

## TECHNICAL NOTE

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### Document Image Transmission by Telecommunication

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**REFERENCE:** Gernandt, M. N., "Document Image Transmission by Telecommunication," *Journal of Forensic Sciences*, JFSCA, Vol. 35, No. 4, July 1990, pp. 975-980.

**ABSTRACT:** Photophone® is an image-transmission device which uses telecommunications to transmit questioned documents for examination on an international scale. This instrument, now in use by the Department of Justice, Immigration and Naturalization Service (INS), is a combination video camera and monitor screen, high-power microscope, diskette storage facility, and thermal printer. The Photophone video camera and zoom lens can be focused close up on a document, or on a particular portion of a document, or even out to infinity to capture a high-fidelity image on the Photophone screen. The video camera can also be attached to a zoom microscope for high-quality, increased-magnification pictures. The image generated on a Photophone screen can be image processed for increased contrast, spot zoom capabilities, and negative images. All pictures can be either stored on diskette or printed for hard copy, or both. Photophone creates for the INS a vitally integrated system for examination of questioned documents and identifying individuals at all U.S. Ports of Entry and offices containing a Photophone.

**KEYWORDS:** questioned documents, image transmission, telecommunication

The Immigration and Naturalization Service (INS) is now using an image transmission device, a video telephone called Photophone® (Fig. 1). The Photophone working principle is similar to that for a fax machine by using existing standard telephone lines to send quality document pictures.<sup>2</sup> The Photophone has remarkable picture clarity, unlike many fax machines in use today. Picture distortion occurring through transmission is not a factor when transmitting close-up images of questioned documents.

A questioned document containing a suspect passport photo substitution, counterfeit document, questioned signature, dry seal impression, questioned typewriter, or fingerprint discovered by an immigration officer at any United States Port of Entry or immigration office can now be instantly examined by an Immigration Service forensic document examiner and an opinion can be rendered as to the authenticity of the document. In one instance, a set of signature exemplars needed for examination by one regional office was

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<sup>2</sup>Photophone is manufactured by Image Data Corp., San Antonio, TX, and is distributed to the INS by Photophone Systems, Vienna, VA.

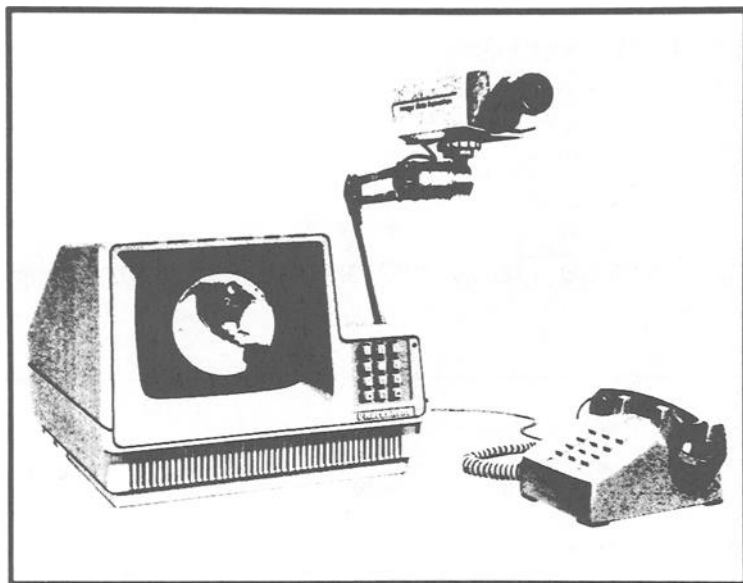


FIG. 1.—Photophone with monitor screen and video camera.

transmitted by Photophone to the requesting regional office for immediate examination and adjudication of dozens of pending alien petitions containing a common questioned signature.

Also, aliens entering the United States who may be detained by immigration inspectors because of possible counterfeit or altered passports can now obtain quick document verifications rendered by the Forensic Document Laboratory in McLean, Virginia, or qualified regional forensic document examiners.

The quality of the black-and-white transmission and printout of Photophone images will surpass that of most photocopy machines, especially when focused close up on particular document problems. The more magnification, the better the image quality.

### Instrumentation

The Photophone comes equipped with a 9-in. (23-cm) black-and-white monitor screen with 64 gradations of black and white, a soft telephone keypad, and a microfloppy-disk drive [1]. The video camera is a CCD solid-state, high-resolution Cohu camera [2]. It comes with a 12.5 to 75-mm zoom lens. This camera unit is attached to a flexible camera arm and camera ball mount.

The video camera can easily be connected to a Bausch & Lomb Monozoom-7 optical system [3]. For increased magnification capabilities, magnification amplifiers of  $\times 1.5$ ,  $\times 2.0$ ,  $\times 3.0$  can be attached to the Monozoom extension tube. The camera stand is mounted above a transparent light surface.

A hard copy printout is produced by a Sony video graphic printer [4]. A 3-in. (7.5 cm) image is printed out on thin-film thermal-sensitive paper with a 9-s heat transfer. Negative or positive images can be printed. There is also a frame-by-frame memory of the previous print.

By utilizing the copy function on the printer and the previous image in memory, a new

image can be superimposed onto the one in memory and printed out. A hands-free speaker phone amplification system comes in handy when adjusting the document under the video camera while in communication with another on-line Photophone connection.

### Features

When the Photophone is engaged, the screen presents a twelve-function primary menu which is operated by the phone keypad. These functions include the following:

*Camera/Auxiliary*—Lets you select the incoming video signal from Photophone's camera or any other auxiliary video source, such as an infrared camera system.

*Change Type*—Normal Mode—provides the full gray scale for best general use; High Fidelity Mode—provides the best image for fine detail and texture; and Fast Mode—provides a smaller screen image with the shortest possible transmission time.

*Dial*—Converts the Photophone keypad into a standard touchtone keypad.

*Temp Save*—Saves the image on screen in internal memory.

*Disk Save*—Saves the image on screen onto diskette storage.

*Help*—Provides on-screen information about operating the Photophone.

### Image Processing

When an image is held on the screen, on the disk, or in memory, the image can then be image-processed. By using the image-processing menu on the screen (Fig. 2), one is able to manipulate the contrast, size, and orientation of an image. With proper picture composition, lighting, and exposure, image processing becomes a workable tool.

There are two contrast controls associated with image processing. One is a contrast expand, which will enhance the contrast of the overall image. The other is a point expand which, when the screen's pointer box is adjusted over the area of the screen's image, can lighten or darken the particular area in question.

A pointer box can be called up onto the screen and manipulated over any portion of the picture. Once in place, that marked area can be point-expanded for contrast or magnified and centered on the screen. A negative image can be produced and the image can be flipped from left to right.



IMAGE PROC		
Cont Exp	Pnt Exp	
Zoom	Orig	Flip
Neg	Undo	
Exit		

FIG. 2—Image-processing screen menu.



FIG. 3—Image arrangement screen.

### Diskette Operations

The Photophone diskette system uses a 3.5-in. (88.9-mm) double-sided, microfloppy-disk drive for image storage. The diskette provides permanent storage and recall of images and can be used much as a slide projector is used.

The diskette menu options offer two possibilities:

1. *Diskette information*—Diskette capacity information on image storage is readily available. The information regarding the percentage of capacity and the number of slides on the disk can be viewed on the screen.

2. *Diskette arrangement mode* (Fig. 3)—This mode lets one select the order in which the images will be presented. Images can be copied, deleted, or transferred in the order chosen, much as 35-mm slides are arranged in a carousel.

If you wish to view a full-size image before transmission, simply mark the slide with the cursor and push "See." Once a diskette has been arranged to your satisfaction, you may either send the complete diskette to another Photophone system or send one image at a time. After the image has been sent and both parties are viewing the same image, the pointer mode can be used (Fig. 4). An arrow can be brought up on the screen to point to an area of the image on which you want the receiving party to concentrate attention. Simply push "Send" and, without delay, the arrow will appear on your receiver's screen for ease of communication.

### Photophone Update

The INS now utilizes 20 Photophones nationwide and has 60 more Photophones on order to be in place in 1989. The distribution of Photophones will locate them in all



FIG. 4—Pointer arrow on magnified Photophone screen.

major U.S. Ports of Entry, U.S. international airports, and Border Patrol checkpoints, as well as the embassies in Rome, Mexico City, Bangkok, Jamaica, and Ireland.<sup>3</sup>

Image Data Corp. also offers Photophones with keyboard display, 30% faster processing and transmittal time, and a greater quantity of shades of gray. Photophone's color system has 15 000 degrees of color, along with a 12-in. (30 cm) viewing screen.

### **Conclusion**

The U.S. INS today is an integrated, yet diverse, organization with offices and suboffices in every corner of the globe. Timely communication has become imperative for expediting identification of citizens, aliens, and their documents.

A person's signature, fingerprint, and photograph are used daily for identification of individuals at ports of entry around the world. Photophone assists the Immigration Service in making those quick, key decisions relating to the identification of individuals and their documents.

A picture is worth a thousand words, and with the use of Photophone, the entire Immigration Service is instantly connected to document libraries, in conjunction with document examiners and intelligence functions. Photophone is in no way a substitute for original documents when it comes to proper examination; yet it can become a favorable tool when dealing with questioned documents in any examiner's office or laboratory.

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### **References**

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