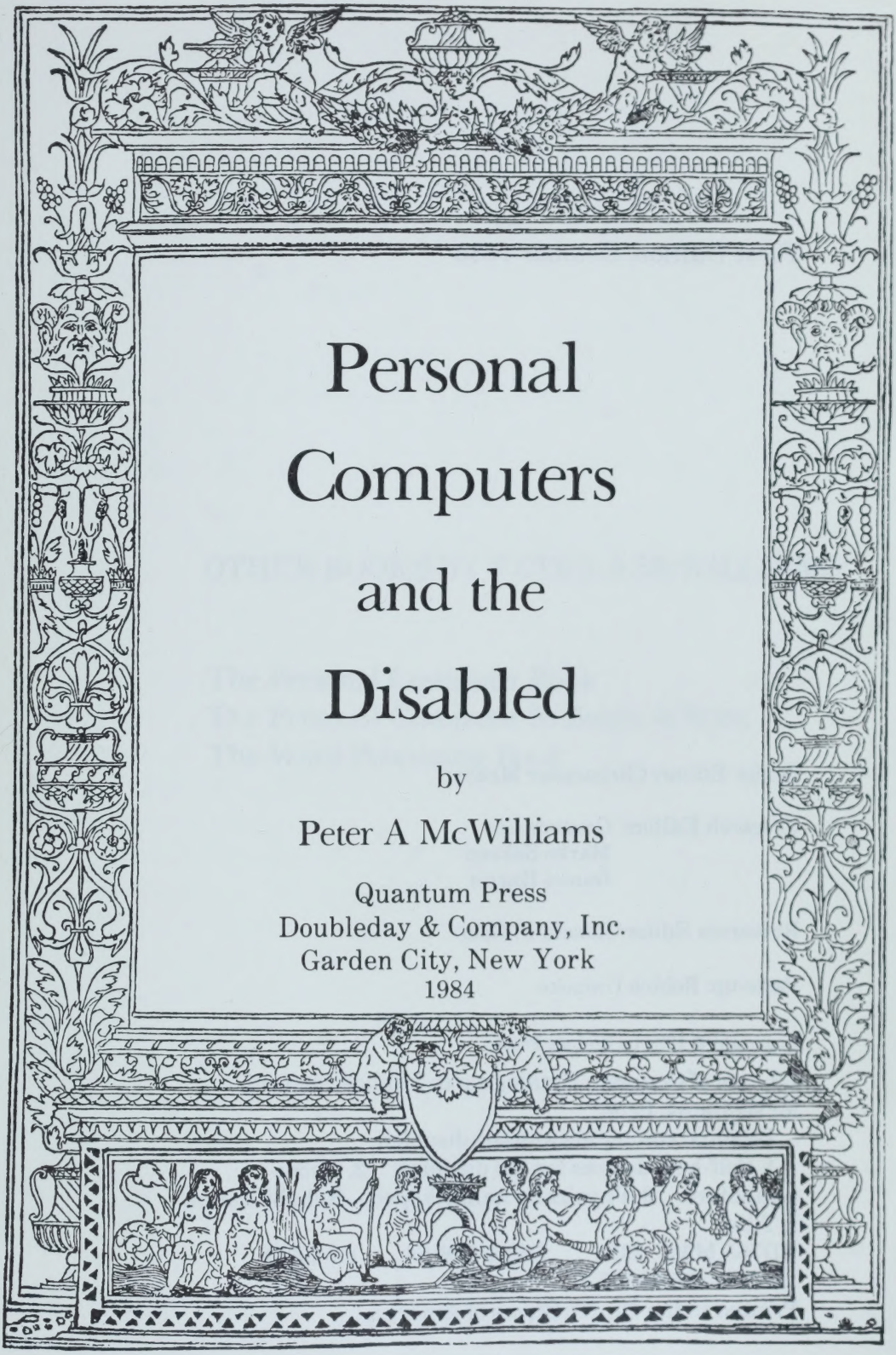
If you are disabled
—or know someone who is—
this book is for you

Personal Computers and the Disabled

Complete with Brand Name Buying Guide

By the Author of *The Personal Computer Book*

Peter A McWilliams



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by

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OTHER BOOKS BY PETER A McWILLIAMS

The Personal Computer Book
The Personal Computer in Business Book
The Word Processing Book

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Chapter Three

The Right Stuff

I spent most of this evening talking with an aerospace engineer from Rockwell International. He worked seven years on the space shuttle program and was Launch Director of the first five flights. He designed 43 of the 47 control panels inside the cockpit. ("When you push a button in a weightless environment," he asks, "how do you know if the button will be pushed in, or if you will be pushed away?" I'm going to sell that to the local Zen Center for their book of Space Age Koans.) He has won four Astronaut's Awards (the coveted "Silver Snoopy") for professional excellence.

His name is Gerry Schwartz. Although his list of NASA and other aeronautic achievements goes beyond impressive and approaches staggering, we spent very little time discussing manned flight. (We did, however, discuss the movie "The Right Stuff." I couldn't resist.)

What we talked about was our mutual passion: computers for the disabled. The admonition to beat one's swords into ploughshares is being faithfully followed by Mr. Schwartz. "They're working on a bomber that will fly at nine Gs, and will deliver a nuclear missile with zero inaccuracy by voice command alone." Evidently, at nine Gs, a pilot can move very little but his mouth, so the mouth becomes the tool for control. Gerry is applying the bomber voice technology to people here on earth who are as immobilized as a nine G pilot.

"I'm trying to make my life help-oriented," Gerry says in his characteristically straightforward style that lacks both conceit or pretension, "rather than develop killing systems." To that end he founded the HOPE Center (Hands Off Program Experience) in Huntington Beach, California (714-962-8689). If he keeps this up, he might just qualify for a Nobel Peace Prize.

Gerry can make any computer do almost anything with voice commands alone. The number of words his

system can recognize is limited only by the amount of available RAM. A 64K computer can recognize about 80 words. Word processing, for example, can be done with the basic commands ("OPEN FILE," "DELETE WORD"), a primitive vocabulary ("IT," "AND," "THE," and so on), and the alphabet. Most words are spelled out one letter at a time, just as on a keyboard. The same could apply to accounting programs, spreadsheet programs, or to the writing of programs themselves.

There are several voice recognition devices on the market. Gerry Schwartz's gift is one of software, and matching the computer to the user. He has three goals when helping a disabled person select a computer, and all three must be met for Gerry to consider the job well done.

First, the machine must be usable at once. (The computer will grow more useful as time goes on, but it should be able to do *something* right away.) Second, the purchase of it shouldn't destroy the disabled person's budget. Third, the system must have room for growth.

One of the most interesting uses is a computer program he wrote for a young man with cerebral palsy. At first, the computer accepted a broad range of pronunciations for the command words, but as the weeks went by, the acceptable range was narrowed, and, consequently, the young man's speech considerably improved. Improving the young man's pronunciation was not the primary goal, but it was an added benefit that can come when computers are used creatively to serve the disabled.

When speech is not possible, Gerry arranges for the disabled person to communicate with the computer using Morse Code. "Morse Code seems to be the standard for certain disabled applications," I said.

"Yes," said Gerry, "but is it right? Is it the best, the most useful? It's what we tell the disabled to use, but I hope they'll use it for a few months and come back and say, 'You idiot: why did you stick us with Morse Code when this or that would work so much better?' "

Gerry looks forward to the day when the disabled people he works with will tell him not only what they need but also how to best fulfill their need. "What's right for them is what's right."

And it is that attitude—the joy of being wrong if a better answer can be found—that is known, I suppose, as the right stuff.

Some disabled people are finding leader birds helpful in getting around.

Walt Woltosz began his work with computers and the disabled in 1980 when his mother-in-law was diagnosed as having amyotrophic lateral sclerosis—ALS, or Lou Gerhig's Disease. She unfortunately died before the software and input devices could be fully developed, but the event had a profound effect on Walt Woltosz's life, and the work continued.

Walt left his job as Aerospace Engineer for United Technologies Corporation and started Words+, Inc. in Sunnyvale, California (408-730-9588). (Words+ does not, by the way, market The WORD Plus spelling checker; that's Oasis Systems in San Diego.)

Walt Woltosz developed a computer/software package called the Words+ Living Center. This sounds like a planned environmental community for writers, but is in fact a Radio Shack Model 4 computer, with special software, and input and output devices. It is designed so that even the most severely disabled person can communicate—slowly, albeit, but fully.

It works something like this: A sensor is placed on or near the muscle group over which the disabled person has the most control. The only movement necessary for successful applications need be the tapping of teeth, the twitch of a thumb, the raising of an eyebrow, or the wink of an eye. When activated by the tap, twitch, raise or wink, the switch gives a single command, roughly translated as "This One."

I tried the Living Center with an eye switch, an infrared device developed by Mr. Woltosz's father. The switch fits over the head and in front of the eyes, like a pair of racing goggles. When an invisible beam of light, reflecting off the eyeball, is broken by a wink or a squint, a "This One" signal is sent to the computer.

On the screen is the alphabet, along with numbers and some punctuation, laid out in a grid, five across and ten down.

A pointer starts at the top and, traveling down, stops for a moment at the first letter of each row. After all ten rows are visited, the pointer returns to the top and makes the trip down again. A wink at any row causes the

pointer to travel horizontally across the selected row. A second wink selects a specific letter, and a new screen appears.

The new screen has fifty words on it, all starting with the letter chosen, and arranged in the same five-across-ten-down format. The pointer continues its vertical search, and a wink causes the pointer to travel horizontally across the chosen row. A second wink selects a specific word. The word is added to the work area at the bottom of the screen, and the top of the screen returns to the alphabet.

In this way, sentences are built, word upon word. It's slow—five to ten words per minute (about as fast as I type)—but considering the fact that complete thoughts and ideas can be expressed by someone who has control over the movement of just one *eyelid*, it's remarkable. One of the tragedies of ALS is that the mind remains clear and alert while all the methods of communication, including speech, are taken away. The Words+ Living Center will allow people with ALS or other severe disabilities to communicate with friends and loved ones longer than ever before possible.

The Words+ Living Center costs $2,200 without printer or voice output, or $2,900 to $3,500 complete, depending upon input device. The software, switches, or any component of the system can be purchased separately at reasonable prices.

The "+" part of "Words+" includes games, the ability to draw, a voice synthesizer, and the on/off control for electrical appliances and environmental control.

Also in Walt Woltosz's arsenal is the Words+ Portable Voice. This is an Epson HX-20 computer with a speech synthesizer and a portable power supply. Type in a message, and the Portable Voice will pronounce it. The Portable Voice can also store sentences and say them on command. Fourteen-year-old Pam Adams, who has cerebral palsy, writes and gives speeches using the Portable Voice.

The Words+ Portable Voice costs $1,675.

Anything Words+ makes can be adapted by Walt Woltosz and his associates for specific needs. He is a man

dedicated to serving the disabled. Why did he give up an outrageously high paying job in aerospace for the non-paying (thus far) job of developing computer systems for the disabled? "You only go through life once, and you've got to do what feels best. Unlocking people's minds gives me the most satisfaction of all."

The concept of unlocking is one that carries through in his company logo, a key, and the company motto, "Unlocking the Person."

Elephants have disabilities when it comes to, say, dancing.

Ken Yankelevitz is a flight simulation engineer for McDonnell Douglas. In his spare time he makes joysticks for the disabled. But aren't joysticks for playing *games*? Do disabled people want to use computers to play games? As Ken explains, "Disabled people are just like everybody else—especially kids."

And kids seem to be Ken's specialty. Although disabled adults appreciate the opportunity to play Pac Man or chess or Decathlon, Ken seems to take special delight in helping disabled children control the hopping about of Qbert, or walking with Big Bird down Sesame Street.

Ken works regularly with the younger members of the Rancho Las Amigos rehabilitation center in Downey, California. "Some of them use the same type device as the game controller to operate their wheelchairs," Ken explains. "Playing games teaches them accuracy and coordination, which they can use in steering the chairs. It can also be good exercise." So, there are practical benefits to game playing. "Sure," says Ken, "but mostly it's just fun." It's also fun to watch disabled youngsters trounce able-bodied friends at video games.

Ken's controllers are designed for use with movements of either the hand, head, mouth, foot or tongue. They attach to Atari, Sears, and ColecoVision video games, and to Atari 400/800 and Commodore VIC-20 computers.

Trying to get game controller devices for his quadriplegic friends proved impossible, so Ken invented some. He demonstated them to Atari. They were not interested in marketing them, but anytime a disabled person called Atari looking for a special joystick, Atari gave them Ken's name.

He formed KY (Ken Yankelevitz) Enterprises in Long Beach, California (213-433-5244). Yet to show a profit (Ken's special controllers are generally less expensive than regular mass-produced joysticks), Ken refers to the entire activity as, "An expensive hobby." His wife, Diane, takes part in the family hobby, too.

The controllers can, of course, be used for more than playing games. ("More" implies that game playing is lowly

and other computer activities are not. This is not my intent. Recreation, it seems to me, is as valuable as creation. Let's say that controllers can be used for purposes *other* than playing games.)

Many educational programs use the joystick as an interactive device—selecting letters, numbers, pictures and so on. The controller can be used as a cursor movement device. The keyboard can be used—perhaps with a mouth stick—to enter information, and the mouth-activated controller for zipping about the file while editing. The controller becomes a sort of mouth mouse.

One of the exciting things about the mouth controllers is how inexpensively an education/communication/game system can be assembled for a disabled person. Video games or VIC-20 computers cost about $100, and the less expensive Atari runs $200 or so. Add one of Ken's controllers ($20 to $65), buy a few cartridges, hook it up to any television, and it's set to go. $120 to $265 may seem like a lot to some budgets—especially considering the other financial obligations disabilities bring—but such a configuration offers a great deal of fun and learning for a price much lower than most people think a computer especially adapted for a disabled person might cost.

Were I writing this as a feature piece for a local newscast, I might end it with something syrupy like: "Ken Yankelevitz helps simulate flight for grown-ups during the day, so that he can stimulate flights of fancy for young people at night."

Fortunately for us all, this is not a TV news feature. I can close this piece by simply saying, Good work, Ken. Film at eleven.