Communication By Computer

By JOEL SCHWARZ

A computer, earphones equipped with sensors, and Morse code are the voice elements being used by a small number of handicapped people to 'talk' to the world.

JOEL SCHWARZ PHOTOS

Speech-and-language therapist Judy Matas explains to Steve Harper how to operate his new Morse-code system.

Not long ago a short note, crisply printed on a home computer, arrived among the sacks of mail delivered to the White House. The moving letter was one young boy's celebration of freedom — the freedom to express himself clearly and to be understood after a lifetime without communication. The letter read in part:

"Dear Mr. President. I'm Steve Harper. I'm 13 years old. I have cerebral palsy. I live in Washington State. I can't talk. I'm in a special project for the University of Washington. This project is for people who can't talk, but can with a computer. . . . The reason I'm writing is because you o.k.ed it. I just want to thank you for doing that! You have given people who can't talk a chance to talk! You won't be disappointed of them I can promise you that!"

Steve Harper is among a handful of young people who are perhaps the greatest beneficiaries of the computer revolution. He and other subjects are using small computers mounted on their wheelchairs to communicate by Morse code.

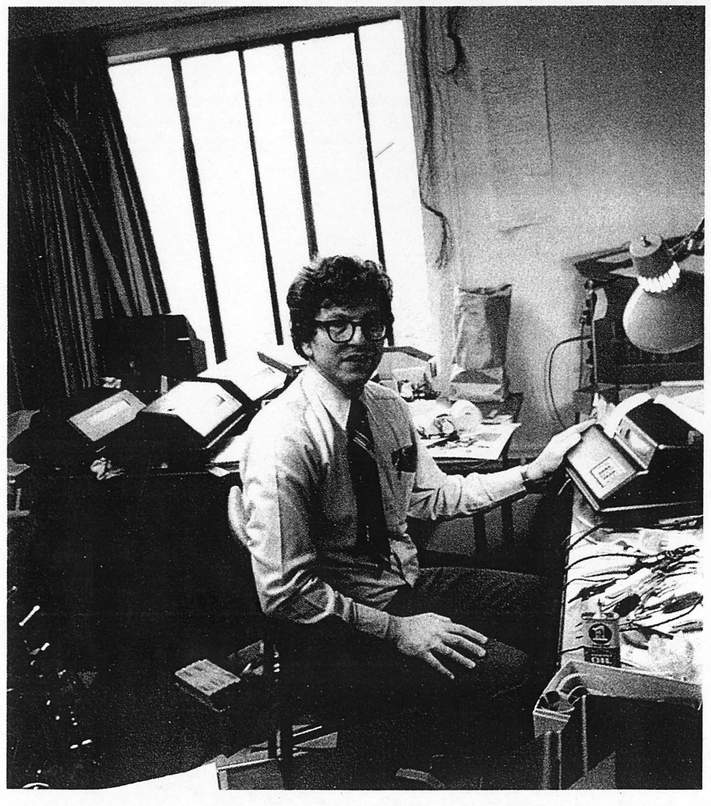
The Morse code is sent when the user moves his or her head from side to side, touching sensors housed in earphones. The computer translates the electronic dits and dahs into letters that appear on display screens facing the user and the person with whom he or she is communicating. By signaling with a programed code, the user can activate a printer, which will write out the complete message, or triggers a voice synthesizer, whereby the message is spoken by the computer.

The Morse-code-based communication system, as it is called, was designed by the Alternative Communications System Project at the University of Washington's Child Development and Mental Retardation Center in Seattle. Although it has been tested on a limited number of people so far, this federally funded system has the potential of liberating thousands of victims of cerebral palsy, strokes, and paralyzing accidents who lack the motor coordination to speak or write normally.

Communication using the Morse-code system is slow by normal standards, averaging about eight words a minute. But that is about four times as fast as cruder systems most cerebral-palsy victims employ, such as wands attached to their heads, which are used to point to words or letters written on a board or to peck at special keyboards. Some cerebral-palsy victims also have developed eye codes to communicate with their families and a few close friends. But these kinds of communications can't be understood by most other people.

The development of the Morse-code system grew out of a chance encounter in 1975 when Al Ross, a research engineer at the University of Washington, was video-taping students in special-education classes. One of the students was Dennis Robertson, then nearly 21, a cerebral-palsy victim who was filmed typing with a head wand. Ross recalls:

"I watched that tape over and over and watched how Dennis struggled with the head wand. It required fine motor skills to find 1 of 40 typewriter keys and then touch it with an 18-inch-long stick. There seemed



Al Ross *(left)* developed the Morse system for cerebral-palsy victim Dennis Robertson *(above)*. The system has allowed Robertson to attend college.

there should be a better way for him to communicate."

Ross tested Robertson, who knew a little Morse code, on a typewriter using dots and dashes. Then Ross, who has an electronics background, went to work. With surplus Western Union Teletype parts married to a video converter, Ross built a prototype communications system. Robertson meanwhile had been mastering Morse code.

Robertson was about to be institutionalized, but his skill in using the Ross machine convinced state officials that he had an effective method of communicating. Robertson soon afterward was admitted to Fort Steillacoom Community College and later became its first severely handicapped graduate. He is now enrolled in Pacific Lutheran University where he is working on his bachelor's degree in journalism.

"I was so moved by Dennis's ability to use the equipment I developed that I wrote a grant proposal to fund further research," says Ross.

Federal funding began in 1979, and a multidisciplinary team that included engineers, computer programers, speech pathologists, social workers, and occupational therapists was formed at the University of Washington under the direction of Wesley Wilson, head of the Alternative Communications System Project.

"We started from where you and I communicate and tried to duplicate that. First we decided what we wanted the system to be able to do, and then we considered the engineering problems," recalls Wilson. "We were looking for a device that would not limit the individual. Some of the severely physically handicapped have higher than normal mental ability, and the existing communications systems limited them."

Ross adds:

"Portability also is an important aspect of our system. There are other communications systems for the handicapped, but they require a child to be brought to the device, which is plugged into a wall. Ours is battery powered. You and I take our communications system with us, and the Morse-code system allows a child to do the same thing."

The Morse-code system already has had a profound effect on the lives of test subjects.

"This machine is irreplaceable, the best thing that ever happened," says Tina Nott, the mother of 15-year-old Tania Nott. Tania, who hopes to become a teacher of the handicapped, calls the researchers at the University of Washington, "the greatest people in this world."

Gladys Harper, the mother of letter-writing Steve Harper, says:

"This device is our lifesaver. Steve was frustrated before because he had no way to communicate with most people, and he wanted to so badly. He is eager and motivated because of the system, and without it he would have given up. With it he is totally involved, and he does all his own homework with it, although it might take him two hours to do an assignment that would take another child half an hour to do."

Then she adds with a big smile, "Steve talks so much now that sometimes we'd like to shut him off."

Andy Rytter, the father of 17-year-old Kris Rytter, an honor student, says the computer has "changed [his] daughter's life around 180 degrees."

Cliff Rowe, a Pacific Lutheran University journalism teacher, recalls his initial encounter with Dennis Robertson:

"The day I first met him I was called to the registrar's office. I could see they were dubious about admitting him, and so was I. Now...he's plugged into a system that would fit right into any newspaper's video display terminals. This just opens up the world to Dennis."

In the past four years the Ross prototype instrument has been refined and streamlined. A second-generation model, introduced last November, has such innovations as the voice synthesizer, a printer using a

narrow roll of paper, and predictive linguistic programing, which further speeds up communication.

This last feature relies on the computer's memory, which includes a list of common words. When a user begins to spell out a word, the computer scans its memory, guesses what the word is, and spells it out on the display screen. If the computer is correct, the user simply signals for a word space and starts spelling the next word. Then the computer guesses again, based on the ever increasing information as a sentence is being formed.

The system isn't designed for everyone afflicted with cerebral palsy. According to Judy Matas, a speech-and-language pathologist, users must have at least average intelligence and the ability to spell at least on the third-grade level. She says it takes about five months for persons to be able to fully use all aspects of the system.

> 'Steve was frustrated because he had no way to communicate, and he wanted to so badly.'

First they have to learn the alphabet, numbers, and punctuation in Morse code. Then, as they become familiar with the computer, they must learn nearly 100 different codes (letter combinations) that give access to its different functions. These codes turn the device on and off, switch on the display terminals, gain access to other computers, or activate the voice synthesizer. There is even a code for a message-maker retrieval system, which permits a user to store and quickly call up frequently used phrases such as, "Hello, my name is Joe."

Until this year the system had only been tested on half a dozen people in the Seattle area. However, computers have now been sent to the Schnier Communications Unit at the Cerebral Palsy Center in Syracuse, New York; the John F. Kennedy Institute in Baltimore; and the special-education department of the Mesa (Arizona) Public Schools.

Tests at those locations and current research at the University of Washington will continue to measure the system's effectiveness. But this research project already is a success in purely human terms. The smiles of Tania Nott and the laughter of Steve Harper communicate clearly enough what they feel. And it's even better now that they can tell you themselves.

Joel Schwarz is a frequent contributor to American Way.