

LAW ENFORCEMENT MANAGEMENT INSTITUTE

STILL VIDEO: AN ALTERNATIVE TO 35 MM EQUIPMENT FOR CRIME
SCENE SEARCH UNITS AND MUG SHOT PHOTOGRAPHY

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A STILL VIDEO SYSTEM

Hi-tech in photography is progressing by leaps and bounds. Recently, law enforcement has shown considerable interest in still video systems as an alternative to 35mm photography. There are undoubtedly a number of applications for the still video system. This paper, however, will discuss only three applications.

Unlike the 35mm photography system, still video systems are comprised of many pieces of equipment linked together to form the system. There are numerous vendors which offer still video, and the equipment varies depending on the vendor. A typical system could include; an IBM compatible 386 computer, with 640k RAM, 40 megabyte hard drive, 60 megabyte tape backup, and a floppy disk drive; a multi-scan, dual RGB, and dual composite monitor that is capable of interpreting analog and digital signals; a Targa and Alice card; an optical disk drive; color video camera and a video printer.

The computer is the brain of the system, with most of the other equipment wired directly to the computer. The hard drive in the computer is used to store data related to the photographs that are being stored on the optical disk. The tape backup is used to store all data from the hard drive and optical disk to eliminate the possibility of data loss. The floppy disk drive is used to upload software and other programs to the computer. The Targa card is

necessary to process analog signals to digital signals and digital signals to analog signals. The Alice card compresses the photographs for storage. The compression ratio can be ten to one, fifteen to one, or twenty three to one. The monitor described earlier makes it possible to view the data screens with information about each photograph, and it will also display the photograph itself on just the monitor. A two monitor system could be used in lieu of a single monitor system. The color video camera is necessary to take the photographs with the camera wired directly to the computer. The computer will freeze one frame of the video allowing that frame to be captured and stored.

An optical disk drive with at least eight hundred megabytes of storage capacity is recommended. This optical disk system is used to store the photographs. An eight hundred megabyte optical disk is capable of storing eighteen thousand photographs that are compressed at the twenty three to one ratio. Optical disk drives may be linked to a configuration much like a jukebox. When this "jukebox" has been added to the system it allows the storage of ninety thousand photographs. "Jukeboxes" may also be linked together increasing the amount of storage. The video printer produces the capability to print photographs as needed. All of these components make up a typical still video system, which will allow the taking, storing, retrieving, and printing of video photographs.

Several of these systems may be networked together in

various configurations. A system could be set-up with the capability of taking and storing photographs in one location, retrieve in a different location, and retrieve and print photographs in yet another location. The combinations are limited only by one's imagination and the willingness to spend the money necessary to set-up such networks. Still video systems may also be linked with other agencies, who have similar systems, via telephone modem. This would allow agencies to share data regarding persons arrested, photographed and entered on any of the linked systems. Passwords and limited access can be introduced to safeguard against someone erasing or obtaining confidential information.

Additional equipment that can be added to the system are a still video camera and still video player. The camera is much like a 35mm camera, except it takes video photographs using a video disc instead of 35mm film. The playback unit is used for instant viewing of photographs, viewing prior to storage, or to transfer the photograph from the video disc to the optical storage disk. The still video camera and player are often used when it is necessary to have the camera mobile.

STILL VIDEO SYSTEM APPLICATIONS

An important law enforcement application to consider is the capturing and storing of mug shots. Using the 35mm system, or other film based approaches, it is impossible to determine if the photographs are acceptable until they are developed. The arrestee is often unavailable for a retake if the initial pictures are of poor quality. Using the color video camera, film is no longer necessary, hence developing is also no longer required. With the video mug shot system the photographer may view the photograph before saving it to an optical disk. This allows photographs to be retaken if necessary without additional costs. Once a photograph is stored on the optical disk it is no longer necessary for an agency to print every photograph. One need only make prints of mug shots when there is a need for hard copies. This is a tremendous savings in film and developing costs, since it is possible to print two views (front/side) of two arrestees on one print for \$1.25, or about the same as the cost of traditional methods a photograph of one arrestee.

A favorite application for the mug shot system comes from criminal investigators. When preparing a photographic line-up they can use it to select similar photographs. In the past investigators have been compelled to look through numerous files to collect enough photographs of subjects that look similar to their suspect. Often, the Photographs were dissimilar in that the backgrounds were different, they were different sizes, focal point was different etc., all of which

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added doubt to the validity of the line-up. The still video system allows database searches on multiple identification criteria. Searches may be accomplished using one or more of the factors. By using several different criteria the computer can pick the photographs of subjects that appear as close to the suspect as possible.

For example, if the suspect is forty five years old, six feet two inches tall, weighs two hundred pounds, has red hair, green eyes, and lives in Dallas, Texas the search for a line-up consisting of subjects that looked like the suspect might be as follows: "date of birth greater than 4/12/44 and less than 4/14/46 and height equal to 74 inches and weight equal to 200 and hair equal to red and eyes equal to green and city equal to Dallas." This search would produce all subjects that are in the system who are forty five years old, six feet two inches tall, weigh two hundred pounds have red hair, green eyes, and live in Dallas, Texas. The computer will complete this search in minutes, where a manual search may take hours. It is very apparent that the computer search for photographs significantly reduces time over manual searches. Search criteria for the North Richland Hills Police Department's system is outlined in the following list. Search criteria may vary with different systems, however, will follow the same basic principles.

Table 1. IDENTIFICATION CRITERIA FOR NORTH RICHLAND HILLS
POLICE DEPARTMENTS MUG SHOT SYSTEM

1. Last Name	11. Height
2. First Name	12. Weight
3. Alias	13. Eyes
4. Arrest Id Number	14. Features (facial hair etc)
5. Date of Birth	15. Sex
6. Social Security Number	16. Hair
7. Address	17. Race
8. City	18. Citizenship
9. State	19. Comments
10. Zipcode	20. Picture Number

The second area in which law enforcement finds still video to be very useful is in crime scene search. A still video camera at the scene, with a still video playback unit and monitor in the crime scene vehicle, will prove invaluable. Crime scene officers are able to take photographs of the scene, then return to their vehicle and immediately view the photographs. If the photographs are of poor quality, the crime scene officer can re-photograph the scene before it is disturbed (the still video camera system allows fifty photographs to be taken on one reusable one and a half inch camera disk). After re-photographing the scene, the crime scene officer may again review the photographs. Once the scene has been photographed to the officer's satisfaction, the photographs can be stored to optical disk. At their convenience the officers can return to the police station to transfer the photographs from the camera disk to an optical disk by using the still video player, which is connected to

the still video system at the station. Once again, it is not necessary to print every photograph.

If it is a relatively minor crime scene one may erase the photos on the camera disk, as the photos will be stored on the optical disk, and then reuse the camera disk at another crime scene. Major crime scenes such as homicides, may be stored on the optical disk and retained on the original camera disk as an added safety measure. If viewing is necessary at a site where no monitor or playback unit is available, prints can be made on a five inch by seven inch format that can be divided into nine separate areas, each about the size of a 35mm film frame. This allows the printing of nine photographs for the conventional cost of one. The system also allows database searches on multiple identification criteria for crime scene photographs. The following is a list of the criteria used by the North Richland Hills Police Department. It is an advantage to have all the listed search criteria; however, in the vast majority

Table 2. SEARCH CRITERIA FOR NORTH RICHLAND HILLS POLICE
DEPARTMENT'S CRIME SCENE PHOTOGRAPHS

1. Case Number	10. Victims State
2. Date	11. Victims Zipcode
3. Time	12. Photo Location (bedroom etc.)
4. Picture Number	13. Photo Description
5. Victims Last Name	14. F-Stop
6. Victims First Name	15. Lens Type
7. Victims Middle Name	16. Distance from Object
8. Victims Address	17. Filter
9. Victims City	18. Light Source

of cases the only criteria used is "Case Number."

The third law enforcement application for the still video system is with narcotic units. There are two major applications where still video is used by narcotics officers. The first being for surveillance photography of suspects, suspect vehicles, drug buys, etc. The still video camera, depending on make and model, will usually support the use of 35mm camera lenses. All that is necessary for the use of these lenses is an adaptor that fits on the still video camera. This feature enables officers to use various telephoto lenses, and/or night vision equipment with the still video system. There is a definite cost savings, because no film must be developed and the video disc may be reused which eliminates the need for film entirely. Again, photographs do not have to be printed as long as a video player and monitor are available.

Narcotics officers may also use still video to photograph an area where they are planning to execute a search warrant. The photographs can be used to brief the search warrant entry teams. By having a still video playback unit and monitor at the briefing it will be possible to point out areas of concern in detail. It is no longer necessary to draw diagrams on a black board. With still video the entry team can be shown on a television screen exactly what the area looks like prior to their arrival. For example, a search warrant is to be conducted on a house. By the northeast

corner of the house there is a large bush with a pit-bull tied to the bush. Without the still video system, a drawing would be made on a blackboard, using stick like figures, showing a house, bush, and dog. looking at such a drawing it would be very difficult to get a true picture of how to approach this side of the house. Using still video the entry team will see the bush and its relationship to the house. They will see the dog and what kind of rope it is tied with, how long the rope is, and how the rope is attached to the bush. The entry team will get a true and accurate account of what they will face prior to making entry. The team will then be able to determine the exact approach necessary. Once the warrant is executed these photographs may be erased and the video disc reused, eliminating the cost of both film and developing, as well as the time necessary to produce such a presentation.

LEGAL ASPECTS

A primary concern with the still video system is how it will be received in the courtroom. At present, photographs using the still video method have not been challenged in court. Because of the newness of these systems it is a question whether still video photographs have yet been tested in court. A local district attorney advised that he does not put a photograph on the stand; rather, he puts an officer on the stand to testify that the photograph accurately represents the scene and/or person photographed. This attorney saw no difference in the fact that still video might be used as opposed to 35mm film.

Legal issues concerning optical storage of video photographs generally deal with admissibility of optically stored records in courts and other administrative agencies. These governmental agencies would include federal courts, state courts, federal regulatory agencies, and state regulatory agencies. There are numerous different state courts, dozens of federal courts, and hundreds of regulatory agencies, all of which have different types of evidentiary laws and regulations.

There are, however, two related bases for the admission of optically stored records: As copies of original records or as original computer-generated evidence. While the foundational requirements are different, the fact that optical storage media are used should not affect the results. If a challenge to the evidence is expected, a

carefully prepared user and his or her counsel should have available for the court simple, straight-forward evidence as to how optical storage works, how it was used to make the record, and why it is reliable. The apparent reliability and trustworthiness of the record will be enhanced if the user can also offer evidence of an audit trail indicating the source of the original data, when it was recorded and how it was subsequently stored.¹

An excellent document to refer to regarding legal aspects is: Legality of Optical Storage edited by Robert F. Williams, Cohasset Associates, Inc., available from the Library of Congress, catalog number 87-24280. This document contains information on the admissibility into evidence of optically stored records for all fifty states.

COST: STILL VIDEO VERSUS 35MM

The cost of still video systems is decreasing with the advance in technology; however, these systems do still appear to be high priced. The typical system price range may be anywhere from about \$40,000.00 to as much as \$175,000, depending on the vendor and available options. Even though the initial cost seems high, a substantial savings in film and developing cost will be realized.

The North Richland Hills Police Department purchased a still video system in January, 1989 for \$42,378.00. During the first year of operation, savings on film and developing costs were \$5898.50 (see table 3).

Table 3. NORTH RICHLAND HILLS CONVENTIONAL FILM COSTS
JANUARY 1988 - JANUARY 1989

	ROLLS of FILM	COST	DEVELOPING COST
Mug Shots	416	\$1,040.00	\$1,352.00
Crime Scene	862	\$2,155.00	\$2,801.50
Subtotal	1278	\$3,195.00	\$4,153.50
Total Cost Film and Developing - \$7,348.50			

NORTH RICHLAND HILLS STILL VIDEO COSTS
JANUARY 1989 - JANUARY 1990

	DISKS COST	PRINT PAK COST	OPTICAL DISKS COST
Mug Shots	0	\$375.00	\$200.00
Crime Scene	\$300.00	\$375.00	\$200.00
Subtotal	\$300.00	\$750.00	\$400.00

Total Cost Still Video Supplies - \$1,450.00

Total Yearly Savings \$5,898.50

Source: North Richland Hills budget reports 1988-89 and
1989-90

Table 4. EQUIPMENT AND COST OF NORTH RICHLAND HILLS
STILL VIDEO SYSTEM

1. IBM-AT equivalent PC Computer	\$17,500.00
A. 386 CPU	
B. Keyboard	
C. EGA Monitor	
D. EGA Video Card	
E. Serial Port	
F. Parallel Port	
G. 640k RAM	
H. 40 Megabyte HardDrive	
I. 1.2 Megabyte Floppy Drive	
J. 360k Floppy Drive	
K. Intel Above Board	
L. 60 Megabyte Tape Backup	
M. AT&T Targa-16 Card	
N. Super Fine Pitch Video Monitor	
O. Alice Card w/compression	
P. LEVI Software	
2. 800 Megabyte Optical Disk Drive	\$8,495.00
3. Color Camera w/Auto Iris Lens	\$899.00
4. High Resolution Video Printer	\$3,495.00
5. 1000 Watt Stand-by Power Supply	\$1,800.00
6. (2) Still Video Playback Units	\$2,830.00 ea.
7. Still Video Camera and Battery Pack	\$2,725.00
8. 5" Video Color Monitor	\$485.00
9. FD Lens Adaptor	\$222.00
10. Still Video Zoom Lens	\$730.00
11. Battery Charger Unit	\$222.00
12. Still Video Camera Case	\$145.00
Total	\$42,378.00

Source: Special Technologies Inc. 1410 Summit Ave. Plano, Tx.

Table 5. CONVENTIONAL 35MM SYSTEM COST

1. (2) Cannon T-50 35mm Cameras	\$758.00
2. 28mm High Speed Lens	\$200.00
3. 60-300mm Macro Zoom Lens	\$150.00
4. (2) Sun-Pak 611 Flash Attachments	\$720.00
5. Carrying Case	\$145.00
6. 2X Converter	\$59.00
7. Sirchie Photo Identification System	\$1,123.00
Total	\$3,155.00

Source: Sears Roebuck Company

The initial \$42,378.00 investment made by the North Richland Hills Police Department should pay for itself in seven years, if the cost savings remain the same. It is very apparent that even though the initial system cost is high, monies can be recuperated by the savings in film and developing costs.

EXISTING SYSTEMS IN LAW ENFORCEMENT

Although there may be several agencies that have still video systems and/or optical storage systems only two will be discussed in this section. The two systems examined will be those operated by the Federal Bureau of Investigation and the North Richland Hills Police Department.

During 1989, the Federal Bureau of Investigation initiated a pilot image project by combining the technology of fingermatric, Inc., with that of several different vendors to develop the software and other technological configurations necessary to conduct three planned demonstrations. The demonstrations provided image transmission of a black-and-white mug shot and a fingerprint image of wanted subjects over NCIC equipment and telecommunication lines to a two-way radio base station transmitter, and out over a radio frequency into receiving equipment in a patrol car. Equipment had also been configured to permit the capture and transmission of the subject's photograph and a live-scanned fingerprint from a police car to the police station and then on to the NCIC host computer in Washington, D.C., where these images were stored in digital form on an optical disk
2
subsystem.

Even though the Federal Bureau of Investigation's program had initial success, funding requests have been denied through 1991, making the realization of these technological advances limited until such time as the project can be fully funded.

The North Richland Hills Police Department implemented a still video mug shot system with optical storage in January, 1989. Upon installation of this system the conventional system that had been used was completely removed making the still video a stand alone system. This is an indication of the confidence this Agency had in the still video concept.

North Richland Hills Police Department has found some minor problems, but overall personnel are very pleased with the system. Some of the problems that have surfaced are: down time, operator error, software changes and equipment failure. Down time has been minimal, with the longest period being twenty four hours. All of the down time experienced was caused by a faulty stand-by power supply. In the case of the twenty four hour down time, the problem could have been corrected in less time; however, the Department opted to wait until the next day to make the necessary repairs.

As with any new system changes are necessary to obtain the desired output. This was the case in North Richland Hills, as the Department had to have minor software changes made during the first year of operation.

As mentioned, there was an equipment failure, the stand-by power supply. To date, this has been the only equipment failure experienced by North Richland Hills.

The biggest problem with the system has not been directly with the equipment; instead, has been with operator errors. These errors were numerous when the system was first installed, but became fewer over time.

The largest benefits from the system have been time, money and storage space. Time for searching for mug shots has been drastically reduced, film and developing costs have been eliminated and file cabinets are no longer necessary to store photographs. North Richland Hills Police personnel feel they have a very successful system.

There are other agencies considering, and/or are in the process of implementing still video, optical storage systems. Two Texas agencies that are currently considering such equipment are Garland police and Dallas/Fort Worth Airport Department of Public Safety. Garland has already purchased a system and is expecting implementation by mid-May 1990. Dallas/Fort Worth Airport Department of Public Safety is in the bidding process for a system and expects to implement a system by mid July 1990.

In reviewing existing systems it appears thus far that the equipment has been very successful. These components prove that basic building blocks of technology are available to support law enforcement's need for speedy, cost effective and reliable mug shot and crime scene photography programs.

CONCLUSION

Still video is yet another new dimension of new technology to improve law enforcement effectiveness. Still video is reliable and a valuable option in that it permits the viewing of photographs immediately. Searches for photographs can be accomplished in minutes verses hours, and film and developing costs are dramatically reduced.

Even though still video offers many advantages, it is necessary to proceed with caution when implementing such systems. The department considering such a purchase should consult with others that have systems in operation and evaluate cost versus quality. It is also recommended that coordination with the local district attorney's office be considered, a review of all applicable statutes should be completed and the acquisition of Legality of Optical Storage be obtained. These precautions will prepare an agency to address legal questions that may arise with the implementation of a still video system.

ENDNOTES

1. Williams, Robert F. Legality of Optical Storage 5-47
(Cohasset Associates, Inc. 1987)
2. Nemecek, David F. "NCIC 2000: Technology Adds a New
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