Quantum Leaps

By Maureen Hogg

The presenter describes a long series of technological assistive devices she has used to overcome a double disability—blindness and deafness—over the past 30 years in pursuing a highly successful career in technical communication. She also demonstrates the equipment and shows how it makes it possible for her to do her job.

In September 1971, Texas Instruments announced the release of its standard one-chip MOS/LSI calculator logic circuit which featured the revolutionary use of integrated silicon chip technology. The TI press release predicted: “This single chip may make full electronic calculators available to everyone at prices that can put a calculator into every kitchen and every businessman’s pocket.”

At the time, I was a junior in high school, newly designated “legally blind and deaf.” Information was accessible only in Braille or through “universal manual communication,” a method where people printed block letters in the palm of my hand and I answered by voice.

I still use those basic communication methods today. Yet in the nearly 35 years since TI introduced its new technology, I’ve added increasingly sophisticated electronic access technology: an OPTical to TACtile CONverter (Optacon); a Tactile Communicator (TC); and refreshable Braille displays combined with screen reading software to access the latest in PC desktop and laptop technology. This demonstration provides an overview of the systems I used to earn a college degree and that I continue to use to pursue a technical writing career at Ball Aerospace & Technologies Corp.

OPTACON

The same year that TI introduced its integrated silicon chip technology, Telesensory Systems, Inc. (TSI) of Palo Alto, Calif., released a new reading device for the visually impaired. Dubbed Optacon for OPTical to TACtile CONverter, the device uses a hand-held camera to scan a printed page and then converts the images into tactile readout displayed on a finger plate with 166 vibrating rods. The Optacon actually duplicates the same print character as any sighted person would see. The breakthrough opened up a new era in educational and career opportunities for the visually impaired.

I received my first Optacon in July 1974. It facilitated the completion of my Bachelor of Arts degree from the University of Northern Colorado in 1977. It was instrumental in securing a technical writer trainee position at the then Ball Brothers Research Corp., now Ball Aerospace & Technologies Corp., Boulder, Colo.

The earliest Optacon models used lens attachments to access print or computer screens. The basic zoom lens allowed print from 1/12 to 1/4 of an inch to be read in any font style. A fine print lens accessed print smaller than 1/12 inch, common in legal contracts. A CRT lens, when combined with an invert switch to complete video, gave access to early computer screens. In the mid 1980s, a smaller, lighter model called the Optacon II was introduced. Its circuitry allowed a direct interface to computers for auto scanning and a second CRT setting of inverse video.

I used a model R1B-A for eight years, then switched to an R1D to access print hard copy and computer screens for MASS 11 on a VAX VT-100 remote terminal. I later upgraded to an Optacon II to diversify my computer access – first to an IBM AT 286 clone and then to a Macintosh. Lastly, I used the CRT lens with Windows 95, Windows NT, Windows 98/95 and Windows 2000. Today I use both the R1D Optacon to access print media and the Optacon II to troubleshoot visuals on a computer screen that a screen reader cannot easily view.

TACTILE COMMUNICATOR

Even as I began my training as a technical writer in 1978, advances in digital signal processing presaged a new era in electronic access. Early on in my employment, it became clear how much direct telephone communication was needed. Ball Aerospace developers took the basic concept of the Optacon and applied it to the telephone, using the new digital signal processing techniques: a direct conversion of an ordinary input such as a Touch-Tone telephone into a tactile readout in Braille. What resulted was the Tactile Communicator (TC), a telephone communicator that met a special one-way communication need. The caller used the telephone keypad to send letters of the alphabet, which the TC “hears” and converted into the letters of the alphabet and the 10 Arabic numerals in Braille. The caller typed, I read and then I answered by voice.

It still works. The basic design remains viable more than 25 years later. Three generations of pager systems have been implemented to cue me to a ringing telephone. Two generations of TC have addressed changes in telecommunications, including the adaptation of an answering machine. Even portable telephones and certain cell phones can interact with the system.

REFRESHABLE BRAILLE DISPLAYS

In 1975, the first displays were created that presented Braille and “refreshed” it while duplicating a tactile readout of a visual screen. Early refreshable Braille displays were hampered by a non-standard Braille system that could not easily adapt to the computing environment. By 1987, the Braille Authority of North America (BANA) addressed that question: It issued a Computer Braille Code that adapted the often imprecise 6-dot system to the computing environment as read in literary Braille and set guidelines for 8-dot Braille unique to computing needs.

A wealth of refreshable Braille displays resulted, ranging from 80-character desktop versions to 18-character personal data assistants (PDA) today. I chose the SuperBraille-2000LT laptop with a 40-character display as my primary system. It features a Pentium 233 MHz microprocessor with 5 GB hard drive and 126 MB memory. It can be “hung” onto a larger desktop such as a Pentium IV. And it features its own small PDA; a scratchpad for notes, transferable to the laptop mode; a full calculator; and a digital clock.

For an 80-character desktop display, I use a HandyTech Modular System 80 produced in Germany. It also offers a scratchpad feature for quick note-taking, although it is not as easily carried as the SuperBraille. It is my permanent home PC system, connected to a Pentium IV, and it uses digital signal lines to access the Internet or regular phone lines to access work remotely on a work-at-home license.

SCREEN READER SOFTWARE

Concurrent with the emergence of refreshable Braille displays and a standardized computer Braille code was the development of software to read the visual screen and send it to the refreshable display. JAWS for Windows, or simply JAWS, is the screen reader software of choice. Originally released by Henter-Joyce in 1987 for a spoken-word output system, JAWS has evolved to serve both synthetic speech and Braille readouts.

Freedom Scientific now markets JAWS, which can run with any output system on the market and which releases upgrades simultaneously with new operating systems. The SuperBraille runs JAWS with Windows 98/95 in its laptop mode and with XP Pro in desktop mode. The HandyTech Mod 80 runs JAWS with XP Pro in desktop mode.

THE FUTURE IN ACCESS TECHNOLOGY

Just as PDAs and cell phones have pushed ahead mainstream communications, so too the access technology for the blind or deaf is forging ahead. New products are now in early release to improve on the Optacon, which ended its production in 1996. Chief among these is the Portable Print Reading Device (P2RD), manufactured by CA Technology of Florida. The P2RD combines optical character recognition (OCR) scanning capability with a spoken word output. Its next release is expected to include a tactile display. From Germany comes the VideoTIM, produced by ABTIM to furnish a high-resolution tactile readout.

In telephone communications, in 2003 UltraTec released its newest product: The CapTel, short for “captioned telephone.” CapTel uses the latest in speech recognition software and digital communication lines to allow a hearing-impaired person with good vocal capability to use a telephone in real time with a person with full hearing.

When taken together, the mainstream consumer electronics and the customized access technology of 2005 have far surpassed the modest expectations of 1971. Predictions concerning what the next 35 years will bring will doubtless meet a similar fate.

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Maureen Hogg is a senior technical writer/editor in Communications Services with Ball Aerospace & Technologies Corp., Boulder, Colorado. She began her writing career as an undergraduate student at the University of Northern Colorado[2], where she was named Outstanding History Major of 1976 and won the Hazel E. Johnson Award in Colorado History.. After joining Ball Aerospace in 1978, she won 15 more awards in internal publications, marketing communications, and community relations. These included the Trail Blazer Alumna Award from the University of Northern Colorado (1985) and the Women in Communications/Woman of Achievement Award in Advertising/Public Relations (1992). Her work has appeared in *Aerospace America*, *Engineering Horizons*, and *Spaceflight: The International Monthly Magazine of the British Interplanetary Society*. She has been a member of the Rocky Mountain Chapter[3] for the Society of Technical Communication[4] since 1981 and a senior member since 1986. She currently serves on the AccessAbility Special Interest Group (SIG)[5] for the international STC organization.

URLs FOR HOT LINKS

1. Ball Aerospace & Technologies Corp (BATC):
http://www.ball.com/aerospace/

2. University of Northern Colorado:
http://www.unco.edu/

3. Rocky Mountain Chapter of STC:
http://www.stcrmc.org/

4. Society for Technical Communication (STC)
http://www.stc.org

5. STC International AccessAbility SIG:
http://www.stcsig.org/sn/index.shtml