

AMPEX

READOUT

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VIDEOFILE™ INFORMATION SYSTEMS

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AMPEX VIDEOFILE

REVOLUTIONIZING INFORMATION MANAGEMENT

VIDEOFILE SYSTEMS: Electronically Automating Paper Files. Recording images of paper documents on magnetic tape is a totally new concept, although it has its roots in Ampex's videotape and computer technologies. A Videofile system automates document storage and retrieval, reducing conventional document files to high resolution videotape images. These are brought by electronic means to viewers simultaneously at many locations, printed out as hard copies, and kept up to date with the push of a button. Especially important, no document is ever out of file or lost. The degree of automation can be selected to match the needs of the user. In its simpler forms, a Videofile system can make filing nearly instantaneous, and give truly automated retrieval. In its most complete forms, it can become an interconnected visual communications network that eliminates almost all paper flow.

ALTERNATIVE SYSTEMS: Digital Computers, Microfilm, CCTV, Throw-away Copies. To automate large files, there really aren't any true alternatives to a Videofile system. Computers, for example, first translate the information in a document into a digital code or punch it into a card before storing. With a Videofile system, the actual (and complete) document itself is recorded. Seals, signatures, and graphic data of all types are preserved in original form. The only thing converted to digital format is a short address (requiring limited key-stroking) to identify the document. This is not to imply that computers and Videofile systems compete with each other. Far from it. In fact, the cross indexing and automatic programming abilities of a computer, coupled with the speed and operational flexibilities of a Videofile system can join together to create what is the only complete information processing system available today.

Microfilm is also visual storage of whole documents, but it is primarily intended for library type storage whereas a Videofile system is for active day-to-day filing and retrieval. Microfilm requires a processing step (development) and can't be erased. This means you can't set up a true file folder type of organization because you can't update, purge, or add to a previously photographed group of documents.

Closed circuit television can automate retrieval to the extent that it too can bring a document as a visual image to the user. This can be done with full-size documents or microfilm images. But it is limited in several ways. Commercial CCTV systems simply don't give a good enough picture (they have only 25% of the required resolution), and can only present one page at a time. In contrast, Videofile systems present an entire file in sharp,

Filing, storage, distribution: three aspects of modern information management uniquely handled by Videofile Information Systems with electronic images recorded on magnetic tape. Videofile systems can bring a wide degree of automation ranging all the way from fast filing and automatic retrieval to eliminating nearly all paper flow. They are doing for the storage and retrieval of graphic files what computers have done for accounting and data processing. In many instances, Videofile systems and computers operate side by side. The Videofile system handles storage and retrieval of graphic information. The computer handles data processing.

clear pictures, allowing the viewer to browse through the file as needed.

Throw-away hard copy is another possibility for remote viewing, but simply costs too much for large files with high retrieval rates—even with the lowest cost printers. If hard copies are needed, a Videofile system can provide them easily.

BASIC OPERATION: Document Images on Magnetic Tape. A Videofile system uses various combinations of six basic units: File Section, Buffer Section, Display Section, Printer, and System Control Center. Here's how it works. Each paper, photo, drawing, graph, or document is placed on a platen and recorded through a high resolution camera in the Filing Section onto tape in the Videotape Section. This action is final; no further processing or development is needed. The address is recorded as a digital signal at the same time as the document by means of a manual keyboard or a card reader in the File Section.

Monitors display both document and address to the operator before filing to be sure they match correctly. Filing can be ordered alphabetically, numerically, or chronologically, exactly as with paper files. Each segment of tape, housing one document or a series of related documents, can be considered as a magnetic file folder. Filing in random order is also equally possible. With either type of file, retrieval is quick and automatic because the search speed (for 8½ x 11-inch documents) is 1,140 pages per second.

To retrieve a file, requester uses a keyboard or card reader to enter the address of the file. The Videotape Section which may be located anywhere in the building (or nearby location) receives the electronic command and rapidly searches the tape to locate the right file. When the file is pinpointed, it is instantly copied into a Buffer Section, the original remaining in the master file for others to use. The Videotape Section is then free to answer other requests. Average time of the whole operation, from several seconds to under one minute with file tapes kept on line for immediate retrieval in a Videotape Section. For off-line retrieval from a tape library, the time is typically a few minutes although it is more common to wait and batch several requests together before processing. In some cases, all batched requests are handled on an evening or night shift.

The requester can receive the file as a high resolution image on a television screen or an electrostatic copy, or both. In systems with a Display Section, he can browse through all the documents in the file on his screen, and if he chooses, make a printed copy of any page immediately. When he is finished, the Display Section image vanishes. In either type of distribution, there is nothing removed from the master file, so no clerical labor is required to pull files or re-file, and no file is ever out. Each person gets his own image or hard copy. This means several people can be looking at the same file at the same time. The out of file problem is completely eliminated.

INFORMATION SYSTEMS

THREE SYSTEMS IN ONE: Filing, Storage, Distribution. Looking at it in a broader sense, a Videofile system really is three systems. 1) It is a very fast filing system which captures images of pages and puts them on tape. This means a corps of file clerks don't have to traverse rows of file cabinets and leaf through countless folders. Instead, the document moves instantaneously as an electronic signal from the File Section camera to its location on magnetic tape in the Videotape Section. 2) It is a storage system for these pictures which can conduct automatic searches, automatic purges, automatic reorganizing and a host of other storage functions. 3) It is a distribution system to take document images instantly to any location required by users, again without the use of file clerks.

USES OF VIDEOFILE SYSTEMS: Where Does It Fit? Videofile systems fit in large centralized files which need quick and efficient filing and the ability to bring the file to the user (automated retrieval). To put this in perspective, we're not talking about small offices where a secretary merely stands up, turns around, and pulls a document from a nearby file. Or even a medium size business, factory, or educational facility where a group of clerks operate from a nearby file room with several dozen file cabinets.

But Videofile systems can be justified, both in terms of cost and increased efficiency, where files are centralized, or should be centralized. It may even allow some to become centralized for the first time. Many files have not been centralized because the costs of going to the file plus the out of file problem would not make good economic sense. A business may have files on the same customer in the Credit Department, Sales Department, and the Service Department. Lack of file centralization can result in the Sales Department working hard to sell a customer a product or service at a time when the Credit Department is threatening collection measures with the same customer, who is in fact fighting with the Customer Service Manager over a warranty problem. A Videofile system can pull these files together and solve this information management problem.

Files large enough to benefit from a Videofile system are commonly found in areas such as:

Banks	Insurance
Court Records	Law Enforcement
Demand Print Files	Medical Records
Department Store	Motor Vehicle Records
Charge Accounts	Title Insurance
Government Records	Transportation
Industrial Research	Utility Companies
Libraries	Vital Statistics Bureaus

A BRIEF VIDEOFILE SYSTEM GLOSSARY

Address	Digital recording of an identifying number by means of which a document is located. May contain special codes or flags to automate updating, reorganization, or purging.
Browse	To review at the viewer's own pace (in forward or backward direction) a number of document images, for example, a file folder, on a Display Section.
Buffer Section	A temporary storage device (multitrack disc recorder) for holding a number of video images. Used to: (a) Repeat individual video images for continuous display on a monitor. (b) Hold several file documents temporarily to allow the user to browse through them. (c) Match speed and timing between standard system operating rates and those of its input and output devices.
Display Section	Contains a high resolution television picture tube for viewing the document, and a keyboard for entering the document address.
Filing Section	The portion of the Videofile system where documents are entered. Includes a high resolution camera and a digital keyboard. The output of the Filing Section is video images and address signals.
Image	An electrical analog (video signal) of a page resulting from a scanning process in the Filing Section.
Off Line Tapes	Reel of tape in the Videofile system not mounted permanently on a particular tape transport. Retrieval time for documents on these tapes is about three to five minutes.
On Line Tapes	Reel of tape in the Videofile system assigned to and mounted on a particular tape transport. Retrieval for documents from on-line tapes takes from a few seconds to about one minute.
Printer	An electrostatic device for converting the video signal of a page into a high resolution printed (hard) copy.
Resolution	A measure of how readable a document is when retrieved from a Videofile system. In technical terms, it is the amount of resolvable detail in a video picture. Videofile system resolution is at least four times better than conventional television systems.
Scratch Pad Tape	See WORK TAPE.
Search	The act of locating images by means of identifying addresses. The search may be in either forward or rewind direction and is usually carried out at high speed.
System Control Center	Contains a small process control computer and input/output circuitry for controlling the interaction of the various sections.
Videotape Section	Contains a magnetic tape recorder and associated circuitry to place and retrieve document images on two-inch-wide magnetic tape.
Work Tape	A tape on which selected documents or entire files are temporarily copied from a master tape to handle expected retrieval activity. Work tapes are placed on line on Videotape Sections to provide instant retrieval. Keeping 25% of current files in work tapes can usually handle 80% to 90% of all recall activity.

TRANSPORTATION APPLICATIONS

SOUTHERN PACIFIC . . . Changing the Waybill Picture with a Videofile System

by K. Gootgeld, *Senior Systems Analyst, Transportation*





Filing consoles in the Videofile System at Southern Pacific. Waybills are filed instantaneously with their digital address as electronic images on magnetic tape.

SUCCESS IN RAILROADING: Selling Transportation Services. The key to future railroad success is to sell transportation . . . not just railroad service. Modernization is important too, both for the railroads and all other segments of the transportation industry. Increasingly, railroads today are using computers to control the expensive and time consuming operations of putting freight trains together, taking them apart and keeping track of where they are across the nation. A new system for automatic weighing of freight cars is in the offing. Automatic push button control of trains in freight yards is already in operation. Mobile freight stations, containerized shipments, and piggyback trains are examples of the new systems approach to transportation that is quietly revolutionizing the railroad business.

THE WAYBILL: Common Problem in Transportation. The transportation industry, like other giants in our economy, generates a deluge of paper each year. The heavy investment in computers has helped to reduce the so-called "paper blizzard." However, certain functions have until recently defied computerization. One in particular is that vital, but unloved piece of paper—the waybill.

What is a waybill? The waybill is undoubtedly the most important single document to any transportation company. This piece of paper is generated by the company's agent from a bill of lading prepared previously by the shipper.

The information on the waybill contains the identity of the originating station and carrier, commodity codes, routing instruc-

tions, special handling instructions, rates, and dates. In its final form, the waybill spells out the movement of the goods from the original shipping point to the destination. As the shipment moves between these two points, many things happen to it, some expected, some unexpected. The routing may not follow the route designated on the waybill. If it's a rail shipment, it may very well be transferred to many different railroads. It may be placed in a warehouse for subsequent reshipment. Various services may be performed on it, such as refrigeration, heating, or, if it were livestock, watering and feeding.

The waybill shows all these events, in effect giving a historical log for that particular shipment. Any of these events can change the freight charges and share of charges due to each participating carrier. Eventually, when the shipment gets to its destination, the waybill will be used to prepare a freight bill for collection by the agent of the final (destination) carrier. The waybill then goes to the destination carrier's central accounting offices for auditing. The waybill, because it is a complete record of the entire transportation process, contains all of the needed documentation for paying each carrier his share of the revenue.

To start the ball rolling on interline settlements, the destination carrier makes up an abstract of the waybill data. A copy of the abstract is sent to all of the participating carriers. Subsequent claims, corrections, or adjustments will reference this abstract and the original waybill. So important are waybills to all segments of the transportation industry that the Interstate Commerce Commission

requires carriers to hang onto them for as long as four years.

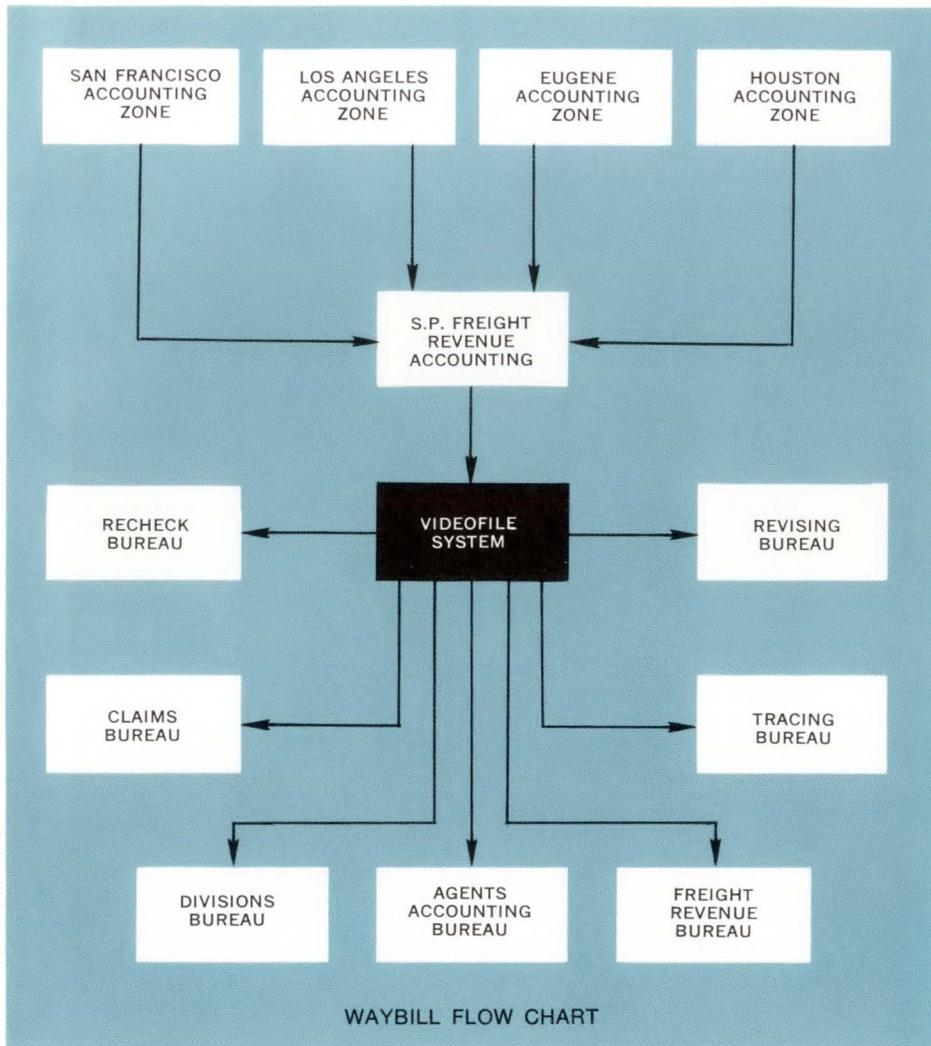
Why hasn't the waybill been eliminated? After all, there are many ways of communicating or transmitting data through the maze of communications links utilized by the transportation industry. The answer is simple—revenue. Since it is the basic accounting document, many people may have to refer to it before final settlement.

Billions of revenue dollars annually are guaranteed to the individual carriers through the documentation contained on the lowly, unloved waybill. It is also true that these documents create a paper shuffle that can only be described as gigantic.

The referral rate to the waybills and abstracts is also gigantic. Each adjustment, correction, overcharge or damage claim requires a look at the abstract, the waybill, or both. Furthermore, the individual carriers cyclically review the revenue distribution settlement from other carriers. This constant referral activity results in large volumes of documents being shuffled from department to department. The time involved in locating a particular document on a timely basis can be unbelievably high—especially when the document is out-of-file.

The railroads in particular, have faced up to the problem of waybills and have taken dramatic steps to improve the system.

SOUTHERN PACIFIC: Automating the Waybill
Southern Pacific Company is the first commercial firm to install an Ampex Videofile Information System as a means of solving its filing and retrieval problems. At Southern



Documents in a Videofile System are available as soft copy images on a display screen or as hard copies from an electrostatic printer. This unit at Southern Pacific prints out hard copies of waybills.

er pinpoints the document by finding that address during a high-speed search (380 inches per second) through the tape. The tape search speed is twice that of the computer-industry tape transports.

Once found, the document recording is played back by the transport into intermediate holding equipment (buffer system). There a metal disc magnetically records the incoming signals, duplicating the document recording. The disc later plays these recording back into an electrostatic printer, which produces a facsimile of the document image on paper. The cycle is complete when the requester receives his documents at his desk the first thing the next morning.

Since the magnetic disc merely duplicates the original document recording on tape in the master file, no entry is ever "out of file" to other requests.

CATEGORIES OF WAYBILLS: Four Basic Files.

Southern Pacific has set up four basic categories of files: (1) a received file for freight originating on another line and delivered by the Southern Pacific; (2) a forward file for freight originating on Southern Pacific, but ultimately delivered by another line; (3) an intermediate file for freight originating on another line, passing over Southern Pacific and delivered to a connecting carrier; and (4) a local file for freight carried entirely within the Southern Pacific system. Each type of file is contained on separate monthly reels of tape in the Videofile System. Late arriving waybills are recorded in the correct accounting month reel, since blank tape is reserved at the end of the reel for this type of contingency. Supporting documents substantiating adjustments, corrections, and claims are also recorded on the reserved portion of tape, and cross indexed in their document address so they are printed out automatically with the waybill.

Pacific, it automates the handling of waybill and abstract files.

The \$750,000 system will ultimately reduce file floor space to one-eighth the space presently required and has dramatically streamlined the handling of waybills. With a total capacity exceeding 20 million documents, the system is designed to accept more than 400 thousand new documents monthly and retrieve 100 thousand each month on request. Documents can be filed on the average of one every ten seconds and retrieved on the average of one every six seconds.

RECORDING WAYBILLS: Document Images.

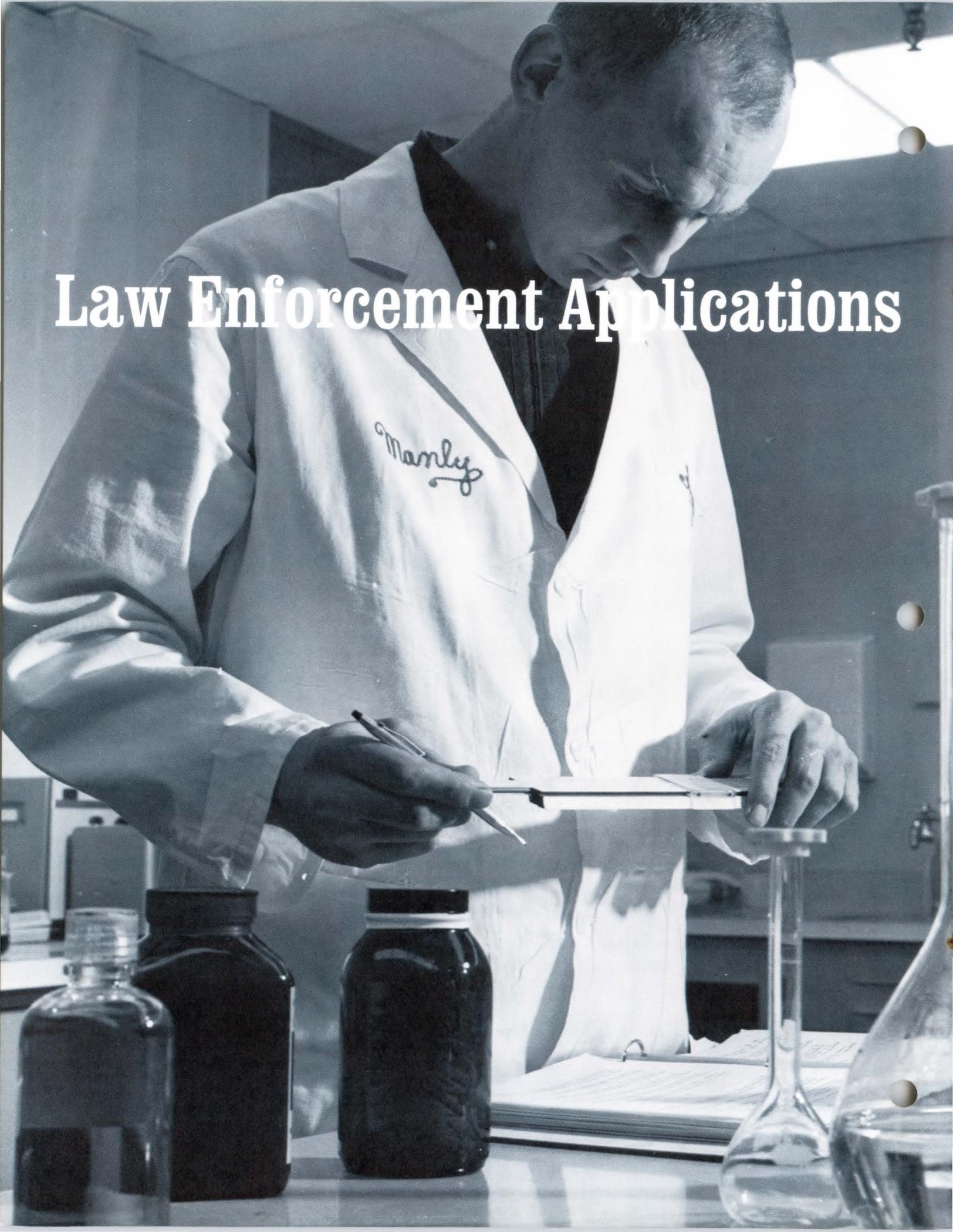
This is how the system works at Southern Pacific: An operator places a document on a glass platen at one of the six File Sections. Underneath the platen is a television camera, which scans the document and converts its image to a television signal. As a double check, the document's image is shown on a televi-

sion screen (monitor) in front of the operator. The signals are sent to one of eight videotape recorders. One reel of tape (10½ inches in diameter with 3600 feet) will hold the contents of 12 four-drawer file cabinets.

A second set of signals also is sent to the tape transport at the same time, but in computer language. These signals (digital address code) are keyed in by the operator as the document is placed on the platen. They are recorded on the tape, just in front of the document recording. The address identifies the document so it can be found again at any time.

To retrieve the document, the requester prepares a mark sense card at his own desk bearing the address code. Cards are filled out during the day shift, and batched together for feeding into a digital card reader during a later shift. The card reader tells the central control unit what address it has read. On the control unit's command, the videotape record-

Law Enforcement Applications



VIDEOFILE SYSTEM

A New Weapon in the Arsenal Against Crime

by G. Bradley, Senior Systems Analyst, Law Enforcement

- 9:45 p.m.** ABC Liquor Store held up. Night manager wounded. Customer in store at time of robbery notifies police and gives general description of suspect.
- 10:30 p.m.** Preliminary investigation discloses latent fingerprints. Some may belong to suspect.
- 10:45 p.m.** Physical description and latent print images transmitted to central file for automatic search for respondents.
- 11:10 p.m.** "Pot party" in suburban residence raided. Twenty-five participants transported to booking unit on misdemeanor complaint.
- 5 p.m.** Automatic file search for respondents to robbery case complete. Elimination prints rejected. Respondent prints from file available for comparison by fingerprint analyst. Mug shots available for review by witness.
- 11:30 p.m.** Witness at precinct station makes tentative identification of possible suspect John Doe.
- 11:40 p.m.** Fingerprint analyst at central file makes tentative identification of possible suspect John Doe.
- 12:10 a.m.** Fingerprints of pot party participants transmitted to central file for processing and identification.
- 12:30 a.m.** Fingerprints of Richard Roe, pot party participant, identified as belonging to John Doe, suspect in felony armed robbery case.
- 12:35 a.m.** John Doe, alias Richard Roe, held for further investigation.

SPEEDING UP THE IDENTIFICATION PROCESS: Vital to Progress in Law Enforcement. Until recently, the foregoing was a good scenario for a television series, but impractical in the real world of criminal investigation. Minimum elapsed time is one of the most essential ingredients in a successful criminal investigation. The shorter the time between criminal act and identification, the higher the probability of apprehension. In the example cited, less than three hours elapsed, during which time two sets of fingerprints (latent and rolled) were transmitted, searched and identified, and a mug shot file was searched for potential identification.

The records and identification unit of a modern law enforcement agency has primary responsibility for keeping criminal records associated with an individual. In performing this responsibility, heavy emphasis is placed upon the identification process to insure that "John Doe" has his own record, his entire record and no part of anyone else's record. Since the fingerprint is the only proven positive identification unique to an individual, large fingerprint collections have been accumulated as a key identifier for the record keeping process. Contrary to popular belief, fingerprints are rarely used in the "who dunit" side of crime solution.

The reasons for this are quite simple. The analysis of the minute detail within a fingerprint is highly interpretive and complex. In order to insure that all possible interpretations are incorporated in any one classification, the classification scheme for filing purposes takes into account only the basic pattern type and a gross approximation of the number of ridges intersecting two reference points within the pattern. In order to make an identification, the analyst must search through hundreds of fingerprint sets in the particular classification in order to find the required set. Quite often he must look in several classification areas before the search is complete. If the set to be identified includes all ten fingers, as in the case of an arrestee, the search may take from several minutes to an hour or more, depending upon the uniqueness of pattern types and clarity of images. If the fingerprint to be identified is a single digit, as located at the scene of a crime, the



search may take from several hours to weeks, depending upon the amount of non-fingerprint data available (such as a list of suspects). Thus, it can be seen that until such time as the identification process can be accelerated, a valuable apprehension tool is lost.

VIDEOFILE SYSTEMS: High-speed Retrieval of Fingerprints, Mug Shots and Records. Great technological strides have been made in the area of high-speed transmission of voice, data and graphic information. Modern data processing has speeded up much of the work involved in cross index and table look-ups. To close the loop required to fully automate the criminal information process, a high-speed storage and retrieval system for graphic and non-digital data is required. In addition to high-speed capability, the storage and retrieval system must be flexible, easy to update, and capable of simultaneous service to many users.

Figure 1 is typical of the variety of tape formats available within the Videofile system program. Figure 1a is a dossier, or file folder format that accumulates all information associated with a particular individual. File folder size may be fixed or variable. Space for criminal history accumulation is normally preallocated at the time a file is created and added to as historical data is developed. In the event a folder becomes full, the file may be expanded, reorganized or purged—all modes under automatic program control.

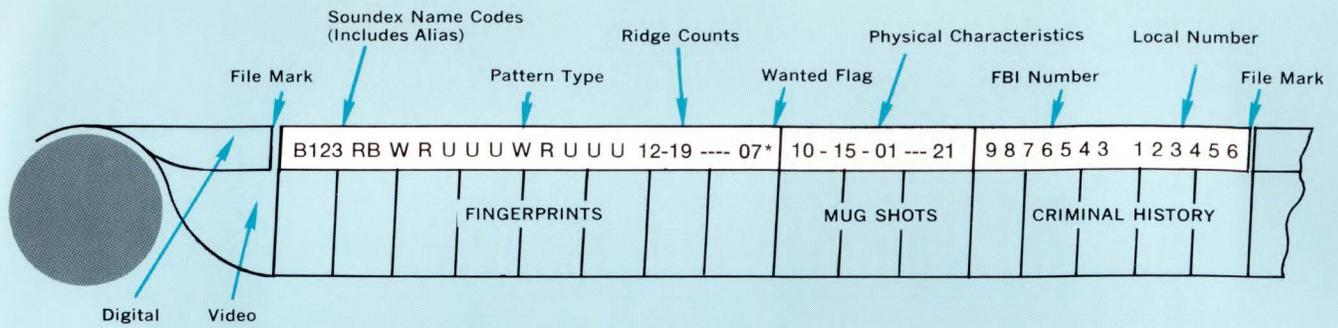


Figure 1a. Typical File Tape Format.

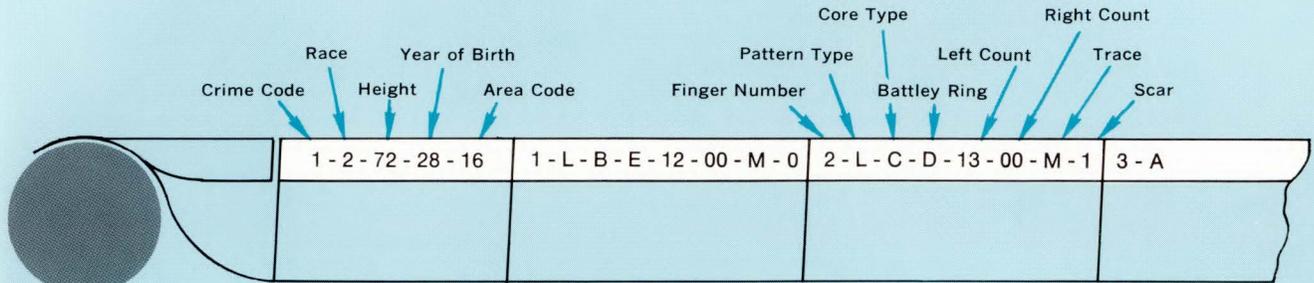


Figure 1b. Latent Fingerprint Tape Format.

Figure 1b is representative of a tape format useful in locating possible respondents to a latent fingerprint search. As with the dossier file, the digital recording is descriptive of the graphic information associated with it. Any recording is descriptive of the graphic information associated with it. Any character position in the digital recording may be searched on the basis of an exact match, range, or ignored completely. Two or more address words may be "banded" together to take advantage of all descriptive data available. On this basis, the fingerprint file shown would satisfy the following request:

- | | | |
|--------|---------------------------------|--|
| Match | — Race | — Males only |
| | Loops | — Latent image is clear enough to identify a loop pattern. |
| | Age | — Witness described suspect as "about 40." Request year of birth 18-38. |
| Range | — Finger # | — Position of latent image indicates the right hand, exclusive of thumb. Request finger # 2-5. |
| | Ridge Count | — Latent image indicates at least 10 ridges between core and delta. Request ridge count 10-99. |
| Ignore | — All other character positions | — No further information is available pertinent to this search. |

In this case, the request is for fingerprint sets belonging to males, between the ages of 30 and 50, with loop patterns containing 10 or more ridges in any finger from 2-5. Obviously, the more data available in the search criteria, the fewer respondents to the search. Once a respondent file has been located on tape, all or any portion of the file may be copied to a temporary storage buffer for further routing. It should be emphasized at this point that the tape section is now free to continue searching for other respondents or requests. Since the file has been copied to the temporary storage buffer, the original is still resident on the file tape and available for other requesters. The out-of-file condition has been eliminated.

From the temporary storage buffer, files may be routed in any of three directions: to a display monitor for viewing by the requester, to a facsimile printer for recreation of the original file in hard copy form, or to another tape. This latter mode is useful in purging files to off-line storage, re-organizing files, or creating temporary work-in-progress tapes.

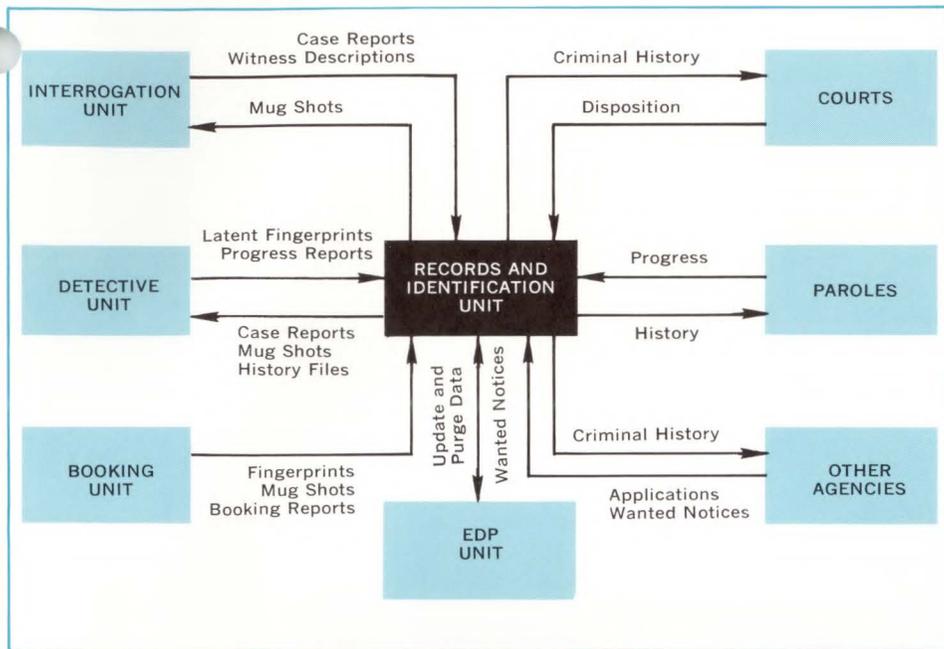
FINGERPRINT IDENTIFICATION: Split Screen and Browsing Techniques. Viewing fingerprint files on the display monitor offers some interesting innovations in the identification process. Utilizing a split screen monitor display, two images from the temporary storage buffer can be displayed simultaneously, giving the operator/analyst the ability to make a direct comparison of fingerprints to be identified and respondents from the file. A complete file of respondents can be browsed under operator control until an identification is made or the request for information satisfied.

Figure 2 is representative of a series of displays from the operator point of view. In 2a, thumb of search argument and first respondent from the file are displayed for comparison. If no identification is made, thumb of second respondent is displayed for comparison. In 2b, if an identification is made, or if the specific digit imprint is smeared or otherwise difficult to read, the operator may advance both images for further comparison or verification. In 2c, when an identification is made, the operator has access to mug shot or criminal history records identified with the suspect for communication to the requester.

CRIMINAL RECORDS: Speed Accuracy, and Automatic Purging. Figure 3 illustrates the key role played by the records and identification unit in the total law enforcement process—from criminal act to rehabilitation. An interrogation unit performs the preliminary duties of collecting data and questioning any available witnesses. Speedy retrieval of mug shots of potential suspects is required as witnesses are prone to forget details with the passage of time, and become reluctant to appear at a later date.

If no immediate identification of a suspect is made, all information pertinent to the case must be made available to the detective unit assigned to investigate the case. If latent fingerprints are developed, these must be quickly processed. History files of possible suspects must be made available for human analysis and investigation.

As arrestees are brought in for booking, reports and forms are generated as well as the familiar mug shot and ten fingerprint set. The



CRIMINAL INFORMATION FLOW

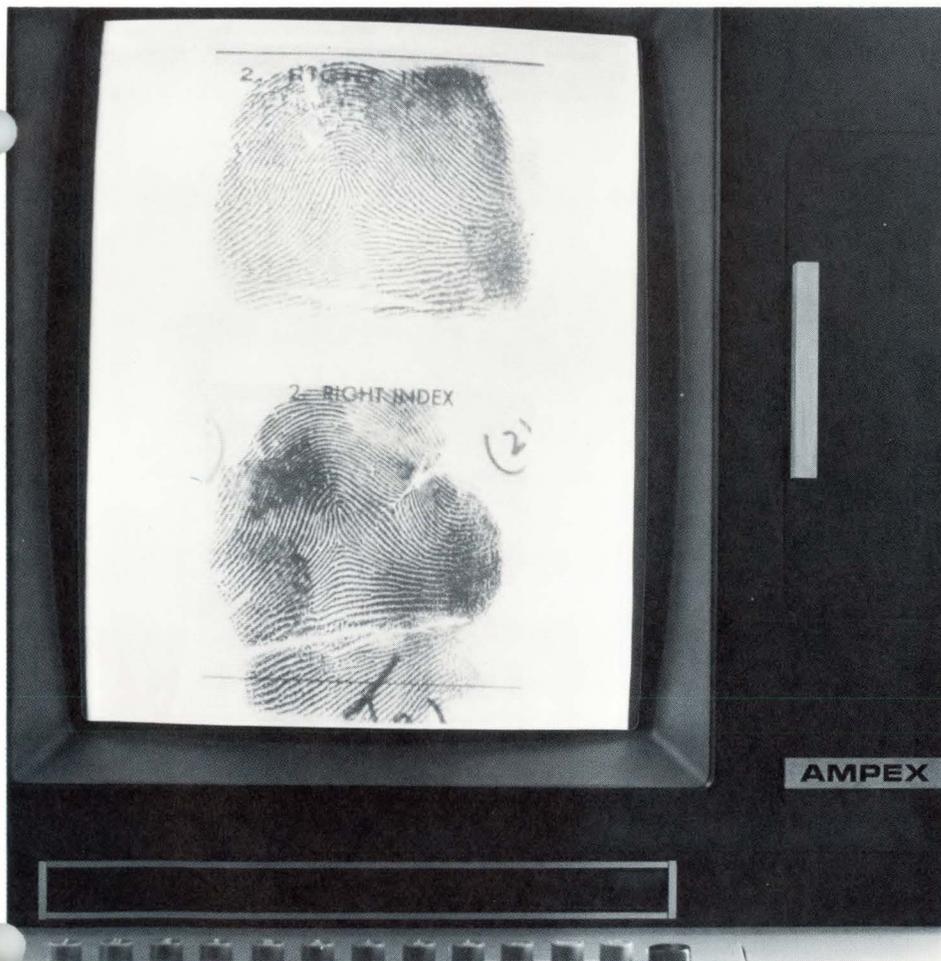


Figure 2. Split screen fingerprint images available quickly for browsing with a Videofile System.

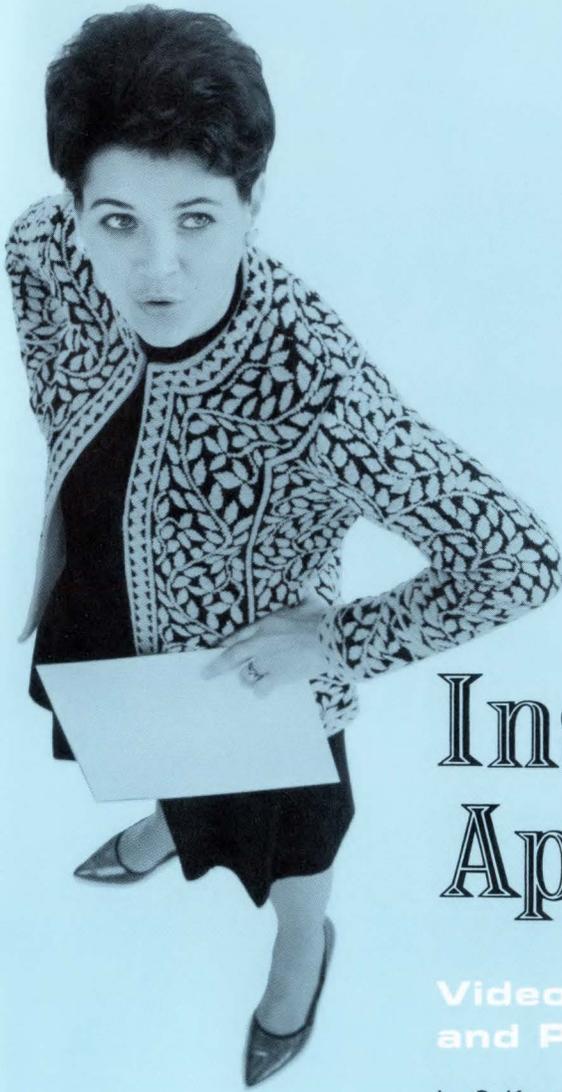
first step in the process is to look for a positive identification of the arrestee to ascertain the existence of a prior criminal record. If none exists, a new file is opened. If the arrestee has a prior record, the new material must be added. Where an alias exists, this fact must be cross-referenced for future identifications. Within hours of the arrest, the courts may be required to set bail. This function usually requires an up-to-date, accurate record of criminal history and case circumstances in order to render a just decision.

In preparing both prosecution and defense, access to complete and accurate records is required. If convicted, the criminal record is an important factor in setting sentence. If acquitted, statutes may require that certain records be purged. As emphasis is shifted to rehabilitation, accurate records of history and progress are vital to a successful return to productivity.

INTER-AGENCY COOPERATION: Records System Needs Jet Age Speed. Not to be overlooked is the ever-increasing importance of information exchange between cooperating agencies at the local, state, national and international levels. The jet age is more than just an expression. It is a mode of transportation for criminals that transcends jurisdictional boundaries at near sonic speeds. The pressure is on the record system to equal, or better, this pace.

Last, but by no means least, is the importance of a reliable record system to the general public. The law-abiding citizen will most probably volunteer a set of fingerprints, at some time in his life, as his personal signature for purposes of identifying a clean record. An accurate and reliable identification and record storage system is a major safeguard to this personal security.

The Videofile Information System for the storage and retrieval of criminal information performs two important functions, often at lower cost than present manual systems. It provides a highly flexible storage medium to accumulate records in an accurate and efficient order. It provides the speed necessary to take our opening scenario out of the science fiction class and into the real world of criminal justice.



Insurance Applications

Videofile Systems Speed Policy Issue and Post Issue Services

by G. Keyarts, Senior Systems Analyst, Insurance

The insurance industry faces a paperwork dilemma in the issue of new business. Today's competitive market demands faster issue while still maintaining or improving the quality of their risk selection. This risk selection and issue procedure is based on the pending application file. The problem is that the more frequently the file is sent out to the underwriters for possible issue and the more often the file is updated with information to improve risk selection, the more difficult it becomes to maintain control of the file.

For example, several clerks may be simultaneously searching for the same file to update it with a medical exam, credit check, physician's report, or the record of previous coverage. It may be on any one of several underwriter's desks. Each clerk has an opportunity to replace the file on the wrong desk or to misfile it in the central pending file. Incomplete and "can't find" files are a major problem. Underwriter waiting time multiplies. Clerical costs increase.

Similar problems hinder a company's post issue efforts to service customer requests on issued policies. Videofile Information Systems offer an entirely new concept to solve these dynamic records management problems in the insurance industry.

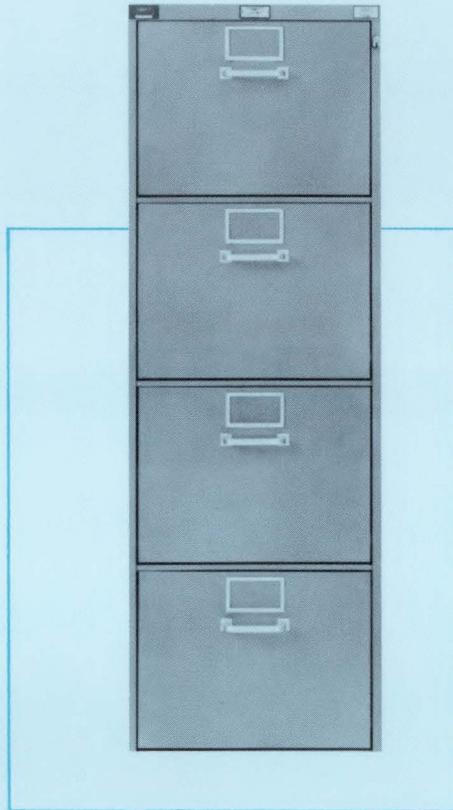
Insurance companies first see justification for a Videofile System as an "automated file cabinet" solving the three basic filing problems they have in common with all industry: 1) Reducing central file storage space for its burgeoning policy records, 2) reduction of mounting file-personnel expenses, and 3) eliminating their perennial out-of-file problem.

Once the planning and layout of the electronically interconnected network of cameras, storage devices, display screens and printers that comprise such a system has started, however, the automation-conscious insurance companies have been quick to recognize the potential for even greater benefits. More sophisticated use of the system can provide a dynamic graphic communications tool, cut-

ting deeply into the costs of physical batching, moving and processing of their mountains of paperwork.

NEW BUSINESS: Three Filing Techniques for Faster Handling. Solving the new business dilemma and providing the insurance underwriter with pending applications that are always-in-file, always-up-to-date, and immediately available, requires that an application be entered into the Videofile Information System at the earliest possible point in the processing flow.

As an example, American National Insurance Company will place its applications before the cameras in Videofile filing consoles as they are received and numbered, entering the application number address on the console keyboard. Another company, immediately following receipt and numbering, will obtain a card punched with the filing address number as a byproduct of entering a digital abstract of the application into its EDP system.

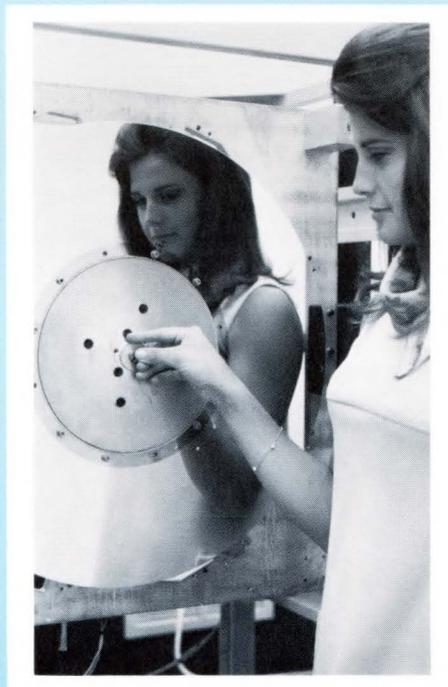


This card will insure accuracy and save a second keying when used with a Videofile card reader to address the input at the filing console.

A third company proposes to mount its on-line computer terminal for digital application data entry right on the filing console. When keying has been completed the operator will place the application directly on the camera platen and the filing address will be supplied to the Videofile system through a direct digital interface from the EDP system.

Methods to rapidly update these pending application files with all of the supporting documents required for final issue include locating a filing console in the incoming mailroom. Regardless of the method or particular point of input, updating is accurate, easy, and fast. The updated file is immediately available since magnetic tape recordings, unlike microfilm, requires no developing or other processing.

POLICYHOLDER SERVICES: More Rapid Handling with Videofile Systems. Customers may change their names, addresses, beneficiaries, mode of premium payment, and then change the changes. They take loans, convert plans, assign policy values, or just simply ask questions. Better service on these, broadly termed policyholder service requests is the byword among progressive insurance companies. Strategically located system filing consoles will speed these incoming documents to the case workers at American Republic Insurance Com-

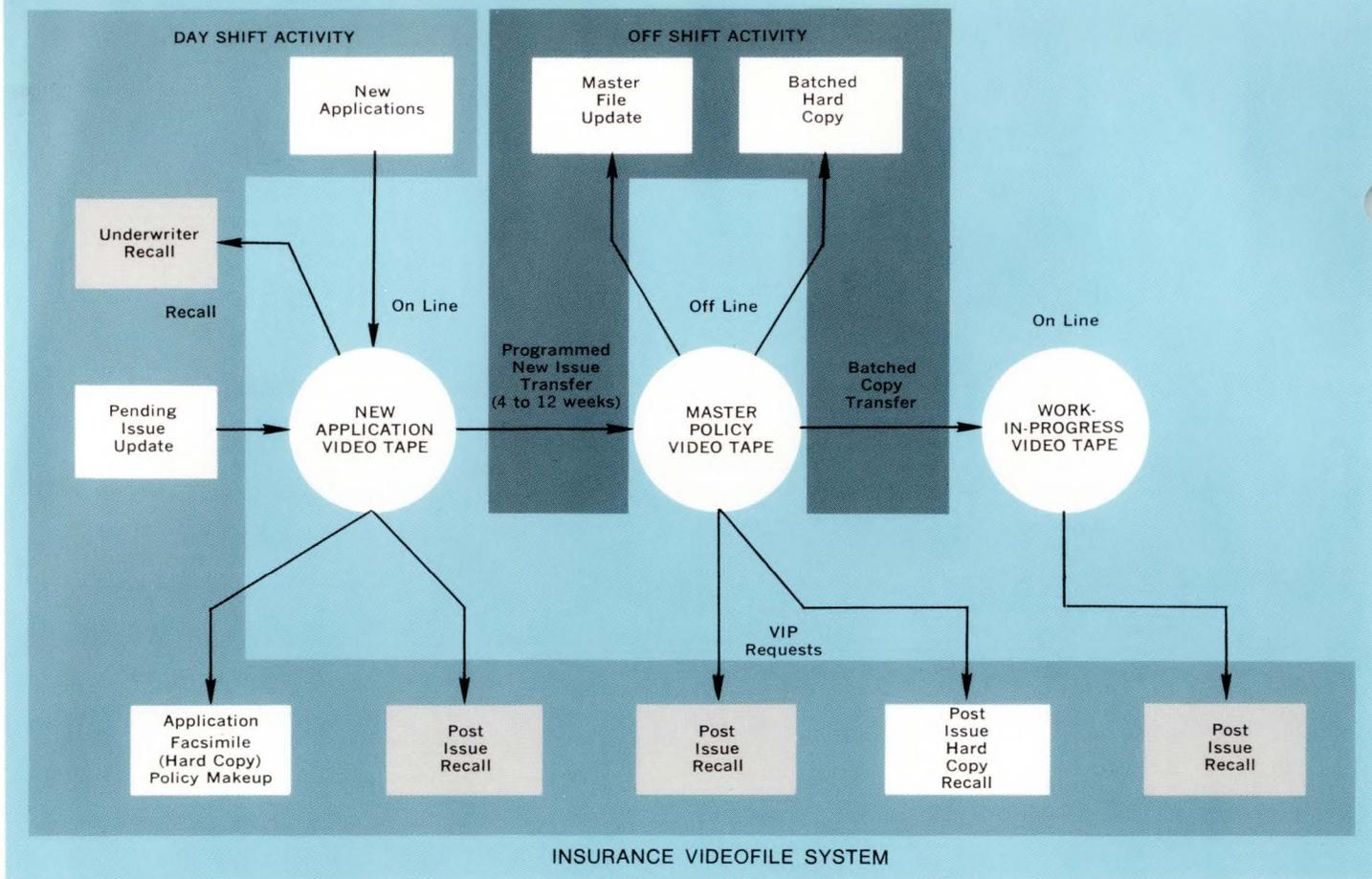


Metal disc used in the Videofile System buffer with super smooth surface (three to five micro-inch arithmetic average). It is made up of a thin magnetic sublayer on an aluminum core.

pany, bypassing traditional batching and mail movement operations. Work in process pending files are created on tape and rapidly updated, solving out-of-file and incomplete-file problems which are similar to those just outlined in the new business area.

Many companies write a part of their outgoing policyholder service correspondence on automatic typewriters or on computer typewriter terminals from a store of prewritten paragraphs. Semiautomatic filing of this type of letter has been explored with promise of speeded input and cost savings.

STORAGE OF DOCUMENTS: Flexibility with a Videofile System: The information in an insurance Videofile system is made available for use from three functionally different kinds of tapes: (1) Certain types of information are filed and worked from on-line work tapes, with all or selected documents copied to the master policy file tapes to update them at some subsequent time. (2) Master policy file tapes are stored off-line and individually brought out and mounted on on-line Videotape transports to answer very important or urgent requests. They are updated from documents on tape or from a filing console during an off-line batch pass of the library. (3) Information from the master tapes is required over a period of time or rapidly at an indeterminate time. This is copied from the master tapes to a work tape during the off-line library batch pass (as above) and the work tape then mounted on-line.



NEW BUSINESS FILES: Retrieval in Seconds. The new application and subsequent update from the new business filing operations will normally be recorded on a special-purpose, relatively short on-line new application tape. The images may be organized on tape in any manner common to paper files, or, because of the high speed search and address logic capabilities, in many ways which are impractical with paper files.

One method is a terminal digit organization, which places several new applications in a common, preaddressed magnetic file folder based on the last 2 to 4 digits of the application number. This has the advantage of using the law of averages to drastically reduce the total amount of blank tape which is commonly left in the magnetic file folders to accommodate individual file growth. Access to any new or pending application or recently issued policy on this tape will average 10 to 15 seconds.

As this tape fills, the individual page-erase capability of the Videofile system is used to remove the oldest policies from the terminal digit folders to make room for additional new applications. This is generally an automatic operation based on a date code in the filing address and is written as a part of the program which first copies the issued policies over to the master policy file tapes. Depending upon the particular design, issued policies may remain on-line on the new application tape for 4 to 12 weeks or more.

BETTER POLICYHOLDER SERVICE: Eliminating the Out-of-File Problem. A medium-sized insurance company will receive 500 to 1,500 applications each day with 4,000 to 10,000 pending issue at any given time. The master policy file will contain 2 to 4 million issued policies totalling 24 to 50 million pages. Policyholder service requests will number 1,000 to 2,000, requiring 800 to 1,500 policy files from the master files.

With the flexibility of magnetic tape in a Videofile system, it is possible to vary the amount of on-line vs off-line tapes as needed to handle these 800 to 1,500 files. Statistics show that as high as 25% of all requests are for policies less than 45 days old. These can be viewed from the on-line new application tape, and are the principal reason for maintaining recently issued policies on this tape for 4 to 12 weeks. This is where service really counts to hold the sale.

A sizable number, perhaps 100 to 200, are urgent requests from off-line files. These can be individually obtained by mounting the master tapes on-line on videotape recorders provided in the system for this purpose. Access times, including tape mounting, will run 2 to 3 minutes. The remaining majority of requests are of a routine enough nature that an overnight cycle does not present an unrealistic burden on the quest for better service. These requests are obtained on an evening shift when the master policy file tape library is passed for updating with new documents.

During this same operation, the required folders are copied to a Work in Process Tape. This tape is mounted on-line at the start of business the next morning, so that policyholder service personnel have access to any policy on it in 10 to 15 seconds.

REMOTE DISPLAY MONITORS: Providing Soft Copies for File Review. We have examined the videotape recorders and the various tapes which are mounted on them. We have also looked at how and why these tapes are created and updated. The real purpose in all this is to make the information available when required. In insurance systems, this is done primarily on display section monitors.

A display section consists of a high resolution monitor and a keyboard for entering the address of the required file. As with the filing consoles, some companies have substituted single punched card readers for the keyboards in a semiautomated work control system.

When the address has been entered and the display control key pushed, the Videofile system control center routes the requested address to the proper Videotape Section and a search is started. If the address is not found on-line, it is displayed to a system operator so that a master policy tape may be taken from the shelf and mounted.

After a file of pages has been copied from the master tape to a buffer, the requester may use the browse control on his keyboard to leaf forward or backward through the file. He

ay retain the file on his monitor for as long required.

Since the master tape containing this file is still available to the system and since the file has only been copied onto the buffer (not removed), it may be retrieved by others for consultation or for parallel processing steps.

As indicated earlier, the time from keying of the required address until the first page automatically appears on the display monitor can be as short as 10 seconds for on-line tapes and 2 to 3 minutes for off-line tapes mounted in response to a request.

HARD COPY PRINTER: A Production Tool. If a hard copy of any page being viewed on a display is required, the operator simply presses the print control key on his keyboard. The electronic image on that track of his buffer is copied to a track on a printer video disc buffer which then changes speed to drive the system electrostatic printer. This speed translation is necessary because the printer reproduces a page image at $\frac{1}{48}$ of the 15-frames-per-second read-write speed of the electronic system.

A typical insurance facility has one or two centrally located printers for hard copy output. To identify the various requesters of the prints coming out of the printer, the Videofile system will place a requester's identification number at any predetermined location on the copy. This number could be the station number of the requesting display, a mail stop or a worker number of up to 24 characters.

The printer is also used in insurance systems to obtain hard copies of an entire folder for certain low volume users not having displays, or in some cases for very large high volume users where a single page from the folder is all that is required. A Videofile system offers this ability to selectively retrieve a single page or group of pages from a folder in either soft or hard copy by proper page and request coding. Many companies view this feature as a major step toward increased efficiency because of the human tendency to read through an entire folder even though the information on a single page would complete the case at hand. Punched cards are a common method of input.

ISSUING NEW POLICIES: Providing a Facsimile Automatically. When an issued policy is assembled, it is legally required that the application, or a facsimile, be a part of the contract. Traditionally these facsimiles have been made by any one of a wide variety of office or professional copy methods. The problem has been that the application must be split out from the file and later physically sorted and rematched with—the file, the copy and issue policy pages, which in most cases have been produced by computer. Delays in issue and even lost applications often result.



Underwriter studies one of a series of documents recalled seconds before from a new application file. Any selected document can be printed out as a hard copy if desired.

In a total system concept, the EDP system will supply an EAM card punched with the issued policy address as a part of the whole package of documents. This card is immediately placed in a system card reader which addresses the new application tape and causes a facsimile of the application to be produced on the system printer. This can be done within a minute or so—nearly in phase with computer printout of other required documents.

Several companies will now use this same punched card to address the filing of any of the computer produced pages which are to become a part of the permanent policy record for storage in the Videofile system.

SYSTEM CONTROL CENTER: Heart of System Dynamics. The entire Videofile Information System is controlled by a small, general purpose, stored program computer acting essentially as a process controller. This system control center for insurance systems can provide a wide variety of unique time and cost saving operations in conjunction with the processing that has been described.

One of the first is the automatic editing of the new application file when it is copied to the master policy file tapes to remove those documents required for issue but not needed in the permanent policy record. Similarly, policy file correspondence may be purged from the master files based on some temporary coding indicator and a date code. The ability to systematically remove images from files is seen by many insurance executives concerned with information management as one of the Videofile system's greatest benefits.

Special electronic "flags" may be placed in the address track of selected documents or files to indicate issue or decline, to hold another day on a work tape, to limit or direct access to special times or individuals, to record work accomplished. A program may be

written to type out the addresses of files in some special condition on the system control center teletype unit.

SYSTEM INTEGRATION. Total EDP/Videofile System. As implied throughout this discussion, a joining of EDP and Videofile systems within the total insurance system may prove desirable at many points. We have shown punched cards as one media for allowing the two systems to talk to each other. Many companies play even more sophisticated integration of the two systems through direct electronic digital interfaces. Such an interface (or punched cards) can be used to request previous coverage policies on an individual for use in the underwriting of a new application for additional insurance. Most companies have, or are planning to have, their name-to-policy number cross indexed on a digital computer. This index is checked against a new applicant's name at an early stage of processing and the EDP system is programmed to request the Videofile system to obtain the required policy files for underwriting.

The use of a punched card to obtain the application facsimile on newly issued policies has already been covered. Another use is during consolidation of in-force policies on a new working master policy file tape, where the EDP system supplies the lapsed policy numbers to be copied to archival tapes and the in-force numbers to be retained.

SECURITY TAPES: Easily Available if Desired. Security tape copies for on or off-site storage are quickly and easily obtained in a Videofile system. Their true value is difficult to assess at this time, since companies have operated without security file systems of any kind for so many years. Yet, loss of the policy file would all but put them out of business if it occurred, and it can happen. ■



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