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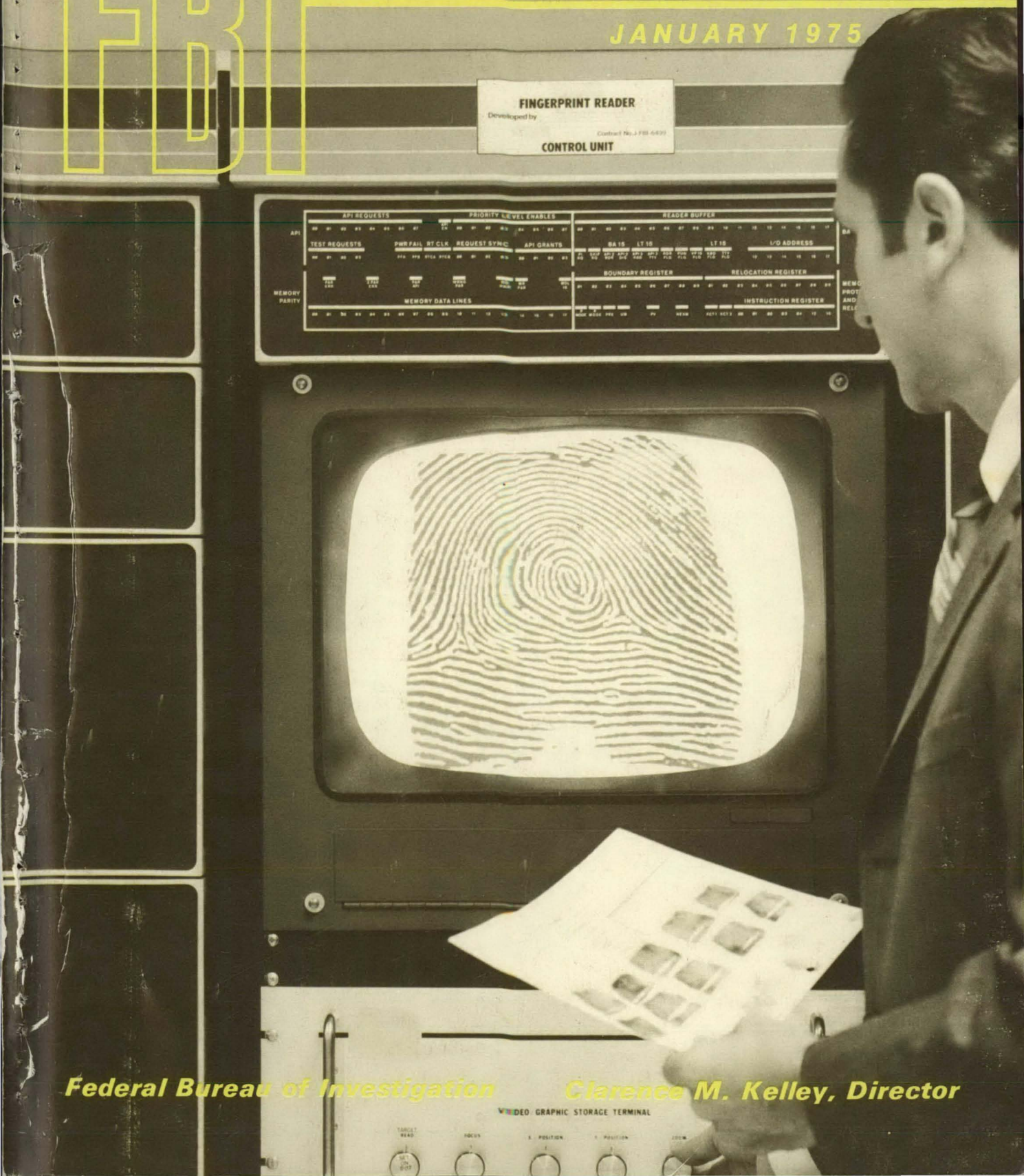
FBI Law Enforcement Bulletin

JANUARY 1975



Federal Bureau of Investigation Clarence M. Kelley, Director

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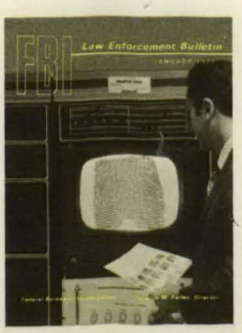

THE COVER

Harnessing electronic data processing technology to fingerprint identification procedures holds great promise for the law enforcement profession. This month's cover photo pictures some of this space-age technology at work in the FBI's Identification Division. See related article beginning page 2.

Message from the Director . . .

THE OUTSET OF THE NEW YEAR is traditionally a period of reflection. It is an opportune time to weigh accomplishments, reexamine priorities, and rededicate oneself to the tasks ahead.

In recent years, the law enforcement profession has, in my opinion, accomplished much. As a result, we are on the threshold of an era of major change in the structure and performance of our profession. And, this is all to the good.

We should be frank in acknowledging, however, that there are many inadequacies which have shackled the fulfillment of our responsibilities. Some of these are giving way to enlightened programs and procedures that greatly enhance our ability to serve the community in the just and effective administration of the law.

There has never been a time in my more than 30-year law enforcement career when the profession has been better equipped to meet its challenges. Our material and intellectual resources have never been greater—not the least of these is a clearer understanding among the profession, and a growing appreciation by the public as well, of the role of the police in our society. Without these insights into our responsibilities, I am certain that the great strides which have been made in law enforcement training, equipment, planning, research, technology, and personnel selection would not have been possible. While we are indebted to a host of separate public and private efforts in support of law enforcement, there is considerable room for pride in the fact that many improvements have been initiated and cultivated within the profession.

Although much has been accomplished, there is still much left to do. Our maturing professional competence must be more efficiently harnessed to combat the continued growth of crime.

I believe the more immediate priorities for law enforcement in the new year are: emphasizing creative management of police efforts . . . removing opportunities for crime by vigorous involvement in prevention programs . . . intensifying the search for more meaningful measurements of police performance . . . educating the public about the integrity of and the need for police technological systems, which are regrettably viewed by too many persons as unreasonable encroachments on personal privacy . . . maintaining the confidentiality of law enforcement investigations . . . seeking responsible guidance from concerned experts in other professional disciplines . . . and heightening cooperation with other segments of the administration of justice system in order to further unify the front against lawlessness.

There are other worthy priorities. I invite all members of the law enforcement profession to join me in seriously taking stock of our strengths and our weaknesses. We owe it to ourselves, to our profession, and more importantly, to the public, which has every right to expect that we do so.

CLARENCE M. KELLEY
Director

JANUARY 1, 1975

THE FBI'S APPROACH TO AUTOMATIC FINGERPRINT IDENTIFICATION*

By
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PART I

I. Introduction—A Brief History of the FBI's Fingerprint Automation Research Project

Ever since the advent of electronic data processing (EDP) technology, members of law enforcement have dreamed of harnessing the speed and accuracy of the computer to the task of searching and identifying fingerprints. However, because the science of fingerprints is itself a difficult and exacting discipline, it has defied the application of conventional computer techniques.

No members of law enforcement are more eager to see the successful application of EDP technology to fingerprint identification than those who have the responsibility for operating the FBI's Identification Division. Since 1924, the Division has acted as the national clearinghouse and repository of fingerprint records for the United States. Consequently, the Division's files have grown over the years to phenomenal proportions. The criminal fingerprint file alone contains over 72 million fingerprint cards representing over 21 million individuals. An average day will see the receipt of over 22,000 fingerprint cards that must be searched against criminal name indices and fingerprint files. This huge manual burden has required the recruitment, training, and maintenance of a staff of over 3,300 employees, 1,400 of whom are fingerprint technicians.

"Ever since the advent of electronic data processing (EDP) technology, members of law enforcement have dreamed of harnessing the speed and accuracy of the computer to the task of searching and identifying fingerprints."

The FBI has looked to the emerging EDP technology to alleviate this burden. In 1963, representatives of the Identification Division approached the National Bureau of Standards (NBS) and requested the advice of NBS scientists regarding the feasibility of automating the Division's fingerprint identification operations.

There followed a joint FBI/NBS study of the overall problem of fingerprint identification, including a review of the available technologies and the efforts made by other organiza-

*This is a paper which was presented at a Conference on The Science of Fingerprints held at the Home Office, London, England, on September 24–25, 1974, and is reprinted from the conference proceedings with the permission of the Home Office. In the interest of currency, certain information has been updated.

tions to automate fingerprint processing up until that time. It was concluded that the major hurdle to the automatic processing of fingerprints in computers was the enormous amount of data contained in a fingerprint, normally over 2 million bits of raw data. It was found that the most common approach adopted by others to resolve this problem was to avoid it by having a human fingerprint technician visually examine the fingerprints, classify them, and then keypunch the classification data into machine-readable form for later entry into a computer. Another approach that was then under development by several private companies was the utilization of optical correlation techniques (principally holographic technology) to compare the global characteristics of the prints. A third possible approach was to use digital image-processing techniques; that is, a computer-controlled flying-spot scanner to digitize the fingerprint, and digital enhancement and detection techniques to extract its identifying characteristics.

As early as 1934, the FBI had experimented with having fingerprint technicians classify fingerprints into classification codes which would then be keypunched into punchcards for processing on unit record equipment. This experiment proved the impracticability of such an approach when applied to a file as active as that of the FBI's, where up to 30,000 fingerprint cards might be received on a given day for processing.

Nor did the more recently developed optical correlation technology appear to be the answer. A review of available optical correlation techniques indicated that they would not have the selectivity needed for the FBI's very large file. Further, the requirement that the fingerprints undergo photographic processing prior to searching would create additional problems.

The FBI opted for the digital image-processing approach as it felt that it best suited its needs. Although digital image-processing techniques had been successfully applied to topographical and topological problems involving a commensurate degree of processing difficulty and volume of data as are encountered in the fingerprint problem, it was found that such processing on general-purpose computers was inordinately time consuming. Therefore, before the FBI could adopt this technology for its automated fingerprint identification system, the following question needed to be answered: "Can a digital image-processing device be developed which will read the identifying characteristics of a fingerprint with sufficient speed and accuracy to support an automatic fingerprint identification system?"

The study also concluded that, even if this inquiry were answered in the affirmative, it would be to no avail unless the automatically read fingerprint data could be compared automatically to determine whether two fingerprints came from the same finger. Therefore, the second question requiring an answer was: "Can computer logic be devised that can take the fingerprint data generated by the digital image-processing device and automatically compare and identify them?"

In order to find the answers to the above two inquiries, two benchmark tasks or milestones were adopted for the FBI's fingerprint automation research project. The first task was to construct an automatic scanning device that could read fingerprint characteristics directly from standard inked fingerprint cards. The second task was to develop computer logic and programs that could automatically compare and identify the data. It was agreed between the FBI and NBS that if either or both of these two benchmark tasks proved to be unachievable, the project would be reconsidered.

Accordingly, in 1967, the FBI placed contracts with Cornell Aeronautical Laboratory, Inc. (now Calspan Corp.), Buffalo, N.Y., and the Autonetics Division of North American Aviation, Inc. (now Autonetics Group of Rockwell International Corp.), Anaheim, Calif., to build engineering models of automatic fingerprint readers. The task of developing computer logic and programs to compare fingerprint data was undertaken by NBS.

By 1969, the benchmark tasks were achieved. Both private contractors had built engineering model readers that successfully read fingerprints with sufficient precision to support automatic fingerprint identification. Also, NBS had successfully demonstrated computer programs that compared and identified fingerprint data produced by both of the readers.

The next major benchmark task adopted in the research program was the construction of actual prototype fingerprint reader equipment. The

Two benchmark tasks were adopted for the FBI's fingerprint automation research project: construction of an automatic scanning device that could read fingerprint characteristics directly from standard inked fingerprint cards and development of computer logic and programs that could automatically compare and identify the data.

"The general approach adopted for the FBI's automatic fingerprint identification system is to duplicate, insofar as possible, the human technician's visual and mental processes as he performs the task of fingerprint identification."

prototype reader was to serve two purposes: (1) to fully test, evaluate, and perfect actual reader equipment so that specifications could be developed for the procurement of more advanced models for use at the Identification Division in daily production operations; and (2) to acquire an automatic reader which could be used to economically amass a data base of sufficient size to test and perfect the other portions of the automatic fingerprint identification system. Therefore, in 1970, the FBI directed Cornell Aeronautical Laboratory to proceed with the design, development, and construction of a prototype automatic fingerprint reader. The prototype reader, called "FINDER" (a contraction of "FINgerprint" and "reaDER"), was delivered and installed at the FBI in September 1972.

There followed a period of extensive testing and evaluation of the prototype equipment during which it was conclusively demonstrated that FINDER met its design goals. Consequently, procurement specifications were developed and issued to private industry. On July 30, 1974, a contract was awarded to the Autonetics Group of Rockwell International for the construction of five advanced version readers. These advanced readers will hereafter be referred to as "FINDER II" readers in order to differentiate them from the FINDER prototype reader.

The FINDER II readers are to be delivered over the next 2 years. In the meantime, development work will continue on the remaining portions of the total automatic fingerprint identification system. This will include work to perfect the NBS computer programs, and the acquisition of additional general- and special-purpose hardware needed to complete the system.

II. The FBI's General Approach to Automatic Fingerprint Identification

The general approach adopted for the FBI's automatic fingerprint identification system is to duplicate, insofar as possible, the human technician's visual and mental processes as he performs the task of fingerprint identification. That is, the goal is to duplicate with hardware and software the technician's ability to perform the following processes:

(1) *Reading:* To scan the global features of fingerprints and at the same time discern their ridge structure, reading through areas of marginal quality, but eliminating areas of substandard quality caused by over- and under-inking, smudging, et cetera;

(2) *Registration:* To take into account the positioning of the fingerprints on the card, both in translation and rotation;

(3) *Classification:* To recognize the patterns of the fingerprints for classification purposes; and

(4) *Matching:* To compare and identify a set of fingerprints with others having the same classification on the basis of their minute identifying characteristics, called minutiae.

A fifth process of "Verification" is also involved. This process is not enumerated above since it is merely a repetition of some or all of the first four processes by another technician to verify a fingerprint identification made by the first technician.

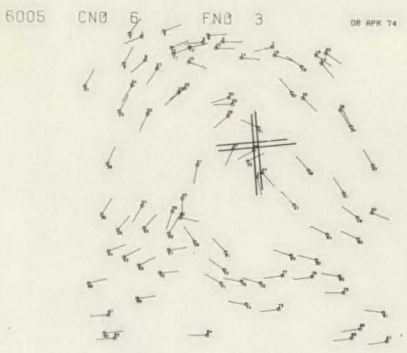
A brief discussion of each of the processes as they apply to the FBI's automatic fingerprint identification system is given below.

Reading

The reading process is performed by a computerized flying-spot scanner system called "FINDER," which is discussed in greater detail in the next section of this paper. It is sufficient to merely point out here that FINDER will read a fingerprint, enhance its ridge structure, and detect and record fingerprint data in an average processing time of one-half second per fingerprint. However, in order to provide a better understanding of the task of the reader and the subsequent registration, classification, and matching processes, the following brief description is furnished regarding the data produced by the FINDER reader:

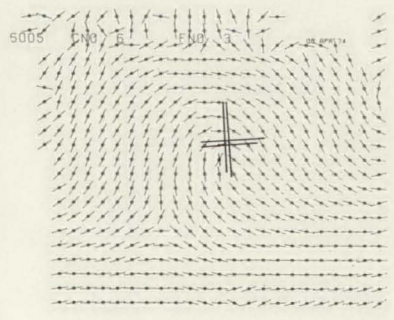
There are two types of digital data generated by the reader, that is, "minutiae" and "ridge direction" data. Figure 1 shows four graphical plots of the output of the reader for two inked impressions of the same finger.

Minutiae data are made up of the location and direction where ridges terminate or end ("ridge endings") and where ridges branch or bifurcate into two ridges ("bifurcations"). The coordinate system used for measuring the location and direction of minutiae is shown in Figure 2. On different inkings of the same finger, a ridge ending may change to a bifurcation, or vice versa, due to over- and under-inking. Because of the method utilized in measuring minutiae, this will cause

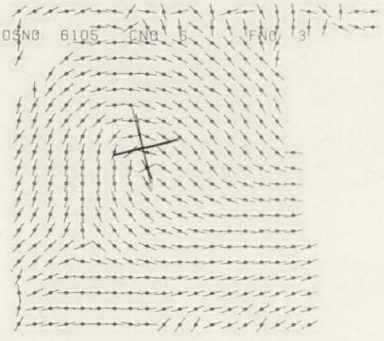


IMPRESSION "A" MINUTIAE PLOT

IMPRESSION "B" MINUTIAE PLOT



IMPRESSION "A" RIDGE DIRECTION PLOT



IMPRESSION "B" RIDGE DIRECTION PLOT

FIGURE 1. MINUTIAE AND RIDGE DIRECTION DATA FROM TWO FINGERPRINT IMPRESSIONS AS READ BY FINDER.

only a slight shift in location (one-half to one ridge spacing) and no change in angle. In the minutiae data of Figure 1, each dot represents the location of a ridge ending or bifurcation and the tail indicates the direction of the minutiae.

Ridge direction data (also called "ridge contour" data) are samplings of the average direction of ridge flow at regular selected intervals across a fingerprint. These data describe the general pattern of the print. The ridge direction plots in Figure 1 are graphical representations of ridge direction data.

Registration

The registration process involves the normalization of the minutiae data and ridge direction data to a standard reference position. It is performed in a minicomputer after reading has been completed. Registration is necessary in order to take into account the fact that inked fingerprint impressions vary in location and orientation in the fingerprint blocks of an inked card. Without this normalization, the subsequent matching process could not function properly.

Computer logic for automatic registration has been developed by NBS and is reported in detail elsewhere.[1] Briefly, the registration program utilizes the ridge direction data output of the FINDER reader to compute a center point for a fingerprint and the angle through which the print should be rotated to achieve normalization. The resulting registration values are then used to translate and rotate both the minutiae and ridge direction data to a standard reference position. In Figure 1, the centers and angles are shown as crossed lines in each of the four graphical plots.

Classification

Classification is required in a computerized fingerprint file for the very same reason that it is necessary in a manual file, that is, to reduce the area of the file that has to be searched on the basis of minutiae comparison. Classification is performed utilizing the same ridge direction data that were used for registration and is performed in the same minicomputer.

The classification system presently under development by NBS is reported in detail elsewhere.[2] Briefly, the ridge direction data of a search fingerprint are compared with stored prototype fingerprint patterns. The prototype pattern that compares most closely with the search fingerprint determines the classification of the search finger-

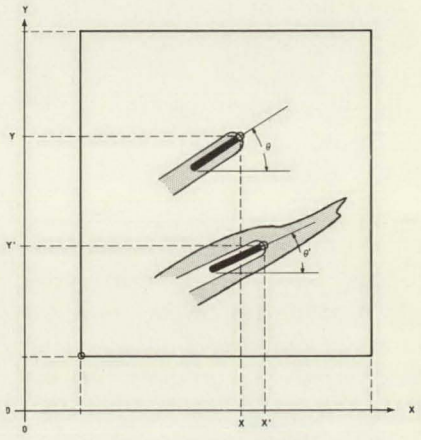


FIGURE 2. COORDINATE SYSTEM FOR MINUTIAE DETECTION AND LOCATION

print. A composite of the classifications of eight fingers (the little fingers being omitted) is used as the overall classification for a fingerprint card.

After registration and classification are completed, the ridge direction data are no longer needed and therefore are discarded. The resulting digital record for the whole fingerprint card requires approximately 2,500 bytes (characters) of storage. This storage requirement is sufficient not only to store the minutiae data (allowing 100 minutiae per fingerprint on eight fingers) and classification information, but also to store associated indexing numbers such as a process control number and an FBI-assigned identification number.

Matching

The matching process involves the comparison of the minutiae data of two fingerprints to determine if they came from the same finger. The matching algorithm developed by NBS [3] utilizes a statistical scoring procedure to determine the degree of correlation between the locations and angles of the minutiae of a file fingerprint and those of a search fingerprint. File fingerprint minutiae sets achieving a composite score at or above a certain threshold are reported as possible matches of the search fingerprint card.

Matching is presently performed on a large general-purpose computer. However, since this step involves considerable processing, it has been determined that it will be cost-effective to

> ***"Design work is underway . . . on a prototype minutiae-matching processor ('Matcher') which will compare two fingerprints in a little over one (1) millisecond."***

CONTROL COMPUTER SHOWING OPERATOR AND FINGERPRINT DISPLAY SYSTEM

OPERATOR LOADING CARD HANDLER. THE SCANNER IS LOCATED OVER THE CARD HANDLER, SCANNER ELECTRONICS UNIT IS ALONGSIDE, AND THE PREPROCESSOR IS IN THE BACKGROUND.

FIGURE 3. THE FINDER PROTOTYPE AUTOMATIC FINGERPRINT READER

build a hard-wired version of the computer algorithm. Design work is underway at NBS on a prototype minutiae-matching processor ("Matcher") which will compare two fingerprints in a little over one (1) millisecond.

Verification

The FBI's automated fingerprint identification system will require that any possible matches produced by the system be checked by undergoing a verification step, just as is presently required in the FBI's manual system. Further, this step will be performed by a fingerprint technician, just as in the manual system. The inclusion of a human in the processing "loop" will provide a final check on the accuracy and integrity of the automated system. At some future point in time, when the system's soundness has been fully established, the human verifier may be replaced with an automated verification procedure.

III. The FINDER Automatic Fingerprint Reader

The FINDER prototype fingerprint reader is the product of over 5 years of research and development work which cost approximately $1.25 million. Figure 3 presents two photographic views of the equipment. The prototype has been the subject of prior papers.[4, 5]

The prototype reader performs the functions shown in Figure 4, where the reader is shown broken down into four major subsystems; that is, card handler, scanner, preprocessor, and control computer.

Card Handler

Standard 10-finger inked fingerprint cards are loaded into the card handler, and this mechanism moves and positions each vertical pair of fingerprints on the card under the scanner. First the upper, or right-hand, rolled fingerprint of a vertical pair is scanned and processed, followed by the lower, or left-hand, fingerprint; that is, first the print in finger block number 1 is read, followed by that in block 6. After both of these prints are read, the card handler moves the card 1.6 inches to the left, bringing finger blocks numbers 2 and 7 under the scanner. A control computer directs both the movement and selection of the finger blocks to be scanned according to either operator or preprogrammed instructions. It is possible to read only one, all, or any combination of prints on the card.

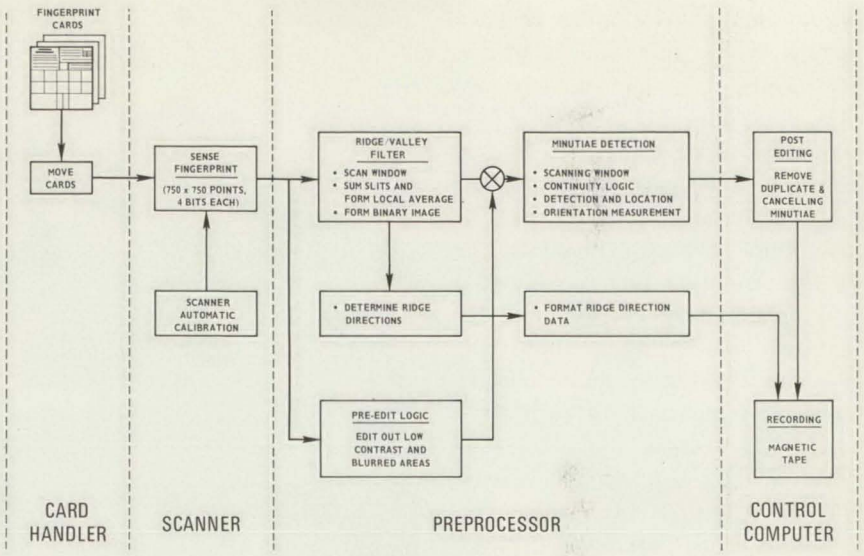


FIGURE 4. FINGERPRINT READER FUNCTIONAL BLOCK DIAGRAM

Scanner

The function of the scanner is to read reflected light intensity over an inked fingerprint and digitize it into one of 16 levels of gray. The scanner operates at one (1) microsecond per sampled point, which represents the state-of-the-art in scanning speed. The separation between points of scanning is 0.002 inches. This close spacing is required not for accuracy in locating the minutiae, but rather to obtain the resolution required to separate adjacent ridges on heavily blurred fingerprints.

The scanner must be able to read a variety of cards—some new and white, others yellow with age; some lightly inked, others heavily inked. Therefore, automatic calibration is used to sample the fingerprint area, establish the black to white contrast, and adjust the scanner's parameters to equalize the digital signal to the preprocessor. The calibration of the scanner takes less than 0.01 seconds per fingerprint and greatly increases the range in quality of fingerprint cards which can be scanned by the reader.

Preprocessor

The preprocessor is the "heart" of the FINDER reader and performs the bulk of the processing. It incorporates high-speed hard-wired, parallel logic that is capable of processing its algorithms over 12,000 times faster than possible on a large general-purpose computer.

An important part of the preprocessor is the *ridge-valley filter*, a two-dimensional image-processing algorithm, which is designed to dupli-

cate the human eye's ability to identify the ridges and valleys of the fingerprints. It is comprised of two parts, a "local area filter" and a "slit filter." Over a small area of a fingerprint image, the eye identifies whether a point is blacker or whiter than the surrounding area and, therefore, the eye identifies that point as either a black or a white point. Likewise, the *local area filter* helps to convert the image from its gray scale to a binary image by comparison of each point with its local average.

The *slit filter* also performs a function similar to that of the human eye. It follows the continuity of ridge structure by linking up points in the direction of the ridge flow, removing small breaks which result from pores, breaks in ridge structure, poor inking or other imperfections in the fingerprint image. This is similar to the eye's behavior in trying to see continuous ridge structure. In total, the ridge-valley filter represents an image-processing technique which is highly tuned to the characteristics of fingerprint ridge structure and is capable of developing clean, usable binary ridge structure out of light or poorly inked fingerprint images.

An example of the type of image enhancement performed by the ridge-valley filter is shown in Figure 5, where a portion of an inked palm print has been scanned and enhanced. Most of the ridge structure of the palm print appears as short disconnected segments of ridge. The enhanced image shows how the filter has filled in the broken structure to provide the continuous ridges essential to minutiae detection.

The preprocessor also performs *pre-editing*. In certain areas of a fingerprint, it may be impossible for the ridge-valley filter to develop sufficiently clear ridge structure where minutiae detection can be performed. These areas are pre-edited or rejected from any further consideration as

LEFT PORTION OF INKED PALM PRINT SHOWING BROKEN-UP RIDGE STRUCTURE

ENHANCED BINARY IMAGE OF PALM PRINT

FIGURE 5

ENHANCEMENT OF BROKEN-UP RIDGE STRUCTURE ON PALM PRINT BY RIDGE-VALLEY FILTER.

sources of legitimate minutiae. Three tests are made to eliminate these areas: (1) too white (typically a blank card area around the fingerprint); (2) too black (areas of excessive inking); and (3) insufficient ridge structure or contrast to allow reliable minutiae detection to proceed. When any one of these three test conditions is found, the area is pre-edited and no minutiae will be detected there.

Figure 6 shows a pair of fingerprint impressions read and enhanced by FINDER. Each impression has some areas of excessive inking that have been pre-edited from their enhanced binary images. No minutiae will be detected in these pre-edited areas of the prints. In spite of the extensive pre-editing in impression "B," these prints were successfully registered, classified, and matched.

The preprocessor next detects *ridge direction data.* As the ridge-valley filter processes the gray scale fingerprint image and produces a binary image, it keeps track of the ridge direction at each point in the fingerprint. This information is then averaged over a larger area and recorded for subsequent use in performing the registration and classification steps which follow fingerprint reading.

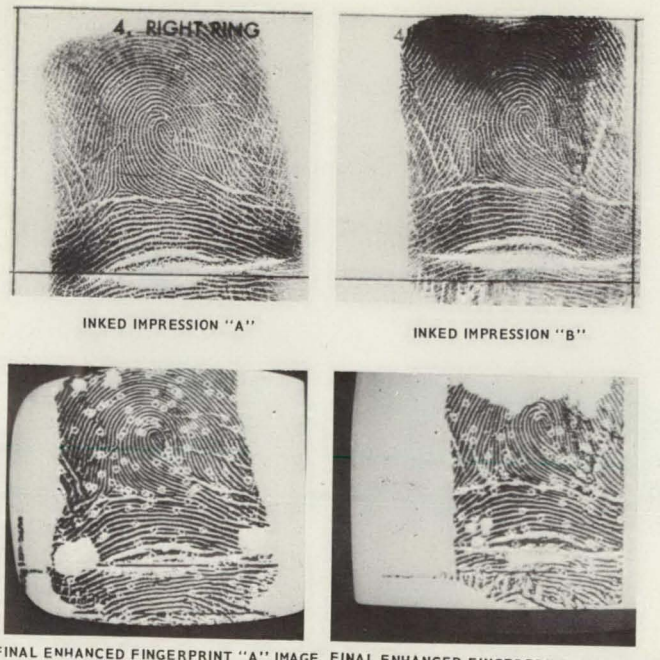
Figure 7 shows the ridge direction data from two inked impressions of the same print. It can be seen that sufficient information is left in the ridge direction representation to register the print and to recognize the pattern type.

The preprocessor next uses *detection logic* to locate minutiae. A detection window of 16 x 16 points dimension is positioned at each location on the print, and the area is examined to determine if a minutia, either a ridge ending or bifurcation, exists at that location.

Once a possible minutia is located, several parameters are measured on the image. These include area, perimeter, width, length, and orientation (angle). These numerical measurements, along with the location of the possible detection, are then transmitted from the preprocessor to the control computer for further processing.

Control Computer

The last major subsystem of the FINDER reader is the control computer. As its name implies, it controls all the other subsystems so as to accomplish the rapid reading of fingerprint cards. In addition to this, it performs the final processing and selection of minutiae in a routine called *post-editing.*



INKED IMPRESSION "A"

INKED IMPRESSION "B"

FINAL ENHANCED FINGERPRINT "A" IMAGE WITH MINUTIAE CIRCLES

FINAL ENHANCED FINGERPRINT "B" IMAGE WITH MINUTIAE CIRCLES

FIGURE 6. EXAMPLE OF PRE-EDIT OF SMEARED PORTION OF FINGERPRINT. CIRCLES SHOW MINUTIAE DETECTIONS.

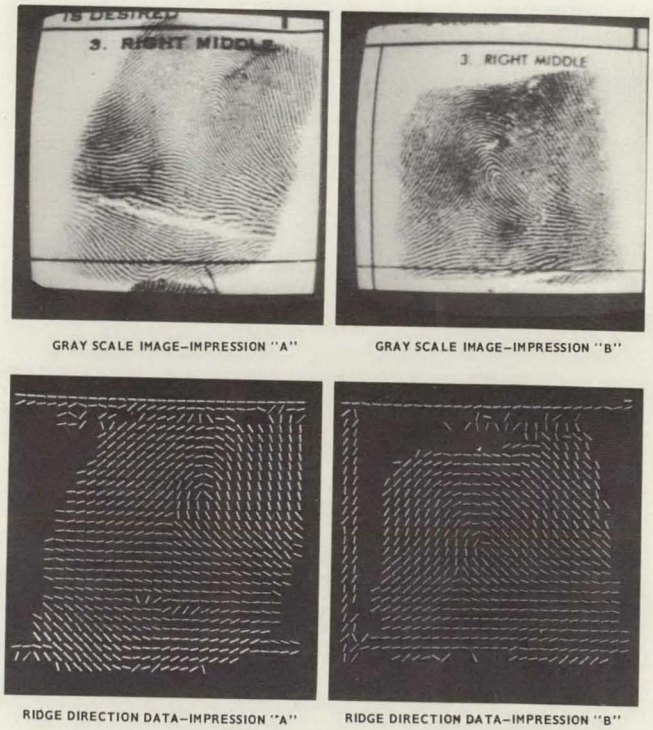
In performing its function of detecting minutiae at every location on the print, the preprocessor will send multiple detections of the same minutia to the control computer. These multiple detections are merged into one reported minutia in the post-editing process. In some cases, there are detections of pairs of minutiae which actually represent the two ends of a ridge on either side of a break in the ridge structure. A test is made of all minutiae located close together to determine whether they represent merely a break in the ridge rather than two minutiae. These break tests are performed after multiple detections are merged and, if a break is detected, the two spurious minutiae are eliminated from the minutiae output list.

Another function of the control computer is to *display* data, as they are being processed in the FINDER reader, using a video storage tube display device. The display function is not utilized during normal fingerprint card reading operations, but rather is used for demonstration and diagnostic purposes.

The display will save one complete frame or image of intermediate or final processing results on its high-resolution silicon storage tube. Either a multi-toned gray scale image, or an enhanced binary image may be displayed. Minutiae detections and ridge direction data can also be displayed superimposed over the binary image of the print. Examples of reader performance shown in this paper were obtained by photographing the display.

The control computer uses a magnetic tape unit for *data recording*. The minutiae and ridge direction data generated by the reader are recorded onto magnetic tape. The tape is then transferred to a large general-purpose computer where the registration, classification, and matching steps are performed.

(Continued on page 24)



GRAY SCALE IMAGE–IMPRESSION "A"

GRAY SCALE IMAGE–IMPRESSION "B"

RIDGE DIRECTION DATA–IMPRESSION "A"

RIDGE DIRECTION DATA–IMPRESSION "B"

FIGURE 7. EXAMPLE OF RIDGE DIRECTION DATA READ FROM TWO IMPRESSIONS OF THE SAME FINGERPRINT.

Special Abilities for Special Needs—

A TACTICAL OPERATIONS UNIT

By
CAPT. CONNIE H. PITTS
Commander
Tactical Operations Unit
Police Department
Birmingham, Ala.

Like other medium-sized city police departments, Birmingham's has evolved over the past 100 years in response to the demands of an increasingly mobile society. The advent of the automobile required the creation of specialized units to direct traffic, enforce the traffic laws, and investigate the inevitable accident. Of course, not all the new police functions were confined to traffic accident investigation. As society's norms and mores changed, so did criminal behavior. Police operations, therefore, were amended to counter new patterns of criminal activity. Highly mobile units, skilled in modern techniques and in the use of modern weapons and vehicles, were organized, trained, and employed for the first time.

During the early 1960's, a period characterized by rioting in Birmingham, the specialized unit concept reached its high watermark. As in most major cities, Birmingham community crises changed police organization in an evolutionary, but haphazard, manner. Many of the problems that surfaced were rooted in the proliferation of fragmented specialized enforcement units and the concomitant distortion of effort and frustration of control which inevitably resulted. In the aggregate, the limited operational flexibility derived from these units had been gained at the expense of command control and efficiency.

The commander of the Uniformed Division, faced daily with the task of controlling and coordinating a vast array of small functional units operating in scattered locations throughout the city, initiated positive steps to secure a coordinated police effort. Staff meetings were held and ultimately resulted in the drafting of a plan for consolidating the various specialty units into a unified framework.

The command structure of the department wrestled with the problems of (1) decreasing the number of personnel assigned to special functions, (2) maintaining a unit large enough to deal with a number of varied responsibilities, (3) providing extensive training in several different functions

to a small cadre of officers, and (4) avoiding the creation of an elitist attitude on the part of the personnel assigned to a tactical operations unit. Additionally, the Uniformed Division Commander wished to narrow the scope of his responsibilities and effectively place control and responsibility for such a unit in one subordinate individual.

Before any plan could be implemented, an analysis of the beat patrolman's function had to be made. The results of this study indicated that the patrolman's role and responsibility could be enlarged to incorporate many of the traditional specialty functions. Primary responsibility for all police service was, therefore, transferred to the beat officer.

To facilitate the transfer of more responsibilities to the beat officer, a new absolute field reporting system was instituted. The institution of these procedures gave the beat patrolman a challenge and, at the same time, reduced the manpower requirements in specialized enforcement units.

Prior to selecting Tactical Operations Unit (TOU) personnel, the exact nature of that unit's area of responsibility had to be defined. Functionally, it was to be the responsibility of the Uniformed Division Commander. The unit's mission was to augment the regular patrol force and reinforce line units in the accomplishment of their assigned duties. Secondary missions involved riot control, barricaded criminals, bomb disposal problems, and combatting snipers, as well as attending to a variety of other specialized areas of police operations. The TOU's separate existence insured the support of other divisions as it could be detached from regular assignments for special services without disrupting regular Patrol Division duties and functions.

The varied nature of the missions and responsibilities assigned the Tactical Operations Unit, of necessity, required an investigation of how best to economize the forces available to it. Economy of forces, particularly in a period of increasing personnel costs, requires police administrators to constantly review and evaluate specialized units to avoid unnecessary expense and duplication of effort in their operation. At the same time, a force sufficient to meet all reasonably anticipated needs must be maintained.

The Birmingham Tactical Operations Unit was task organized and designed to minimize these potential administrative pitfalls. All TOU personnel were cross-trained in each of the groups' specialty areas. Whether his task is to isolate or assault a sniper, each team member received sufficient cross-training to enable him to assume the duties of any other should that teammate become a casualty. This training progressed to the state that should the need arise any member could assume the duties and responsibilities of team leader.

Recent events mandate that urban police departments be prepared to react with properly trained and equipped personnel to disturbances involving snipers, riots, bombs, and barricaded criminals. However, the majority of police agencies, due to a limited amount of resources, cannot bear the cost of specialty training for every police officer. It was because of the costs involved that the Birmingham Police Department ultimately decided to confine its specialty training efforts to a small cadre of 40 officers concentrated under a unified command structure termed the Tactical Operations Unit.

Chief James C. Parsons

Operational Flexibility

As recommended by authoritative guidelines, flexibility is the TOU's hallmark. The specialty units that were combined to form the unit provided the department, at the onset, with a cadre of officers trained in advanced police functions and techniques. Under the single command of the Tactical Operations Unit Commander, who provided a direct link, heretofore missing, between the Uniformed Division Commander and the specialist officers, the unit was task organized into various elements, each under the direct control of a sergeant or lieutenant.

Bomb disposal duties were organized into a seven-man squad within the TOU. Each member of the squad has attended the Hazardous Devices School in Huntsville, Ala., and has received the best training available to law enforcement officers in this field. The squad has been provided with the finest equipment available and undergoes periodic retraining sessions to maintain their professional edge. As a consequence of its bomb disposal squad's skilled level, the Birmingham department now furnishes bomb dis-

"Police operations . . . were amended to counter new patterns of criminal activity. Highly mobile units, skilled in modern techniques and in the use of modern weapons and vehicles, were organized, trained, and employed for the first time."

Bomb disposal equipment used by seven-man TOU squad.

posal assistance for a seven-county region.

The solo motorcycle element of the TOU is primarily responsible for enforcement of moving violations. It also conducts special assignments involving escort duty, saturation patrols, large parades, and traffic control at football games. Additionally, its personnel are trained in the use of sophisticated radar equipment for highway patrol.

The canine units, of which there are 11, are organized as a distinct element of the Tactical Operations Unit. These units are employed in searches and saturation patrols in high crime areas. The entire canine element undergoes periodic retraining at the direction of its training officer. It is planned that the canine units be trained additionally in explosives and narcotics detection.

For antisniper and barricaded criminal operations, the entire TOU is task organized into five seven-man teams. The first two teams introduced into a critical area are organized as an isolation element and an assault element. The first of these to be inserted into the critical area is the isolation element which is composed of two antisniper teams—each team contains a countersniper and his spotter. These countersniper teams provide 360-degree surveillance of the objective area and restrict the sniper's movements by pinning him down with gunfire and by physical occupation of buildings adjacent to him.

The second group is the assault element which is organized into three teams: the search team, the close support team, and the general support team. The assault team conducts the search of the objective building and neutralizes the threat posed by a barricaded criminal or sniper. The remaining TOU teams are held in reserve for any contingency.

All Tactical Operations Unit personnel have been exposed to intensive training for operations in a built-up urban area. This training includes regular military maneuvers, specially modified for police purposes, extensive firearms training, and tactical exercises in multifloored structures, including rappelling. In order to assure the rapid placement of isolation and assault teams in congested urban areas, plans are being made to conduct rappelling exercises from helicopters onto obstructed rooftops.

All antisniper and civil disturbance equipment is maintained at a centrally located headquarters. This insures the maintenance of continuous security of all weapons and equipment and provides a secure assembly area for all Tactical Operations Unit personnel. It is the location where all personnel assemble when called to duty in an emergency situation and where briefings and assignments are made.

The unit is now in the process of conducting an analysis of all key terrain features in the Birmingham area to provide advance knowledge of certain locations which have great potential for occupation by snipers. For purposes of antisniper operations a key terrain feature is defined as any building or installation which, if held or occupied by a sniper or snipers, would serve to put the TOU at a tactical disadvantage. A terrain analysis involves the extensive use of aerial photographs taken from both perpendicular and oblique angles. The aim is to provide a contingency plan of attack for every key terrain feature within the Birmingham area. The data with respect to each location in such an analysis include, but are not limited to, the following: identification

Members of the TOU canine unit are shown during a retraining session.

of all covered avenues of approach, exit points from the building, the location and range to adjacent dominating terrain features, floor plans, likely entry points for assault units, information regarding a sniper's possible targets of opportunity, locations for the placement of countersniper teams, locations of preassault assembly areas, medevac points, and location of power plants within the objective building. In short, every effort is made to provide antisniper personnel with as much advance knowledge of an objective as possible.

Training for Tactical Unit Operations

Physical conditioning, mental discipline, and training in tactical operations are prerequisites for success of personnel in the unit. The aim of the unit's training program is to instill confidence in each officer rather than to develop an elitist attitude so prevalent and so undesirable in many specialized units. To this end controlled coordinated operations, gunfire discipline, and self-control are heavily stressed. This policy has been established in the belief that unless the special resources available to tactical units are employed with the utmost professional skill short-run goals may be achieved at the expense of long-term alienation of the community.

All members of the TOU are required to meet minimum physical standards and are tested quarterly in order to maintain membership. The examination consists of four trials: a mile run in 8 minutes or less, 20 continuous pushups, 30 continuous situps, and 10 leg raises. In addition to the physical standards, each officer has for some time participated in the advanced karate program at the gym in the TOU's headquarters.

Proficiency in the use of the variety of offensive and defensive weapons, as well as in operating the department's special vehicles, is a requirement. Weekend marksmanship training is conducted on a semiannual basis at nearby military installations. In addition, countersniper isolation teams are required to have advanced marksmanship training.

Abandoned multifloored structures provide the unit with a training site for the building searching and clearing exercises incident to its operations. These exercises are intended to provide all personnel with the most realistic settings for gaining experience in all facets of countersniper and barricaded-criminal operations.

Fast, efficient communication is imperative in the effective deployment of unit personnel at the scene of operations. Each member of the unit has multichannel portable radios, in addition to regular police band radios, in their vehicles. During an emergency requiring tactical operations, one communication channel is assigned for the exclusive use of the unit. This allows the unit to function without interference from the routine business of the department, while at the same time maintaining communication with police headquarters.

The personnel of the TOU are furnished blue coveralls and baseball-type caps for a work and training uniform. A special patch was designed for this unit to be worn on the work uniform, as well as the regular police uniform. The members of the unit take great pride in this symbol, and it adds much to the esprit de corps of the unit.

Summary

Based on the Birmingham experience, the following are suggestions for success with a Tactical Operations Unit:

1. Select mature individuals with initiative for the Tactical Operations Unit. Psychiatric examinations, if available, may prove helpful in selecting men with the finest emotional and mental traits.

2. Speed and accuracy in gathering and dispensing information to meet a crisis is essential. An analytical capability should be developed to assemble intelligence and assess results of operations.

3. Provide written policy and guidelines to govern deployment, behavior, and activities of the unit.

4. In training and in performance, emphasize the restraint required of law enforcement in a democracy to avoid it and TOU gaining a "Gestapo" image.

5. Provide the best equipment and training available.

6. Review constantly, with a total command staff, this special enforcement unit's operations, to assess its departmental worth and its acceptance by the community.

Rappelling from buildings (as shown) is included in the intensive training of all TOU personnel.

THE EXERTION COURSE

Despite the increasing sophistication of police sciences and the tendency to rely more and more on special purpose items in the police arsenal, the sidearm remains the most important weapon available to the law enforcement officer today. In recognition of this fact, most police agencies continue to emphasize use of the sidearm in their firearms training programs.

Unfortunately, however, most handgun training courses, as other firearms courses, are limited in subjecting the student to the realism of the actual gunfight. Far from the ideal conditions usually enjoyed while training on the firearms range, the law enforcement officer, when facing an adversary who intends to kill him, will likely find himself confronted with an entirely different set of circumstances—lighting may be poor, footing may be uncertain, and terrain may be uneven. But most important, he will be forced to shoot while under severe emotional and physical stress. Products of this stress—rapid heartbeat, hurried and irregular breathing, and muscle tremors—combine to make accurate shooting under these conditions extremely difficult.

The simulation of genuine emotional stress during training is difficult and can be accomplished only to a limited degree. Physical stress, however, can be more easily induced into firearms training and its effects convincingly demonstrated.

The Exertion Course was developed by the FBI Academy Firearms Training Unit to familiarize law enforcement officers with problems encountered while shooting under stress occasioned by strenuous physical activity. It is an advanced revolver course for the student who has mastered target and combat shooting and who is aware of his ability under normal shooting conditions.

Shooters line up facing their targets at the target line. On command from the control tower, they execute a left face and begin running a route which is approximately 235 yards.

When all shooters have reached the spot on the 25-yard line opposite their targets and the command to fire is given from the tower, each shooter draws his weapon, assumes the point-shoulder position, and fires five rounds double action. He then immediately drops to his strong knee, reloads with five rounds, and fires five rounds double action from the kneeling position. He then unloads and holsters an empty weapon before standing up.

Standard silhouette targets are used and scoring is accomplished by multiplying the actual K–5 value of hits by 2 for a possible score of 100. Only hits in the K–5 area are counted.

There is no mandatory time limit for the two positions or for the completion of the course; however, the shooters are urged to fire quickly as if actually involved in a combat situation. They are informed of the time elapsing in 5-second intervals after the command to fire is given.

Point-shoulder position.

Kneeling position.

Modified point-shoulder position using two hands.

Inasmuch as execution of this course involves running with a loaded weapon, safety must be emphasized before and during firing. Specifically, students should be cautioned to exert pressure on the sidearm with the elbow while running to prevent inadvertent loss of the weapon.

Results of the course have indicated that shooters in excellent physical condition fire rapidly and have only a slight decrease in proficiency after exertion. On the other hand, shooters who are not in good physical condition have a much greater reaction to exertion. Generally, they fire slower, and accuracy is decreased considerably. Comparative accuracy has decreased in these latter cases as much as 80 percent.

Shooters who experience severe reaction to exertion have difficulty in assuming a crouched position, breathing, and bending from the waist. Leg and arm tremors can result. The supporting arm may be used to steady the shooting arm in the kneeling position.

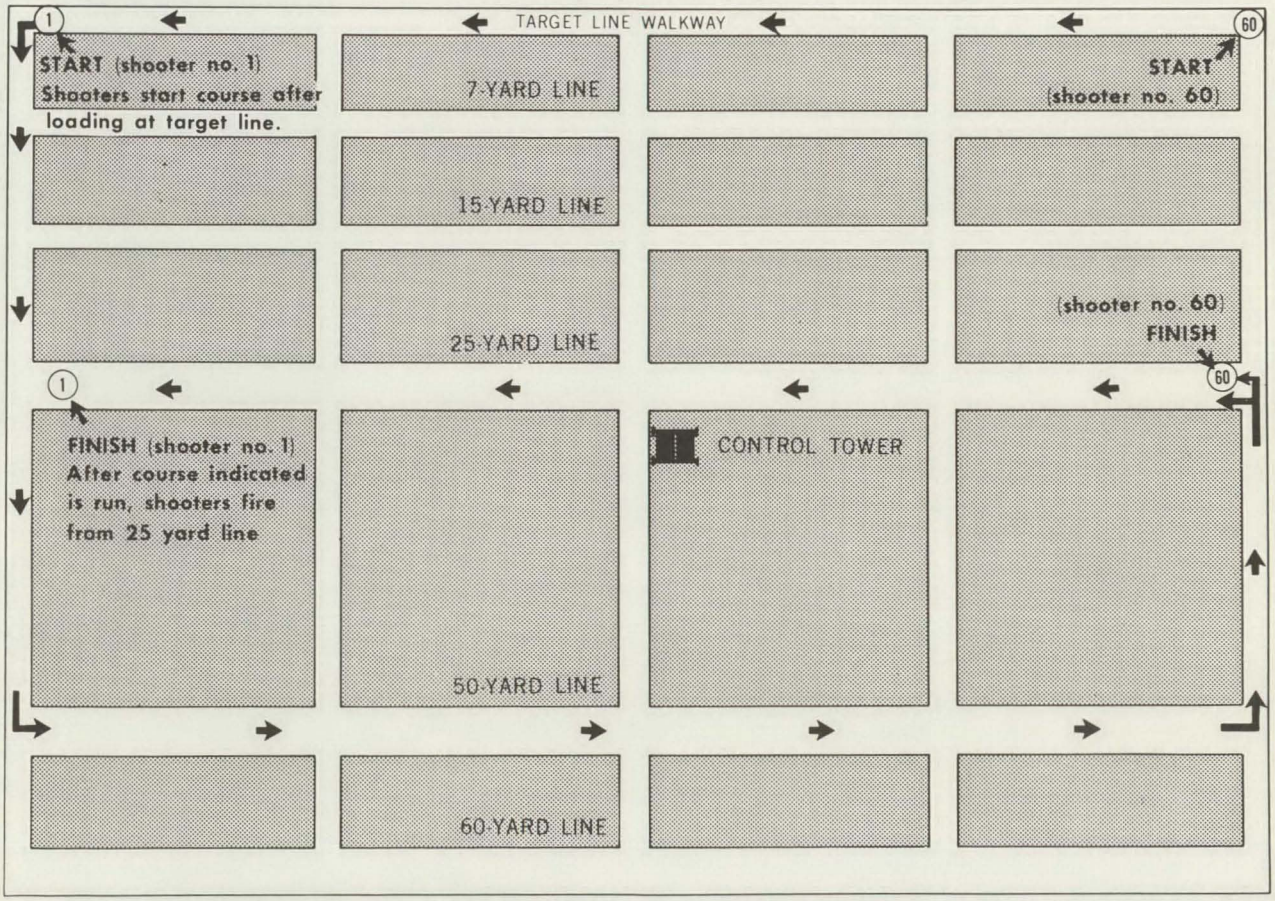
The tighter the grip, the tighter the groups of hits on the target. Attempting to reduce arm tremor by relaxing the grip results in wild shots. Waiting until the sights stop moving as a result of tremor and heavy breathing will only delay the shots, for similar heavy tremors continue in the vast majority of cases. Tremors continue with some shooters for as long as 2 minutes, which obviously is too long to delay shooting when in an unprotected position.

Physical stress greatly affects small muscle groups in hands and fingers, as evidenced by difficulty experienced in reloading after exertion.

As a basic training vehicle, the Exertion Course is well-suited to modification to provide specialized training for tactical units. For instance, the student can be armed with a shotgun, rifle, or submachinegun instead of a handgun and required to wear items such as a uniform, gas mask, and/or body armor to more closely approximate the stress he will encounter while functioning as part of his special unit.

The Exertion Course is an invaluable element of a combat firearms training program because it demonstrates to each student the irrefutable need for maintaining a high level of physical conditioning in addition to firearms proficiency. An added feature of the course is that it can be fired by any law enforcement agency which has access to a firearms range without the need for special equipment.

Route traveled by shooters.



In the north central part of North Dakota's vast plains lies an immense Strategic Air Command (SAC) installation, Minot Air Force Base. This giant complex, with a total population of more than 20,000, has an important mission in maintaining peace in the world. Large B–52 "Stratofortress" bombers shadow the flight line, ready to be airborne at a moment's notice. KC–135 "Stratotankers" have full bellies of fuel and are ready to fly to some rendezvous point to refill thirsty aircraft. Aerospace Defense Command F–106 "Delta Dart" fighters sit like coiled springs waiting to be flung into the sky in the event of an enemy attack. Within 12,000 square miles surrounding the base are the most advanced solid fuel Minuteman missiles placidly waiting in underground concrete casings, bearing a deadly potential if necessity brings them to life. All these weapon systems are important in maintaining a balance of power for the Free World.

Security Systems

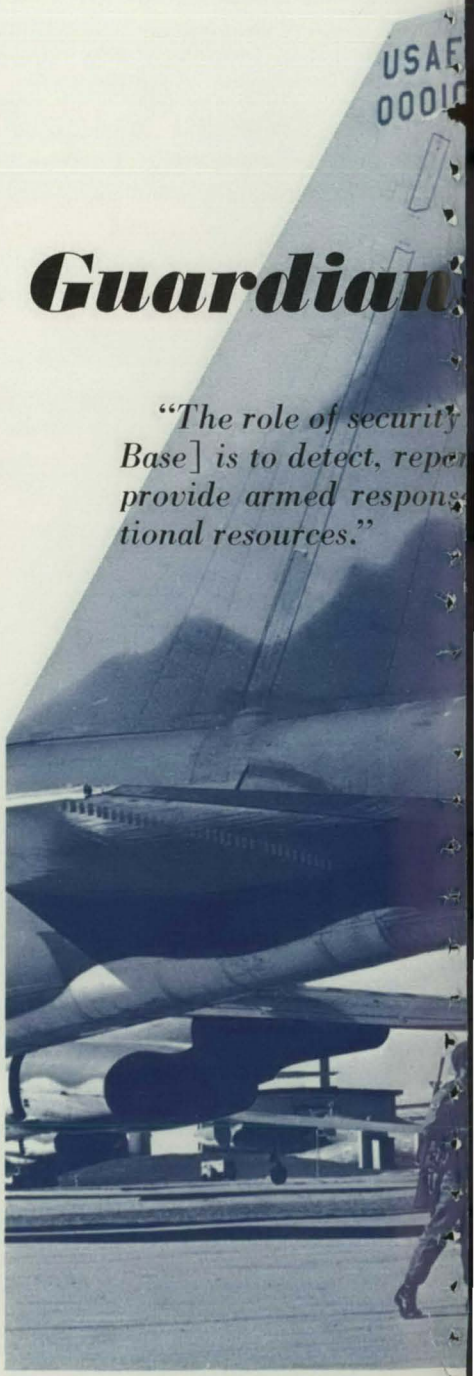
Because of their significance, a highly technical security system is required, and close coordination with local and Federal law enforcement and related functions are jobs of the 91st Security Police Group. The group is comprised of two squadrons, the 91st Security Police Squadron and the 91st Missile Security Squadron.

Because of the magnitude of the mission, over 1,000 highly trained security police are assigned to the group. It is comprised of three major operational branches: missile security, aircraft security, and law enforcement. Other assigned administrative and support elements such as training, supply, armament, and equipment insure the mission is accomplished efficiently.

The missile and aircraft security operations maintain overall security of the sophisticated, highly technical weapon systems assigned to the base. It functions on the concept that a state of security must be achieved for operational resources by deterring the enemy from employing hostile operations against the Air Force weapon systems.

The Missile Security Squadron has the largest mission within the group. Its personnel handle the varied and diversified jobs that are required to assure that adequate security is maintained at all times for the 91st Strategic Missile Wing. The majority of these personnel work within the missile complex which contains the Minuteman missiles. The complex is located in seven counties and covers an area of approximately 12,000 square miles.

The Aircraft Security Branch works only on the base and is responsible for the security of the B–52 bombers and KC–135 refueling tankers assigned to the 5th Bombardment Wing, the F–106 fighter interceptors assigned to the 5th Fighter Interceptor Squadron, and a munitions storage area. Personnel work around the clock to maintain continuous security over these important elements. Assuring that everything is functioning correctly is a Central Security Control (CSC), the Aircraft Security Control Center, which has a hand on the security pulse of the overall aircraft security operation.



A member of aircraft se

for Peace

ces at Minot Air Force entify, neutralize, and threats to vital opera-

guards giant B–52 bombers.

Basically, it is the responsibility of security personnel to detect and report to CSC any unusual or suspicious actions they may observe. Security Alert Teams (SAT) are dispatched to check out the situation and take appropriate action; however, it doesn't stop there. All unusual events are reported by CSC to the base command post and, through them, to the Strategic Air Command. If, upon evaluation, any incident is serious enough, then reinforced, rapid defensive measures are initiated to assure that protection of the vital resources is maintained. This could result in expansion from normal security to emergency security operations. The important factor is to insure that the aircraft can be launched immediately.

Like missile security, the aircraft security operations also have electronic security surveillance systems. These systems are installed around highly sensitive restricted areas and consist of line sensors designated to detect an intruder attempting to gain entry into the protected areas. Both visual and audio indications are received by a security policeman in a surveillance tower, who dispatches a SAT to the exact location where the alarm occurred. By the utilization of these surveillance systems, the number of security policemen previously required to physically guard the aircraft has been reduced. The Air Force Systems Command is presently working on a portable laser beam fence to further reduce tedious guard duty. This system will give an instant alarm when the beam is broken.

Law Enforcement

Law enforcement is one of the smallest branches within the group, yet it has a very important role in the mission and relates closely with civilian law enforcement functions. This branch's primary functions are protecting USAF resources and maintaining law and order on the installation. Protection includes those phys-

> ***"Law enforcement activities . . . include enforcement of Air Force standards of conduct, traffic control, on-base patrol, vehicle registration, visitor control, and investigation of accidents and minor incidents."***

By

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91st Security Police Group
Minot Air Force Base
Minot, N. Dak.

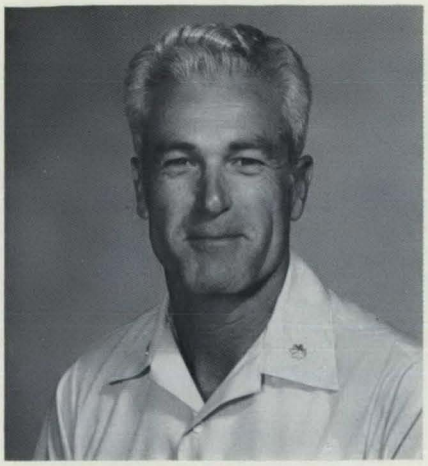
*Sergeant Moody retired from active duty with the Air Force in September 1974.

ical actions necessary to safeguard USAF nonoperational resources, that is, other than aircraft, missiles, et cetera, against loss or damage. Law enforcement activities also include enforcement of Air Force standards of conduct, traffic control, onbase patrol, vehicle registration, visitor control, and investigation of accidents and minor incidents. Additionally, a detention facility is operated which can house 11 prisoners.

The standards for dress and appearance for law enforcement personnel are necessarily high. They are readily identified by the distinctive uniform they wear. Many of their duties are performed in public areas where their conduct and appearance are subject to close scrutiny. They are expected to set the example for all other military personnel in dress, appearance, and bearing.

Basically, this branch operates like any civilian police department. The desk sergeant is the focal point of all activities. He dispatches all patrols, receives all complaints, and completes accident and incident reports. Additionally, he has radio communications with the Ward County Sheriff's Department, in the event their assistance is required, and with the Aircraft Security Control Center. All funds activities on the base are equipped with both a duress and night activity alarm. Both alarms are channeled to a control panel at the desk sergeant's area for monitoring. Further, this branch maintains close liaison with the police department in Minot, our nearest large city, located 13 miles south of the base.

To protect a serviceman's right against self-incrimination, the Air Force utilizes Article 31 of the Uniform Code of Military Justice. This article must be used when any military suspect is apprehended. Naturally, any civilians apprehended within the limits of the base are advised of their rights under the fifth amendment.



Lt. Col. Thomas E. Morris, Commander, 91st Security Police Group.

Suspects for "minor incidents" investigations are turned over to the Law Enforcement Investigation Section, which determines if the offense is minor or major in nature. The more serious cases are turned over to the Air Force Office of Special Investigation for more comprehensive investigation or referred to the Federal Bureau of Investigation, as appropriate. These are normally cases where the seriousness of the offense indicates that the investigation is beyond the capabilities and scope of the law enforcement branch.

Canine Program

The Military Working Dog Branch has 21 personnel assigned, and 15 of these are patrol dog handlers. Each handler and his dog receives 12 weeks of patrol dog training at Lackland Air Force Base, Tex. Dogs have been utilized in the Air Force for sentry work since shortly after World War II. At that time they were trained to respond only to their handlers, thereby emphasizing the psychological effect of a vicious dog. In 1968, the Air Force conducted a feasibility test to determine the advisability of utilizing the military dog in a manner similar to civilian police departments, that is, training the dog to be more easily controlled and to attack only upon command of the handler. As a result of the test, the Air Force adopted the patrol dog program in 1969 and extended the use of the dog to many additional functions in security police work. The overall aim in their utilization is to increase the security within sensitive areas and to better enforce law and order.

Experience has proven that the capabilities of a security policeman working with a military dog far exceed the capabilities of a lone human being. This capability is particularly useful when the senses of a security policeman are limited; also, the mere presence of a military patrol dog acts as a psychological deterrent to potential offenders. For these reasons, patrol dogs are recognized as a very effective and versatile security police aid. At Minot, the patrol dogs are utilized mainly in the munitions storage area; however, other duties include riding with the law enforcement patrols, checking buildings, escorting funds, and patrolling on foot on the base. The drug detection dogs are used to search dormitories and other facilities where illegal drugs may be hidden. These drug detection dogs

A patrol dog being taken through the obstacle course by his handler.

Central Security Control is the hub of aircraft security operations.

have proven to be very effective and successful.

Because the dogs must remain proficient at all times, many additional hours of training are given. While on post, the handler and his dog are frequently inspected and tested by simulated problems. In addition to insuring proper performance of duty, this training is most important in insuring a proper psychological attitude for the dog. When dogs, like humans, are only expected to perform under supervision, there is a tendency to relax at other times. Therefore, constant exercises develop interest and anticipation on the part of the dog and sustain its desire to maintain surveillance at all times. Lackland Air Force Base is now training dogs to detect explosives, and recently one of Minot's dogs graduated from this 9-week course.

Training

In order for a group of this amplitude to function, effective and efficient support must be maintained to insure that every aspect of the mission is accomplished. Some of the important support elements are training, arms and equipment, performance checks, and vehicle control. The quality of training has a direct and serious influence on mission accomplishment. Training is a continuous process in developing skills, knowledge, and attitudes. All training is designed to increase the efficiency of the group in performing its assigned mission. Each security policeman arriving at Minot receives 1 week of refresher training. Additionally, those security police assigned to Minuteman missile security receive 10 additional days of comprehensive training. Moreover, each security policeman is required to qualify with the weapons that he will be armed with while performing duties. Such qualification must be attained before a security policeman is assigned any duties.

Comprised of elite law enforcement and security personnel, the standboard section evaluates the job knowledge of all security policemen by written, practical, and oral examinations. Evaluations are often no-notice, and the evaluators grade the individual based on his knowledge. By the use of a standardization section, supervisors and the training section are made aware of weak areas, and corrections can be made or remedial training given.

Wing Security Control is the center of the missile security operation.

Conclusion

It takes a large security police unit with a lot of highly trained men, money, and sophisticated equipment to perform the important and complex security and law enforcement functions in support of the strategic and air defense missions at the huge Minot Air Force Base in North Dakota. The role of security forces is to detect, report, identify, neutralize, and provide armed response to threats to vital operational resources. Law enforcement personnel, on the other hand, protect all other Air Force resources on the base and maintain law and order. The capability of the security police at Minot is further enhanced by the cooperation and assistance provided, when required, by local, State, and Federal law enforcement agencies. By maintaining daily liaison with these agencies, this spirit of teamwork is sustained.

"The initial testing . . . was conducted in a gymnasium with trained personnel at each of eight stations with the final testing . . . given in the same order by the same personnel 14 weeks later."

Fitness Changes During a 14-Week Basic Law Enforcement Training Program

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The primary purpose of this study was to assess the initial fitness level of the law enforcement trainees in the program sponsored by the University of Illinois Police Institute at Champaign and to see what changes might occur during a 14-week training program. The 17 officer-trainees, ranging in age from 21 to 31 years, averaged 24.5 years of age, 71.5 inches in height, and 202 pounds in weight. Their employing agencies represented both municipalities and sheriff's departments within the State of Illinois.

These trainees received 38 hours per week of classroom instruction plus 1½ hours per week of physical activity in the gymnasium. This activity included hand-to-hand combat, disarming, use of a baton, and pugil stick wrestling, along with a few carryover gymnasium activities. Calisthenics were utilized for initial warmups. The entire physical activity program would be termed submoderate with some emphasis on physical conditioning.

During the 8th, 9th, and 10th weeks, the trainees left campus and returned to their respective departments throughout the State. The university program was continued from the 11th through the 14th week following their return to campus.

The initial testing (T_1) was conducted in a gymnasium with trained personnel at each of eight stations with the final testing (T_2) given in the same order by the same personnel 14 weeks later.

The Tests

(1) Cardiovascular fitness was assessed by the use of the sphygmograph pulse wave taken from the brachial artery of the left arm in a sitting position in a quiet, rested state, on a Cameron Heartometer. The area of the pulse wave reflects the volume of blood ejected on each stroke of the heart. A well-con-

ditioned cardiovascular system ejects a greater volume of blood during each stroke than a poorly conditioned system, hence, a greater pulse wave area.

(2) The maximum chest girth minus the abdominal girth gives a body measurement value indicative of body structure and condition. When the expanded chest girth is greater than the abdominal girth, a superior relationship is indicated.

(3) Adipose (fat) folds measures were taken on the cheek, abdomen, hip, buttock, front thigh, and rear thigh with calipers. These six measure sites were added together to give a total measurement in millimeters of adipose tissue (fat folds).

(4) Shoulder flexibility was measured by having the subject lie face down on the floor, arms extended shoulder width, holding a ¾-in dowel in the hands. The extent of his ability to raise his straightened arms vertically with his forehead on the floor was measured from the dowel to the floor in inches.

(5) Trunk extension backward was measured by having the subject lie face down on the floor, his hips and legs held down, and then raise his chin as high as possible with his hands behind his neck. The measurement was made from the chin to the floor in inches.

(6) Trunk flexion forward was measured by having the subject sit on the floor with legs kept straight and feet 18 inches apart and bend forward and bring his forehead as close to the floor as possible with his hands behind his neck. The closest measurement to the floor was recorded in inches.

(7) Hand strengths were measured by a handgrip dynamometer. Leg and back strengths were measured by a Medart dynamometer. These four strengths were added together to give a total strength figure. Then the weight of each man was divided into his total strength to give a ratio of strength per pound of his body weight.

(8) Performance on a 16-ft long beam, 2 inches wide and 8 inches from the floor, was used to assess balance. These activities and their scoring are described elsewhere in this article.[1]

(9) Agility run, where the subject ran a prescribed pattern around four obstacles, was timed with a stopwatch, as described elsewhere.[2]

(10) Power was assessed from the results of the vertical jump, measured in inches, and of the chins and dips, measured by the number, described elsewhere.[3]

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Results

Cardiovascular and Body Measurements

Initially, the law enforcement group mean sphygmograph pulse wave area measure was 22.1 mm^2 (30 S. S.[4]) at T_1 which was at the 12th-percentile level and improved to 25.8 mm^2 (34 S. S.) at the 18th-percentile level. Both measures were far below the population average and demonstrate a gross inadequate cardiovascular fitness level for the group of officers.

The maximum chest girth minus the abdominal girth value at T_1 was 5.4 in (59 S.S.) and at T_2 was 4.7 in (55 S.S.), a loss of four standard scores. This was due to an average increase of almost one inch in abdominal girth. This insignificant change was probably due to a more relaxed posture during the second round of measuring.

Initially, the total fat folds mean at T_1 was 154.5 mm (42 S.S.), and at T_2, it improved to 144 mm (47 S.S.) with both means still below normal. The law enforcement group had excess adipose tissue when compared to table values using already overfed and underexercised males, placing the group in an unfavorable position. Excessive fat folds (obesity) is a form of malnutrition which Mr. Cathey discussed in his article, "Why Weight?"[5]

Shoulder extension on T_1 gave a mean of 15 in (67 S.S.), and at T_2, it was somewhat less at 14.1 in (60 S.S.). These values were considerably above average.

Trunk extension backward mean value at T_1 was 15.9 in (62 S.S.), and at T_2, 15.1 in (62 S.S.), indicating no apparent change with both values above average.

Strength and Motor Performance

The right hand grip T_1 mean was 115 lb (47 S.S.), and at T_2, there was a slight regression to 112.6 lb (45 S.S.). All officers were dominant in the right hand. There were items such as pugil stick wrestling that required the use of both hands, but these did not seem to improve the nondominant hand. Both means were below average score values.

The left hand T_1 mean was 104 lb (47 S.S.), and at T_2, it improved to 107 lb (49 S.S.). Both means were just below average.

The back lift T_1 mean was 427.6 lb (66 S.S.), and at T_2, it improved to 446.5 lb (71 S.S.). Both measures were well above average with T_2 showing 5 S.S.'s improvement.

Leg strength at T_1 was 589.6 lb (67 S.S.), and at T_2, it improved to 642.9 lb (73 S.S.), an improvement of 6 S.S. Both means were well above the average.

The summation of the four strength measures gave a total mean at T_1 of 1,245.6 lb and a T_2 mean of 1,303.3 (72 S.S.). Both means were above average, reflecting good muscular strength *per se*.

Strength divided by body weight gives a meaningful quotient more so than pure strength *per se*. An individual can be very strong and also overweight; however, when the latter is due to excessive adipose tissue, it lowers the ratio of strength per pound of body weight. The law enforcement group was below average in this ratio; that is, they were excessively fatty. Their strength means were above average. When these were combined into a strength per pound of body weight ratio, at T_1, there was 6.2 lb of strength per pound of body weight (52 S.S.), and at T_2, there was a slight loss of fat and a gain in total strength giving an improved ratio of 6.4 lb of strength per pound of body weight (54 S.S.). These strength per pound of body weight values were not comparable to total strength means, which were over 70 S.S. The strength per pound of body weight ratio would improve if there was a considerable weight loss (fat) even without an accompanying improvement in strength.

The balance beam performance gave a T_1 mean score of 14.2 (41 S.S.) and at T_2 a slight improvement to 17.1 (47 S.S.). However, both measures were below normal and indicate a greater need for improvement.

The vertical jump, which is a measure of explosive power and correlates very highly with the ability to run a 100-yd dash, had a T_1 mean of 18.8 in (57 S.S.) and showed a slight improvement at T_2 to 19.9 in (59 S.S.). Both values were above average.

In chinning ability, both means were below average. At T_1, the mean was 3.5 (42 S.S.), and at T_2, 4.8 (48 S.S.). This was an improvement of 6 S.S. These values indicated a need for improved development in upper body strength as well as a need to lose some weight in order to handle one's body better in acts of climbing

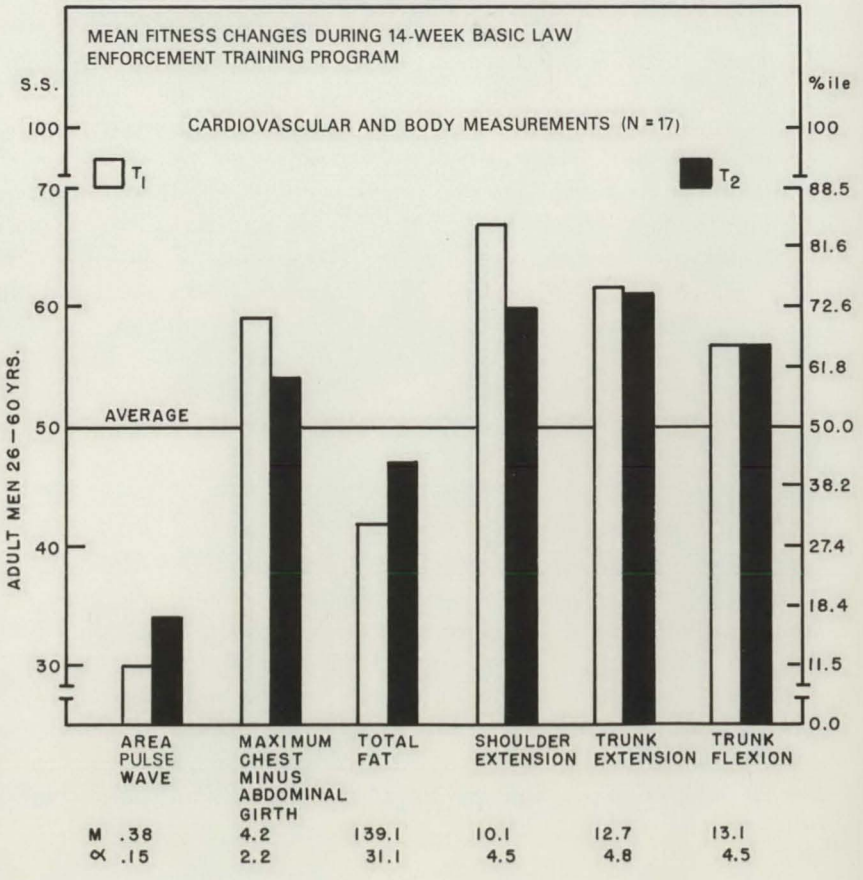
In dips on a parallel bar, the mean number for T_1 was 6.3 (52 S.S.), and an improvement was made in T_2 with a mean of 7.6 (57 S.S.). Both of these values were slightly above the population average and were classified as good.

The agility run at T_1 had a mean of 19.40 s (62 S.S.) and at T_2 improved slightly to 19.06 s (64 S.S.). Both measures were above average, indicating excellent ability to change body direction with speed and ease.

Summary

An assessment of the physical fitness of 17 male law enforcement officer-trainees is shown in figures 1 and 2

FIGURE I



Symbol Definitions

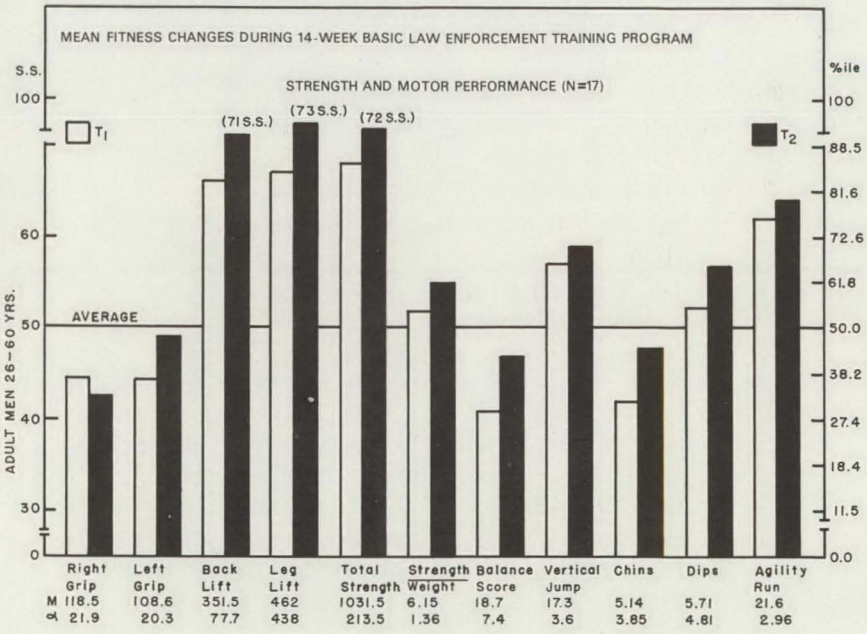
S. S. = Standard Score. The standard score is used as a 100–point denominator score computed according to the statistical equation: $\frac{6\ S.D.}{100}$ = standard score (100 units). There are equal increment units over a range of six standard deviations starting with the mean as 50 S. S.

%ile = that point in the distribution above which, and below which, a certain percent of the cases fall.

M = mean, or the arithmetical average. The sum of all the scores divided by the number of scores. This is the most commonly used and most reliable measure of central tendency.

σ = sigma, or the standard deviation used to indicate the variability of scores or measurements. This constitutes the most important and most reliable measure of variability. In a normal curve, the standard deviation gives the limit of the middle 68.26 percent of the cases; 34.13 percent either side of the mean.

FIGURE II



and has been presented in the results. The purpose was to record their initial physical fitness status and then, with the limited program of 1½ hours per week, determine what changes might be brought about.

Initially, the men had poor cardiovascular efficiency and improved very little. To promote significant changes, a program of moderate or strenuous physical activity is needed three times a week for no less than 45 minutes each session.

In fat fold measures of adipose tissues, the candidates were overweight with the obvious need to reduce. More output of exercise and less intake of calories is needed.

In all three measures of flexibility, the group was satisfactory.

Handgrip strengths were below average and a need for improvement was evident. Their leg and back strengths were very good. Their strength per pound of body weight would automatically improve by maintaining the same strength and by losing excess weight.

Balance needed improvement in both static and dynamic responses.

Vertical jump, which indicates quickness, was very good. Improvement in chinning ability is a necessity which can be done by improving upper body strength along with some loss of weight.

"Cardiovascular fitness is most difficult to attain and maintain, but it is the category of fitness that is most necessary."

The dips were good and the ability to run and dodge among objects in the agility run demonstrated an excellent attribute needed in the law enforcement function. However, agility is short lived when there is a lack of stamina fitness. When a crisis occurs and in the apprehension of offenders, there is a demand for stamina, strength, and agility. It is not a good image for law enforcement should an officer fail due to poor physical conditioning or strength. Cardiovascular fitness is most difficult to attain and maintain, but it is the category of fitness that is most necessary.

Current tests indicate that for many middle age begins at 18 years of age where the fitness spectrum from 18 to 70 years of age is charted in each fitness test. Fitness tables show downward trends unless individuals supplement their lives at least three times a week with some vigorous activity. Otherwise, premature physical deterioration will occur. A systematic program is necessary. Concurrent findings are also revealed by Barry et al.[6] and by Bender et al.[7]

Recommendations

Physical fitness tests should be incorporated into the selection system for law enforcement trainees. If current fitness is not satisfactory (at 60 S.S. levels), hiring physically unfit individuals will hamper the efficiency and image of the force. Because individuals may be hired, there is no indication that they will automatically change their activity habit and become fit if they are unfit at the outset.

Yearly physical fitness tests should be given in order to forewarn those who drop below desired standards so they may take the necessary steps for self-improvement.

Physical fitness tests should be considered as a part of the requirement for promotion. Medical examination is only the first step; physical fitness tests should follow. To be free of disease is not enough. Standardized fitness tests should be used as a valuable guide to the selection, retention, and promotion of men and women on any police force.

FOOTNOTES

[1] Cureton, Thomas K., "Physical Fitness Appraisal and Guidance," St. Louis, C. V. Mosby, 1947.

[2] Ibid.

[3] Ibid.

[4] Standard score. The standard score is used as a 100-point denominator score computed according to the statistical equation: $\frac{6\ SD}{100} =$ standard score (100 units). These are equal increment units over a range of six standard deviations starting wth the mean as 50 S.S.

[5] Cathey, Richard E., "Why Weight?" FBI Law Enforcement Bulletin, Oct. 1971.

[6] Barry, A. J., et al., "The Energies of Police Officers," Police, May–June 1963.

[7] Bender, J. A., et al., "The Problems of Physical Conditioning in Police Work," The Police Chief, July 1963.

FBI APPROACH

(*Continued from page 9*)

The New FINDER II Readers

In the main, the new readers will perform the same functions in the same manner as the prototype. However, certain subsystems will be changed to provide for high-volume data processing operations. These changes are:

(1) The card handler has been redesigned to load and unload fingerprint cards at high speed without any individual handling by a human operator.

(2) The card handler will provide for optical character recognition (OCR) of a process control number (PCN) printed on the cards in order to automatically identify each card and its data. Provision is made for keyboard entry of PCN's that are not readable by OCR.

(3) Provision is made in the card handler for "Reject" bins for cards where the PCN is unreadable or the fingerprints on the card are too poor for processing.

(4) Minutiae and ridge direction data will be transmitted to a minicomputer, called the "data output processor (DOP)," which will perform the registration and classification steps.

(5) The DOP will transfer registered minutiae and digital classification data to the next processing step by means of a data communications link.

REFERENCES

[1] Wegstein, J. H., "Manual and Automated Fingerprint Registration," *National Bureau of Standards Technical Note 730*, U.S. Government Printing Office, Washington, D.C., June 1972.

[2] ———, "The Automated Classification and Identification of Fingerprints," *Proceedings of a Conference on the Science of Fingerprints*, Home Office, London, England, September 1974.

[3] ———, "Automated Fingerprint Identification," *National Bureau of Standards Technical Note 538*, U.S. Government Printing Office, Washington, D.C., August 1970.

[4] Stock, R. M., "Automatic Fingerprint Reading," *Proceedings of the 1972 Carnahan Conference on Electronic Crime Countermeasures*, University of Kentucky, Lexington, Ky., April 1972.

[5] Banner, C. S., "The State of Development of the FBI's Automatic Fingerprint Identification System," *Proceedings of the 1972 International Symposium on Criminal Justice Information and Statistics Systems*, New Orleans, La., October 1972.

Continued Next Month

(UCR, 1973, pg. 37)

POLICE PATROLS

In 1973, 85 percent of the police patrol assignments utilized in cities were vehicle patrols, and 15 percent were foot patrols. In cities with over 250,000 inhabitants, 73 percent were vehicle patrols, and 27 percent were foot patrols. In the areas covered by sheriffs and county police departments, 94 percent were vehicle patrols, and 6 percent were foot patrols.

The distribution of one- and two-man vehicle patrol assignments for all cities indicated that 86 percent of the vehicle patrols during the day involved one-man cars, 76 percent during the evening hours, and after midnight, 74 percent.

(UCR, 1973 pg. 26)

AUTOMOBILE THEFT

In 1973, 923,600 motor vehicles were reported stolen. This is a 5-percent increase compared with 1972 when 882,200 motor vehicles were reported stolen.

Geographically, the volume of auto theft was highest in the Northeastern States which reported 31 percent of the total number, followed by the North Central States with 25 percent. The Southern States reported 23 percent, and the Western States reported the remainder. Seasonal variations disclosed the volume of auto theft was highest during the month of October.

(UCR, 1973, pg. 15)

ROBBERIES

The volume of estimated robberies in 1973 increased by 7,890 offenses from the prior year. There was an estimated total of 382,680 robbery offenses committed in the United States in 1973.

The heaviest volume of offenses occurred in the Northeastern States with 33 percent of the total. The North Central States experienced 25 percent, the Southern States 24 percent, and the remainder were reported in the Western States.

This is the conclusion of a three-part article. Parts I and II appeared in the November and December 1974 issues of the BULLETIN, respectively.

Investigative Detention

By
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Washington, D.C.

III. The Frisk

A. Authority to Frisk

1. Constitutional Authority

Under what circumstances can a police officer frisk a suspect whom he has stopped? *Terry* provides the answer.

"(W)here a police officer observes unusual conduct which leads him reasonably to conclude in the light of his experience that criminal activity may be afoot and that the persons with whom he is dealing may be armed and presently dangerous, where in the course of investigating this behavior he identifies himself as a policeman and makes reasonable inquiries, and where nothing in the initial stages of the encounter serves to dispel his reasonable fear for his own or others' safety, he is entitled for the protection of himself and others in the area to conduct a carefully limited search of the outer clothing of such persons in an attempt to discover weapons which might be used to assault him." 392 U.S. 1 at 30 and 31.

This is the Court's own summation of its holding in *Terry* that a "frisk" is a "search" within the meaning of the fourth amendment. Therefore, the frisk must be reasonable or it is unlawful, and this quotation is the Court's statement of the general rule as to what constitutes a reasonable frisk by a police officer. Examine the rule closely and observe the manner in which Officer McFadden's actions in *Terry* fit within it:

(1) The officer must make a lawful stop.

Without a lawful stop there can never be a lawful frisk. See *United States* v. *Davis*, 459 F. 2d 458 (9th Cir. 1972).

(McFadden reasonably suspected Terry and his companions were "casing a store.")

(2) The officer must believe reasonably the person(s) stopped may be armed and dangerous.

It is clear that an officer cannot frisk every person he has stopped. Of the persons he stops he can frisk *only* those he reasonably believes may be armed and present an immediate danger to him or others.

(McFadden thought the men were planning to rob the store. Robbers are often armed.)

Law enforcement officers of other than Federal jurisdiction who are interested in any legal issue discussed in this article should consult their legal advisor. Some police procedures ruled permissible under Federal constitutional law are of questionable legality under State law, or are not permitted at all.

(3) The officer must identify himself.

(McFadden identified himself as a police officer.)

(4) The officer must make reasonable inquiries.

(McFadden asked the men their names.)

(5) The officer's concern for his or others' safety is not dispelled.

(In response to McFadden's question, the men "mumbled something.")

It will not do to satisfy some or most of these conditions. All must be satisfied.

If all five prerequisites are met, then

(1) the officer may pat down the outer clothing

(McFadden grabbed Terry, spun him around, and patted down his coat.)

(2) to feel for weapons

The sole purpose of the frisk is to discover if the person stopped possesses a weapon. The frisk has *nothing* to do with searching for evidence. *Sibron.*

(3) and, if he feels what he thinks may be a weapon, he may intensify his search and determine the nature of the object.

(After feeling an object he thought was a pistol, McFadden reached inside the lining of Terry's coat and seized it. McFadden did not reach inside the coat of one of Terry's companions because he did *not* feel a weapon while patting him down.)

A frisk reasonably conducted, as was McFadden's, does not violate the fourth amendment. For a frisk to be reasonable, the general rule set out by the Court in *Terry* should be followed whenever possible.

Situations will arise in which the general rule cannot be followed strictly, and if there is a valid reason for deviating from the expressed standard, the frisk will be held to be reasonable.

For example, in *Ballou* v. *Commonwealth*, 403 F. 2d 982 (1st Cir. 1968), officers received a tip that certain named persons were presently at a particular location and were armed. The police recognized the names given to them as members of a criminal element responsible for several gangland slayings in the area. Immediately upon arriving at the scene and confronting the men, officers frisked them and a weapon was discovered. The general rule was not followed. "Reasonable inquiries" were not made, but the court found the deviation from the general rule reasonable. Because of the reputation of the men involved, it might have proved disastrous to delay frisking. The answer to the officer's questions could have been a gunshot.

2. Statutory Authority

See Part II, A, 2.

B. Facts Justifying Frisk

1. In General

The sole justification for allowing an officer to conduct a limited search, that is, a frisk, for weapons is to afford the officer some protection for his safety or that of others in the area. Thus, the officer must have reason to think the person he has stopped may be armed, and must be prepared to testify as to those facts which led him to think as he did, in the same manner as the officer must justify stopping a person by testifying as to the facts which led him to suspect criminal activity was afoot.

One test must be satisfied to justify the stop; another must be met to allow a frisk. For the stop there must be a sufficient degree of evidence supported by facts reasonably to suspect criminal activity is afoot. For the frisk there must be a sufficient degree of evidence supported by facts to believe that the person stopped may be armed and therefore dangerous to the officer or others in the area. Since it is reasonable to stop the person, and it is reasonable to believe the person may be armed, it is reasonable for the officer to frisk the person.

Any facts or set of facts which can lead to this reasonable belief that the person stopped may be armed can be considered by the officer as he makes his decision.

The officer can consider:

(1) The type of crime he suspects is, has, or is about to be committed. Armed robbery—*Terry, Young* v. *United States*, 435 F. 2d 405 (D.C. Cir. 1970); possession and attempted sale of a gun—*Meade* v. *Cox*, 438 F. 2d 323 (4th Cir. 1971).

(2) The reputation of the person stopped. Known hoodlum involved in gangland slayings—*Ballou* v. *Commonwealth*, 403 F. 2d 982 (1st Cir. 1968); see also *United States* v. *Harris*, 403 U.S. 573 (1971).

(3) Any other relevant fact, such as the time and place of stop—*Adams*—or, seeing a bulge—*United States ex rel. Jackson* v. *Warden of Green Haven Prison*, 255 F. Supp. 33 (S.D. N.Y. 1966); *United States* v. *Marshall*, 440 F. 2d 195 (D.C. Cir. 1970), cert. denied, 400 U.S. 909 (1970). Early morning hours in a high crime area—*Henderson* v. *Beto*, 309 F. Supp. 244 (N.D. Texas 1970).

It is not necessarily any one fact which justifies the frisk. Like the justification of the stop, it is the sum total of all the relevant facts known to the officer at the instant the frisk begins.

2. Sources of Facts Justifying Frisk

The source of the facts considered by the officer can be himself, his personal observations and knowledge, as in *Terry;* or a third person, as in *Adams* where an informant reported a person sitting in a car had a pistol concealed at his waist. Hearsay information can be used to justify a frisk just as it can be used to justify a stop,

so long as there is some reason for believing the hearsay.

See Part II, B, 1, b.

3. Special Circumstances

Given appropriate and very compelling circumstances, a frisk may be conducted routinely without a showing that the officer thought a particular person was armed. Limited searches of airplane passengers are a common example. *United States* v. *Epperson*, 454 F. 2d 769 (4th Cir. 1972), cert. denied, 406 U.S. 947.

In *Downing* v. *Kunzig*, 454 F. 2d 1230 (6th Cir. 1972), the court upheld a regulation permitting Federal building guards to make a cursory search of briefcases and packages for the purpose of assuring that no weapons or explosives were brought into the building.

Similarly, visitors to the Supreme Court Building in Washington, D.C., are required to pass through a magnetometer and the handbags of women visitors are searched for weapons.

C. Mechanics of Frisk

1. Intensity of Frisk

The frisk is a two-step procedure. The first step is to pat down the clothing of the person lawfully stopped. At the conclusion of the pat down comes step two at which the officer can do one of two things. If he has not felt anything which he thinks could be a weapon, he must stop searching. If he thinks he has felt a weapon, he may intensify his search by doing whatever is reasonable and necessary to find out whether or not the object is in fact a weapon. At the moment he determines the object is not a weapon, he must terminate the search. If he ascertains the object is a weapon, he may seize it. *Terry*.

Thus a frisk reasonable in its inception can become unreasonable by becoming too intense without justification. *Sibron* v. *New York*, 392 U.S. 40 (1968). In *Del Toro* v. *United States*, 464 F. 2d 520 (2d Cir. 1972), eight police officers, possessing an arrest warrant for an individual charging him with sale of narcotics, surveilled that person for several hours and observed him move from one establishment to another. Del Toro was his constant companion throughout this period of time. The officers moved in, arrested the subject, and patted down Del Toro.

> ***". . . a frisk reasonable in its inception can become unreasonable by becoming too intense without justification."***

So far all was well. The stop was reasonable and the initial pat down of Del Toro was reasonable because one officer, experienced in investigating narcotics activity, testified he knew from experience that narcotics dealers often are accompanied by armed body guards. The court found it was reasonable for the officers to believe danger was present even though eight officers were on the scene because Del Toro could have attempted to allow the arrestee to escape and even though the attempt likely would have been unsuccessful, it would place the officers in danger.

During the pat down a soft object was felt in the handkerchief pocket of Del Toro's suit coat. An officer reached in the pocket, seized it, and determined it to be narcotics. This evidence, the narcotics, was seized illegally because there was no justification for reaching into the pocket. The initial frisk was reasonable, but the second step was not.

The officer testified he thought the object he felt could have been a razor blade. The court expressed the thought that when an experienced narcotics officer feels a soft package in the coat pocket of a person in the company of a known seller, that officer thinks he has felt narcotics, not a razor blade, as is indicated, the court continued, by the fact that while a razor blade could have been hidden almost anywhere, for example, in the wallet, the officer did not look in the wallet. *United States* v. *Gonzalez*, 319 F. Supp. 563 (D. Conn. 1970), is another "razor blade" case reaching the same result.

Unfortunately, lethal weapons can be concealed on a person in such a way that an initial pat down will not disclose their existence. Small pistols fitted into a billfold or wallet are not uncommon. At all times the officer's first thought should be the personal safety of those around him and himself.

2. Area of Frisk

a. The Person Stopped

The person stopped may be frisked, as in *Terry*. But what other area may be checked for weapons as well? Since the goal is to protect the officer, persons or objects within the area from which danger can come should also be subject to the carefully limited search for weapons.

b. Packages

In *United States* v. *Riggs*, 474 F. 2d 699 (2d Cir. 1973), a frisk of a camera case was upheld but, in *United States* v. *Hostetter*, 295 F. Supp. 1312 (D. Del. 1969), the person stopped was carrying a suitcase and officers searched the suitcases for weapons. The court expressed the opinion that removing the entire suitcase from the immediate area of the person stopped would have been preferable to looking in it.

The rule to follow is to intrude into the privacy of the person no more than the minimum necessary to do what needs to be done.

c. Companions

Recall that in *Del Toro* v. *United States*, 464 F. 2d 520 (2d Cir. 1972), it was held reasonable to frisk the per-

son of a companion of an arrestee under circumstances in which police had reason to suspect the companion was armed.

In *Meade* v. *Cox*, 438 F. 2d 323 (4th Cir. 1971), cert. denied, 404 U.S. 910 (1971), an officer received a radio report which led him to believe the defendant was carrying a gun and trying to dispose of it. After arriving at the scene and while waiting for help to arrive, the officer observed the defendant and his wife stop at several stores in which the gun could be sold. Upon stopping the defendant, it was reasonable for the officer to look into the wife's pocketbook for the pistol.

In *Tinney* v. *Wilson*, 408 F. 2d 912 (9th Cir. 1969), the initial frisk of the companion of an arrestee was held reasonable upon testimony by the officer that he thought the companion planned to rob those the arrestee directed to an alley for the purpose of prostitution, since the companion was found hiding in the alley.

d. Automobiles

In *United States* v. *Thomas*, 14 Cr L 2415 (D.C. Ct. App. 1/31/74), officers stopped an automobile occupied by two men after a high-speed chase. During the chase, one officer noticed a passenger in the fleeing vehicle leaning forward periodically. After stopping the vehicle, the police ordered the occupants out of the car and the order was obeyed. The suspects were frisked and one officer looked under the front seat in the area at which the passenger had been observed reaching during the chase. A pistol was found. (The suspects fled after seeing a plainclothes officer in an unmarked car watching them as they followed two women pedestrians at 2 a.m. in an area where several robberies had occured.)

The court found the stop reasonable and held the limited search under the front seat where the passenger reached during the chase also reasonable, and concluded that the pistol was lawfully seized.

Most cases of this sort focus on the search of the vehicle incidental to the arrest of the driver and not the legality of a limited search (or frisk) of a vehicle after a stop.

For example, *United States* v. *Green*, 465 F. 2d 620 (D.C. Cir. 1972), seems to turn on a search of a vehicle after a traffic arrest [it is a case decided before *United States* v. *Robinson*, —U.S.—, 38 L. Ed. 2d 427 (1973)], yet relies heavily on *Terry* and cites with approval the following quotation from George, "Constitutional Limitations on Evidence in Criminal Cases" 73 (1969): "If after initiating the encounter the experienced officer reasonably believes that the driver or occupants may be armed, he should be fully justified in ordering them out, frisking them, and quickly checking the part of the vehicle that might be accessible to them if they should break away from the officer and attempt to flee."

IV. Evidence Obtained During a Stop and Frisk

The authority to seize evidence discovered during a frisk must not be confused with the authority to frisk for weapons. An officer can frisk for the sole purpose of determining the presence of weapons; he cannot frisk in an effort to find evidence. But if, while conducting a lawful frisk, the officer inadvertently discovers evidence, he may seize that evidence lawfully and use that which he has discovered, just as he can use any evidence which he lawfully obtains.

> ***". . . if, while conducting a lawful frisk, the officer inadvertently discovers evidence, he may seize that evidence lawfully and use that which he has discovered. . . ."***

The object seized may be a gun and provide the basis for an arrest for carrying a concealed weapon, as in *Terry*.

It may be an item of contraband, as in *State* v. *Streeter*, 195 S.E. 2d 502 (N.C. 1973), where the subject was stopped and frisked lawfully. During the initial pat down, the officer felt an object he reasonably thought could be a weapon. Upon removing the item, he observed it to be a burglary tool. The court held the seizure and subsequent arrest for possession of burglary tools lawful.

The object may be some item other than contraband, the discovery of which provides an additional element of probable cause to arrest. In *United States* v. *Peep*, 490 F. 2d 903 (8th Cir. 1974), police officers were executing a valid search warrant at premises occupied by persons known to handle large sums of money and to have a reputation for violence. During the search, Peep, who was unknown to the officers, entered the premises. He was frisked by the police who noticed a bulge in his pocket. One officer stuck his hand in Peep's pocket and removed the object causing the bulge. It was a large roll of money. Peep was arrested.

The court held the discovery lawful and found that the discovery of the money coupled with all the other facts about the crime in question (these facts are not set out here) known to the officers were sufficient probable cause to arrest Peep.

The mere feeling of an object during a frisk may give the officer probable cause to arrest before the item is removed and seen by the officer. ". . . if in the course of a proper frisk, the officer feels an object having the characteristic feel of heroin in a glassine container, he may be in a position to arrest the suspect for the possession of narcotics." A.L.I., Model Code, p. 121, but see *Del Toro* v. *United States*, 464 F. 2d 520 (2d Cir. 1972). In such a case, the better prac-

"The watchword is restraint."

tice is to announce the arrest prior to removing the container.

Of course, if an officer sees evidence in plain view after a stop before the frisk has begun, he may seize it, as in *United States* v. *Wickizer*, 465 F. 2d 1154 (8th Cir. 1972), where the officer saw the barrel of a gun protruding beneath the front seat of an automobile he had stopped.

If the stop or frisk is unreasonable, any evidence obtained as a result of either the stop or the frisk is inadmissible in evidence against the person from whom it was obtained. *Sibron.*

V. Conclusion

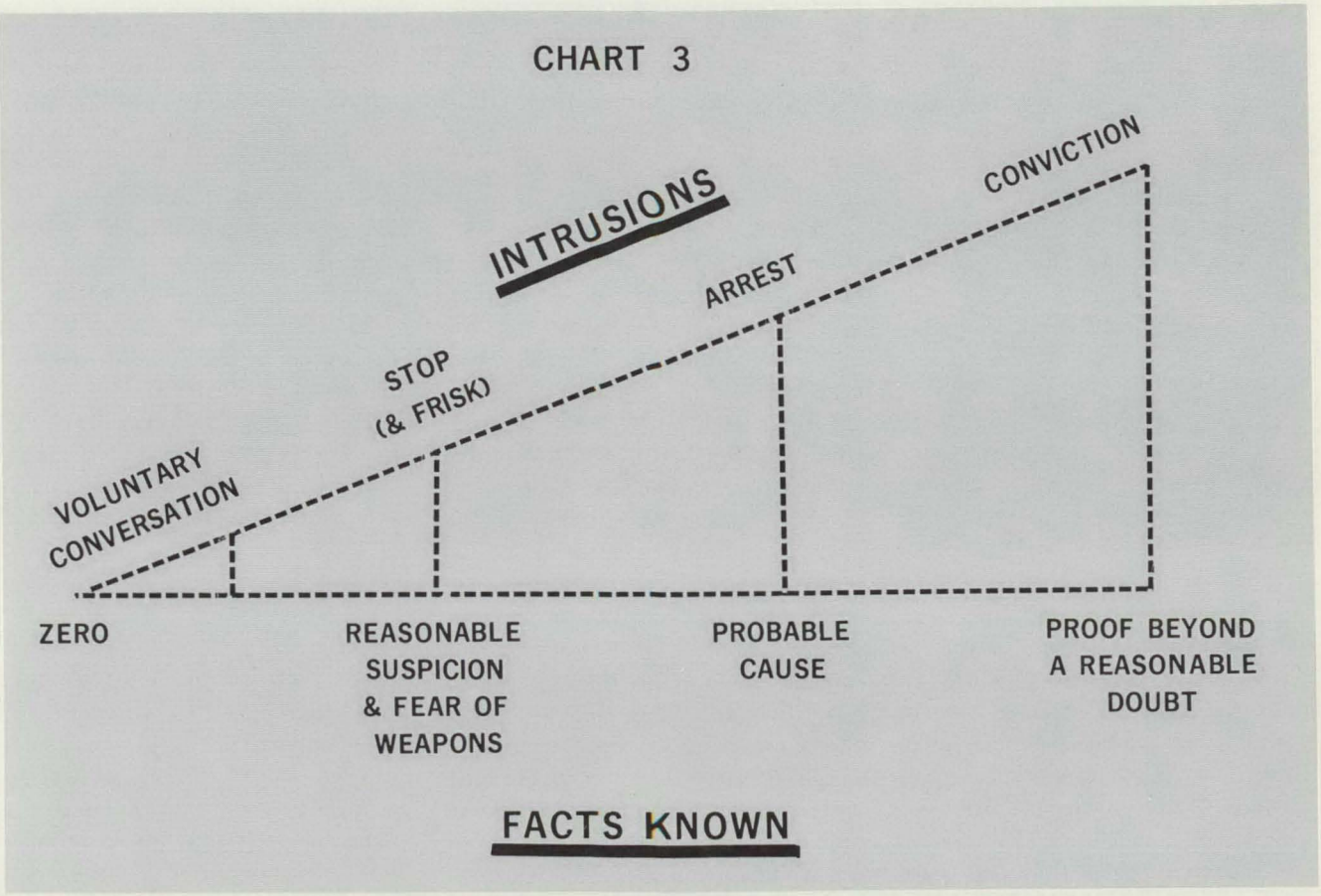
The watchword is restraint. Make any intrusions into a person's right of privacy as limited as you possibly can and still do your job safely. If you can resolve the situation by engaging a citizen in a voluntary conversation and not using your authority to stop and detain, do so. If not, but you can stop and detain without arresting, do so. You are attempting to resolve a situation in which the person you see may be innocent, or may be guilty. What do you lose by cautious restraint? If the person is innocent and you have acted with restraint, all law enforcement officers will have gained the respect of the person involved. As for the criminal, it is doubtful he will think any less of the police no matter what you do.

There is a bonus. You will win more cases, too. Hopefully you have observed in the preceding pages some examples of excellent police work—how the officers began with a stop, not an arrest, and built the case from reasonable suspicion for the stop into probable cause for the arrest by being skillful investigators. Had the initial intrusions been arrests, many cases would have been lost because it was not until after the stop that the officers were able to meet the probable cause standard.

Acting with restraint did not require the officers you read about to gamble with their lives. No rule of law requires an officer to risk his personal safety. Judges are aware of the risks involved. Chief Justice Warren noted in *Terry* the great number of officers assaulted every year.

What the law does require is that the intrusions you make into a person's freedom be based upon a proper amount of evidence. As the intrusions become greater, more facts are required to justify those greater intrusions. This article began with a little diagram. It ends with another.

CHART 3



Judge-Controlled Nonautomated Felony Caseflow

"Caseflow will not manage itself. Neither will it move without firmness and certainty only a judge-directed and judge-controlled system can provide."

By
MARIAN P. OPALA
Administrative Director of the Oklahoma Courts
Oklahoma City, Okla.

In the Anglo-American adversary system of representative litigation, a court case moves from one stage of procedure to another only when the lawyer for the "fast side" exercises the initiative to procure the necessary action of the judge. The judge himself bears no responsibility for case movement. He waits for the interested lawyer to spur him into action. In criminal cases, that lawyer is, of course, the prosecutor. He decides which, and when, cases will reach trial. He prepares the trial docket from which he may strike cases at will. The judge never stands in his way even when he decides to dismiss a case or to "bury" it for gradual extinction.

This tradition still dominates the Oklahoma judicial scene, although by statute, in effect since statehood, the prosecutor, unlike his English counterpart of ancient vintage, no longer enjoys complete mastery over the case. He cannot, for instance, "discontinue or abandon a prosecution for public offense" without an order of the court.[1]

In practice, however, the judge too often still places upon the prosecutor almost complete responsibility for case movement. Before our court reform of 1969, this was a way of life. Since that time, we have seen some significant episodes of departure from the tradition. This article is a story of one such episode that proved successful, brief though it was.

In a typical American court system, such as Oklahoma had before 1969, a felony case is commonly prosecuted by information, i.e., by accusation initiated by the prosecutor rather than a grand jury. It is launched in a lower-court level where the judge functions as an examining or committing magistrate to determine, in advance of any upper-court proceeding, whether a crime has been committed and whether there is reasonable cause to believe that the man charged with it has committed it. In Oklahoma, there were at least two different classes of judicial officers in every county who could perform this function (justices of the peace and county judges). They were not in any way administratively subordinate to the court that had the power to try felony cases (district court), but functioned independently.

Court Reorganization

All this was changed by the 1969 court reorganization. Felony prosecutions can now be *initiated and terminated* in the same court—the new single-level district court. It has "unlimited" power because it may handle any court case, large or small, civil or criminal, felony or misdemeanor, juvenile, domestic, or probate. More importantly—and this is all too frequently overlooked even by those who profess great expertise—all judges who staff our district court in the same county location are no longer holders of separate and independent judicial offices, but are organized into a court under a management hierarchy that was created by law.

These two aspects of our reorganized court system—integration of lower and upper multijudge trial levels under a centralized local management—are the organizational ingredients that made our story possible.

Our story begins when, early in 1969, a district judge in Tulsa County

put to work these new organizational features of the new court system to devise a felony flow management technique that placed an end to prosecutorial burdens and marked the very beginning of a judge-controlled case movement, from start to finish. The advantage of the new technique: indescribable simplicity. It requires no sophisticated computer technology, no automatic data processing at all. It is premised on the assumption that trial scheduling conflicts and consequent liberal continuance policies will be avoided when felony case movement is judge directed with great firmness, but with due regard to a lawyer's legitimate prior professional commitment elsewhere.

The assumption proved valid. Its validity was doubtlessly bolstered by increased participation of public defenders and court-assigned lawyers. These practitioners, unlike privately hired counsel, had no reason to delay deliberately the progress of a felony case.[2]

Management Technique

The management process began at the first appearance before the magistrate. Counsel, whether appointed or retained, would be allowed to *choose* a preliminary hearing date that was conflict free, but would be warned not to expect the case to be continued for rescheduling. The same admonition would be given by the magistrate when scheduling arraignment date after holding the defendant to answer at trial. The last innovative step in this technique would consist of scheduling defendant's trial date at the conclusion of his arraignment, again allowing his lawyer to choose a conflict-free day.

This technique, simple as it is, proved increasingly effective until its gradual abandonment during the calendar year 1972. The chart, titled "Post-Reform Felony Litigation Profile," shows the spectacular rise in Tulsa County felony dispositions from 1969 through 1971. It also indicates that effective court-directed case movement that is swift may be discouraging to those who would seek a preliminary hearing as a device to delay the progress of a case. It is clear from the graph that when the case management system was at its peak stage the number of preliminary hearings held suddenly dropped quite appreciably.

The lesson to be learned from the Tulsa experience is that a simple, judge-managed felony caseflow, not necessarily monitored by a computer, may afford an answer, at least for locations not much larger than Tulsa, to the ever-increasing problem of lagging justice. It is worth exploring.

The secret of the technique is that it effects case movement from each stage to the next by judicial rather than party or clerical direction. At each stage, the defendant and his lawyer learn when the next step will occur. These elements infuse into litigation process both firmness and certainty—the very essential ingredients that are absent when prosecution alone or the clerk manages the caseflow for the judge.

Some will say that in spite of its obvious simplicity the technique would not work in small counties because there felony flow is so "microscopic" that no judge could possibly tell at arraignment time when he will hold his next criminal jury term at which the defendant may be tried. This argument obviously presupposes that no rural county can have a mixed (civil and criminal) jury term at regularly predetermined time intervals. Placed in this posture, the argument answers itself because in Oklahoma's State-supported court system funds are readily available for judges to have a short jury term even though the total of civil and criminal cases awaiting trial may be rather negligible. There is no valid reason—logical, legal, or economic—for failing to call a jury when as few as five cases are ready for trial.

If the Tulsa experience yields any wisdom at all, it teaches us that simple procedures will work to solve the problem of "lagging justice." It is quite possible that "lagging justice" really is a misnomer, and the proper verbal attire for the vexing phenomenon is "unmanaged justice."

Caseflow will not manage itself. Neither will it move without firmness and certainty only a judge-directed and judge-controlled system can provide.

POST-REFORM FELONY LITIGATION PROFILE

Year	Felony cases		Preliminary hearings	
	Filed	Terminated	Held	Waived
1969.....	2,589	1,708	582	298
1970.....	3,179	2,438	1,439	469
1971.....	2,793	[1] 4,837	540	381
1972.....	2,939	2,851	896	473
1973.....	3,050	[1] 3,279	1,046	398

[1] Includes carryover cases from previous years.

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[1] 22 O.S. 1971 §§ 815 and 816.

[2] A recent Alabama court study by the Institute for Court Management shows that it takes less time to move a felony case with appointed counsel than one with retained counsel. The variance is attributable to the fact that too many defendants retain counsel they cannot afford. "Without a fee, however, most defense counsel will not proceed with the case; thus, cases with retained counsel tend to take longer. This type of situation is prevalent in a number of jurisdictions. . . ." Report on the Alabama Data Analysis Project by the Institute of Court Management, May 1973.

WANTED BY THE FBI

NCIC classification:
PM PO PI PI 12 PI CI PM PO PI

Right index fingerprint.

RALPH MURRELL, also known as John Luther Graves, Ralph Graves, Eddie Kennedy, Charles Martin, Ralph Murray, Ralph Murrel, Ralf Murry, James Thomas, John F. Williams, "Tootsie"

Interstate Flight—Murder

Ralph Murrell is being sought by the FBI for unlawful interstate flight to avoid prosecution for murder. A Federal warrant for his arrest was issued on July 28, 1967, at Montgomery, Ala.

The Crime

On July 18, 1967, it is alleged that Ralph Murrell brutally beat a woman to death with a .22 caliber rifle and then killed her male companion with a .38 caliber revolver at Phenix City, Ala.

Description

Age	47, born Feb. 9, 1927, Spartanburg, S.C. (not supported by birth records).
Height	5 feet 10 inches.
Weight	150 to 165 pounds.
Build	Slender.
Hair	Gray streaked, may be dyed black.
Eyes	Brown.
Complexion	Dark.
Race	Negro.
Nationality	American.
Scars and marks	Scar over right eye, scar on right shoulder, large light blotch on chest.
Occupation	Cook, dishwasher, electrician, elevator operator, salesman, and waiter.
Social Security Numbers Used	251-16-1891; 317-10-1959; 251-50-2478.
FBI No.	662,220 D.

Fingerprint classification:

M 32 W O I I 12 Ref: 32
I 28 W IMO 32

Caution

Murrell has been convicted of attempted grand larceny. He is reportedly an occasional heavy user of alcoholic beverages and may use narcotics. He should be considered armed and very dangerous.

Notify the FBI

Any person having information which might assist in locating this fugitive is requested to notify immediately the Director of the Federal Bureau of Investigation, U.S. Department of Justice, Washington, D.C. 20535, or the Special Agent in Charge of the nearest FBI field office, the telephone number of which appears on the first page of most local directories.

U. S. GOVERNMENT PRINTING OFFICE : 1975 O - 563-669

(UCR, 1973, pg. 17)

ROBBERY ARREST DATA

Nationally, arrests for robbery increased 4 percent in 1973 when compared with 1972. The greatest volume occurred in cities, where arrests were up 3 percent. In the rural areas, arrests increased 21 percent, and in the suburban areas, arrests increased 17 percent.

Examination of arrest data discloses that 76 percent of the persons arrested for robbery were under 25 years of age and 56 percent were under 21 years of age. Of all persons arrested for robbery, 34 percent were under the age of 18.

In 1973, 7 of every 100 persons arrested for robbery were females. Arrests of women for this offense rose 5 percent in 1973 when compared with 1972.

(UCR, 1973, pg. 6)

MURDER

In 1973, there were an estimated 19,510 murders committed in the United States. This represents a numerical increase of 960 over the 18,550 estimated homicide offenses for 1972.

An analysis of murder by month in 1973 shows that the summer months had the greatest frequency of murder as compared to any other period of the year.

A geographical breakdown of murder by region showed 44 percent of the murders occurred in the Southern States, 22 percent in the North Central States, 19 percent in the Northeastern States, and 15 percent in the Western States.

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INTERESTING PATTERN

This interesting pattern at first glance appears to be a plain whorl. However, a closer analysis of the core reveals there are two separate loop formations with two separate and distinct sets of shoulders. Therefore, the pattern is classified as a double loop-type whorl with an outer tracing.