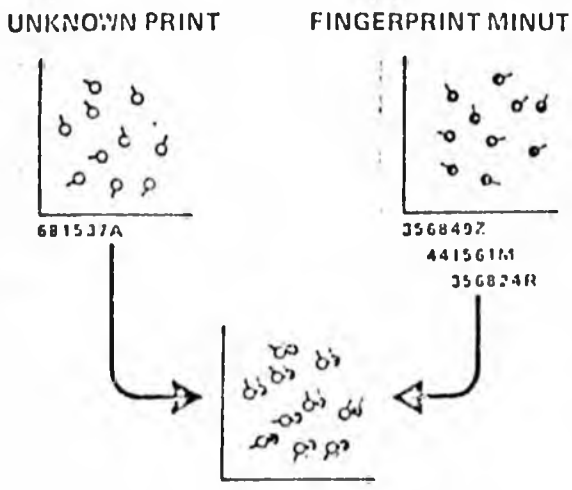
THE PRINTRAK 250S SYSTEM'S "MINUTIAE"-BASED APPROACH OFFERS ACCURACY ... SPEED ... AND ECONOMICAL TRANSMISSIBILITY OF DATA.



FINGERPRINT READING



FINGERPRINT MATCHING



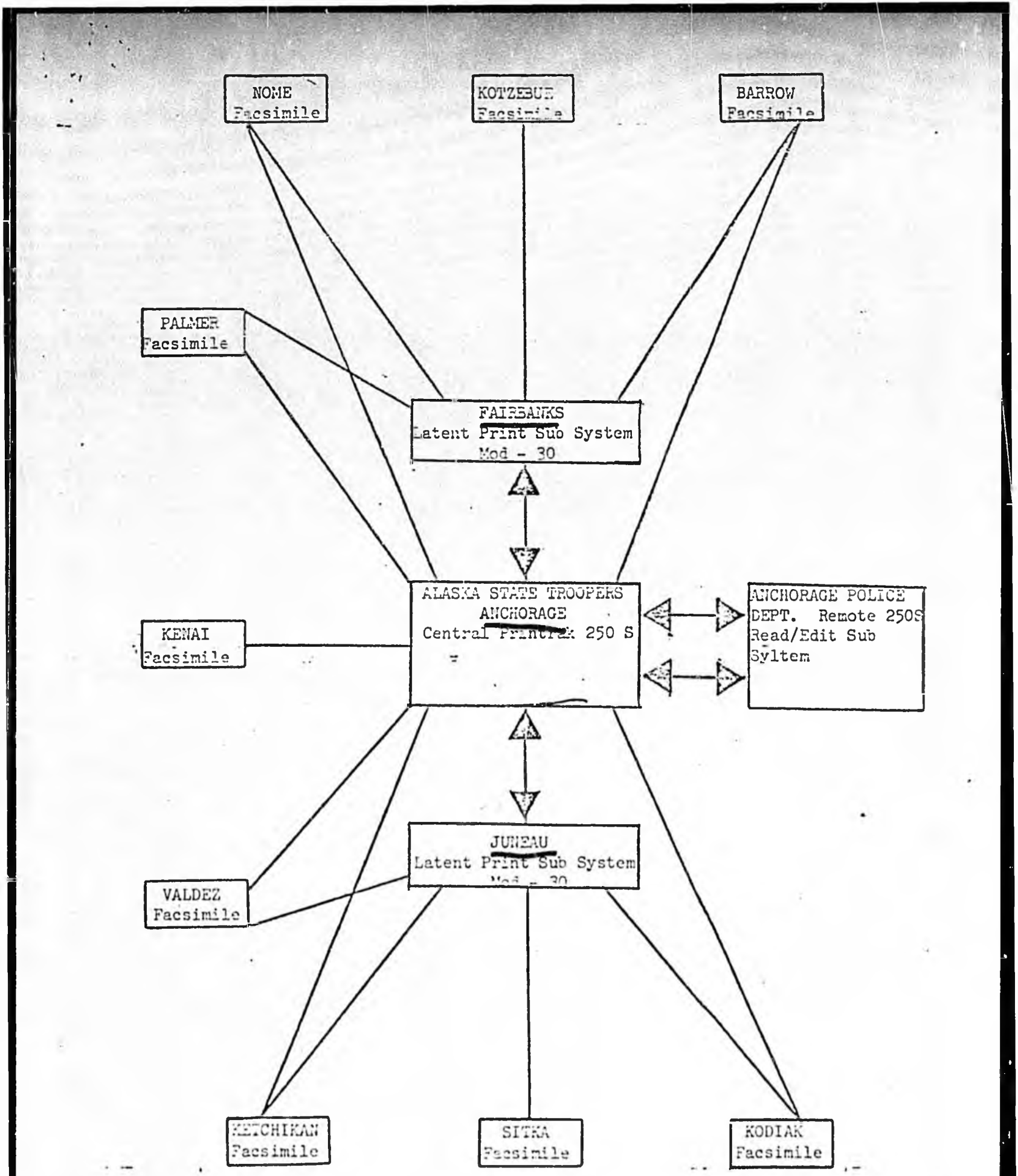
The equipment reads directly from card or paper input, which means there is no need for costly and time-consuming photographic processing of input information. The data which is stored for each fingerprint, and which is subsequently used for matching, are digital, binary-encoded descriptors, and is amenable 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 Subsystem. 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 communications, fingerprint cards and latents can be sent from anywhere in the State to either 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 READ/EDIT SUBSYSTEM

ANCHORAGE POLICE DEPT.

"CENTRAL" PRINTRAK 250S SYSTEM

PRINT PROCESSOR

SEARCH PROCESSOR

READ/EDIT CONSOLE

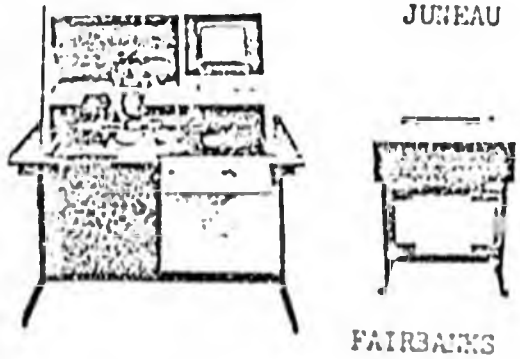
PRINTER

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 conjuction 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)	$ 412,340.00
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

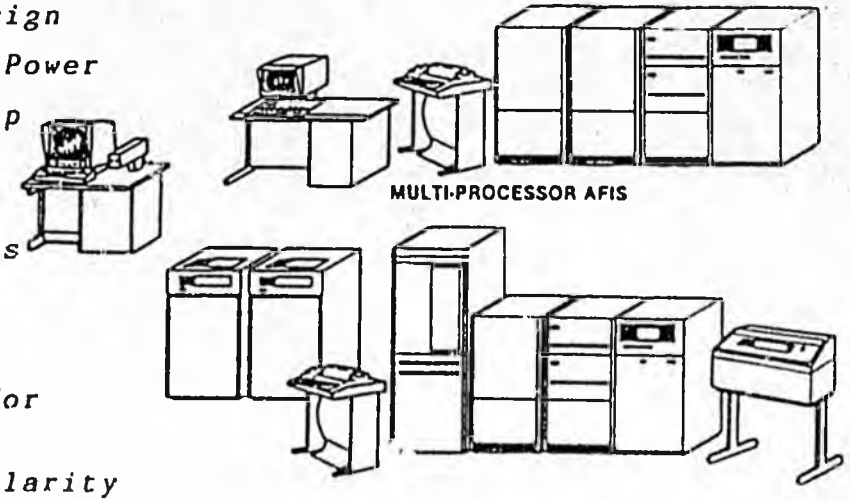
PLEASE NOTE: THE PRECEDING PAGES WERE TREATED AS A UNIT IN THE ORIGINAL DOCUMENT.

On December 9, 1981, Thomas De La Rue & Company Ltd., a wholly owned subsidiary of the De La Rue Company p.l.c. of London, England, acquired Rockwell International's computerized auto mated fingerprint identification Printrak equipment product line, including all tangible and intangible assets.

Rockwell International had incorporated no product improvements in recent years; De La Rue has made the below listed changes and improvements to the product since its acquisition.

A Second-Generation Automatic Fingerprint Identification System, featuring:

- *State-of-the Art Design*
- *25% More Processing Power*
- *Low Cost-of-Ownership*
- *Improved Accuracy/ Repeatability*
- *Increased Match Rates*
- *Card Reading Rate Increased 100%*
- *New Ten-Print Mode for Large Bureaus*
- *Improved System Modularity*



The System 300 is a second generation Automatic Fingerprint Identification System manufactured by De La Rue Printrak, Inc. in Anaheim, California. The new level of performance and operational flexibility achieved by the System 300 is directly attributable to extensive experience gained with the Printrak 250 and Printrak 250S AFIS equipment currently in use in North and South America. Like its predecessor, the Printrak System 300 is a completely self-contained automatic fingerprint identification system which automatically files, classifies and identifies both 10-print and latent fingerprints. While similar to its predecessor in function, the System 300 Automatic Fingerprint Identification is a completely revised mechanization employing state-of-the-art hardware to achieve improved system accuracy, major increases in processing rates and low cost-of-ownership. The high level of operational flexibility provided in the Printrak 250 systems has been expanded with new input terminals, new operational modes, and new user utility programs.

Following is a brief description of significant features of the System 300 Automatic Fingerprint Identification System.

State-of-the-Art Design

The System 300 is a completely revised mechanization of the successful 250S system. Approximately 80% of the 250S system has been upgraded with new state-of-the-art hardware. Major changes include:

- new fourth generation computer system with increased processing power.
- a new fingerprint reader subsystem using new graphics electronics, new image storage circuitry and a solid state digital scanner. An all new operator interface has been designed with new cursor and mode changing controls.
- a new high-speed hardware matcher (employing the advanced R40 matching algorithm) has been incorporated into the System 300.
- a new high-speed microcomputer-based associate processor has been added to improve the card reading rate.
- new tape drive and disk peripherals.

Increased Processing Power

The System 300 AFIS incorporates an all new fourth generation PDP-11 computer system as the central processing element. This computer, with new high speed central processor, combined with a large 8K byte high speed cache memory, provides a 25% to 30% increase in processing power over previous Printrak systems. In addition, the ability to access up to one million bytes of main memory (four times the Printrak 250S memory), provides ample memory space for future expansion and accommodates many different network configurations.

In addition to a completely new central processor, a high-speed microcomputer-based associate processor has been added, as an option, to the input subsystem. This 16-bit microprocessor, which provides computing performance equaling or exceeding the most powerful minicomputer, performs post processing of raw minutia data during card reading. This unit, operating at 4 million instructions per second, off-loads the main computer and provides a 100% increase in card reading rate over previous 250S systems.

Improved Accuracy/Repeatability

The System 300 incorporates a completely new R40-based hardware matcher unit. This new, high-speed, high-accuracy matcher enables all search prints to be processed through the matcher resulting in improved accuracy over previous Printrak systems. In actual field use on the Printrak 250S system, a software version of this R40 matching algorithm has demonstrated exceptional accuracy and selectivity in searching latent prints. First place "hits" have been obtained with as few as six minutia encoded from the latent print when matched against one million file prints.

Repeatability of the System 300 is improved by the incorporation of an all solid-state fingerprint scanner. This scanner provides a highly repeatable gray level fingerprint image during the card reading. This consistent image results in improved minutia detection repeatability.

New Input Reader Terminal

The System 300 AFIS incorporates a completely new input reader terminal constructed of state-of-the-art components. The analog TV scanner used in previous 250S systems, has been replaced with an all solid-state scanner capable of very high resolution imaging with little or no adjustments. Drift and sizing adjustments previously required have been virtually eliminated.

The image collection and graphics electronics used in the System 300 input terminal is completely new. This unit provides a 300% speed increase in graphics writing, local hardware calibration circuitry for optimization of the fingerprint image prior to processing by the print processor and new video mixing circuitry for improved display readability.

The input terminal has been completely repackaged to enhance maintainability and minimize operator fatigue.

Improved System Modularity

The Sytem 300 is a complete stand-alone fingerprint system. However, the high degree of modularity, compatibility between all of the product line hardware and software, and the ability of the various subsystems within a network to communicate by commercial telephone lines, allows the System 300 to be quickly and economically expanded into wide coverage ID "networks". The increase in processing power of the System 300, combined with four times the main processor memory, new operational modes and several new remote terminal products, enables the System 300 to be configured into a broad variety of network combinations to meet the requirement of law enforcement agencies of cities, counties, states and even nations.

Low Cost of Ownership

A design requirement in the development of the new System 300 AFIS was low cost-of-ownership. Maintenance and reliability data gained from over four years of field experience with the Printrak 250S was used to develop a low cost-of-ownership design. New reliability and maintainability features incorporated in the System 300 include:

- New data base diagnostics and maintenance software
- Simplified Reader Terminal with a solid state camera, thus eliminating calibration and alignment problems
- Fourth generation computer system using state-of-the-art hardware
- Error correcting MOS memory
- Completely redundant system disk drives
- Remote diagnostics options
- Visual indication of power supply malfunction
- New microprocessor controlled magnetic tape system with self contained diagnostics
- New system disk drives featuring embedded closed-loop servo positioning system which eliminates cartridge alignment and interchangeability problems

The Printrak System 300 is the most advanced computerized automated fingerprint identification system available. This is directly attributable to the many years of operational field experience on the Printrak 250 and 250S systems.

TO WHOM IT MAY CONCERN

The Montgomery and Prince George's Counties, Maryland Regional Automated Fingerprint Identification System Report

March 23, 1982

Submitted and Endorsed
by

Sergeant Paul H. Smith
Project Director
Department of Police
Montgomery County, Maryland

Henry A. Jones
Project Director
Department of Police
Prince George's County, Maryland

Brief History

The automated computerized fingerprint identification system equipment was delivered and installed the last week of March in 1979. This was accomplished by Montgomery and Prince George's Counties, Maryland, working together on a joint project, supported by both State and Local funds, augmented by a grant from the Governor's Commission on Law Enforcement and the Administration of Justice. The project has been titled the Regional Automated Fingerprint Identification System (R.A.F.I.S.).

Prior to equipment installation, 40,000 fingerprint cards had been sent to Rockwell International located in Anaheim, California, for the conversion of the fingerprint information into the R.A.F.I.S. data base. Selected information (county identification number, sex, race, year of birth, year of activity, geographical area and file category) was merged by the means of a descriptor tape, created by the respective counties, with the fingerprint information captured by Rockwell. This portion of the data base was delivered with the equipment.

Operational Progress

After installation and employee training, our first priority was to convert the remainder of our existing fingerprint cards into the automated data base. During that period of time, 28,158 records were added to the existing data base. Over 75% of the time spent by personnel working with the system was consumed by this process.

Searching latent evidence through the automated system, during 1979, was limited. Latent searching on the automated data base before completion, would have duplicated automated and manual searching on all cases not identified.

At the end of 1981, our data base consisted of 91,149 ten-print records and 2,340 unsolved latent prints. Presently, daily operations include the searching of all incoming latent prints of sufficient quality and new ten-print cards, as well as, updating recidivist records. There are very few old latent cases being searched through the system because of work load and manpower constraints.

R.A.F.I.S. Results

Listed are the total R.A.F.I.S. statistics accomplished by Montgomery and Prince George's Counties for the first three years of operations. There has been no attempt to inflate the statistics and accurate records have been maintained on the source of all statistical information provided. This information is also used by us as a managerial tool to improve the efficiency of our entire process.

Records have been maintained as the number of latent hits, as well as, the number of latent case hits. This procedure has been adopted because we often record more than one latent hit on an individual case and we do not want the statistics to be misleading.

Total Statistics for Montgomery and Prince George's Counties:

1979

Latent Cases Received	3,506
# of Hits (latent)	63
# of Cases (latent)	51
# of Alias (10-print)	183
# of Same Name (different I.D.#'s)	322
Total 10 Print Hits	505

1980

Latent Cases Received	6,732
# of Hits (latent)	215
# of Cases (latent)	178
# of Alias (10-print)	323
# of Same Name (different I.D.#'s)	862
Total 10 Print Hits	1,185

1981

Latent Cases Received	6,760
# of Hits (latent)	224
# of Cases (latent)	181
# of Alias (10-print)	544
# of Same Name (different I.D.#'s)	1,309
Total 10-Print Hits	1,853

1979 - 1980 - 1981

Latent Cases Received	16,998
# of Hits (latent)	502
# of Cases (latent)	410
# of Alias (10-print)	1,050
# of Same Name (different I.D.#'s)	2,493
Total 10 Print Hits	3,543

Latent Searching Evaluation

The value of latent evidence has been greatly enhanced during the existence of our program. This is clearly indicated by our statistics because the number of latent cases received have almost doubled between 1979 and 1981.

A more complete and proficient crime scene search is being accomplished because the investigators have been convinced that the R.A.F.I.S. personnel can be of assistance in the closure and prosecution of criminal cases.

The morale of the latent examiners has improved. They do not have a sub-servant attitude; but, they feel like they are part of a team with much to contribute.

At the end of 1979 an evaluation was done on all the R.A.F.I.S. hits. It was determined that for every hit made by R.A.F.I.S. the investigators following the case up, would actually close an additional three cases, plus arrest one other accomplice. It was interesting to note that the California Department of Justice has reported basically the same findings.

The searching of latent prints by automation is directed towards the apprehension of the career criminal. Hits are not possible if a person only commits one crime and is never arrested because he would not be in our data base; however, detection of the habitual offender is certainly a possibility.

Ten-Print Searching Evaluation

The accuracy of searching a fingerprint card through the existing data base can only be described as excellent. The accuracy of the Printrak System far exceeds any current manual method of searching. Presently, it is estimated that the ten-print accuracy exceeds 99.9%.

The Printrak System accuracy is accomplished because fingerprint cards of poorer quality and impressions not totally recorded can be easily searched. Actually, the only thing needed is the center of the pattern area and system speed allows searching the fingerprint minutiae through the entire data base.

Conclusion

The Printrak System has been proven to be successful in an actual field environment. Numerous cases have been closed with the aid of R.A.F.I.S., which in the past, would have remained open indefinitely.

Its value to the user will hinge upon the exploration of potential, proper utilization and the amount of effort each respective agency directs toward the project.

82-03-22

TO WHOM IT MAY CONCERN:

The R.C.M. Police took delivery of a Printrak 250 system on 78-12-13. This system's ten print searching procedures were changed recently with classification descriptors providing respondents for minutia match on thumbs only. The ten print operation scans four fingers - filling thumbs only (index when thumbs are missing) for eventual comparison purposes.

Ten print operation:

Files converted	1.6 M. (82-03-21)
Conversion rate	350 cards per hour.

Latent operation:

Files in data base	131,000
Conversion rate	210 cards per hour
Total prints searched to date	14,660
Average daily search at present	60

Criminal Idents: 1980 - 132
1981 - 200
1982 - 56 (as of 82-03-21)

The R.C.M.P. is currently testing accuracy of recent software modifications that allowed manual classification info to select respondents for minutia match. Printrak accuracy is 98%, however, more errors (misses) do occur and are as a result of the manual classification input and poor data on file. Efforts are currently being made to ensure accurate classification, however, some data on file simply cannot be improved.

The Printrak 250 system could not accurately classify the poor quality fingerprints on file and those received daily. Therefore, it was necessary to abandon the automated classifier relying instead on manual classification. The system has, however, significantly reduced search time, improved accuracy, and eliminated the need to view the majority of respondents generated from search procedures. The R.C.M.P. will have more information available on 10 print searching in the fall of 82.

B.W. King, Insp.,
O. i/c Fingerprint Bureau,
R.C.M. Police.

City of Miami

KENNETH I. HARMS
Chief of Police

March 25, 1982

Mr. Earl Schouweiler
PRINTRAK INC.
2121 S. Manchester Ave.
Anaheim, Cal., 92801

Dear Mr. Schouweiler

In response to your telephone inquiry on March 23, 1982, Sgt. Charles Nassberg has furnished the following information regarding our PRINTRAK 250S Sytem.

1. Installation December 2-7, 1980, operational after initial training on or about December 20, 1980.

2. First Ident made on December 12, 1980, during training.

3. Current Data Base = 117,750 (65,000 Civilian, 52,700 Criminal).

4. Number of Latent Cases where idents made, by crime type.

Homicide	16
Abduction	1
I.S.B.	6
Robbery	31
Agg. Assault	2
Burglary	212
Auto Theft	2
B&E of Auto	9
other	1
Total	280

Among the hits above, thirty-five (35) were made from the unsolved latent file and at least twenty-two (22) additional cases were idented as a result of identifying the offenders

in the above cases.

It may also interest you to know that in February 1982, three arrests were made on separate cold case homicides (2 to 4 year old cases) where the identity of the offender was made known by PRINTRAK 250S inquiry.

As for ten-print entries, we are confident enough in PRINTRAK's ability to perform with a higher degree of accuracy than with our previous manual method that we are contemplating abandoning our manual ten-print file.

I hope these facts may be of some assistance to you.

Sincerely,

Major E B Putman

Major Emory B. Putman
(for) Kenneth I. Harms
Chief of Police

KIH:ww:EBP

CITY OF SAINT PAUL
DEPARTMENT OF POLICE

WM. W. McCUTCHEON, CHIEF OF POLICE
101 East Tenth Street
Saint Paul, Minnesota 55101
612-291-1111

GEORGE LATIMER
MAYOR

March 26, 1982

Printrak, Inc.
2121 South Manchester Ave.
Anaheim, California 92801

To whom it may concern:

RE: Printrak, Inc.
250 S System

The St. Paul Police Department is the central site for the Minnesota Automated Fingerprint Identification System. This system is a regionally shared endeavor amongst the St. Paul and Minneapolis Police Departments, plus the Minnesota Bureau of Criminal Apprehension.

St. Paul and Minneapolis each have a 250 S Read/Edit terminal. Minneapolis has an additional Model 20 latent fingerprint terminal and Minnesota Bureau of Criminal Apprehension has a Model 20 latent terminal. Minneapolis and the Minnesota Bureau are connected to the St. Paul central system by dedicated telephone lines.

Our system was up and running in February, 1979. In the first year St. Paul entered many latent fingerprint lifts which were on file from current crimes as well as crimes from previous years. The first year St. Paul scored 100 identifications of persons previously unknown to us despite the efforts of investigators at the time of each particular incident.

By extracting the minutiae thru the Read/Edit terminals we have a data base capacity equivalent to 360,000 cards on-line. We can also retain additional data off-line such as persons over 65 years of age, or persons not believed to be active criminals at the present time. Currently we have on-line 326,000 cards in our data base.

The fingerprint card search accuracy is 98+% and the latent fingerprint hit rate is 10 to 15% as opposed to 1 to 3% using the previous manual search. We do not take elimination fingerprints at crime scenes. If we did, we would have a latent fingerprint hit rate probability of 40 to 50%.

Needless to say, on some of the latent fingerprint hits, we have experienced multiple clearances, especially in burglaries and auto thefts committed by juveniles. 50% of our burglary hits are juveniles as well as the majority of the auto thefts.

We are presently requesting our state legislature for funding to add an additional Read/Edit terminal to the Minnesota Bureau of Apprehension and a Model 30 latent fingerprint terminal to St. Paul. We are also requesting an additional disk-drive plus some softwear changes to make these additions compatible to the system.

We are very satisfied with the performance of this system, especially as we look back to a few years ago when we depended on the hit and miss manual Search and Identify method which was unproductive and expensive in man-hours which resulted in few case clearances.

Sincerely,

Gerald A. Hanggi Sr.

Lt. Gerald A. Hanggi, Sr.
Director, Crime Laboratory
St. Paul Police Department
101 E. 10th St.
St. Paul, Minnesota 55101

GAH:dl

HOUSTON POLICE DEPARTMENT

AUTOMATED FINGERPRINT SYSTEM

The following information is intended to record the progress of the Houston Police Department's Automated Fingerprint System.

As a matter of background information, the Automated Fingerprint System (AFS) installed in Room 430 C of the Police Communications Building is the Rockwell International Printrak 250 S. The system was delivered in July, 1979 and became operational in October 1979. It is basically a computerized minutia-based fingerprint identification system capable of storing approximately 375,000 criminal fingerprint records, (3,750,000 individual fingerprint impressions) along with descriptor data as well as 12,000 unidentified latent fingerprints.

Our Printrak 250S is one of only five (5) such systems operating in the United States at present. Funded by a L.E.A.A. grant, it was the third system to be installed and was designed to meet the needs of our Department and area law enforcement agencies.

Rapid identification of a suspect in a criminal offense is now possible should he or she by chance leave a portion of a single fingerprint impression at the scene of a crime. Heretofore, identification of such a fingerprint was possible only if the investigation of the crime developed the name of a person who might have a fingerprint card on file. Many exhaustive hours were spent by investigators and many suspects eliminated before a positive fingerprint identification could be made in the majority of cases. The AFS has developed a suspect in as little as one (1) minute which resulted in a positive identification and subsequest arrest. The rapid identification of prints from the crime scene saves investigative time, and leads to a quick apprehension of the suspect often while he is still in possession of the fruits of his criminal act and, most important, before he can repeat his crime.

Today we have complete fingerprint records of more than 340,000 persons who have previously been arrested for some criminal offense. A person arrested and jailed can now be fingerprinted, his prints entered into the system and positive identification effected in moments should he have a prior record. The system is designed to search and match the ten-finger print card as well as a single fingerprint.

During 1980, operational procedures were established, personnel trained, and system reliability established. Fingerprint records of the Fort Bend County Sheriff's Department were added to the data base and plans are now being formulated to gather records of known offenders from other area law enforcement agencies in an effort to enhance the probability of identifying the criminal that moves from area to area to commit his criminal acts. Interest in our system has come not only from out immediate area but also from visitors from across the State and various states

as well as some foreign countries. Forty-five (45) agencies requested a latent fingerprint searche in the past two (2) years with over fifteen (15) cases identified.

During the year 1980, the following accomplishments were attained:

1. 16,262 Ten-print records wer added to the system

2. 871 Individuals jailed were identified as having prior records using a different name.

3. 52 Suspects were identified by fingerprints developed at the scene of a crime.

The crimes included:

Murder	1
Rape	2
Robbery	2
Auto Theft	7
Forgery	6
Felony Escape	1
Narcotic Law Violation	1
Burglary and Fel Theft	32

During the year 1981, the following accomplishments were attained:

1. 18,576 Ten-print records were added to the System

2. 1,011 Individuals jailed were identified as having prior records using a different name.

3. 89 Suspects were identified by fingerprints developed at the scene of a crime

The crimes included:

Murder	5
Rape	2
Robbery	2
Auto Theft	10

Forgery	1
Felony Escape	1
Narcotic Law Violation	1
Burglary and Felony Theft	64
Others	3

In the summer of 1982 we created a "senior citizen" data base therefore, removing all persons sixty (60) years and older from the operational data base and placing them on an off line disk pack. This procedure created additional space on the operational data base.

It should be noted that in many of the latent cases identified through use of the AFS, the arrest of the suspect resulted in the clearance of several other cases. One of the felony theft arrests resulted in the suspect confessing to more that twenty-four (24) similar crimes in four (4) counties.

With the addition of the AFS to the Identification Division we have been successful at identifying several unknown deceased persons that would have remained unknown because one or more fingers of the deceased were missing.

It is my opinion that implementation of the AFS has proven itself as another tool in combating crime and clearing cases.

Peggy James

Peggy James
Fingerprint Classifier II
Identification Division
Automated Fingerprint System
Houston Police Department
Houston, Texas 77002
(713) 222 5505

On July 9, 1981, a Massey Business College teacher was abducted from a walkway to the front of the college. She was later found beneath her car on a lonely southeast Houston road dead - death attributed to a fractured skull, a broken neck, and a crushed chest. She had been sexually abused and run over by her own vehicle. There were no witnesses to this brutal murder, so the physical evidence gathered at the crime scene became the only clues to solve the case. The victim's vehicle was dusted and paper items retrieved from the vehicle. These paper items were chemically treated with ninhydrin and, subsequently, the prints were developed and entered into the Automated Fingerprint System. Search and match time on the identified prints was one hour and twenty-three minutes. The System matched over 500,000 single prints in this time period and placed the charged suspect number one on the respondent list of suspects. Within 13 hours, the suspect was arrested. After a full confession, the subject was charged with Capital Murder.

Homicide detectives have praised the Automated Fingerprint System to the highest degree, stating all leads had been exhausted and that their only hope for solving this case was the single fingerprint search through the Automated Fingerprint System.

A side note to this case is that the subject charged with this crime had been out of Texas Department of Corrections for approximately 6 weeks.

Physical evidence in all cases is extremely important, and single print searches using a computerized fingerprint system are now a reality. The System is being used by police departments or state bureaus in 5 states in the United States, and each site has proven the capabilities far beyond initial expectations. Law enforcement agencies need to support the technology developed to date and demand that, if indeed, the public wants crime controlled, monies, whether they be federal, state, of local, must be found and allocated to projects such as this if the technology is to

survive.

We here in the Identification Division of the Houston Police Department are proud of our accomplishments and are determined to see that the technology not only survives, but also flourishes. We need your interest and support to see that crimes of the caliber just reported are ended.

Peggy James

Peggy James
Fingerprint Classifier II
Identification Division
Automated Fingerprint System
Houston Police Department
Houston, Texas 77002
(713) 222 5505

MSG 82-00021484 PRTY 1 04/16/82 12:10:44 ORIG: LA01 IN= 0002 OUT= 0070
FROM: CINDY ANCH TO: JNU INFO
TARGET: LJH2 SUBJ: POM PAGE 0003

TO: SENATOR FISCHER

FROM: KAREN SMITH, 8550 BLACKBERRY APT 2, ANCH. 99502 248-3999 HM

I SUPPORT THE COMPUTERIZED FINGERPRINT SYSTEM. SB 688

MAFIN

MINNESOTA AUTOMATED FINGERPRINT IDENTIFICATION NETWORK

MODERN FORENSIC TECHNOLOGY'S ANSWER FOR RAPID, ACCURATE, ECONOMICAL FINGERPRINT IDENTIFICATION ... IMPROVED CRIME CLEARANCE RATES ... SLASHED CLEARANCE COSTS

INTRODUCTION TO MINNESOTA AUTOMATED FINGERPRINT IDENTIFICATION NETWORK

This booklet offers a description of the Minnesota Automated Fingerprint Identification Network (MAFIN) which has been acquired by St. Paul, Minneapolis, and the State of Minnesota Bureau of Criminal Apprehension (BCA) to increase speed and accuracy of police fingerprint identification processing ... to increase the number of identifications made through fingerprint matching ... to dramatically raise the crime clearance rate ... and to significantly reduce crime clearance costs in the Twin Cities and, potentially, throughout the entire State of Minnesota.

The booklet has been prepared for two purposes: First, to make MAFIN's operation, benefits, and objectives clear to users and supporters. And, second, to acquaint Minnesota jurisdictions outside the Twin Cities with the automated network, to the extent that such jurisdictions may consider the feasibility of revising their own fingerprint systems as necessary to become a part of the ID system "network" of which the Twin Cities and BCA represent the initial components.

CONTENTS

WE HAD A PROBLEM ...

Police agencies in St. Paul and Minneapolis, Minnesota, 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 Twin Cities 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 experienced investigators may sometimes have a good mental list of suspects.

If Twin Cities 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.

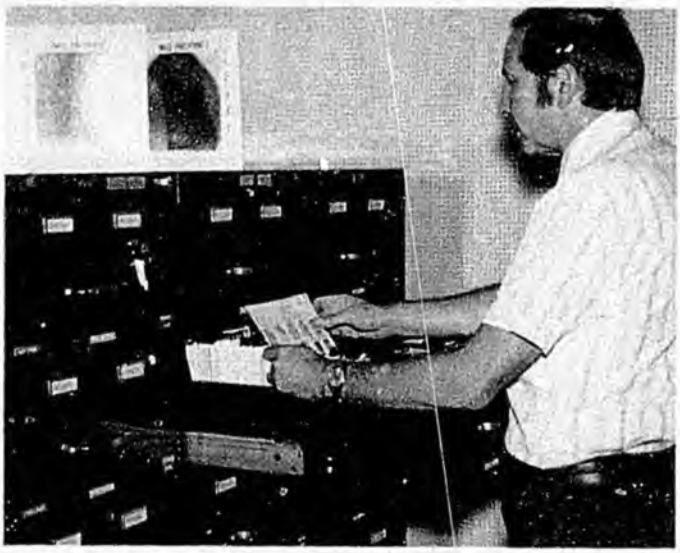
Every time an arrest takes place in St. Paul or Minneapolis, the alleged lawbreaker's fingerprints are rolled onto a 10-print file card. Altogether, the Twin Cities' files in 1976 contained a total of around 250,000 ten-print cards, and the State of Minnesota's Bureau of Criminal Apprehension (BCA), also in St. Paul, had on file more than 90,000 such cards. Thus, the Twin Cities police departments and the BCA had on file a total of 340,000 ten-print cards (or 3,400,000 individual prints) of known offenders. In addition, the Twin Cities had a combined file total of more than 25,000 individual, unidentified "latent" prints "lifted" at the scene of crimes.

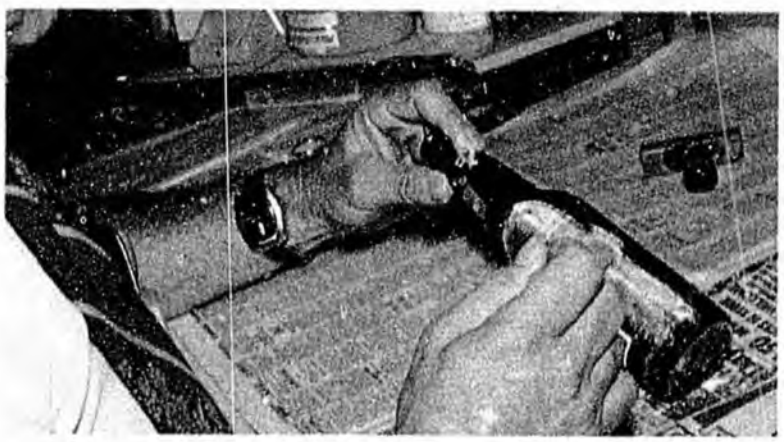
When a police officer is able to find a good latent at a crime scene, it is possible in many cases to pull from file the cards of all those on his mental list of likely suspects and, by manual handling and simple visual examination of the prints, to achieve a "hit" — that is, a match between the latent and a file print — in only a few hours. In 1975, around 3½% of all the latents picked up by Twin Cities officers 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 3 million fingerprints in the Twin Cities/BCA 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 Minnesota — namely, 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 — was 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.



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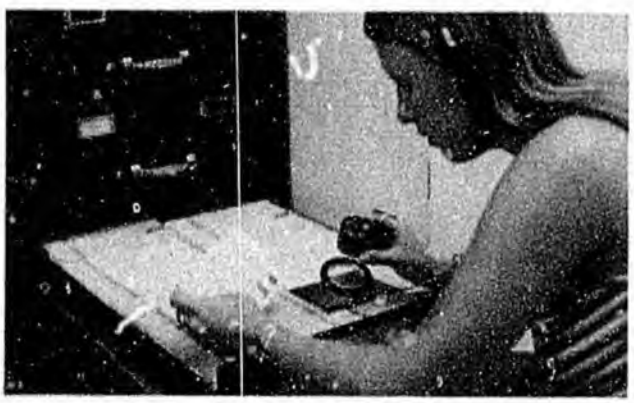
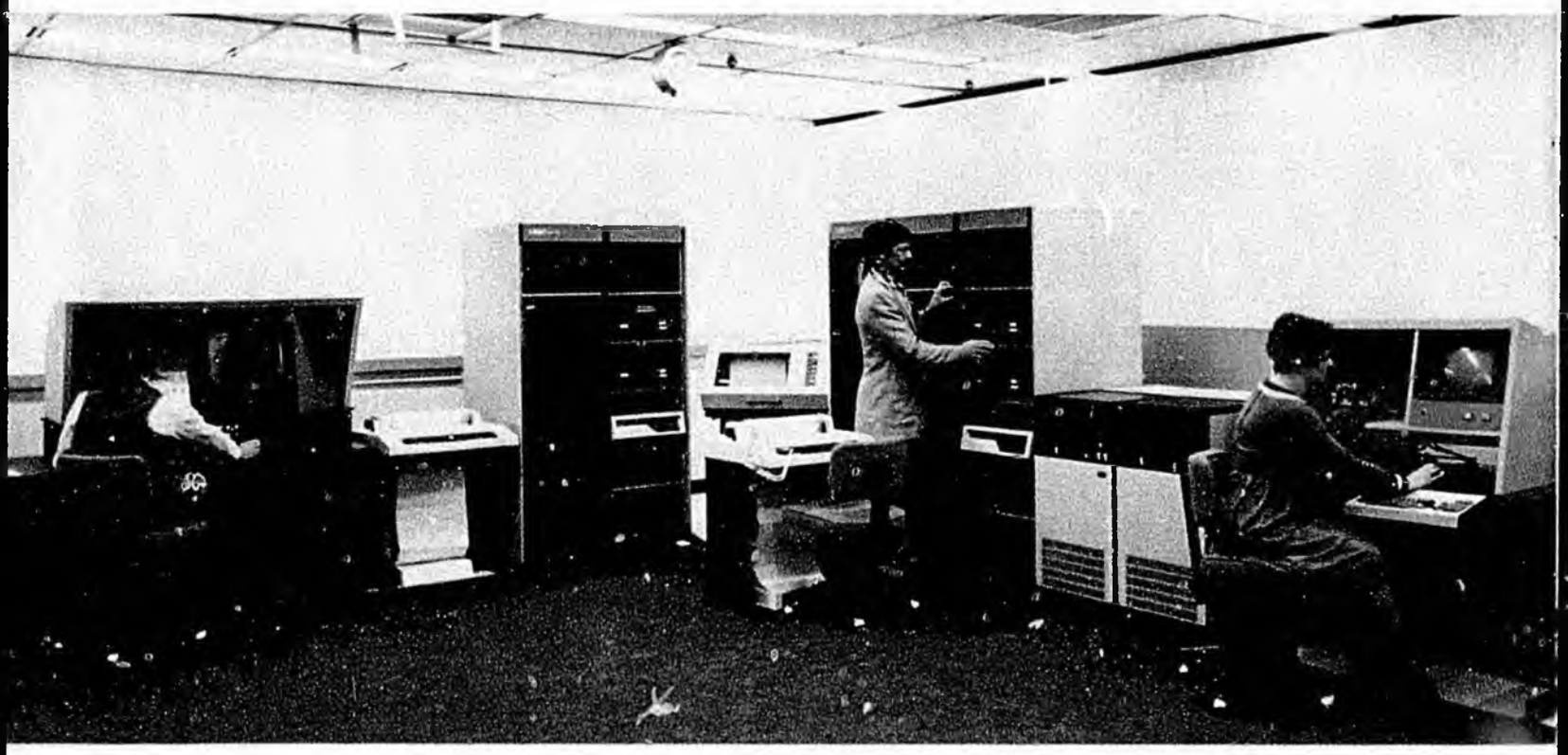




WE SOLVED THE PROBLEM ...

And Our Solution Will Save us Hundreds of Manhours and Thousands of Operational Expense Dollars — While Upping Our "Hit" Rate by More than 30% Annually

We've gotten ourselves an *automated* system — a tested, proven, highly reliable system that's faster, more efficient, and less costly to operate. The system *automatically* searches our extensive files in only minutes ... *automatically* finds the most likely matches ... *automatically* prints 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 the extent indicated at right.

	"Hit" Rate per 1000 Latents Processed	Number of Technician Manhours per "Hit"
With the Old Manual Method:	69	35
With Our Automated System:	90	10

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

The automatic search techniques of the 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 frees investigators for their prime purpose — investigation. As a corollary, it cuts the amount of investigator costs involved in the fingerprint process.*

Minutia-Based Approach Offers Advantages of Discriminability, Speed and Transmissibility

The approach taken by the Minnesota 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 positvely identify specific persons.

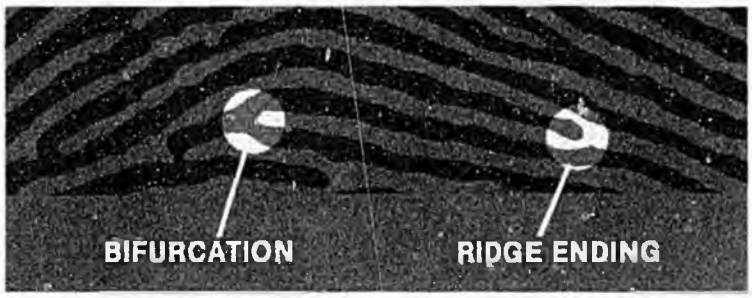
The Minnesota equipment reads directly from card or paper input, which means there is no need for costly and time-consuming photographic processing of input information. The data which are stored for each fingerprint, and which are subsequently used for matching, are digital, binary-encoded descriptors, and are thus 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.

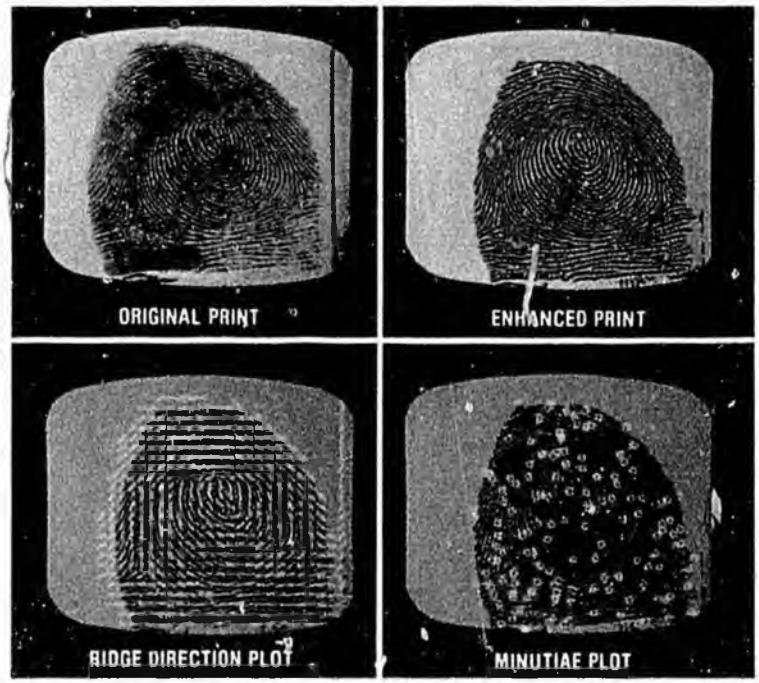
Because the automated Minnesota system uses digitally encoded data and only 2500 bits of information are needed to uniquely describe a fingerprint, the system provides a means for transmitting fingerprint data both rapidly and inexpensively over ordinary telephone lines.

Another valuable feature of the Minnesota system is its ability to maintain its own file of fingerprints 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.

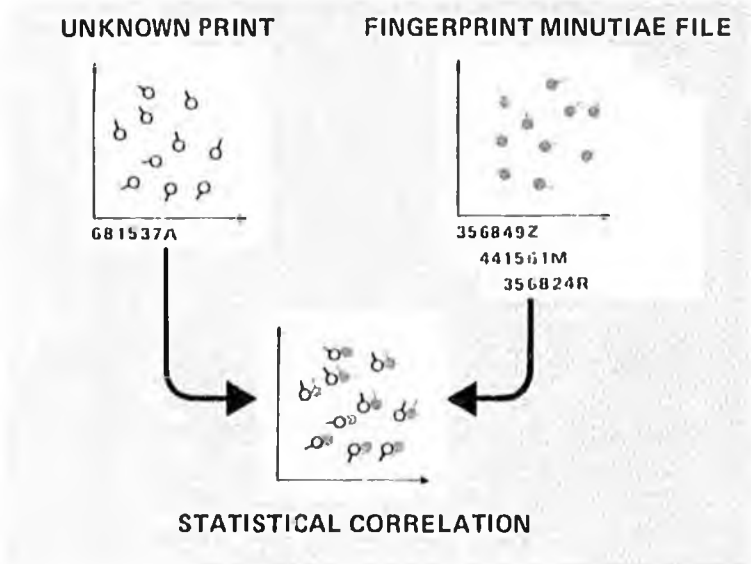
Not least among the Minnesota system's features are its compatibility with the minutia-based system hardware/software of a rapidly growing number of users throughout the U.S.A. and abroad ... including the Federal Bureau of Investigation, a number of major U.S. cities, and the Royal Canadian Mounted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

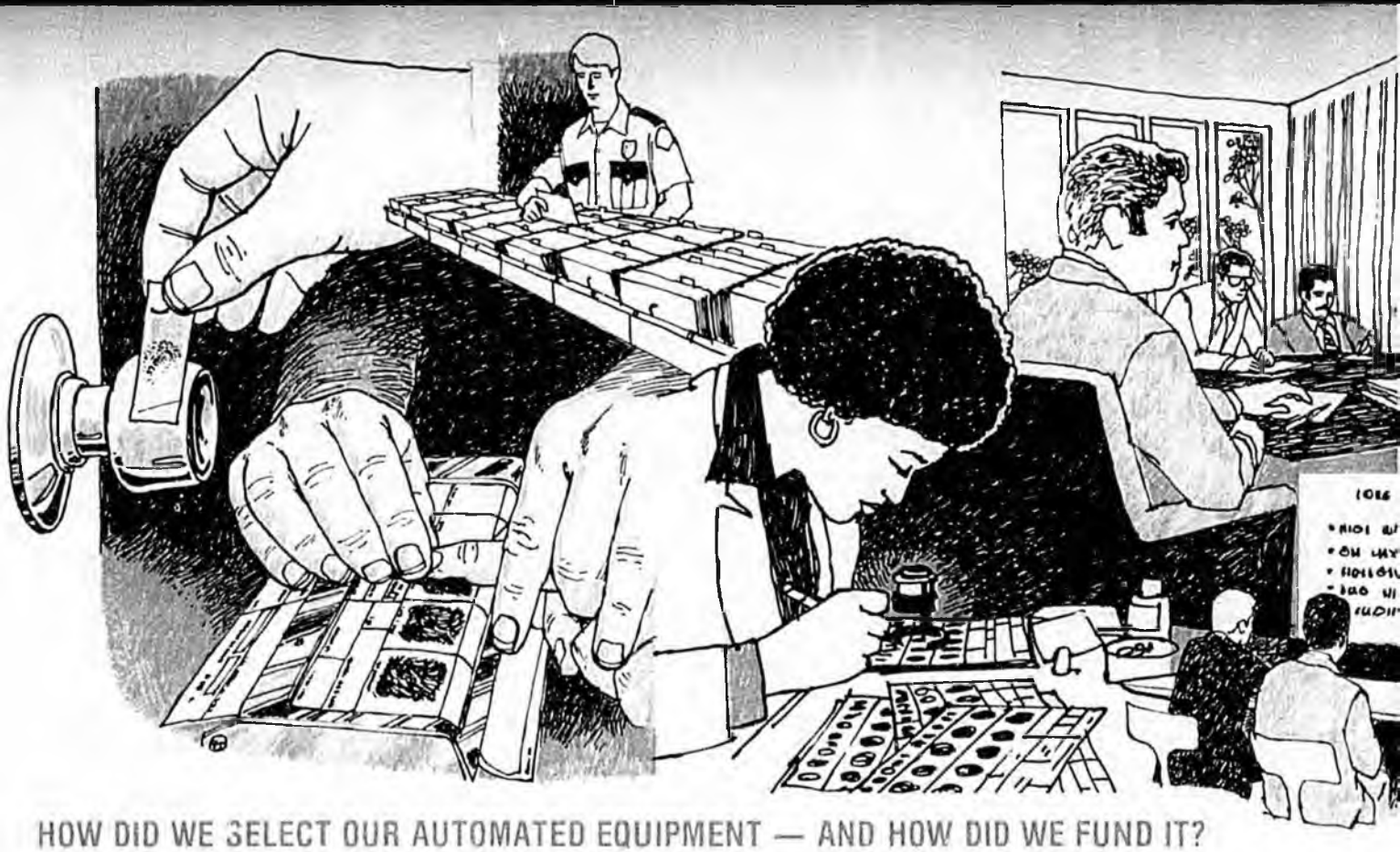


FINGERPRINT READING



FINGERPRINT MATCHING





HOW DID WE SELECT OUR AUTOMATED EQUIPMENT — AND HOW DID WE FUND IT?

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 1976, Minneapolis/St. Paul Police Departments were obtaining "latents" at approximately 50% of all crime scenes. The combined files of the two cities and BCA held a total of 52,000 unidentified latent prints, and more than 3 million identified, rolled prints.

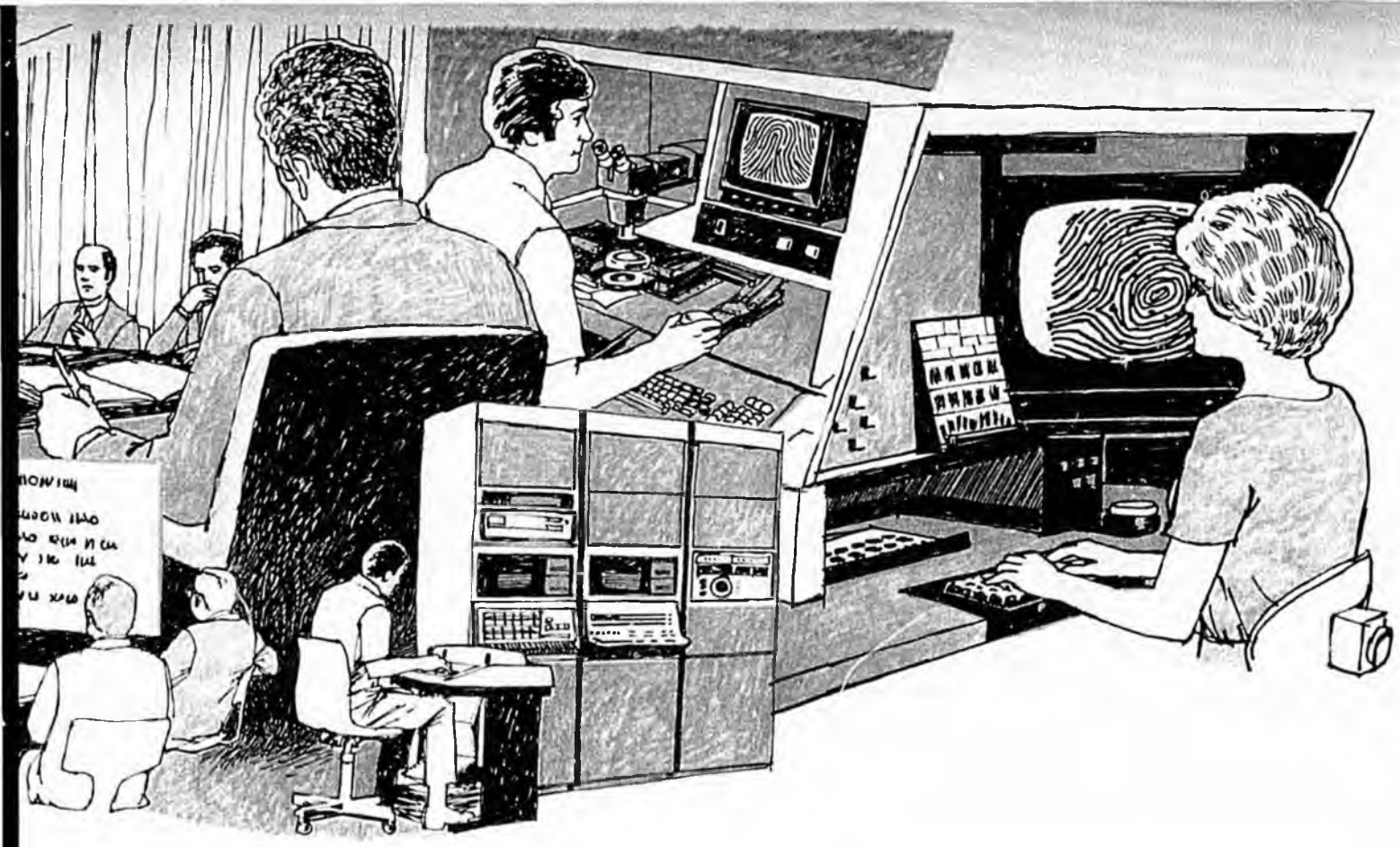
And yet — in spite of their extensive fingerprint file resources, the ability to lift latents at least half the time, and the unquestioned ability of fingerprints to positively tie down identification, St. Paul, Minneapolis, and the BCA were unable to put fingerprints effectively to work to solve crimes and to cut crime-clearance costs. *With existing manual fingerprint processing, it simply took too long.* To find a match for a single latent, with no other clues to the criminal's identity than the print itself, was almost more difficult than finding the proverbial haystack needle — and certainly a lot more expensive!

The crying need was for a way to search the files and obtain a match *rapidly.* It became 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.

Money Doesn't Grow On Trees

The metropolitan Police Department of any large city in the United States has three main purposes: to solve crimes, to prevent crimes, and to protect the public from criminals. It is supported in these activities by the voting citizens within its jurisdiction.

Although the public demands crime solution, crime prevention, and citizen protection on the part of the police, it also quite reasonably demands that these services be performed as *economically* as possible. Thus, when considering their need for an automated fingerprint ID system, St. Paul, Minneapolis, and the BCA realized that the system which they selected must not only be *functionally* the best system attainable ... it must also be *cost-effective to purchase, to operate, and to maintain.* And, above all, it must be within the budgetary limits of the three law enforcement agencies.



From the Beginning ... A Carefully Considered Course of Action

An analysis of fingerprint evidence submittal rates in both St. Paul and Minneapolis over a five-year period (1971-75) showed that the submission of latent evidence was increasing at an annual rate of about 10%.

Armed with this information and the realization of today's growing dependence on physical evidence, the two metropolitan departments and the BCA pooled their efforts to undertake an extensive analysis of available automated latent fingerprint identification systems.

The joint effort was sponsored by the Governor's Commission on Crime Prevention and Control. Timothy Ruggles, then a member of the Commission and now a consultant to the Minneapolis Police Department, headed the team. Other team members included Dr. Steve Coleman of the Commission ... Lt. Gerald Hanggi, Sgt. Joseph K. Corcoran and Sgt. Donald Hanson of the St. Paul Police Department ... Lt. Richard Cich and Lt. Dale Berven of the Minneapolis Police Department ... and Clayton Mellem and Karen McDonald of the BCA.

The team made a thorough study of the three existing types of available automated equipment, including a holographic system, one that was microfilm-based, and two minutia-based systems. The report was submitted to the Crime Commission in January 1977.

The study team concluded that minutia-based equipment was the best suited to meet the requirements. Of the two available systems, equipment produced by Rockwell International's Identification System organization in Anaheim, California, was judged to be the superior system based on tests conducted by the study team.

The Rockwell equipment is able to read, process, and store computerized minutiae data from more than 500 new 10-finger cards per day, and will be capable of accommodating card-submittal loads in Minnesota for the foreseeable future. In addition, it can match latents against fingerprints on file at a rate of up to 250 prints per second.

At this matching speed, and provided adequate descriptors, the entire Minneapolis/St. Paul 10-finger card file of more than 3 million individual prints could be searched in a matter of minutes.*Or, in other words, the system can automatically make 150,000 comparisons in the time it takes a fingerprint technician to do one manual match!

The joint study group proposed the purchase of the equipment based on three distinct and cost-effective justifications:

- Cost savings attributable to the increased efficiency of the system in performing latent print identification tasks
- Cost savings in terms of the potential for immediate resolution of critical or extraordinary cases
- Overall improvement of case clearance rates at minimum or no increase in personnel, with a potential for further increases in clearance rate through additions to the evidence technician work force

State Block Grant funding from the Law Enforcement Assistance Administration was combined with monies from the two cities to obtain the equipment. The equipment will be combined in a regional "network" — MAFIN (Minnesota Automatic Fingerprint Identification Network) — that will serve both St. Paul and Minneapolis, along with the State Bureau of Criminal Apprehension. Additional sites throughout Minnesota can be added later.

*This assumes that the entire file is searched, i.e., no selectivity data are supplied to de-limit the quantity of prints to be searched. Usually, some data are known that will limit the search and thus decrease the search time. The latent print pattern may be known. The finger number of a range of finger numbers may be evident. Personal descriptors of various sorts may be reported. Of course, the crime and its location are certainly known. These factors are used by the system to drastically reduce the time the equipment uses to search for matchable candidates.

COST-EFFECTIVENESS ANALYSIS

An important part of the study that led to selection of the Rockwell minutia-based equipment for MAFIN was a detailed cost-effectiveness analysis. Conclusions from the analysis are summarized below.

Assuming that the automated system will function at the absolute minimum accuracy demonstrated by projecting actual test results over very large match files, we expect that, using a decision rule designed to minimize manual searches, of 5000 latents submitted per year, 315 of these will be identified by the system. Since St. Paul expects to receive approximately 5000 usable latent prints annually, we can use this figure to compare the costs of an automated system with costs of the manual search method employed in St. Paul.

It is assumed that the cost per latent of collecting latent evidence and submitting it to the Crime Laboratory does not change. It is further assumed that Investigation Division and Crime Lab expenditures for personnel do not change.

Manual System

Investigation Division costs involving latent evidence	$ 21,776
Crime Lab costs for processing latent fingerprint evidence	99,144
Patrol Division costs for collecting latent fingerprint evidence	31,316
TOTAL	$152,236

Current annual rate of hits with manual system = 301. Therefore, cost per hit using the manual system = $506.

Automated System

Investigation Division costs involving latent evidence	$ 0
Crime Lab costs (at 3370 hours per 315 hits)	31,336
Patrol Division costs for collecting latent fingerprint evidence	31,316
Amortized cost of system (assuming St. Paul pays one-half the entire costs, including maintenance, and an amortization period of 10 years)	55,500
TOTAL	$118,152

Expected rate of hits in the automated system (5000 latents x 60% recidivism rate x 70% searchable latents x 15% expected hits) = 315. Therefore, cost per hit using the automated system = $375.

IT IS PARTICULARLY IMPORTANT TO REMEMBER ... Actually, the above figures are "pessimistic," in that they do not reflect the to-be-expected increase in hits from the design improvements made to the Rockwell system subsequent to the testing done for this analysis. Overall cost-effectiveness may be twice as great as shown here.

WHAT IS MAFIN — AND HOW DOES IT WORK?

The Minnesota Automated Fingerprint Identification Network (MAFIN) presently includes "hardware" in three separate locations interconnected by voice-frequency, commercial telephone lines.

The three separate installations include the "Central" facility at St. Paul Police Department headquarters ... a remote terminal at Minneapolis Police Department headquarters ... and a remote terminal at the BCA facility in St. Paul.

The main computerized fingerprint files and automated file-searching and print-matching equipment are located in the Central facility in St. Paul. Minneapolis and St. Paul have operator console-type "Read/Edit Terminals," by means of which an operator is able to process both rolled and latent prints, to add prints to or purge prints from the files, and to instruct the automated system to conduct search-and-match processing for both latent and rolled prints. All sites contain printout equipment to provide hard-copy lists of respondents resulting from the automated search-and-match processing.

Both St. Paul and Minneapolis have the capability for conducting independent latent searches and for autonomous file control. Access to the extensive Central files is immediately available, by dedicated telephone line.

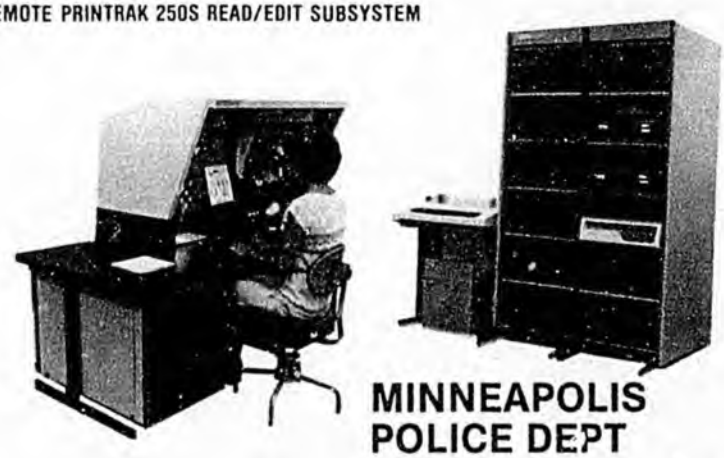
The BCA facility is equipped with a Latent Operator's Console for editing and searching latent prints only. To add new cards to the files, the BCA facility uses the services of either the St. Paul or the Minneapolis facility. Like the Minneapolis facility, the BCA terminal is telephone-connected to Central for search-and-match.

All three MAFIN facilities communicate instantly and economically by telephone line. Multiplexing permits signals from all three stations to be present on the lines simultaneously, so that operations of one station do not interrupt or interfere with those of any other.

MAFIN Features:

- *Economical interconnection of all network facilities by dedicated commercial telephone lines. Modems automatically detect any transmission errors.*
- *Multiplexing for simultaneous intercommunications among all facilities as necessary.*
- *Immediate access by all remote terminals to extensive Central files for rapid search and match processing of both rolled and latent prints.*

REMOTE PRINTRAK 250S READ/EDIT SUBSYSTEM



MINNEAPOLIS
POLICE DEPT

"CENTRAL" PRINTRAK 250S SYSTEM

PRINT
PROCESSOR

SEARCH PROCESSOR

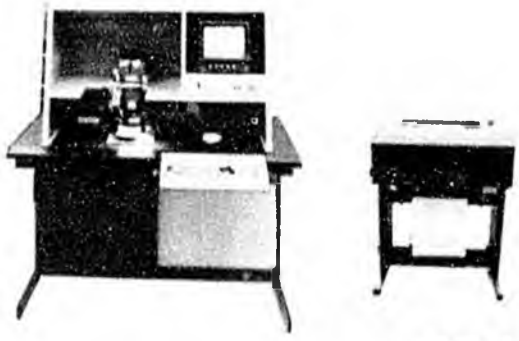
READ/EDIT CONSOLE

PRINTER

DATA
STORAGE

ST. PAUL POLICE DEPT.

REMOTE LATENT SUBSYSTEM



BCA

OVERALL DESCRIPTION OF MAFIN HARDWARE/SOFTWARE

Hardware

MAFIN includes 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 in St. Paul, and another at the Minneapolis Police Department facility is connected to the Search-and-Match Subsystem in St. Paul 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.

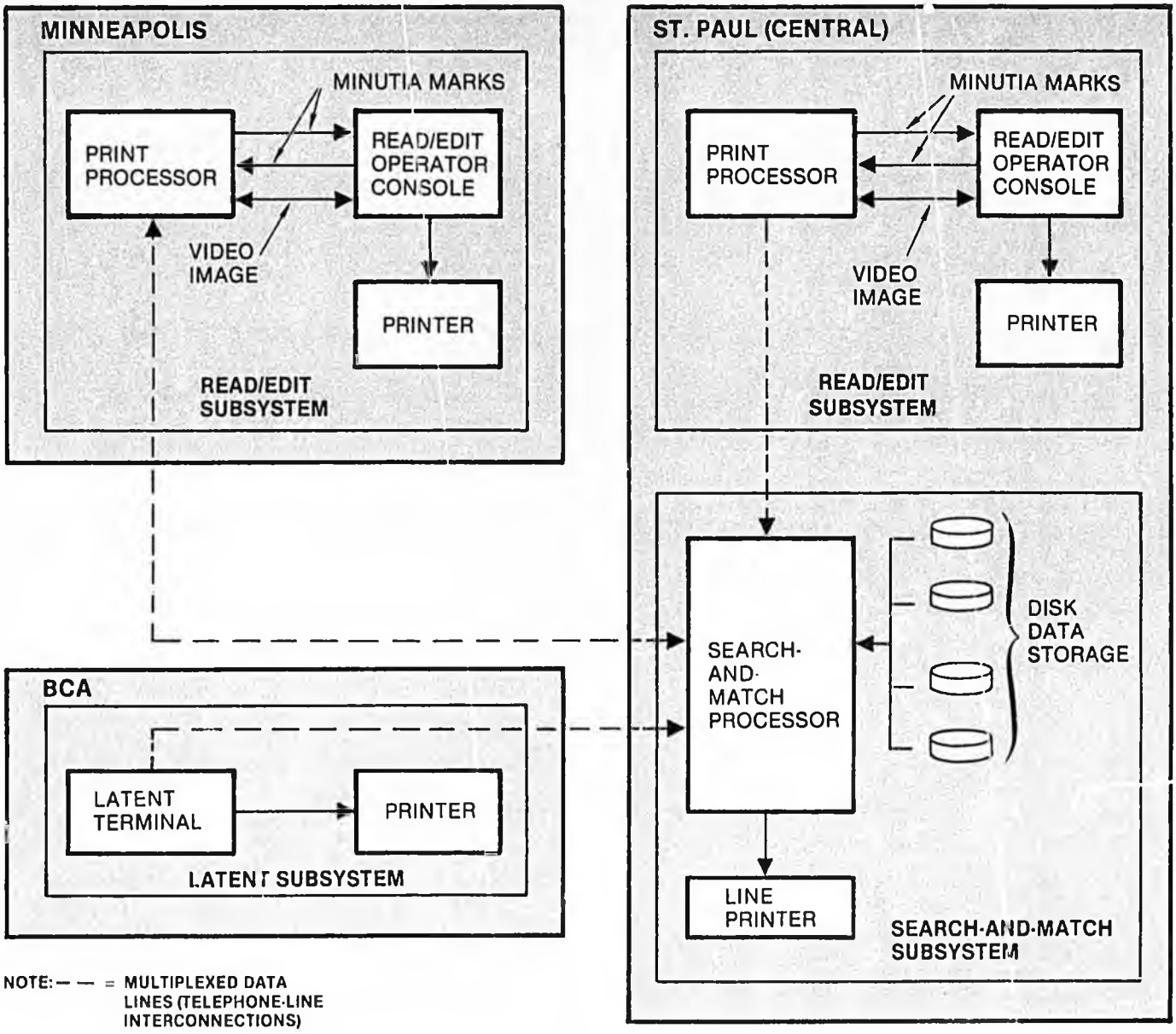
- **Latent Subsystem,** which includes a Latent Terminal and a Printer, gives the user automated assistance in entering descriptor data via keyboard, in encoding locations of minutiae in latent fingerprints, and in receiving results of file searches. A Latent Subsystem is located at the BCA facility in St. Paul and is connected to the Central Search-and-Match Subsystem via a voice-frequency telephone line.

- **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.

Software

Automated operation of MAFIN is achieved via its software, that contains all the necessary programs for controlling and coordinating the system's processes. The software is human-operator-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 opposite), provide an orderly sequential control of all data flows between the hardware equipments, including those to the operator interfaces.



Built From Only a Few Basic Types of Hardware Modules, MAFIN is Easy and Economical to Update or Expand

As can be seen in the above block diagram, all of the subsystems in MAFIN are obtained by combining in various ways a few basic types of hardware "modules." These are: the Print Processor, the Read/Edit Operator Console, the Latent Terminal, the Search-and-Match Processor, the Printer, Line Printer, and Data Storage. All of these modules are designed and assembled by the same firm — Rockwell International — except the Printer, Line Printer, and Data Storage, which were selected for their compatibility with the rest of the system. All modules are capable of being combined to form a broad variety of system configurations. This system "modularity" lends itself to easily and economically effected system growth and functional expansion. Minneapolis and St. Paul can thus each expand their basic system by adding two more Read/Edit Operator Consoles without any modification of existing hardware or software. In the same way, BCA can add Latent Terminals up to the ability of the multiplex lines to carry their signals for interface with the Search-and-Match Subsystem at the St. Paul Police Department. Overall capacity of the main files in St. Paul can be readily expanded, simply by adding more disk drives for Data Storage.

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 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 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, e.g., minutiae patterns.

Data Storage

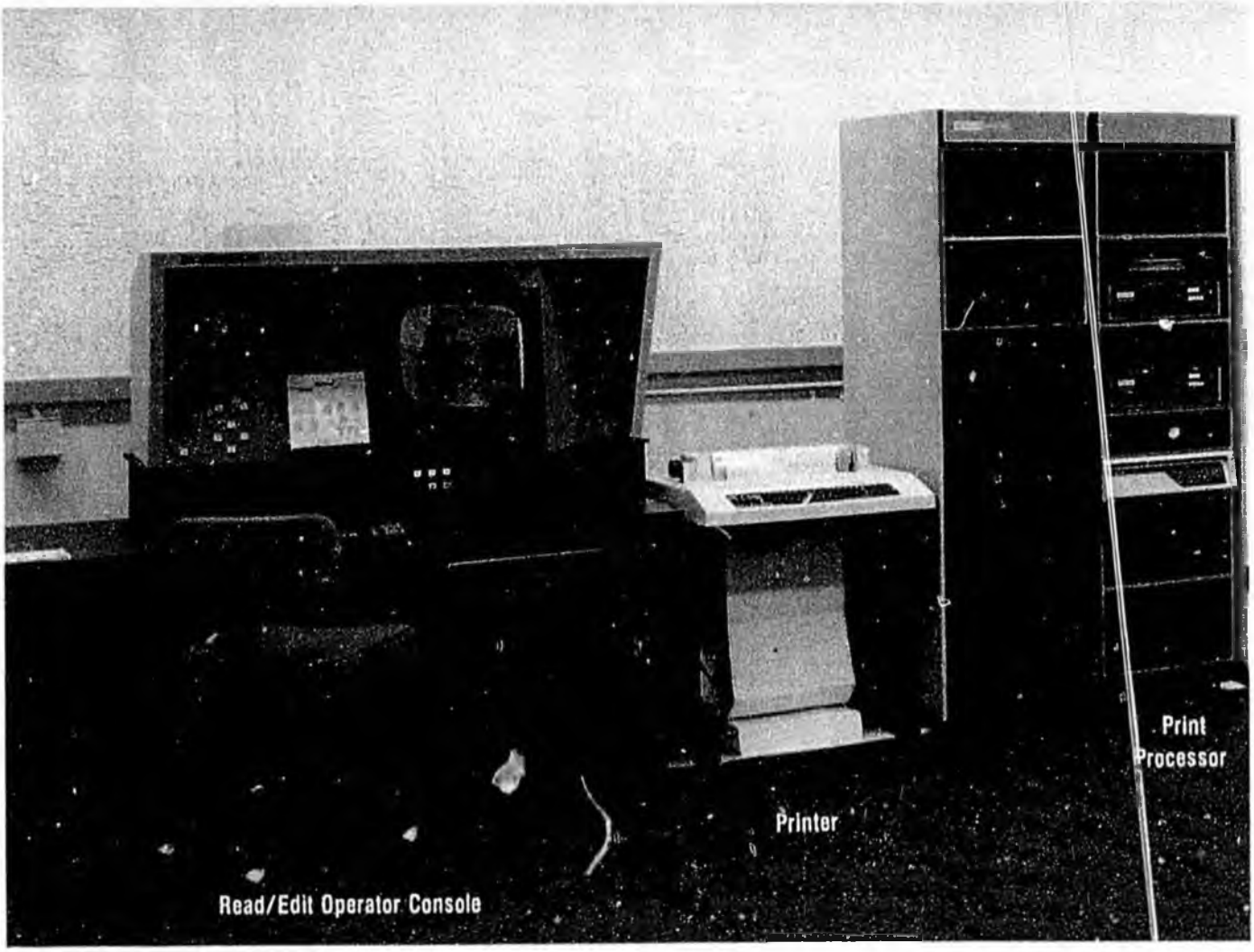
Data Storage contains the records of all data that have previously been encoded. In addition to the encoded minutiae for each fingerprint on file, these records include personal descriptors (e.g., suspect's sex, date of birth, etc), identification numbers and classification data for each print.

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.

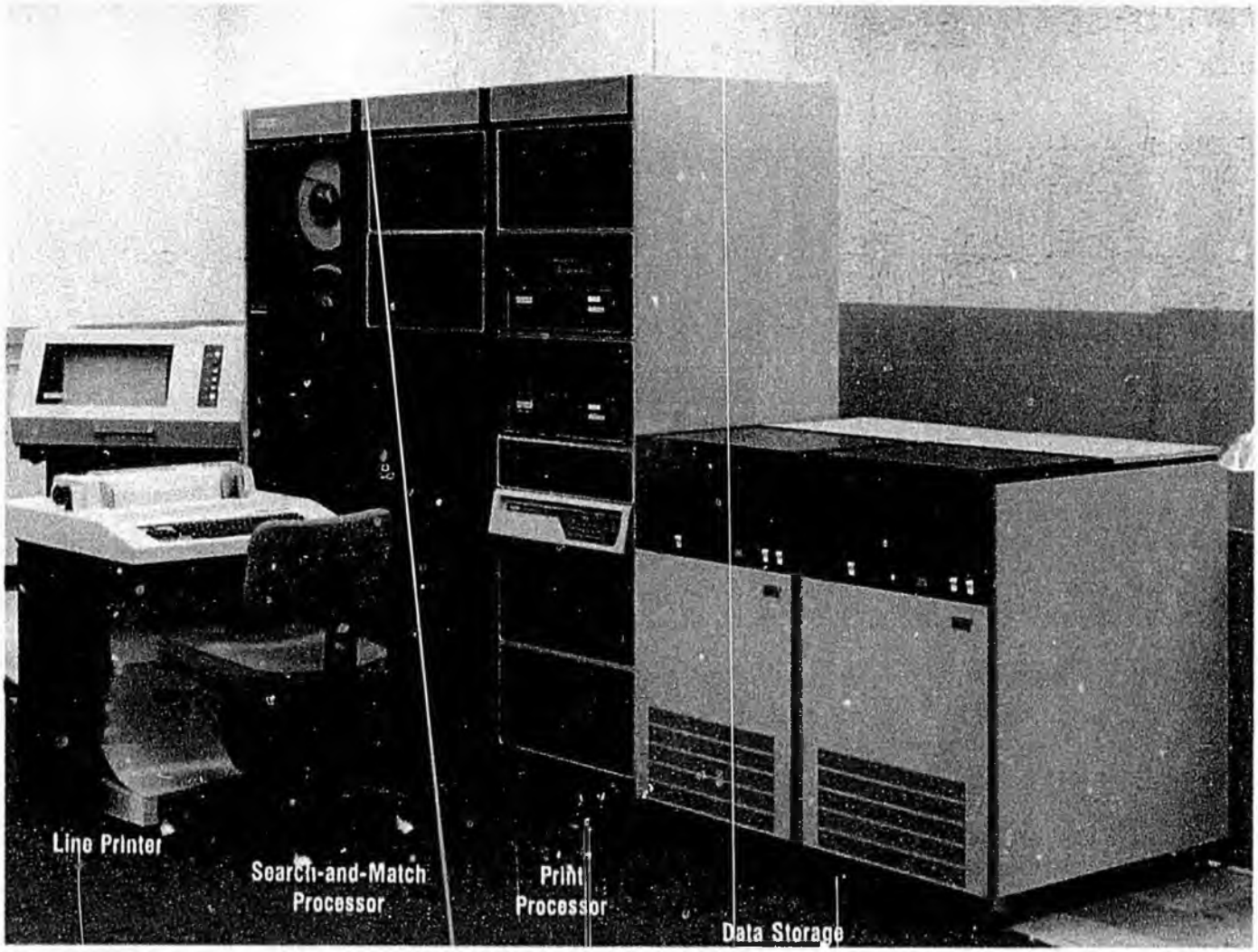
A particularly notable MAFIN feature is the fact that unidentified latents can be stored on disks on-line, and subsequently can be compared against all new 10-fingerprint cards entered into the system. *Thus, it is only a matter of time until hits can be obtained for almost all crime "repeaters."*

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.



READ/EDIT SUBSYSTEM

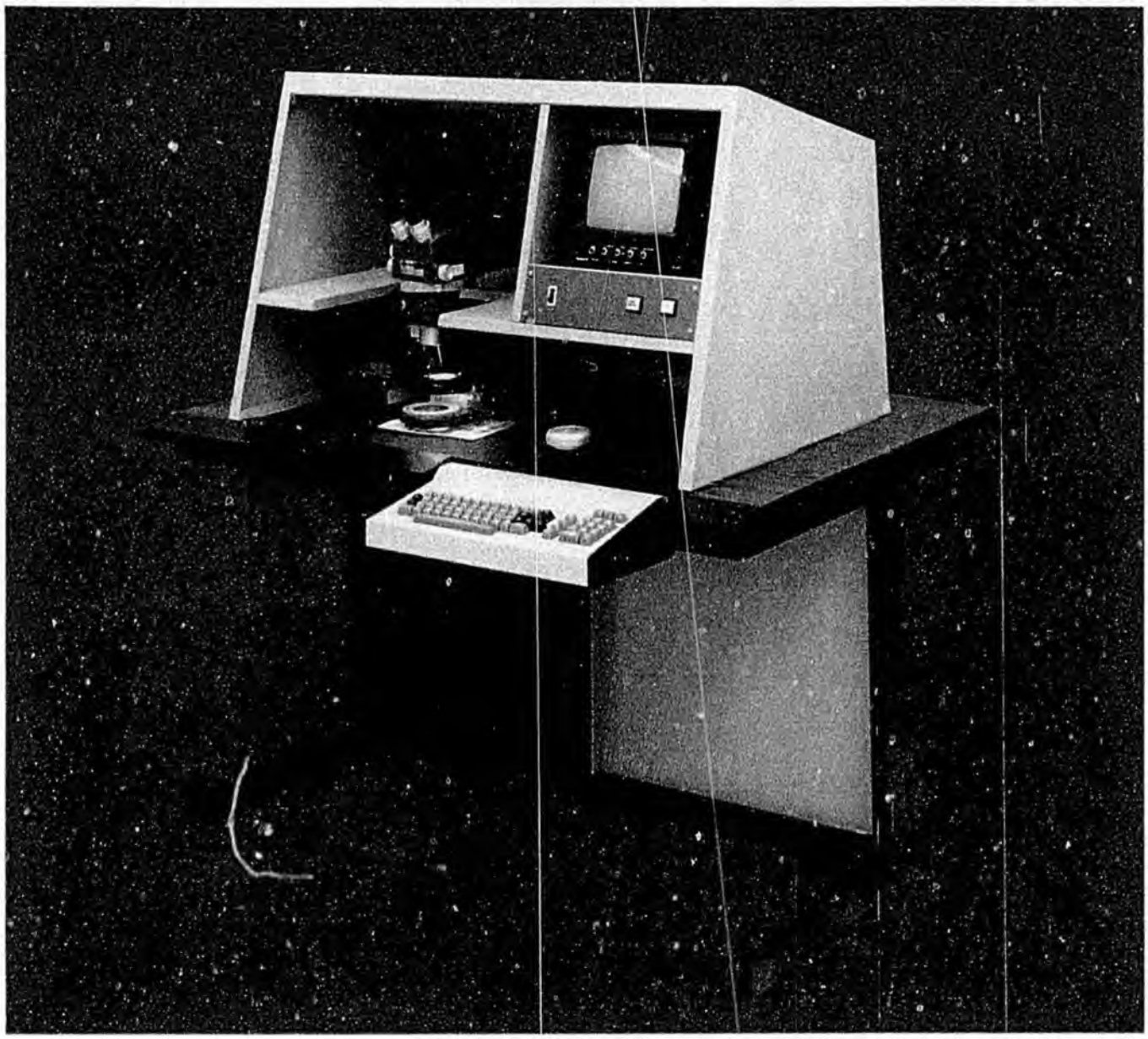


SEARCH-AND-MATCH SUBSYSTEM

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 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 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 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

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 local on. 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, sta. messages, and search results.

FOUR OPERATIONAL MODES GIVE MAFIN COMPLETE FUNCTIONAL CAPABILITY

The remote network stations in St. Paul and Minneapolis are designed to fulfill the specific requirements of those two facilities — the BCA station to encode, enter descriptors, and initiate search-and-match for latents only ... and the Minneapolis facility to carry out all of these processes automatically for both latents and 10-print sets of rolled prints.

In the Central facility, as in Minneapolis, complete functional capability is provided by four modes of operation — 10-print search, latent print search, file conversion, and file update-and-purge. Each mode is operator-selectable to process fingerprint cards or latent prints in any order desired. The four modes make it possible not only for the system to perform rapid, automatic search-and-match processing for print identification ... but also to build its own files ... and to maintain, update, and clear the files of duplications and poor-quality prints thereafter.

10-Print Search Mode

The 10-print search mode is used to 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" at the scene of a crime and, then, using those minutiae together with any known "descriptors" (suspect's sex, race, modus operandi, type of crime, 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 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 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 or add to the initial fingerprint file.

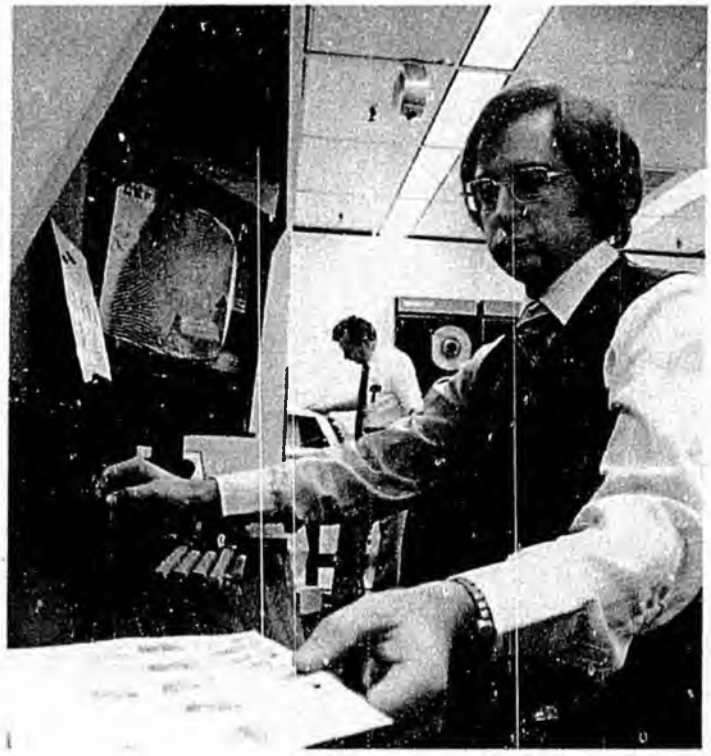
File Update-and-Purge Mode

In the file update-and-purge mode, maintenance activities are performed on the fingerprint file. Poorest-quality duplicate prints of any agency 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 if it has been inadvertently destroyed.

OPERATION OF MAFIN IS STRAIGHTFORWARD ... EASY ... AND FAST

IN THE 10-PRINT SEARCH MODE the operator uses the Read/Edit Operator Console keyboard to enter the identification 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 and NCIC (National Criminal Information Center) classification.
- The operator positions the print under a camera included in the system, the video image of the print is scanned, and minutiae data 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 editing the print. At that time, the minutiae are manually encoded at the operator's option.
- When the entire fingerprint card has been entered, the system conducts an automatic search of the file for similar fingerprint sets. The operator is given a listing of the ID number(s) of the matching card(s) 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 fingerprint classifications, and then positions the latent print under the 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 matched against (i.e., compared with) the latent print. Prior to start of search, the operator may establish search parameters, so that he may be given the entire list of respondents, or he may elect to limit the list by selection of a "decision rule."

MAFIN Provides:

- *Ability to edit minutiae after fingerprint reading and encoding*
- *Encoding time of only 1/2 minute per card*
- *Automatic real-time display of encoded minutiae*
- *Operator-controlled cursor for minutiae designation*
- *Ability to incorporate programmable decision rules*
- *Enhancement of latent and inked fingerprints*

MAFIN'S ABILITY TO ENHANCE POOR-QUALITY LATENTS RAISES THE PROBABILITY OF "HITS"

An especially important feature of MAFIN's Print Processor is its ability to enhance poor-quality prints. By means of this virtually dramatic ability to enhance, the Print Processor gives to otherwise unidentifiable latents and badly inked rolled prints a degree of detail and contrast that permits their rapid and positive matching with prints on file.

In order for minutiae to be located and used in identifying fingerprints, the Print Processor must transform the tremendous range of quality in fingerprint records and the many shades of inking present in prints to binary equivalents for digital processing. It accomplishes this by examining, point-by-point, each print with which it is presented and determining where ridges exist (black) and where valleys occur (white). It "looks" at each point and its surrounding area within the print, examines the average value of grey levels in the area, and performs a weighted averaging calculation to decide whether the grey level of that point should be identified as black or white. During this operation information is available to determine quality of the fingerprint image at each point, and low-quality portions of the print are edited from the final data output. The end product of the process is a print with recognizable ridges and valleys, permitting minutiae to be identified and a match to be made with a known print.

POLAROID PHOTO OF
LATENT PRINT NO. 40

ENHANCED DISPLAY IMAGE OF
LATENT PRINT NO. 40

A Real-Life Example

The colored portion of the rolled print (below) on a St. Paul, Minn., Police Department 10-print file card corresponds with the latent print shown at bottom left, page 22. The prints are those of Sgt. Joseph K. Corcoran of the st. Paul Police Dept. and were made by him expressly for use in rigorous latent-matching tests conducted at Rockwell International's Anaheim, Calif., plant to demonstrate the accuracy of the Rockwell automated, minutia-based fingerprint ID search-and-match equipment. The test results record sheets are shown at right; near the bottom of the "next-to-last" sheet can be seen the entry for Test Latent Print No. 40. The No. 40 print is the one pictured on page 22. As can be seen on the test sheet, the highest match-score obtained by the Rockwell system for the file prints selected for comparison with latent No. 40 was 881. The next-highest match-score for print No. 40 was 494, separated from the 881 score by 387 points ... while the next two highest scores— 487 and 366 — were even further separated from the top score. This wide separation is highly indicative of a "hit." That a "hit" had most certainly been achieved can be readily observed by visually comparing the rolled print on the 10-print file card with the Polaroid photo and enhanced display image of the latent, as pictured on page 22. The occurrence of this and many other hits during the latent matching tests offered convincing proof of the Rockwell system's accuracy in identifying latent fingerprints.

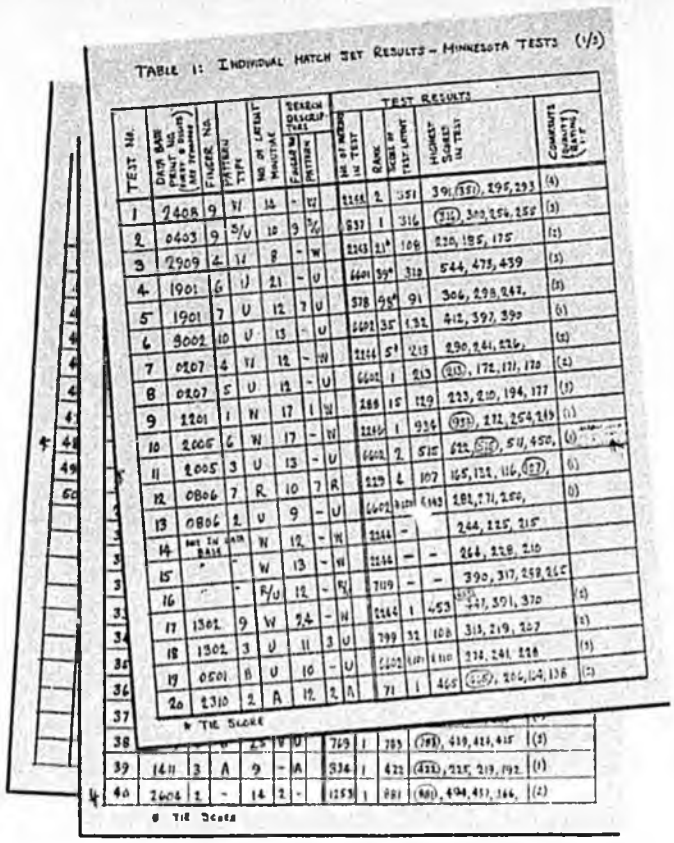


TABLE 1: INDIVIDUAL MATCH SET RESULTS – MINNESOTA TESTS (1/3)

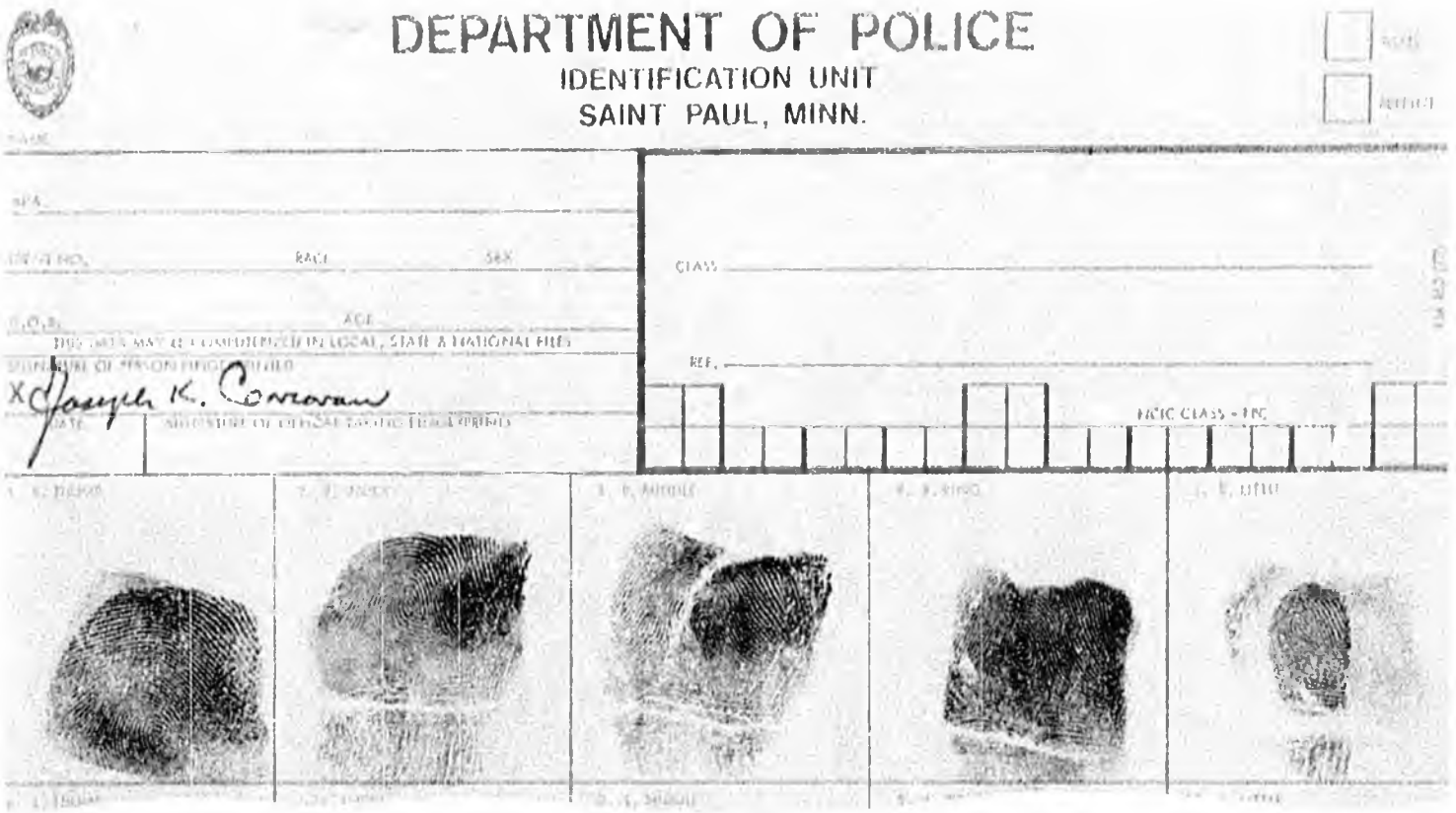
TEST NO.	DATA BASE PRINT NO. (LAST 4 DIGITS)	FINGER NO.	PATTERN TYPE	NO. OF LATENT MINUTIAE	SEARCH DESCRIP. TYPE: FINGER NO.	SEARCH DESCRIP. TYPE: PATTERN	TEST RESULTS: NO. OF HITS IN TEST	TEST RESULTS: RANK OF HIT IN TEST	TEST RESULTS: HIGHEST SCORES IN TEST	COMMENTS (SCORES) (RANK) ETC.
1	2408	9	W	16	-	W	2166	2	351	391, (881), 295, 293 (4)
2	0403	9	S/U	10	9	S/U	837	1	316	(881) 393, 254, 252 (3)
3	2909	6	W	8	-	W	2263	21*	109	220, 185, 175 (2)
4	1901	6	U	21	-	U	6601	39*	319	544, 475, 459 (3)
5	1901	7	U	12	7	U	578	9*	91	306, 298, 242, (3)
6	3002	10	U	13	-	U	6601	35*	132	412, 392, 390 (6)
7	0207	4	W	12	-	W	2264	5*	213	290, 241, 226, (2)
8	0207	5	U	12	-	U	6601	1	213	(213), 172, 171, 170 (4)
9	2201	1	W	17	1	W	288	15	129	223, 210, 194, 177 (3)
10	2005	6	W	17	-	W	2265	1	936	(936), 272, 264, 249 (1)
11	2005	3	U	13	-	U	6602	2	515	622, (515), 511, 450, (6)
12	0806	7	R	10	7	R	229	4	107	165, 122, 116, (65), (5)
13	0806	2	U	9	-	U	6602	NONE	6493	281, 271, 260, (0)
14	[illegible]	-	W	12	-	W	2266	–	–	244, 225, 215
15	"	-	W	13	-	W	2266	–	–	264, 228, 210
16	"	-	F/U	12	-	F/U	2119	–	–	390, 317, 259, 245
17	1302	9	W	24	-	W	2266	1	453	(453), 371, 301, 270 (5)
18	1302	3	U	11	3	U	799	32	108	313, 219, 207 (1)
19	0501	8	U	10	-	U	6602	NONE	4196	238, 241, 228 (1)
20	2310	2	A	12	2	A	71	1	465	(465), 206, 104, 136 (2)
37							769	1	785	(785), 419, 414, 415 (3)
39	1411	3	A	9	-	A	536	1	423	(423), 225, 219, 192 (0)
40	2606	2	-	14	2	-	1253	1	881	(881), 494, 487, 366, (2)

* THE SCORE

TEST SHEET SHOWING MATCH RESULTS FOR LATENT PRINT NO. 40

***NOTE EXCELLENT SEPARATION** between the 881 score of the correct match and the next-highest-probability match scores. Such wide separation is indicative of a "hit."*

10-PRINT FILE CARD
(COLORED PORTION OF ROLLED PRINT CORRESPONDS TO LATENT NO. 40)


DEPARTMENT OF POLICE
IDENTIFICATION UNIT
SAINT PAUL, MINN.

FOR THE FUTURE

The present Minnesota Automated Fingerprint Identification Network is intended primarily to fill the needs of St. Paul and Minneapolis Police Departments, working in close cooperation with the Minnesota Bureau of Criminal Apprehension within the St. Paul-Minneapolis jurisdictions.

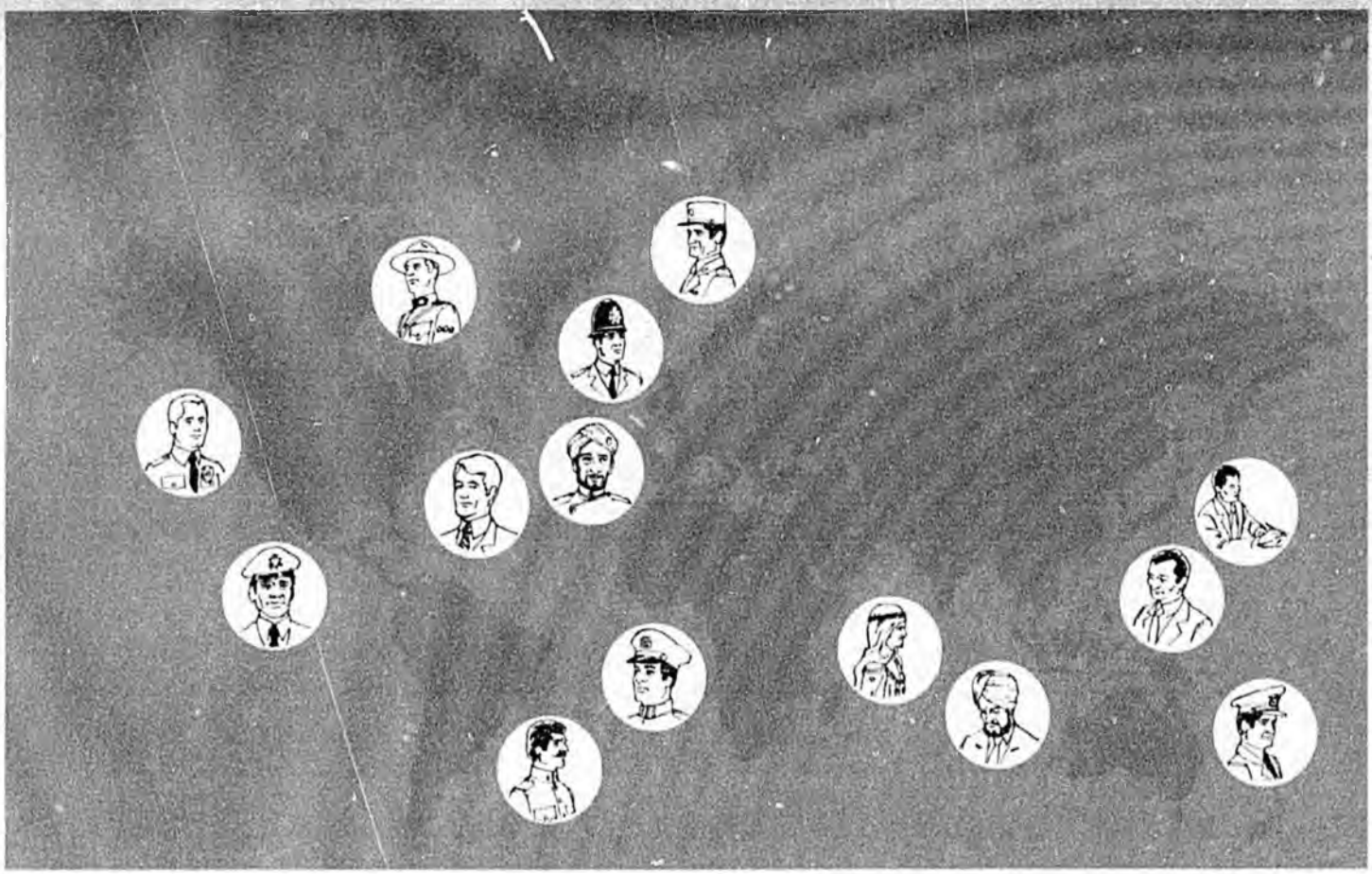
The dynamic, automated system is planned and designed, however, with an eye to the needs of the future — for *easy and economical updating* to keep pace with technological advances ... for *increased fingerprint data storage capacity* ... for *increased functional capability and versatility* ... and for *network expansion* to cover a larger geographical area.

System Updating Latent prints are being added to the St. Paul-Minneapolis files at a rate of 10%, and to the files of other Minnesota jurisdictions at a rate averaging around 8%, annually. As the files grow, so must the overall data storage capability. The only cost involved in expanding fingerprint data files beyond the original off-line capacity of the automated system is the relatively low cost of additional disk packs. Expansion of on-line storage is readily achieved through minor hardware/software changes.

Functional Expansion Every opportunity should be taken to exploit the usefulness of an important investment such as the MAFIN. The network's functions can easily be made capable of performing not only latent searches but also card-to-card ID searches. Also, card input searches can be expanded beyond the present criminal application — as, for example, to verify ID's and determine the use of aliases for civil applications. Most importantly, the system can be given dramatic versatility by the addition of new modules, both similar and different in function and capacity from those of which the system is originally composed.

Network Expansion *As MAFIN proves its multiple benefits of improved speed, slashed costs, and dramatically heightened clearance rates, it will doubtlessly become desirable to extend system "network" coverage to other cities and jurisdictions over the state of Minnesota.*

Terminals can be added as needed in various law-enforcement installations throughout the state. Up to three Read/Edit Subsystem operator consoles can be handled by each Print Processor in the system. Additional Latent Terminals can be absorbed, up to the capacity of the multiplexed telephone lines to carry their signals, with each terminal "using up" one of the available MUX lines. The addition of neither Read/Edit nor Latent Terminal subsystems within these limits requires any changes to existing system hardware and software. For addition of terminals beyond these limits, additional Search-and-Match Subsystem, Print Processor, Line Printer, and Data Storage hardware/software can be integrated into the system as required.



AND SOONER THAN ONE THINKS ...

Sooner than one may imagine, today's metropolitan and regional automated fingerprint systems may expand into national ... and, after that, even international ... identification networks.

Already in operation, in development, or in negotiation are minutia-based, automated systems for law-enforcement agencies in Minnesota ... Florida ... California ... New York ... the District of Columbia ... Canada ... and South America. The number of the users of the systems is constantly increasing.

The common minutia-based approach brings compatibility among the systems of all the various cities, states, regions, and nations — both in fingerprint records format and in fingerprint data transmission.

In the future, as the number of cities and nations employing minutia-based systems rapidly increases, globe-circling satellites will permit instantaneous radio access by any agency in the world to the central national files of this country ... or to the autonomous files of any city, region, state, or nation.

Thanks to automated, minutia-based fingerprint systems ... tied into an almost instantly-responsive, universal format, global network ... the day is rapidly approaching when no criminal in the world will be able to count on security from apprehension due to an unidentifiable latent fingerprint.

THE FARSIGHTED MEN WHO MADE THE DECISION FOR ...
AND WHO ARE HELPING ENSURE OPTIMUM USE OF ...
THE MINNESOTA AUTOMATED FINGERPRINT IDENTIFICATION NETWORK (MAFIN)

RICHARD H. ROWAN is Chief of Police, St. Paul Police Department, St. Paul, Minnesota. A 29-year veteran in the Department, he was appointed Chief in 1970 after finishing first in the selection process. He previously held ranks of Detective, Deputy Chief in charge of the Detective Division, and Deputy Chief of the Patrol Division. He is a graduate of the FBI National Academy (83rd Session), Northwestern University Institute, and the Southern Police Institute. He was graduated from the National Executive Institute in July 1977.

STEPHEN COLEMAN is a Senior Research Analyst on the staff of the Minnesota Crime Control Planning Board. He was responsible for performance analyses during evaluation and selection of MAFIN. Dr. Coleman received a BA in Mathematics in June 1963, and a PhD in Political Science in June 1972 — both from the University of Minnesota. He has authored many published books and articles related to his professional disciplines. In May 1970 he was co-recipient of the Best Paper Award of the Midwest Political Science Association. In 1971-1972 he was awarded a National Science Foundation Graduate Traineeship. Dr. Coleman was formerly employed for several years as a Mathematician and Systems Analyst.

GERALD A. HANGGI, SR., joined the St. Paul Police Department on July 6, 1948. He was promoted to Detective in August 1957, and to Lieutenant on January 11, 1973. Presently, he is the Director of the St. Paul Police Department Crime Laboratory, as well as the St. Paul Project Director for MAFIN. He is a recognized fingerprint expert, and is a member of the International Association for Identification, and the Minnesota Division of the International Association for Identification.

JOSEPH K. CORCORAN joined the St. Paul Police Department on March 2, 1964. He was promoted to Sergeant on October 3, 1970. Presently, he is assigned to the St. Paul Police Department Laboratory as a Latent Fingerprint Examiner. He is a recognized fingerprint expert, and is a member of the International Association for Identification, and the Minnesota Division of the International Association for Identification.

CARL E. JOHNSON is Chief of the Minneapolis Police Department, Minneapolis, Minnesota. A member of the Department since 1953, he brings to his position as Chief a well-rounded background which includes service in the Department's Communications, Burglary, Homicide-Robbery-Sex, Forgery-Theft-Auto, and Investigation Divisions. His 15 years of practical police experience are backed by extensive training in law enforcement, police management and supervision, police and community relations, traffic, and investigation, through numerous special courses and seminars conducted by Minnesota's Bureau of Criminal Apprehension, Northwestern University, St. Thomas College, University of Oklahoma, Michigan State University, University of Louisville (Ky.), and the University of Wisconsin.

TIMOTHY H. RUGGLES was the Police Team Leader/Planner and member of the Research Committee for the Minnesota Governor's Commission on Crime Prevention and Control. As Grants Coordinator/Consultant for the Minneapolis Police Department, he now serves as Chairman of the Department's MAFIN Coordinating Committee, and is Project director for the Minneapolis Comprehensive Career Criminal Identification Project. Mr. Ruggles holds the degrees of BA in Criminal Justice Studies from the University of Minnesota; MS in Psychology from the University of Wisconsin; and JD in Law from the William Mitchell College of Law. He was a member of the St. Paul Police Department for 5 years.

RICHARD P. CICH has been a member of the Minneapolis Police Department for 16 years, including five years in the Uniform Patrol Division and 11 years in the Identification Division. He was promoted to Lieutenant in February 1971. His practical police experience is backed by formal education and specialized training courses related to evidence, fingerprint science, and law enforcement, presented by the University of Minnesota, Long Beach (Calif.) State College, Minnesota State Crime Bureau, and Chicago (Ill.) Police Department. Lt. Cich is a recognized fingerprint expert and has served as a member of the Advisory Panel on Evidence Technician Training for the Minnesota Governor's Commission on Crime Prevention and Control. He is the Minneapolis Police Department's Project Director for MAFIN.

USERS HANDBOOK

Computerized Fingerprint
Identification Systems
Users Group

CONTENTS

COMPUTERIZED FINGERPRINT IDENTIFICATION SYSTEMS USERS GROUP

The Computerized Fingerprint Systems Identification Users Group was established to promote the free exchange of information and ideas pertaining to the use of computerized fingerprint identification systems.

Members of the Users Group represent companies or agencies who are currently utilizing Rockwell fingerprint identification systems, or who are under contract for such installation.

Meetings are held at least annually in order to share information and experiences and to identify potential new ideas.

USERS HANDBOOK

This handbook is intended to provide Users Group members and interested parties with:

- A guide to systems currently in operation, system configurations, principal contacts, and operational data.
- Vendor information relative to individuals to contact, corporate responsibility, and other vendor-related facts.

The handbook is designed to be updated as needed. Individual users are to feel free to contact members of the Group, its officers, or Rockwell International, for additional information.

User Group Chairperson
Jack Scheidegger
Program Manager, Automated Latent Print System
California Department of Justice
3301 "C" Street
P.O. Box 13337
Sacramento, California 95813
(916) 323-7140

Users Group Vice-Chairperson
Peggy James
Systems Manager, Automated Fingerprint System
Houston Police Department
61 Riesner - Rm 430C
Houston, Texas 77002
(713) 222-5505

CALIFORNIA DEPARTMENT OF JUSTICE

PROGRAM PRINCIPALS

Kirby Vickery

Kirby Vickery, Program Manager
California Department of Justice
Automated Latent Print System (ALPS)
P. O. Box 13437
Sacramento, California 95813
(916) 323-3901

Phil Soto, Program Supervisor
California Department of Justice
Automated Latent Print System (ALPS)
P. O. Box 13437
Sacramento, California 95813
(916) 323-3901

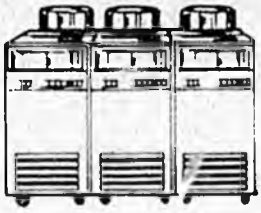
PROGRAM STAFF

Left to right, front row: **Bill Finlay, Phil Soto, Marty Collins, Mary Stokely, Alvin Iwamura;** ***back row,*** **Donna Mambretti, Tamie Burkart, Kirby Vickery, Nancy Collins.**

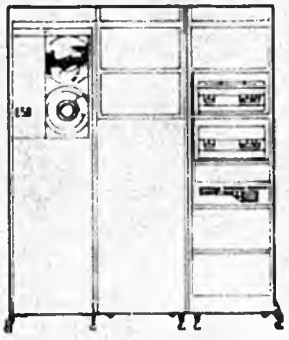
ORGANIZATIONAL DESCRIPTION

The Automated Latent Print System for California's Department of Justice is an organizational component of the Division of Law Enforcement, Bureau of Forensic Services (BFS). Included in BFS are services such as polygraph, questioned document examination, forensic photography, and a statewide criminalistic laboratory system.

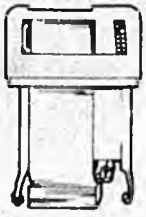
CALIFORNIA DEPARTMENT OF JUSTICE



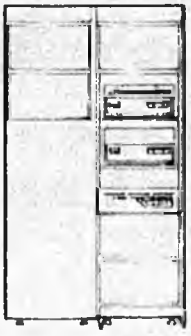
DISK DRIVES



SEARCH PROCESSOR

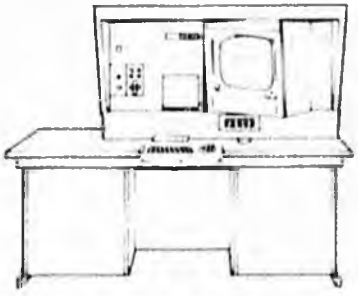


LINE PRINTER



PRINT PROCESSOR

TELEPRINTER



READ EDIT TERMINAL

TELEPRINTER

LATENT TERMMINAL (MODEL 10) WITH PRINTER

CONFIGURATION:

- Autoclassification
- Two matchers
- R-40 matcher

DATA BASE SIZE:

Approximately 122,000.

MONTHLY TEN-PRINT SEARCHES

None; D.O.J. does not utilize the 10-print mode of the system.

MONTHLY LATENT SEARCHES

Approximately 364.

HOUSTON POLICE DEPARTMENT

PROGRAM PRINCIPALS

Randy Sullivan
Asst. Administrator
Identification Division
61 Riesner - Rm 430C
Houston, TX 77002
(713) 222-3648

Peggy James
Systems Manager
Automated Fingerprint System
61 Riesner - Rm 430C
Houston, TX 77002
(713) 222-5505

R. K. Harsten
Police Officer - Grant Section
Planning and Research Division
33 Artesian
Houston, TX 77002
(713) 222-5331

PROGRAM STAFF

Left to right: Robert Ballard, Latent Print Examiner; Harry Hope, Automated Fingerprint System Supervisor; Peggy James, Automated Fingerprint System Manager; Ralph Saldivar, Automated Fingerprint System Supervisor.

SYSTEM OPERATION

The Houston, Texas, Police Department has two major operational modes — 10-print and latent.

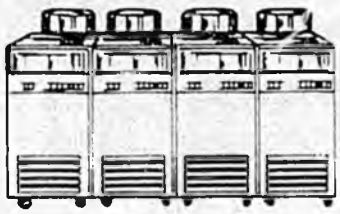
10-Print Operation

The Houston PD reads, searches, and matches 10-print cards through the system as prisoners are processed through the Identification Division to determine prior arrests. This process is accomplished on three working shifts, 24 hours a day, 365 days a year. The Department simultaneously searches a 10-print card against the 10-print file and the unsolved latent file.

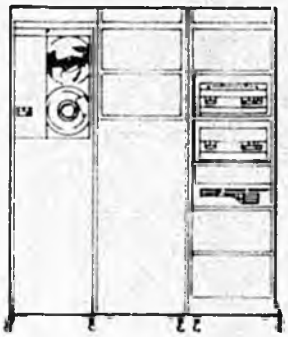
Latent Print Operation

Crime scene prints are encoded and search-matched through the system on both the Latent Terminal and the Read/Edit Terminal, using different operators for each entry. The procedure allows for differences in operator's interpretations of the latent prints. All latents are searched against the 10-print file, and many of them are also searched against the unsolved latent file.

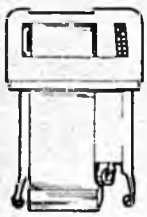
HOUSTON POLICE DEPARTMENT



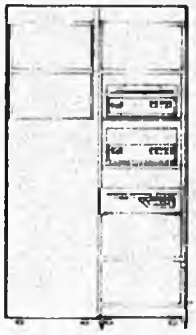
DISK DRIVES



SEARCH PROCESSOR

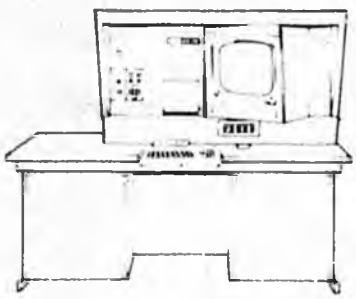


LINE PRINTER



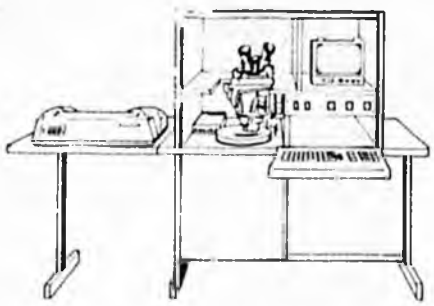
PRINT PROCESSOR

TELEPRINTER



READ EDIT TERMINAL

TELEPRINTER



LATENT TERMINAL (MODEL 20) WITH PRINTER

CONFIGURATION:

- Autoclassification
- Two matchers

SYSTEM WORK FLOW STATISTICS FOR 1980			
10-Print		**Latent Print**	
File Additions	26,623	File Additions	846
File Searches	16,775	Latent Print Hits	52
File Changes	4,143	Latent Print Dispositions	52
File Deletions	2,967	**Total Data Base Size**	
10-Print Hits	871	10-Print	330,053
10-Print Dispositions	833	Latent	1,026

MINNESOTA AUTOMATED FINGERPRINT IDENTIFICATION SYSTEM (MAFIN)

The Minnesota Automated Fingerprint Identification (MAFIN) system is jointly owned by the Minneapolis and St. Paul Police Departments. The Minnesota State Bureau of Criminal Apprehension (BCA) is a system user.

MAFIN's mainframe, consisting of a data base with four 300-megabyte disk drives and a search processor (PDP 1134 Digital Equipment computer using four matchers), is located on the first floor of the St. Paul Police Department Headquarters Building. A read/edit subsystem, which is used to enter 10-print cards and also to search latent prints, is located on the second floor of the same building. Overall responsibility for MAFIN is assigned to the St. Paul Police Department Crime Laboratory.

The Minneapolis site is equipped with a read/edit subsystem and a Model 20 latent terminal, connected to the central site by a dedicated telephone line.

A Model 20 Latent terminal, connected to the St. Paul print processor by dedicated telephone lines, is installed in the Criminal Justice Information Systems (CJIS) Section of the BCA. The CJIS Section handles intake and processing of all arrest fingerprint cards and base maintenance. BCA's Latent Print Section is responsible for all latent searches.

State funding is currently being sought to purchase a read/edit subysystem for BCA, and a Model 30 latent terminal, along with a 300-megabyte disk drive, for the St. Paul site. Additional monies are also being requested to purchase new software changes, to improve speed and operational effectiveness. (Current match rate is approximately 250 matches per second.)

MAFIN - Minneapolis Site

Lt. Richard P. Cich
Minneapolis MAFIN Project Director
Criminal History, Room 3-D, City Hall
Minneapolis, Minnesota 55415
(612) 348-2808

MAFIN - St. Paul Site

Left to right. Sgt. Joseph K. Corcoran; Lt. Gerald Hanggi, Sr. (St. Pal MAFIN Project Director); Officer Terrance Carrol; and Sgt. Donald Hanson.

All of the above can be contacted at:

St. Paul Police Department
ATTN: Crime Laboratory
101 E. 10th St.
St. Paul, Minnesota 55101
(612) 292-3606

MAFIN - BCA Site

Left to right: John Douthit, Identification Officer, Laboratory; Carolyn Robinson, Fingerprint Technician, CJIS; Dennis Hughes, Asst. Identification Officer, Laboratory; Karen McDonald, Supervisor, CJIS Operations; John D. Erskine, Superintendent, BCA; Clayton Meliem, Asst. Director, CJIS; Kathy Holland, Fingerpring Technician, CJIS; Kenneth Bentfield, Director, CJIS.

All of the above can be contacted at:

Bureau of Criminal Apprehension
1246 University Avenue
St. Paul, Minnesota 55104

Prime contact: Karen McDonald
(612) 296-2252

SYSTEM STATISTICS

St. Paul

Data Base

Current Size	344,000 persons
Annual Growth	4,000 records/year
Projected Eventual Size	1,000,000 persons

Search Frequency

10-Print	350-400 cards/month
Latent	30-50 searches/month

Minneapolis

Data Base

Current Size	178,000 persons
Projected Growth (1981)	9,000 persons

BCA

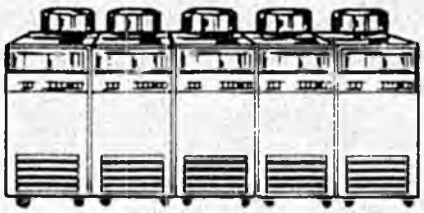
Data Base

Current Size	95,000 persons

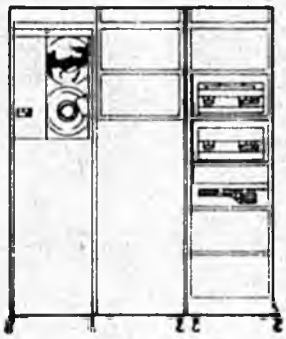
Search Frequency

10-Print	500 cards/month
Latent	7 (average)/month

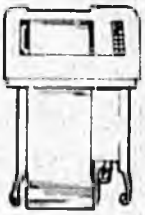
MAFIN



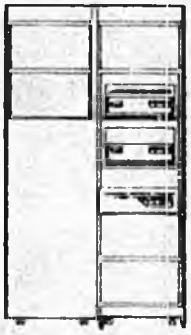
DISK DRIVES



SEARCH PROCESSOR



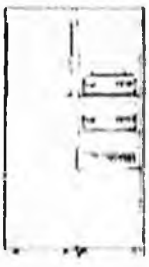
LINE PRINTER



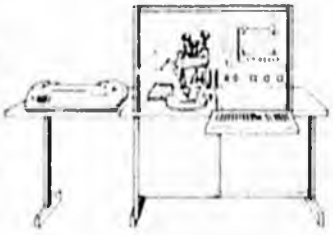
PRINT PROCESSOR

TELE-PRINTER

COMPUTER ROOM (ST. PAUL)



PRINT PROCESSOR

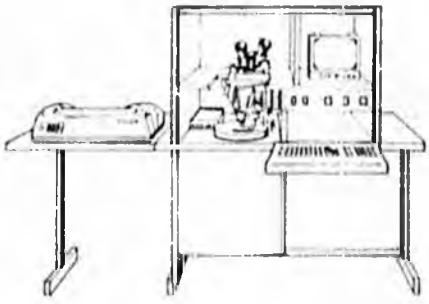


LATENT TERMINAL MODEL 20 (W PRINTER)

TELEPRINTER

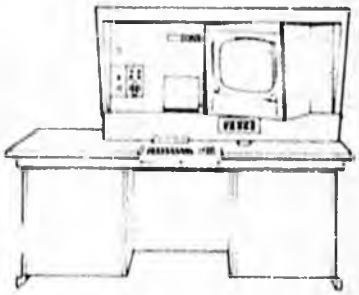
READ EDIT TERMINAL

MINNEAPOLIS



LATENT TERMINAL (MODEL 20) WITH PRINTER

BCA



READ EDIT TERMINAL

TELEPRINTER

ST. PAUL

CONFIGURATION:

- Manual classification
- Four matchers
- R-40 matcher

MONTGOMERY/PRINCE GEORGE'S COUNTIES, MARYLAND

Montgomery/Prince George's Counties, Maryland, Automated Fingerprint Identification System Principals - *Left to right; front row:* Henry A. Jones, Gloria A. Pum[illegible] Smith; back row, Barry F. Ekeberg, Marlin D. Taylor, Robin

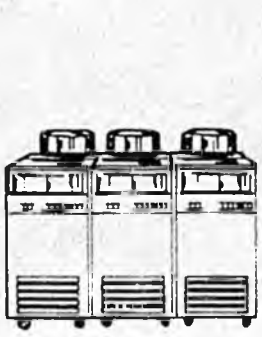
Henry A. Jones
Project Director Prince George's County
Prince George's County Police
3415 North Forestledge Road
Forestville, Maryland 200028
301-420-0180 X224

Paul H. Smith, Sr.
Project Director, Montgomery County
Montgomery County Police
Identification Division
2350 Reseach Boulevard
Rockville, Maryland 20850
301-431-3100

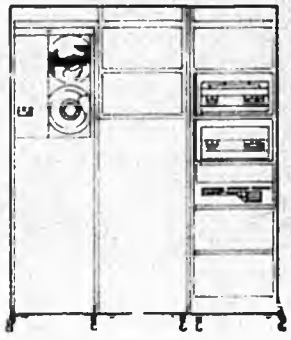
The Police Departments of Montgomery and Prince George's Counties, Maryland, are charged with law enforcement responsiblities for an area covering approximately 1,100 square miles and having a population of around 1,600,000 persons.

Of the total 2,100 personnel staffing the two counties police departments, eight individuals are assigned to fingerprint identification-related activities. The regional Automated Fingerprint Identification System office was opened on March 19, 1979, at 10,611 New Hampshire Avenue, Silver Spring, Maryland (301/431-3100). This geographical location is near the jurisdictional boundaries and the Capitol Beltway (Route 495) for easy accessibility. The automated equipment, fingerprint cards, latent files and assigned personnel from both counties are assembled in this one office to enhance efficiency.

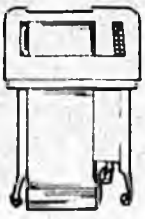
MONTGOMERY/PRINCE GEORGE'S COUNTIES, MARYLAND



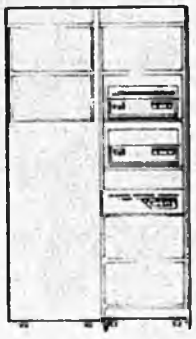
DISK DRIVE



SEARCH PROCESSOR

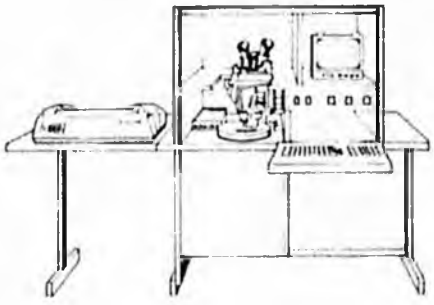


LINE PRINTER

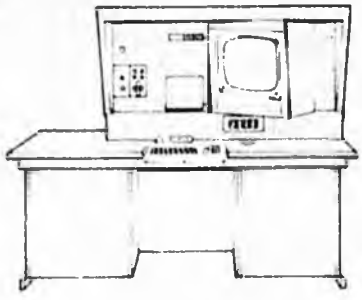


PRINT PROCESSOR

TELEPRINTER



LATENT TERMINAL (MODEL 20) WITH PRINTER



READ/EDIT TERMINAL

TELEPRINTER

CONFIGURATION:

- Autoclassification
- Three matchers
- R-40 matcher

Components for the Maryland system include: Read/Edit Subsystem (Print Processor with Classifier, Read/Edit Terminal, Keyboard Printer); Latent Subsystem (Model 20 Latent Terminal, Printer); Search and Match System (Search Processor — three R-30 Matchers, one R-40 Matcher (software), three 300-Megabyte Disk Drives; Line Printer; Keyboard Printer). As of 1980, there were approximately 80,000 ten-print records in the data base. Storage capacity allows for 250,000 ten-print records and this is the ultimate goal. Approximately 12,000 ten-print records and 2,300 latents are being searched through the system annually.

ROYAL CANADIAN MOUNTED POLICE (RCMP)

RCMP Fingerprint Bureau Staff - ***Front to right, front row:*** **Mrs. Isabel Latrellle, Inspector Bruce King, Mrs. Agathe Chabot, Mrs. Barb O'Meara; back row, Mr. Lloyd Bunbury, Mrs. Lou van der Veldern, Mr. Richard Gowan, Sgt. Ross Reed, Mr. Sid Renout, Mr. Gille Langois, Cpl. Larry Henry, Mr. Ron Widdifield, Mr. George Vallieres.**

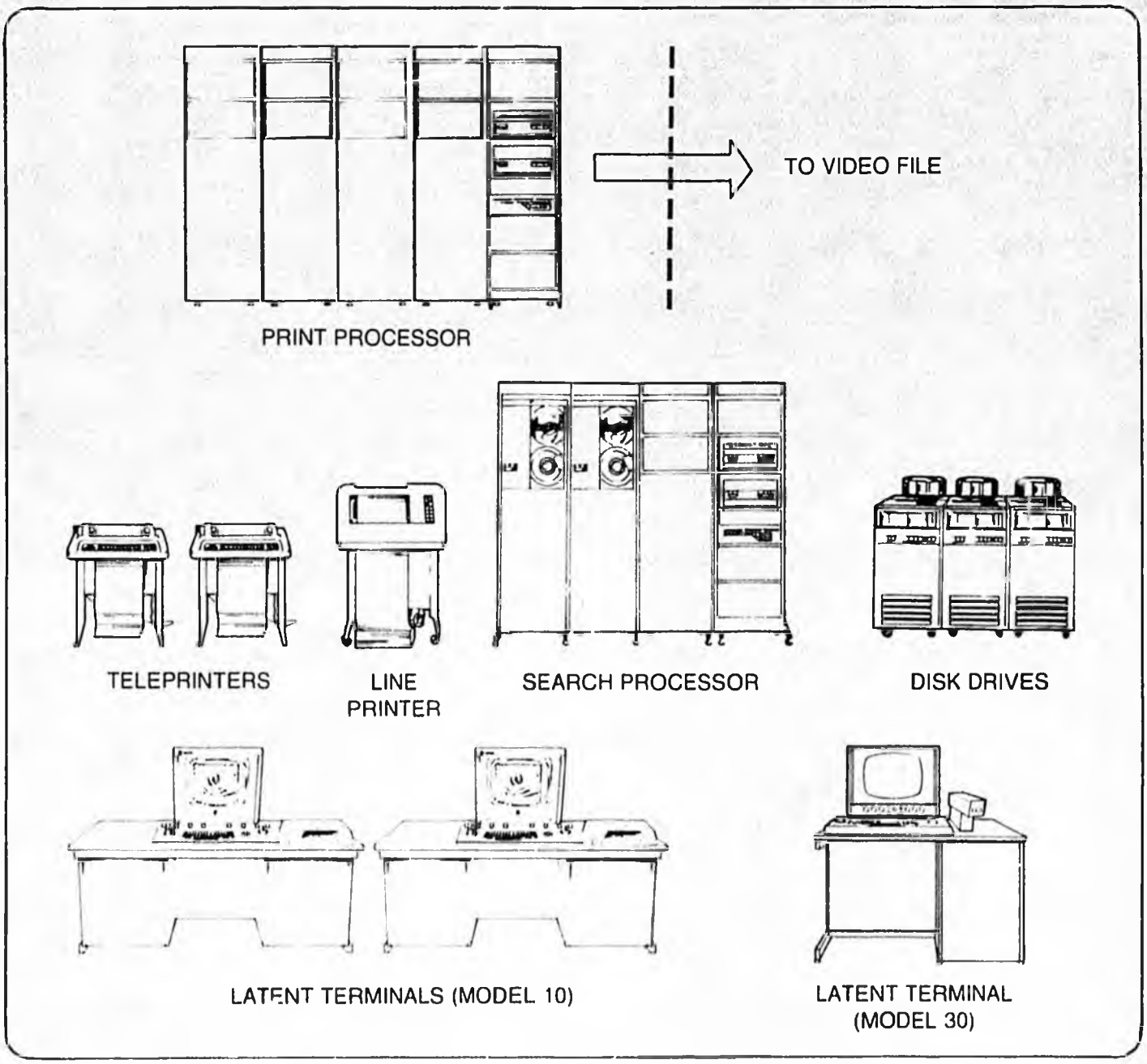
PROGRAM PRINCIPALS

All of the program principals can be reached at the following address and phone number, with individual address "ATTN" notices and telephone extension numbers to be used as noted beneath each individual's name: The Commissioner, Royal Canadian Mounted Police, P.O. Box 8885, Ottawa, Ontario, Canada, K1G 3M8; telephone (613) 993-3800.

Inspector Bruce King	Staff Sergeant Al Coker	Sergeant Ross Reed
Officer in Charge	N.C.O. I/C	N.C.O. I/C
Fingerprint Bureau	Automated Systems	Latent Fingerprint Section
ATTN: "L" Directorate	ATTN: "L" Directorate	ATTN: "L" Directorate
O.I.C. Fingerprint Bureau	Automated Systems	Latent Fingerprint Section
Telephone Ext. 156	Telephone Ext. 215	Telephone Ext. 312

RCMP has changed the conversion method for its Main Bureau file only due to the poor quality of the fingerprints on videofile and the low accuracy rate during Main Bureau search testing. Only the thumbs are scanned for minutiae, with no automatic classifying being done. When Main Bureau conversion is completed, data base addresses will be updated by dumping the addresses from videofile into the data base. A total of 250,000 records have been converted (as of early 1981) from the Main Bureau base, out of approximately 1.3 million. When Main Bureau searching commences on the scanner (1982), approximately 1400 searches are expected to be conducted daily.

Seventy-five latent searches are currently being made daily, against a latent data base of 90,000. The latent data storage base is sufficient to increase the base size to 250,000 records, with the search rate being increased to 100 per day.

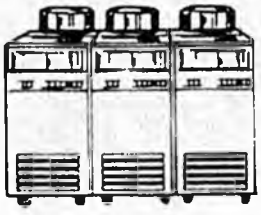


THE BASIC RCMP PRINTRAK 250 SYSTEM is a minicomputer-configured fingerprint identification system. It interfaces and operates, in conjunction with the RCMP Videofile System, to electronically scan fingerprint images from videotape, and to automatically classify the print and store the print data on disk packs for retrieval and matching during the search process. Two interconnected minicomputers provide the communication and data transfer link between a print processor console, a search processor console, two latent terminals and a data base storage system. The configuration includes four R-30 matchers and an automatic classifier.

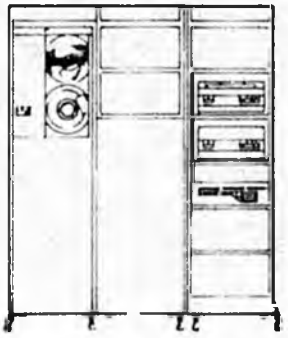
Print Processor Subsystem:

Minicomputer	Interfaces Printrak 250 System with RCMP Videofile.
Image Collector	Converts analog signals to digital images.
	Enhances digitized image.
Image Processor	Extracts ridge-flow detail
	Extracts minutiae.
	Window-edits.
Video Display Monitor	Permits viewing of image processing on a closed-circuit TV monitor.
Classifier	Single-finger classification.
	Locates print center, pattern typee, core/delta distance, references.
Minutia-Detection Processor	Filters out redundant minutiae.
Decwriter LA36	Terminal used by operator for mode initialization and termination and error message typepout.
Search Processor Console	Interfaces with print processor console and data storage systems.
	Conducts data matches.
Minutia Matchers	Compares minutiae of prints on file against those of search prints and establishes a relative score for each match.
Line Printer	Prints hard-copy data — e.g., list of search respondents.
Card Reader	Means of updating file data and entering search data.
Decwriter LA36	Terminal for mode control; reports error messages.
Magnetic Tape Section	Consists of a controller and three tape transports. Two transports are located in the search processor console, and the third in the print processor console.
Latent Terminal (Three)	Interfaces with search processor computer.
	Means for reject processing.
	Means for magnifying, displaying and encoding latent prints.
Keyboard	Means of entering commands and descriptors.
	Operator control.
TV Monitor	Means of viewing print for encoding and reject processing.
Electronic Cursor Unit	Plots minutiae.
Video Mixer	Mixes video signal with graphic display.
Data Base Storage System	Contains three disk drives for disk-pack mounting for storage of data base on disk packs.

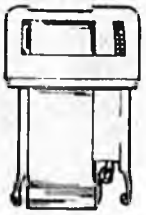
MIAMI POLICE DEPARTMENT



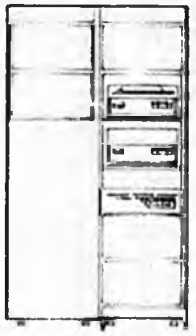
DISK DRIVES



SEARCH PROCESSOR

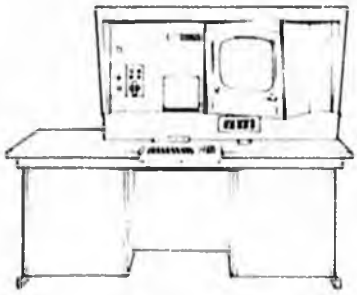


LINE PRINTER



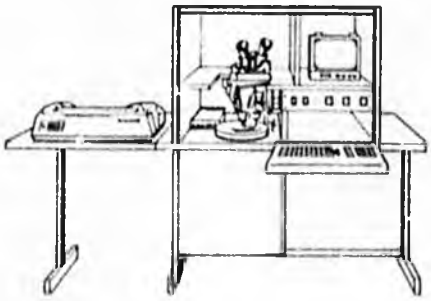
PRINT PROCESSOR

TELE-PRINTER



READ EDIT TERMINAL

TELEPRINTER



LATENT TERMINAL
(MODEL 20)
WITH PRINTER

CONFIGURATION:

- Autoclassification
- Three matchers