The Examination and Demonstration of the Presence of Paper Fiber Patterns on Carbon Film Ribbons Using the Ken-A-Vision® Video Flex® Digital Camera

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Forensic Document Examiners (FDEs) often utilize various instruments to assist them in the examination of questioned documents and to prepare demonstrative charts to illustrate their findings. Unfortunately, many of these instruments are uneconomical and are limited in their capabilities in that they can only be used for a single purpose. Recently, a more versatile instrument, the Ken-A-Vision® Video Flex® digital camera, has become available and is finding its way into the arsenal of the forensic scientist. Utilizing the Video Flex®, the authors tested a new method for the examination and demonstration of paper fiber patterns on carbon film ribbons. This device not only assisted the authors in their examinations, but also provided a means to easily demonstrate the subsequent findings.

Introduction

In 1974, G. H. Hahn's article "Paper Fiber Impressions on Carbon Tape Ribbons" was published in the *Journal of Forensic Sciences*. Prior to Hahn's article, "the standard method of identifying a typewriter as having typed a certain document [had] been to examine the typed impressions on the document for irregularities or identifying characteristics peculiar to that certain typewriter as distinguished from all other typewriters in the same class" (Hahn, 1974). Forensic Document Examiners (FDEs) still use this methodology in the examination of typewritten documents today, particularly when no carbon film ribbons are available for examination in the case.

Hahn's method consists of microscopically examining the carbon film ribbon under low magnification (3X) using transmitted light in order to observe the indentations on the ribbon which correspond to the paper fiber from the questioned document. Photographs are then taken and suitable prints prepared for demonstration purposes.

In September 1985, Gerhart presented a paper to the members of the American Society of Questioned Document Examiners wherein he found that the specimen typewritten document and corresponding carbon paper could be examined simultaneously using a comparison microscope and incident light and then photographed (Gerhart, 1985).

During the course of an examination involving a questioned typewritten document and carbon film typewriter ribbon, the authors discussed the feasibility of utilizing a Ken-A-Vision® Video Flex® microscope/digital camera as an aid in the examination and comparison of the exhibits. Although other instruments, such as the Projectina Comparison Projector and comparison microscopes have been utilized by FDEs in similar cases, these tools are cost prohibitive and not available to numerous government and private laboratories. The authors believe that the Video Flex will offer FDEs a cost-practical instrument to aid them in the examination and demonstration of the presence of paper fiber impressions on carbon tape ribbons.

Methods and Materials

"The Video Flex from Ken-A-Vision is a video camera mounted on a flexible 'goose neck'"[1] and is sold for approximately $1,000.00. This device comes with an 8mm lens, power supply and video connector. Additional lenses and adapters are available for a fee (e.g., 4mm lens, 25mm lens,

light sources, etc.). When used in conjunction with laptop or desktop computers this device can be used to "grab" still images as well as full motion images/video. Although Ken-A-Vision offers their own video capture program, other computer capture programs, such as Snappy Video Snapshot® may be utilized.

This system allows the examiner to capture a color image of the field of view through the left ocular of any standard microscope. The image can easily be transferred to any image program on your computer and then printed in color or black and white at the desired size (Figures 1 and 2).

Figure 1. Image of the typewritten letter "Z" as displayed on the paper. This image was taken using a video flex microscope, Nikon C-mount adapter with extension ring, and a Sigma 28mm lens. Note the paper fibers showing through the carbon film.

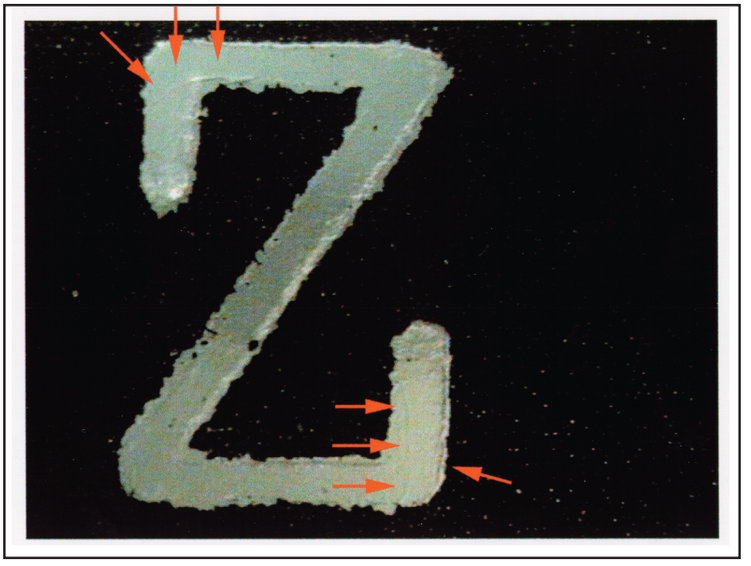

Figure 2. Image of the typewritten letter "Z" from the carbon film ribbon. This image displays the paper fiber pattern from the typewritten text. This image was also captured using the video flex microscope.

We found through talking with Mr. Peter V. Tytell[2] that this video microscope could also be used with an SLR lens adapter (C-mount) for a video camera. This adapter allowed us to affix a standard camera lens and an extension ring to the video microscope (e.g., 55mm Nikon micro or 28mm Sigma macro lens with a Nikon mount). This procedure increases the magnification factor greatly and eliminated the need to use the stereo microscopic to enlarge the image.

When examining typewritten characters on a page, the focal length is sometimes so short (depending on the amount of enlargement desired) it becomes difficult to arrange the angle of lighting. If this becomes too much of a problem, the FDE may always set up the system to view and capture images through a microscope ocular. When utilizing a standard micro/macro lens, the image filled the viewing area of a 19-inch color monitor with one typewritten character. The new Video Flex models have addressed this issue by adding brightness and contrast controls on the camera base. These models also plug-in directly to a USB port on a laptop or desktop computer.

Another feature found beneficial was the use of a computer video card that allows for direct plug-in to a desktop computer. The computer video card used for the images displayed here is an ATI Technologies All-In-Wonder® card.

This system may also be used like a comparison microscope or Projectina. An imaging program like Adobe PhotoShop® 5.0 is initiated, a typewritten character from the paper is captured and displayed as a file in a window. Then the ATI window is activated within Adobe PhotoShop® displaying the live image of the same character from the carbon film ribbon. The FDE may then conduct the comparison directly on the computer monitor. Images of both typewritten characters are saved as separate files in PhotoShop®. Side by side printouts of the images may be made or the FDE may prefer to have the images overlaid in different colors (e.g., red and green). When the typewritten characters are in alignment the red and green overlays turn black. All of these images may be printed for court demonstration or an actual live demonstration may be projected on a screen or monitor in the courtroom.

Discussion

The Ken-A-Vision Video Flex® microscope/digital camera is currently being used by FDEs and firearms examiners at the Florida Department of Law Enforcement crime laboratory in Jacksonville, Florida and has been in use at the Carney & Hammond Forensic Document Laboratory for more than a year. Although originally marketed as a demonstration aid in classrooms, the Video Flex® has applications for every forensic discipline in need of high quality images.

References

Gerhart, F. J. (1985). Identification of Typewritten Original and Carbon Copies Through Fiber Impressions on Carbon Paper. Presented at the American Society of Questioned Document Examiners annual meeting, Montreal, Quebec, Canada.

Hahn, G. H. (1974). Paper Fiber Impressions on Carbon Tape Ribbons, *Journal of Forensic Sci ences*, Vol. 19, No. 1, pp. 136-141.

Resources

1. Internet web site, http://www.sciencevideos.com/Products/kav/VidFlex3.htm

2. Peter V. Tytell, Forensic Research, New York, New York