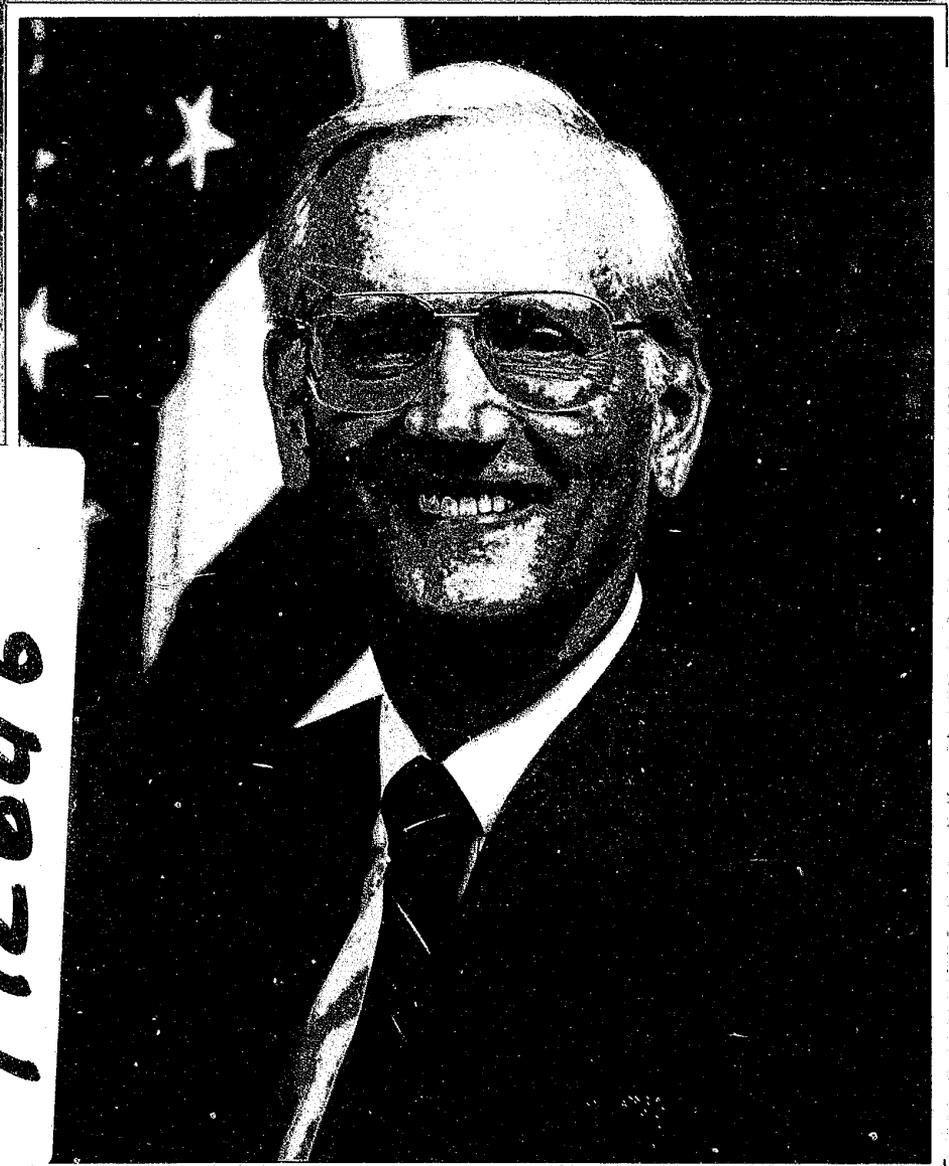


**FBI**

December

**Law Enforcement Bulletin**



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**FBI Director William S. Sessions**

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# On-Line Exchange of Fingerprint Identification Data

***"... a new American national standard ... provides a means for exchanging data between different makes of [automated fingerprint identification systems]."***

By  
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Does the concept of on-line transmission of computerized fingerprint minutiae and image data between law enforcement agencies sound strange and far-fetched? Probably not as much today as it may have just 5 years ago!

The development of technology has reached the point today where automated fingerprint identification can be performed by law enforcement agencies throughout the world. It is possible to electronically "read" a fingerprint card, which means that a machine will scan a set of fingerprints to identify, extract, digitize, and store fingerprint minutiae data. Automated searching and matching of that stored fingerprint data can be conducted for comparison with newly received 10-print fingerprint cards or latent fingerprint minutiae data developed as a result of a crime scene search and latent fingerprint analysis. In addition, automated storage and retrieval of images on a video screen for the purpose of making positive identification and/or verifications by trained fingerprint examiners is being rapidly developed and refined.

Among all this technological advancement, however, one disturbing fact sits ominously on the horizon. Be-

cause law enforcement agencies have systems installed by different manufacturers, their data centers could not, until recently, effectively and efficiently exchange this important information.

In response to the rapidly expanding commercial market for automated fingerprint identification systems (AFIS) used by law enforcement agencies, a number of manufacturers began producing these systems. Unfortunately, these various systems could only interface or communicate with systems made by the same manufacturer. This meant that if one agency within a State purchased a system from company "A," while other agencies purchased systems from companies "B," "C," and "D," etc., none of these agencies could communicate with each other for the purpose of sharing fingerprint identification. They could only exchange on-line information with those agencies having systems manufactured by the same company. This problem also surfaced between States having different systems.

To resolve this problem facing law enforcement agencies interested in sharing fingerprint identification information, a new American national standard has been developed. This new



Special Agent Kurre

standard has been created through the sponsorship of the National Bureau of Standards with input provided by over 70 representatives of national and international law enforcement agencies, AFIS manufacturers, and others having an interest in the problem. The standard is entitled "American National Standard for Information Systems-Fingerprint Identification-Data Format for Information Interchange." It was published in December 1986, under the American National Standards Institute (ANSI) identifier code of ANSI/NBS-ICST 1-1986. This new standard provides a means for exchanging data between different makes of AFIS.

Automated fingerprint identification systems are finding ever-increasing application in State and local law enforcement agencies. As previously mentioned, these systems are available from several different suppliers. Each scans fingerprint images and detects and records information about minutiae-based features; however, all do not incorporate the exact same features, the same coordinate system, or units of measure to record fingerprint information.

A software conversion routine can be used to convert from one system of units to another. Using this approach, each AFIS user would need a different software package to interchange data with every other type of system. An alternative and more economical approach is to use an intermediate set of units and format. Then, each AFIS user would require only a single software package to convert his system's data to and from that intermediate. The standard is arranged to use the intermediate set of units and format.

All AFIS detect fingerprint minutiae (ridge endings and bifurcations) and

record their relative position and orientation. Some of the systems also record ridge counts between selected minutiae or other topological information. The standard provides for alternative means of formatting fingerprint information to cope with the problems caused by differing system requirements.

The standard defines four types of records that may be used in exchanging an individual's fingerprint information. The first of these, a Type-1 record, is used in all transactions. It defines the type of transaction (inquiry, addition, etc.) and contains information about the other record types that may be included in the transaction. It also contains agency identification, subject identification, and descriptive information. Each of the items of information is contained in a numbered field. Use of most of these fields is optional. If the information is not available or is not applicable to the transaction, the field may be omitted. The numbering permits identification of those fields that have been used.

The other three types of records contain information from a single fingerprint of the subject. Thus, up to 10 of each of these records may be involved in a transaction.

The Type-2 record contains a small amount of descriptive information and a complete listing of the feature information that has been detected and recorded by the AFIS. Each minutiae is assigned a reference number. The position of that minutiae in X and Y and its orientation in Theta is listed. The listing is in units that are of higher precision than those used by any of the AFIS systems so that accuracy is not degraded by the conversion process. There is also a provision to enter ridge

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***"The standard defines four types of records that may be used in exchanging an individual's fingerprint information."***

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counts and the identity of the adjacent minutiae that are involved. If the AFIS at the agency preparing the record does not provide ridge count information, calculated values can be used. This may affect performance at a destination agency using an AFIS that requires ridge count information. Alternatively, a Type-3 or Type-4 record may be prepared.

The Type-3 record contains image data. The resolution of these data is a nominal 10 picture elements (pixels) per millimeter. Information about the scanning sequence and quantization level is contained as a part of the descriptive information in the associated

Type-1 record. A Type-3 record can be used as direct input to the destination AFIS as though it were output data from that system's scanner. In that way, the required set of minutiae-based features can be detected directly from the image data record. This bypasses any feature detection limitations in the AFIS at the originating agency.

The Type-4 record is identical to the Type-3 record, except that the resolution is increased to a nominal value of 20 pixels per millimeter.

The records involved in a transaction can be recorded on magnetic media (tape or disks) for transfer to a destination agency, or data communications facilities can be used for transfer. The

choice may depend upon cost and urgency considerations.

ANSI/NBS-ICST 1-1986, "American National Standard for Information Systems-Fingerprint Identification-Data Format for Information Interchange," is available from the Sales Department, American National Standards Institute, 1430 Broadway, New York, NY 10018. The cost is \$15.00 plus \$4.00 shipping and handling. Agencies that are in the process of procuring AFIS might wish to consider including in their specifications the requirement that the supplier provide the capability of interchanging fingerprint data with other agencies in accordance with this standard.

**FBI**

## ***Increase in Crime Recorded***

The FBI has released preliminary crime statistics for January through June 1987. During this 6-month period, crime reported to law enforcement rose 1 percent, when compared to the same period of 1986. The increase was measured by a Crime Index of selected offenses for which law enforcement agencies nationwide provide data to the FBI's Uniform Crime Reporting Program.

While violent crime overall dropped 1 percent in volume, aggravated assault showed an increase of 2 percent. The murder total declined 2 percent, robbery dropped 5 percent, and forcible rape showed no change.

Conversely, property crimes were up 2 percent. Reported larceny-thefts

increased 2 percent, and motor vehicle thefts rose 6 percent. Burglaries declined 1 percent in number, and the arson total dropped by 6 percent.

Regionally, this year's semiannual Crime Index totals showed no change from the first half of 1986 in the Midwestern and the Western States. An increase of 3 percent was experienced in the Southern States, and the Northeastern States recorded a 2-percent rise.

The Crime Index total remained stable in the Nation's rural areas and those cities with populations under 10,000. Cities of other sizes registered increases ranging from 1 to 3 percent. A 1-percent increase was experienced in the suburban areas.