Computer Reader for the Blind

Twenty years ago, Telesensory, Mountain View, California was formed to develop and market technological aids for blind people. Its initial product was a spinoff device called the Optacon, an innovation that permitted the blind and the deaf-blind to read—not just braille transcriptions but anything in print. The Optacon combined optical and electronic technology and incorporated research performed at Stanford Research Institute under the sponsorship of NASA's Ames Research Center.

Last year TeleSensory introduced an even more exciting aid for the blind, a second generation spinoff that not only permits the user to "read" printed words but also provides access to the electronic information available on most personal computers. Called Optacon II, it is a joint development of TeleSensory and Canon, Inc., Tokyo, Japan. The two companies have had a close relationship since 1974 when Canon invested the time and money to introduce the original Optacon to Japan.

The Optacon was invented by Professor John Linvill and Dr. James C. Bliss, who were co-founders of TeleSensory; Linvill is now board chairman and Bliss president. The operation of the print Optacon is illustrated at upper right. The young user is passing a mini-camera over a printed page with his left hand; a control unit processes the camera's picture, translates it into a vibrating image of the words the camera is viewing, and the user senses the tactile image with his other hand. The original Optacon, which can be used with virtually any alphabet or language, provided a new level of independence for thousands of blind persons in more than 70 countries.

Optacon II employs the same basic technique of converting printed information into a tactile image, but it goes much further in that it can be connected directly to a personal computer, opening up a new range of job opportunities for the blind.

Optacon II consists of a hand-held camera with a silicon integrated circuit of 100 light sensitive transistors; a microprocessor control unit that processes information from the camera; and a tactile array, driven by the control unit, consisting of 100 vibrating rods. The camera's "retina" sends the shape of what it is viewing to the control unit and the corresponding rods in the tactile array vibrate. Moving the camera with one hand, the blind operator perceives the vibrating image with the index finger of the other hand. Optacon II is not limited to reading printed words; it can convert any graphic image viewed by the camera.

Optacon II obviously demands extensive training for blind operators. TSI provides 60-hour training courses at its Mountain View headquarters and at training centers around the world. A revolutionary RS-232 interface feature not only provides access to computer information, it also allows the computer to accomplish much of the training that formerly required a teacher. For example, the computer can assist in letter and word recognition drills and speed reading exercises, offering efficiencies in teacher time. At right below, TSI's Optacon II Training Software allows students and their teachers to use Apple and IBM personal computers for training.

IBM and Apple PCs can be used by blind people because their screen information is presented in a format that can be converted to braille or synthetic speech. Until now, however, there have been barriers to use of the Macintosh family because it was generally believed that the blind could not use an input device such as a mouse or trackball. A new development—inTouch™ software developed by Berkeley System Design Inc.—allows Optacon II to display tactually the information on a Macintosh screen. With the Macintosh system, the Optacon II camera is not used; instead, inTouch drives the computer interface and causes the Optacon sensor to show a portion of the Macintosh screen, which the blind operator reads by touch (far right).

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