

THE DATAHAND® SYSTEM

DataHand User Testimonials

—And On-The-Job Evaluations

Including a Short History of DataHand Systems, Inc.
and the DataHand Ergonomic Keyboard

“If aliens came to earth after humans were extinct and found a traditional, flat keyboard, they’d imagine we had thirteen fingers laid out in a straight line, like piano keys.”

—Clifford Lasser, Technical Programmer/Manager
Thinking Machines Corporation, Cambridge, Massachusetts

DataHand Systems, Inc.

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30 December 1999

Introduction— Pain Relief, Safety, and Comfort, on the Road to Cost Savings and Improved Productivity

This compilation of DataHand user comments is assembled from letters and e-mail messages sent to DataHand Systems, exchanges of information and opinions published on the Internet, and, in a few cases, oral statements made to team members of DataHand Systems. All comments have been verified for accuracy. Whenever an e-mail address is included with the name of the person quoted, he or she is willing to communicate with others about his or her personal DataHand experience. Users quoted in the opening section of letters received by DataHand Systems have explicitly granted this permission, but in the section of Internet postings at the end of the document, this permission is assumed inasmuch as the posting itself contains the web address or the e-mail address of the author.

Apart from the initial testimony from Dr. Eliasson at the beginning of the opening section, the user reports are organized in rough chronological order, with the earliest experiences at the beginning. The pertinent date in the chronology is not the date when the comment was sent but the date when the person's DataHand experience began. The first section contains reports sent to DataHand Systems or given to company team members. The second section is composed of comments from corporate customers, often at sites where many DataHand keyboards are in use. The experiences of DataHand personnel are provided at the end of this section. Potential purchasers may want know how DataHand employees feel about their company's product. The third section has been compiled from comments about the DataHand keyboard posted on various Internet websites. These postings were found through the use of a variety of search engines.

Because early DataHand buyers were concerned primarily with musculoskeletal health and the opportunity to triumph over existing pain, the opening section emphasizes the ergonomic value of the DataHand keyboard.

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Higher volume corporate buyers and their employees quoted in the second section are interested in health, safety, and cost savings—but sometimes only if they are certain workers can be returned to full productivity. For corporate buyers, productivity can be an important part of the total DataHand picture. Before they can justify the purchase of DataHand keyboards for their workers, they want assurance of both a health and a productivity payback.

*Discussion of the history of DataHand Systems, Inc. and the DataHand Ergonomic Keyboard continues at the end of all three sections of user comments and evaluations. See Section Four: **Facing the Need for Improved Keyboard Ergonomics and Computer Productivity in The Information Age— The Necessity of a Better Keyboard Paradigm** on page 77.*

Section One:

The Views of DataHand Users Who Have Sent Comments, Thanks, or the Story of Their Experience to DataHand Systems

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“At first I tried other alternative keyboards, but none provided more than minor benefit. I found out about the DataHand keyboard from a computer magazine. It enables me to type every day as long as I need to without experiencing any pain.”

**Dr. Orn Eliasson, M. D., M. P. H.
Private Medical Practice
Internal Medicine, Pulmonary Medicine,
Critical Care, and Occupational Medicine
Baltimore, Maryland**

September 9, 1999: “I started using the DataHand keyboard out of necessity in 1993. I had begun using computerized medical records in January 1993, and as part of that work, keyboarding was involved. Without knowing what I know now, I started doing the work with a regular flat keyboard. By May, I started to experience pain in my forearms. Tendinitis and arthritis were the diagnosis. Soon, I could not even write a prescription by hand. It got so bad, I could not even hold a pen.

“At first I tried other alternative keyboards, but none provided more than minor benefit. I found out about the DataHand keyboard from a

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computer magazine. It enables me to type every day as long as I need to without experiencing any pain.

“Typically, I take case notes using the DataHand system while I work with patients. I can maintain eye contact and talk with each patient while also making entries in my medical records. It is not necessary to look at my hands or at the DataHand key guide. Touch typing is very easy to do on the DataHand system because the keys are laid out around each finger.

“Voice entry would not work for me, because I could not easily record notes while also talking with patients. It would be distracting and take too much time.

“If I work for even a short time on a standard keyboard, I begin to feel pain. All of the alternative keyboards I have seen are similar to the traditional flat keyboard in their ergonomic limitations. They are all based on the basic flat keyboard layout. In my view, they are ergonomically incorrect, just as the flat keyboard is incorrect.

“Because the motion required to play the piano is similar to the flat keyboard motion, I have a hard time playing the piano. Both require the same motion of the flexor muscles, but I do not have trouble playing a guitar. The motions used to play the guitar are different from the motions used on the flat keyboard and the piano.

“Working on the DataHand keyboard does not hurt because the hand is supported, and the work is done with low intensity finger movements. To avoid pain, I have to eliminate all motions which are similar to those which caused the original injury.

“Most of my medical practice involves pulmonary medicine; I see some internal medicine cases, and I do some critical care, but I am also trained in Occupational Medicine. I do get referrals from other doctors or patients with repetitive stress injury from typing, and the solution always has been the DataHand system.

“My personal experience as well as my observation of other cases enables me to conclude that most of the repetitive stress injuries I have seen are not caused by non-work activities. The injuries are primarily linked to long hours of work using some ergonomically incorrect device such as the standard flat keyboard, a cash register number pad at a grocery checkout counter, or some other incorrectly designed tool or process.

“Once the physical damage is done, it affects other activities in the patient’s life. In the cases I have seen, people’s recreational and home-life activities outside of work have not been a source of primary injury

causation. Also, I do not find age or life-style to be principle causative factors. The long hours and intensity of repetitive, ergonomically incorrect work activity has been the main issue in the cases I have observed.

“In my own case, I am not that old at forty-eight, but by the end of the week, my arthritis is bad enough to prevent me from working on a standard calculator without pain. Working on the DataHand keyboard non-stop is no problem, but a few minutes working on a standard calculator is trouble. I do take medication for my arthritis to keep it under control, but still work on a flat keyboard or a calculator is always difficult and quickly painful. I have to avoid percussive flexor motion as much as possible.”

“My personal experience as well as my observation of other cases enables me to conclude that most of the repetitive stress injuries I have seen... are primarily linked to ergonomically incorrect device[s] such as the standard flat keyboard ...or some other incorrectly designed tool or process.” •

**“I am certain the
DataHand [keyboard] has
been instrumental to my
recovery and would very
strongly recommend others
give it a try.”**

**Clifford Lasser
Technical Programmer/Manager formerly with
Thinking Machines Corporation,
Cambridge, Massachusetts**

After typing on a flat keyboard, Clifford Lasser experienced so much pain his ability to do his job was severely affected. He was about to go on rehabilitation leave when he learned about the DataHand system and contacted the company. Beta testing of the first DataHand model was about to begin, so he asked for the opportunity to participate. The following comments began arriving a few days after he started using a beta model of the DataHand minimum motion keyboard.

June 25, 1992: “It’s still too early to tell whether I will have less pain because the pain usually takes some time to set in. Nevertheless, being able to reach the Control and Alt and special symbols without having to move my hands or especially stretch my fingers is an obviously good thing, and I think I’m already doing better. ... I’m definitely typing this just as fast as before I got my DataHand [keyboard], which is why I’m being so verbose!”

June 30, 1992: “...I would characterize my current opinion about the DataHand keyboard as cautiously optimistic and would be happy to discuss my experience with others. By the way, I did all this typing on my DataHand unit.”

July 20, 1992: “It really does look like it was designed for the human hand. And, it feels that way. I would say that my condition has improved significantly since I have been using the DataHand [keyboard] ...

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I am certain I am now typing a lot more and with far less pain. I would not even consider trying to do the amount of coding and editing I do now without the DataHand [keyboard]. I know from previous experience I would certainly have a flare-up that would put me out of commission for a couple of weeks.

“I am very thankful I am able to type this much again. Our original plan called for the [DataHand] keyboards to be passed around. However, now that I have...become dependent [on the unit I have] (in the positive sense), I am not willing to share it.... I will not go back to a normal keyboard now that I have a DataHand [keyboard].”

“I can now type as much as I want.”

October 30, 1992: “Two months ago, I circulated a rather long report on my experience using the DataHand keyboard. At that time I had been using the keyboard for two months and had the following to say about it:

- It had significantly increased my typing ability and reduced my pain.
- It had not yet cured my injury, and it would take time to tell whether it ever would.
- Small hands are potentially a problem, especially for the thumb.
- I recommended that people with tendinitis give the DataHand [keyboard] a try.”

Summary of the Experience after Four Months of DataHand Use:

“...it is time for an update. I will keep it brief:

1. The condition of my forearms has very substantially improved. My left arm no longer hurts, and my right forearm only hurts occasionally. For a while I was regularly icing my forearms at the end of the day, but I rarely do that anymore. There are activities that still irritate them, such as carrying luggage, but typing is rarely one of them.

2. I can now type as much as I want. Before getting the DataHand [keyboard], I could type—at most—for a couple of hours a day, and programming was pretty much out of the question because editing code was particularly painful. Now, I do as much typing as I want to do, including long hacking sessions on the weekends. My right forearm sometimes gets a bit sore after especially long sessions, but that is no longer an impediment.

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3. The thumb pain that developed shortly after I started using the DataHand [keyboard] has gone away. *[As an alternative to having to move the hands, the thumb must perform more work on the DataHand system.]*

4. I have had other pains in my hands, wrists, and forearms, but they all seem to have been related to my typing posture. For example, I found it very tempting to rest my elbows on my chair's armrests. This led to an irritated ulnar nerve (the funny bone nerve). Now that I have made a point of sitting properly, all these pains have gone away.

5. Many people have asked what my typing speed is. I just timed myself at about 35 words per minute. Note that I only learned to touch type about eight months ago and that I switched over to the Dvorak layout [before getting the DataHand keyboard]. This speed isn't great, but I spend most of my time editing code and text, so [speed] is not an issue for me.

“In closing, I now believe my injury may completely go away at some point in the not too distant future. Before I started using the DataHand [keyboard], I was frankly in fear of damaging my career in software engineering. I am certain the DataHand [keyboard] has been instrumental to my recovery and would very strongly recommend others give it a try. The cost of this keyboard is small compared to the cost of a damaged career. I can only thank [DataHand Systems] for producing the DataHand [keyboard] and wish them luck in reaching the large number of people who would benefit from using it. (PS: I have no financial interest in [DataHand Systems, Inc.], just a personal debt to them for helping me type again.)”

“...within two weeks I was doing the same things I was doing before I got the tendinitis.”

Some months—perhaps a year—later, Lasser reflected on his DataHand experience with the perspective of time:

“In short, the DataHand system has allowed me to type again. It's that simple. Basically, the DataHand system saved my career. Before I found this product...I couldn't type at all—well, maybe an hour a day, and that was text

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only, not software development, and that is my job. I had reached the point where the problem never got better. The doctors didn't know what to do about my tendinitis. I would rest for a few days and the pain would diminish, but as soon as I started typing on a flat keyboard again, it came back just as bad. There was never any prolonged improvement. Then I got the DataHand system, and I immediately felt better. Now the pain has been permanently reduced, and I am typing as much as I ever did. I picked up the DataHand system very quickly. Within a week I was very productive again, and within two weeks I was doing the same things I was doing before I got the tendinitis.”

“I picked up the DataHand system very quickly. Within a week I was very productive again, and within two weeks I was doing the same things I was doing before I got the tendinitis.” •

For more detail about Clifford Lasser's experience, see his full report from August 20, 1992 on page 79 in the section on Internet postings.

“Even if I didn’t have an injury, I think [the DataHand keyboard] would be easier to use than a regular keyboard.”

Rosemary Ursutz
Data Analyst, now retired from
Motorola Corporation
Phoenix, Arizona
rnnu@email.msn.com

After seven years working as a data analyst at Motorola, this DataHand user developed severe repetitive stress injury. Like Clifford Lasser, Rosemary Ursutz became a very early beta user of the DataHand minimum motion data entry system during 1992.

“I reached the point where I could not type at all on a flat keyboard; it simply hurt too much. Motorola has been very patient, and they and my supervisor have been most anxious to find a solution and help me.

“When I got [the] DataHand [keyboard], I was very excited, and I immediately began using it. Within four or five days, I was up to full time at my job (this meant four to seven and a half hours of daily keyboard use).

“I have been using [the] DataHand [keyboard] ever since. I do have some pain. I think that if I had the DataHand [keyboard] earlier, I would not have this problem. My hands are so badly injured that if I do a lot of housework (like washing dishes), my hands hurt worse than [at work].

“Overall, I love [the DataHand keyboard]. I would like one for my home computer. Even if I didn’t have an injury, I think it would be easier to use than a regular [flat] keyboard. [The] DataHand [keyboard] is making it possible for me to keep my job and my career.”

July 22, 1999: “[Over seven years], my hands have steadily improved ...and seldom bother me anymore. Now that I am retired, I use a DataHand unit with my home computer. The DataHand [keyboard] is great.” •

“Not only can I touch type numbers..., I can touch type the mouse.”

Charles Mesarosh
Electrical Engineer
Phoenix, Arizona
mesarosh@zpci.com

This DataHand user is a self-employed computer software and hardware design engineer with no signs of repetitive stress injury. He was involved with the development of the DataHand system during the early 1990s. Most of his work involves writing and debugging microcomputer controller code. He began working in 1992 on a DataHand beta model while he was writing DataHand firmware.

“I could type the alphabet quickly. This was a fun thing to show off, but if I had to type anything else, it was much slower (I had to think where each key was), and I would make a lot of mistakes.

“I now have my own DataHand in my office at home. I love [the] DataHand [keyboard]. By the third firmware iteration, it was obvious I was faster on the DataHand [keyboard]...”

[After ten hours:] “...I have to think about where each number is before I type it, but I don’t have to look at my hands or at the keyboard. I can touch type the backslash key! Seems like every keyboard has it in a different place, so I never learned to touch type it.

“...The same positive reinforcement I got from typing on [the] DataHand [keyboard] was there for the finger mouse. Not only can I touch type numbers on [the] DataHand [keyboard], I can touch type the mouse.

“After forty hours of typing on the DataHand keyboard, I’m at 40 words per minute with accuracy in the low 90% range, [and] my speed is still increasing.... My feeling is that my speed has not yet peaked. With each session, the timed tests are better. ...my flat keyboard speed [is only] 35 words per minute with 85% accuracy.

“[I have] almost no problem going back and forth between [the] DataHand [keyboard] and the flat keyboard. It is like my fingers know which one I’m using.” •

**“It is the only keyboard
currently available that met
the restrictions my doctor
has set due to my Carpal
Tunnel Injury.”**

**L.D.
Customer Service Representative
San Diego, California**

“Thank you for [making] the DataHand keyboard. It has enabled me to continue a 12-year career with my employer [a large telephone company in Southern California]. It is the only keyboard currently available that met the restrictions my doctor has set due to my Carpal Tunnel Injury. The DataHand...design [is] very user friendly. Anyone could learn and enjoy [the] DataHand [keyboard]. In the first hour of use, I was familiar with the keys and functions. Many of my co-workers have expressed an interest in my new keyboard.” •

**Chelsea Robinette
A DataHand Alpha Tester
Scottsdale, Arizona**

“It takes less time to get comfortable on the DataHand keyboard than it does on the standard keyboard.” •

**Mary Martin
A DataHand Alpha Tester
Portland, Oregon**

“[The] DataHand [keyboard] is very simple to use.” •

**“...I’m always aware that
the DataHand system
allowed me to stay in the
captain’s chair.”**

Lawrence Smith
Manager, Information Systems
Technical Support Services, Incorporated
Ossining, New York
lsmith@tssicentral.com

1994: “...the DataHand system has pretty much saved my career.”

August 23, 1999: “I’ve been a user of [the DataHand keyboard] for five years.... Back when I first acquired [my DataHand minimum motion keyboard], I was very close to calling it quits in the computer industry [because of the] onset of carpal tunnel syndrome and tendinitis. Today, I’m the Information Systems Manager of a national computer service company that is on the verge of tremendous growth. My work here has figured prominently in that growth. Had I left the industry, I would certainly have missed the opportunity to act as a principal player in the rebuilding of an entire company. In my office sits a specially modified chair that has had its armrests replaced with paddles. On these paddles are my DataHand [units]. People have said that I look like James T. Kirk in command of the [Spaceship] Enterprise. I have to agree with that, and I’m always aware that the DataHand system allowed me to stay in the captain’s chair.” •

“...the pain quit following me home at night, and that sold me right there...”

**Mike Devine
Computer Programmer
Phoenix, Arizona**

“Within three days of using the DataHand system, the pain quit following me home at night, and that sold me right there.... The DataHand system has been the difference between continuing in my occupation and having to look for something else which didn’t require working on a keyboard. I have been using the DataHand system for six months in my job as a computer programmer

“I had been suffering from acute tendinitis in both wrists and was at a point where I was worried about my career if I didn’t find a way to deal with the pain caused by typing on a conventional keyboard. I purchased the DataHand system for myself ... I knew I wanted to continue to do what I was doing.... The DataHand system is absolutely the reason I continue to work in my field. I was surprised at how easy it was to learn the DataHand system. Within two weeks, I was up to a speed ... comparable [to my] flat keyboard [speed]. All in all, my productivity is probably equal now to what it was before, and [it] will probably be better in the long run.”

“I was surprised at how easy it was to learn the DataHand system. Within two weeks, I was up to a speed...” •

**“I can state unequivocally...
the DataHand keyboard
has enabled me to remain
at work and avoid disability
leave.”**

John H. Parodi
Technical Writer
formerly with
Digital Equipment Corporation
Nashua, New Hampshire

March 29, 1994: “I suffer from tendinitis in my wrists and elbows (epicondylitis and swelling in the canal of Guillon, which is next to the carpal tunnel and contains the ulnar nerve). I’ve had one operation on my right elbow; my left elbow began to hurt while recovering from that operation, and it has received five cortisone shots so far; and three months after that, both my wrists began to hurt. I believe these problems are caused at least in part by the amount of typing I do.

“The pain in my wrists was steadily worsening when I heard about the DataHand keyboard (by way of an Internet electronic bulletin board posting).... My boss was concerned enough to disburse the funds for a three-month trial. I was desperate enough to try anything.

“Using the DataHand keyboard was something of a shock. [Initially] my typing speed went from well over 100 words/minute to something like five words/minute. The delicacy needed to operate the [DataHand] keyboard... reminded me of the switch from a manual typewriter to an electric typewriter. I also had problems associated with my software configuration: a DECPC 433ST running eXcursion on top of PATHWORKS (I do a significant portion of my work on X terminal emulators emanating from a VAX/VMS system....).

“...Fortunately several things helped me along. First and foremost is the fact that typing was pain-free. Well, that’s not quite right—rather, my

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wrists hurt no more when typing than at rest. Second, the support and information received from the DataHand hotline has been outstanding. And third, in a relatively short time, my frustration declined, and my typing speed improved.

“...After about 20 hours, I could touch-type, and although I was pretty slow, I was confident enough to commit to real work, with real deadlines. After 35-40 hours, I could type as fast as most keyboard users, though not as fast as, say, a good secretary. I do not type as well or as fast as I did on a flat keyboard but feel I will eventually reach my old speed....

“I can state unequivocally that the DataHand keyboard has enabled me to remain at work and avoid disability leave. My productivity is back at a respectable level. While no one can guarantee my wrists and elbows will recover completely, I now have some hope of that.”

September 15, 1999: “This is an update to the DataHand testimonial I provided back in March of 1994. I still use the DataHand keyboard almost exclusively (I now use the [ProII] Personal model) in my job as a technical communicator. My productivity remains unlimited by arm/wrist pain. And my condition has improved somewhat; while I haven’t been able to return to cross-country skiing, I have been able to start playing the guitar again.

“There isn’t much to add. I still feel that DataHand’s products have benefited me a great deal. And I would still recommend a close look at DataHand products for anyone experiencing repetitive strain injuries in the hands or wrists.”

“[After five years using the DataHand keyboard] my productivity remains unlimited by arm/wrist pain.” •

“I have had my DataHand keyboard since 1994, and I can’t work without it.”

Jennifer Charney
Writer, Editor, Photographer
Ferndale, Michigan
jencharney@aol.com

July 27, 1999: “I have had my DataHand keyboard since 1994, and I can’t work without it. I do all my initial entry with a voice system, then I use the DataHand keyboard to edit. Editing with the voice system would be impossible; it is awkward and problematical enough even for straight entry. I believe high quality voice entry is still years in the future.

“Because of the amount of work required of the thumbs on the DataHand keyboard and because it hurts to press down on the thumb switches, I use foot pedals to reduce the amount of thumb work. The pedals were provided as an accessory by DataHand Systems.

“I have made a special pillow which holds the DataHand units at a 45 degree angle [of pronation] on my lap. If I could, I would put them at a 90 degree angle (vertical), because that is the angle of least stress according to my occupational therapist. I also have a specially constructed chair to support my arms in the exact best position.” •

“My company paid for the DataHand system for me because they are very interested in reducing the expense of problems like mine.”

John Siegel
Technical Support

“My wrists were in constant pain before I got the DataHand, and now they are pain free. The first time I heard about the DataHand system, my reaction was bewilderment... But I couldn’t type anymore because of the pain, and I didn’t know what I was going to do. My company paid for the DataHand system for me because they are very interested in reducing the expense of problems like mine. I had undergone three to four months of therapy and medication, but neither of those helped me at all. Using the DataHand system is much easier on the hands than the therapy was, and I’ve gotten much more benefit from it than [from] the therapy. Now I can type on the DataHand system very well and without pain.” •

Dave Zito
Director of Product Development
PayMyBills.com
Pasadena, California
bigzitod@yahoo.com

June 20, 1999: “I have an old Professional version of your keyboard (and I love it!!), and I need to buy a new Personal edition.... Please help, my hands are hurting....” •

Helpful Customer Support Praised

**Mary Anne Maksalla, RN
Rehabilitation Specialist
Nation's Care (now EBI Insurance)
Bedford, New Hampshire**

The following is the text of a letter thanking DataHand Systems for the support given to a patient, Manny, by a DataHand Systems staff member. As a result of serious, traumatic injury, Manny needed extra attention.

November 8, 1994: “Just a note to let you know how grateful I am for [DataHand Systems’s Customer Support Manager] Preston Windus’s involvement and time spent with one of our injured workers.

“Manny’s injury was ... a forearm crush resulting in little functional muscle mass and damaged tendons. He is left with little motion in his fingertips and a palm that is somewhere halfway between extension and a fist. Obstacles were many, including the obvious emotional one.

“Preston was able to custom fit the DataHand [keyboard] ..., and ... establish a working rapport with Manny. He dealt with him very objectively and taught him with a most positive approach. Preston did not respond to Manny’s negative thoughts but was able to provide praise, direction, and motivational support.

“Manny will have a permanent job [working on] the DataHand [keyboard] at the same company [where he worked previously].... He may never have had the chance without the DataHand [keyboard] and Preston’s help.” •

**Andy Beals
Engineer
IOS Engineering
Cisco Systems, Inc.
San Jose, California**

August 27, 1996: “I really like the DataHand Pro II. I have been dragging it home and using it on my PC clone running DSD unix.... Is there a discount for buying a second keyboard for home use?” •

“The DataHand [keyboard] Revolutionized My Life.”

**L. W.
Olympia, Washington**

February 20, 1996: “I [contracted] carpal tunnel syndrome at the age of 16. I [had begun] using a Macintosh Plus at the age of nine in 1986. I never had a problem with keyboards until I bought a PC and began to work for a DOS-oriented software company at the age of 16. [When] my employer needed me to type a list of documents..., a burning sensation occurred in my arm. I thought nothing of it and kept going.

“That night...the pain did not go away. ...my father, who had [the same pain] himself, said I might have CTS. It all went downhill from there—steep depression. I envisioned myself as a cripple..., and just went ballistic when I could not do the things other teenagers could.

“I had asked for a DataHand [keyboard] for Christmas, [but] my parents scoffed at the steep price tag: ‘forget it.’ However, my grandparents pooled a bit of money together and bought one for me.

“The DataHand [keyboard]...revolutionized my life—because I can do all the things I thought I would never be able to do again. I don’t know what else to say. You have the best customer support in the hardware industry. When I asked for a cable, you shipped it out next day. When I asked for a ROM upgrade, you shipped it out, no questions asked—and all at no cost.

“It makes no sense whatsoever for someone with a painful and harmful affliction like carpal tunnel syndrome to [tolerate] pain while typing. There’s an alternative now...there is no doubt in my mind about the future of keyboard [work]. ... I think employers will be searching for a safer way to use computers in the very near future.

“Carpal tunnel syndrome is now an epidemic, [but] employees and employers now have a choice. The DataHand [keyboard] isn’t hard to operate.... I think my testimonial is the least I can do to show my appreciation.” •

**“The DataHand keyboard
has allowed me to type
without discomfort.”**

Michele Heymann
Certified Nurse-Midwife, FNP, PA
Instructor, Remote-Learning Program
Institute for Midwifery, Women, and Health
Philadelphia, Pennsylvania
jmm7q7@aztec.asu.edu

“Before I started using the DataHand keyboard in 1994, my wrist ached constantly, and I was using a splint and [an] over-the-counter anti-inflammatory [drug] to control the pain. Typing was extremely uncomfortable. I never sought medical care, so no official diagnosis was given. However, it was obviously Repetitive Stress [Injury], since the symptoms improved when I used my wrist less often.

“The DataHand keyboard has allowed me to type without discomfort. With the DataHand [system], even after several hours, no pain occurs. Other repetitive activities such as pulling weeds or using clippers for trimming foliage continue to cause aching pain. During the past two years I [have] spent 20-30 hours on the computer each week, spread over a three-day time span with absolutely no problems with typing. Sometimes, when I go out of town on business, I don’t take the DataHand keyboard with me, and I always regret it. Without this keyboard, I would not have been able to work in this job.”

**“Without this keyboard, I
would not have been able to
work in this job.” •**

“I Don’t Care What It Looks Like—As Long As It Doesn’t Hurt.”

James C. Glick
Consulting Actuary, CPA, FSA
Towers Perrin
Boston, Massachusetts

November 14, 1994: “I have owned a DataHand pre-production model for over a year now. It’s just great. I can only type on a regular keyboard for about 10 minutes before it becomes painful. I had bilateral carpal tunnel surgery in late 1992. While successful, it only gave me the smallest of margins from injuring myself again.

“With the DataHand [keyboard] I am able to type 50 minutes on and 10 minutes off all day long when necessary. I’m able to type at 3/4 the speed of my old keyboard on memos and letters (faster on Lotus because of built-in functions and cursor). I work as a consultant with lots of phone calls and meetings. But I also create Lotus spreadsheets, type file memos, short letters like this one, and correspond with staff by e-mail.

“Being able to type again is wonderful, especially since writing by hand also irritates my carpal tunnel [in] my writing hand....

“People who don’t know me well always stop and stare the first time they see me typing with the DataHand [keyboard]. But I tell them I don’t care what it looks like as long as it doesn’t hurt.

“Thanks...for inventing something that really works!”

“Thanks...for inventing something that really works!” •

“The perception that \$1000 is a high cost to pay for being able to type comfortably is ridiculous when your primary job is typing.”

Robert S. Sanders
Medical Transcriptionist and Computer Operator
University of Michigan
Ann Arbor, Michigan
sandersr@umich.edu

October 25, 1996: “Thank you for taking time to answer my rather lengthy list of questions about the DataHand system. My conversations with you, as well as various user testimonials and reviews off the Web—even the negative ones—have convinced me that my upper extremities will benefit from the use of your product. The perception that \$1000 is a high cost to pay for being able to type comfortably is ridiculous when your primary job is typing. Think how violinists feel about having to pay as much as \$50,000 for a good student instrument....”

July 27, 1999: “I have experienced no pain and no fatigue using the DataHand keyboard at a speed of 80-90 words per minute all day without regular breaks. The flat keyboard workers must take breaks all the time to relieve their fatigue and stress.

“Unless the typing job is very brief, I always plug in the DataHand keyboard in preference over all other keyboards I know of. I own a Microsoft Natural keyboard, and I was going to get a Kinesis keyboard before I got my DataHand ProII. The only thing better about the Kinesis is its greater programmability for macros.

“For medical transcription work and programming, extensive macro availability is valuable—but it is not valuable enough to overcome the other

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advantages of the DataHand keyboard. Software [in the host computer] can be used to enable greater macro capacity. It does not all have to be provided in the keyboard. I carry my DataHand [keyboard] wherever I need to go. I even wish I could plug it into my Palm Pilot for note taking in lectures.” •

“When I balance the cost of such pain...with the cost of the DataHand keyboard, it becomes a small but extremely significant financial investment.”

Jean L. Haines
Retired School Teacher
Washington, D. C.
Jean1939@ricochet.net

The quotation from this DataHand user is part of a letter to Macworld magazine written in response to views expressed in an article about alternative keyboards. Subsequently, Haines acquired stock in DataHand Systems, Inc.

“Instead of being put off by the futuristic appearance of the DataHand keyboard...I am totally intrigued by it. ...as someone who has experienced carpal tunnel syndrome in both wrists simultaneously, I consider it to be the only viable data input device for the millennium. When I balance the cost of such pain—which...invaded every...aspect of my life, from sleeping to driving a car—with the cost of the DataHand keyboard, it truly becomes a small but extremely significant investment.” •

**“As far as I am concerned,
there is no comparison
between the DataHand
[keyboard] and the
standard keyboard.”**

**Jonathan Duley
Santa Monica, California**

December 31, 1996: “I have carpal tunnel syndrome and problems in my hands, shoulders, neck, and upper back—due to injuries caused in 1991 by the standard keyboard (from repetitive stress, etc.). I have had the DataHand [keyboard] for almost two years. Thus, until recently, I had not used the standard keyboard for normal typing. However, upon using the standard keyboard again, the benefits [of the DataHand keyboard] were readily apparent. (As far as I am concerned, there is no comparison between the DataHand [keyboard] and the standard keyboard—with respect to comfort and ease, or with respect to preventing undue stress to hands, tendons, muscles, and joints!)” •

**“She no longer has pain or
wears a brace.”**

**Lori G. Stoler Conway, RN-C, F. N. P.
Farmington Family Practice
Farmington, New York**

“Linda Kleehammer [36 years old] has a past history of work-related carpal tunnel syndrome in the left wrist. She has benefited from [using] the DataHand keyboard. She no longer has pain or wears a brace. I recommend she continue using this keyboard. Thank you.” •

“...a wonderful product.”

**Terri Hinte, Director
Press and Public Information
Fantasy, Inc.
Berkeley, California
thinte@fantasyjazz.com**

December 4, 1996: “I’ve been using the DataHand [keyboard] for over three years and can say without hesitation that it has enabled me, for the most part, to continue to work at or near pre-injury levels.

“I had spent the previous four years trying to cope with debilitating repetitive stress injuries and all the crap that goes with them: scary Workers’ Compensation red tape, hostile insurance companies..., the disorienting incapacity to work as long and hard at the computer as I’d previously done—frequently the inability to work at all. That was the worst part: wondering how I was going to earn a living once I managed (if ever) to crawl through the other end of the Workers’ Compensation tunnel.

“By chance I read an article in *Newsweek* about alternative keyboards, including the DataHand [keyboard]. I called for information, and when my Workers’ Compensation case was settled in June 1993..., my employer purchased a DataHand [keyboard] for me at my request. I’ve been using it regularly since August of that year.

“Not all was immediately rosy. I had a lot of aches and pains during the learning period, particularly because I was using chair arms (as suggested by your sales manager of the time) for arm support: my upper body is abnormally sensitive from my injuries, and by the end of the first week, my neck and shoulders had frozen up, and I was in terrible pain. I’ve had to learn by trial and error what the optimal setup is for me: the *exact right* location, height, and angle for all components, including fingerwells, keyboard tray, monitor, paper stand, and chair....

“But since arriving at the optimal setup, I’ve been in business. Ninety percent of my computer work is writing and editing on a word processor. I use a word completion utility (called Sword) that reduces the number of keystrokes by about 30 percent; Sword, in combination with [the] DataHand [keyboard], enables me to fly on the computer. I continue to see a physical therapist twice monthly and have to be ever on guard about my posture when computing; I can’t overdo. But I am very grateful, after what I’ve been through, to be computing at all. You have a wonderful product!” •

“I firmly believe that if everyone used this device there would be no repetitive stress injuries.”

Bern Pearson
Manager of Engineering and Author
Tallahassee, Florida
BernP@worldnet.att.net

January 30, 1997: “...I write for a living, both in my job at a sixty-five million dollar-a-year company and at home, where I write books. Several years ago I developed severe pain and could not type anymore. The pain was so bad I couldn't tie my shoes or turn a doorknob. Each night my hands became numb from swelling in the carpal tunnel.

“A friend gave me an article about the DataHand [keyboard]. I bought one, and to my surprise it worked. I was able to go back to work immediately. Since that time I have completed two books and started another.

“As time went on, the symptoms of carpal tunnel syndrome abated. Now, even though I type more than ever before, they are mostly an unpleasant memory. I owe my continued employment to my DataHand keyboard.

“I firmly believe that if everyone used this device there would be no repetitive stress injuries. ... Your product is the greatest thing for hand problems since the development of anti-inflammatory drugs.

PS Please let me know when I can buy stock.” •

Bern Pearson did later purchase stock in DataHand Systems, Inc.

**“It’s a world of difference
— my hands never feel
fatigued, strained, or sore
after hours of [DataHand]
typing...”**

Jeffrey Howard
Graduate Student, Computer Science Department
Massachusetts Institute of Technology
Cambridge, Massachusetts
jhoward@burningvoid.com

July 17, 1999: “I bought [my DataHand keyboard] on the recommendation of a friend who also owned [one]. I had tried hers, and recognizing that it wasn’t adjusted for my finger size or position, it [still] seemed comfortable. When mine arrived, I had to play with an old typing tutor program, just to see how my speed had changed. I went from 92 words per minute on a regular keyboard to about 22 words per minute on a DataHand [keyboard].

“It was a very strange feeling to have to think about how to move my fingers to type. I haven’t had to do that since I first learned to type, over ten years ago. I imagine, in a way, that it was something like physical therapy: retraining yourself to do something that seems like it ought to be familiar and simple.

“A few days later I was back up to a speed where I could safely forget the mechanics of typing and concentrate entirely on what I was typing. It was going to work (on a regular Sun Systems keyboard) and then coming home to [work on] the DataHand [keyboard] that made me notice the difference in how my hands felt. It’s a world of difference—my hands never feel fatigued, strained, or sore after hours of typing with the DataHand [keyboard].

“Honestly, I find that I’m putting things off at work and making up the time at home, so that I can use the DataHand [keyboard] to do the work.

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If it were a permanent job, rather than a summer co-op, I have no doubt I'd be working on getting a DataHand [keyboard] there, too. I bought a DataHand [keyboard] before I contracted any form of RSI or carpal tunnel [syndrome]. Because it was a preventive measure, I didn't expect to feel much of a difference, but my hands feel better, stronger, and faster." •

**“[The DataHand
Keyboard] is, absolutely
without question, the best
computer input device
there is.”**

**Andrew Bunner
President**

**Mass Quantities, Inc.
Fremont, California**

bunner@massquantities.com

July 29, 1999: “As a computer programmer and a bodybuilder, my hands, wrists, and forearms see a lot of use throughout the day. When I first developed the symptoms of RSI, I tried several keyboards, including the Microsoft Natural Keyboard and the Kinesis Classic Keyboard. While both were a marginal improvement over the flat keyboard—or ‘the wrist-killer’ as I call it—neither was enough to relieve the pain.

“My productivity was severely impaired, my weight workouts suffered, and I was genuinely concerned for my career. Since I switched to the DataHand [keyboard], I have been able to type for much longer, and with just as much speed, but without the forearm, wrist, and finger pain that has plagued me in the past. I've been more productive and more comfortable and I'm able to dead lift 315 pounds without a problem—even after ten hours of typing. It is, absolutely—without question—the best computer input device there is.” •

“...obviously the ‘right’ way to type on a computer, and I’m convinced that someday everyone will use one. ... I give the DataHand [system] my highest recommendation.”

**Ashley Fryer
Programmer
Black Market Software
(a computer game company)
Fall City, Oregon
phulakes@bmarket.com**

February 18, 1998: “I got my DataHand [system] roughly a month ago, so it’s time to give you some feedback. Overall, I love the keyboard. I’ve been a (albeit 50 wpm) hunt and peck typist for 15 years, but the new keyboard was good motivation to learn proper touch typing. I’m back up to 30 wpm or so and improving. [I am experiencing] no pain, which is good because I also play violin (another source of RSI).

“...the bottom line is that the DataHand [keyboard] is a great product! ...it seems obvious to me that it’s the “right” way to talk to a computer and that someday everyone will use [DataHand keyboards]. Keep up the good work!

August 2, 1999: “I’ve been using the DataHand [keyboard] for 18 months. The DataHand [system] is obviously the ‘right’ way to type on a computer, and I’m convinced that someday everyone will use one. The DataHand [keyboard] costs more than a regular keyboard, but it’s a small price to pay for a professional tool. I give the DataHand [system] my highest recommendation.

“An idea for you: it’s always seemed to me that DataHand Systems is missing a great opportunity to build community. Anyone who buys a DataHand [keyboard] is obviously willing to buck convention and try something new. I think your customer base might enjoy being a loose-knit community, along the lines of the Saturn car company. ...” •

“I tried two other ergonomic keyboards before the DataHand [system], and I found that due to the very light keystroke, only the DataHand [keyboard] allowed me to type without aggravating my tendinitis.”

**L. R.
Senior Research Scientist
NEAR, Inc.
Mountain View, California**

“I started using the DataHand keyboard four years ago when I developed severe flexor tendinitis in my wrists. I tried two other ergonomic keyboards before the DataHand [system], and I found that due to the very light keystroke, only the DataHand [keyboard] allowed me to type without aggravating my tendinitis.

“I have been able to keep my job without taking time off, and to

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continue working while I healed. I now consider myself to be almost completely healed, although to prevent re-injury I continue to use the DataHand [keyboard], and I practice good typing techniques such as taking frequent breaks and stretching.

“I recommend using the foot pedals with the DataHand [keyboard] as a replacement for the shift keys. A while back I had my older DataHand model retrofitted with foot pedals, since that model did not originally come with a foot pedal option. The service I received from DataHand Systems was excellent. They sent me a replacement keyboard to use while mine was being serviced, and they were incredibly responsive and helpful throughout that process since they knew I was dependent on their keyboard at work. That kind of service is very refreshing these days, and very much appreciated.” •

**“...the DataHand keyboard
is an incredible work of art,
... the design ... is a selling
point.”**

**Chi Hyon White
Computer Lab Assistant
Florida State University
Panama City, Florida**

August 11, 1999: “...I [hope] the DataHand webmaster can include [on the DataHand website] several very high quality photos ... so potential buyers can see the design of the DataHand [device]. ...when I opened the box, the DataHand [units] looked ... a million times better than I ... expected.

“The very same night I sent the check to you, I had second thoughts about it. ...the price was my whole Summer 1999 earnings, [but] the DataHand [keyboard] is worth it to me, because I am only 23, and my life is all ahead of me. I see [the] DataHand [system] as a very precise instrument that only a few can appreciate, ... the same way people purchase and consume expensive wine.

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“I would never have had any second thoughts if I [had better understood] the DataHand [design] ... the DataHand keyboard is an incredible work of art,...the design...is a selling point....

“...I am willing to learn how to type all over again after 14 years, even if I am the fastest typist I know ... on a flat QWERTY keyboard with a peak of 150 and a sustained speed of 120 [words per minute]....” •

“I went through three different ‘ergonomic’ keyboards in an attempt to help my wrists. None made much of a difference. ... After a week with the DataHand [system], I had no pain in my wrists.”

Clinton Popetz
Compiler Engineer
Metrowerks Corporation
Austin, Texas
cpopetz@cpopetz.com

August 26, 1999: “I had severe wrist pain, which had been diagnosed as tendinitis (not carpal tunnel [syndrome]). The doctors basically told me I had to stop typing. Before using the DataHand [keyboard], I went through three different ‘ergonomic’ keyboards in an attempt to help my wrists. None made much of a difference; I could type for about three minutes before my wrists were too painful to work. After a week with the DataHand [system], I

had no pain in my wrists. And I'm typing faster with the DataHand [system] than I was with a standard keyboard. So the DataHand [keyboard] definitely saved my career." •

“...I tried [many] different therapies including chiropractic, prescribed drugs, biofeedback, myofascial therapy, surgery, acupuncture, and herbs. I also tried using a DataHand keyboard.

“The DataHand keyboard was a significant help. It reduced the stress on my hands significantly.”

Stephen Arnold
Philadelphia, Pennsylvania
coyote@thecoyote.com

August 24, 1999: “While working at a major software development company in Silicon Valley, I came down with bilateral carpal tunnel

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syndrome and upper body RSI. I first noticed symptoms in late September 1996. Two months later, the injury was severe enough that I was no longer able to work as a software developer (programmer). I was questioning if I would be able to do normal daily activities.

“I was terrified that my career was over. Having spent 10 years of my life studying Computer Science to obtain my Ph.D., the idea of having to retire at the age of 34 was awful. So I started trying to figure out how to return to work. I tried [many] different therapies, including chiropractic, prescribed drugs, biofeedback, myofascial therapy, surgery, acupuncture, and herbs. I also tried using a DataHand keyboard.

“The DataHand keyboard was a significant help. It reduced the stress on my hands significantly. I had my biofeedback therapist measure the electric signals to the muscles in my arms while using a standard keyboard and the DataHand keyboard. The muscles received significantly weaker signal (about 70% to 80% [less]) while doing the same tasks [on the DataHand system]. I could use a standard keyboard for about 1/2 hour before I would start feeling pain. I could use the DataHand keyboard for about four times as long—for two hours.

“Three years after first noticing symptoms, I have been able to start a new career. I am joining the faculty at a major university in Philadelphia. Though I will have to be careful about how much I stress my hands, I expect the carpal tunnel syndrome and upper body RSI will not be a significant problem at my new position.

“I have two DataHand keyboards, one for my home computer and one for the office. In teaching my students, I will talk with them about the dangers of repetitive stress injuries and what they can do to avoid them. Some of this teaching will be by example. I will show them how I have reduced the stress on my hands by using a DataHand keyboard.” •

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Section Two:

Opinions about the DataHand Minimum Motion Ergonomic Keyboard from Corporate Customers

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“...we would completely eliminate cumulative trauma,” with “better quality [performance] and more productivity...”

**Renee Breeden, Executive Vice President
Phoenix Local of the American Postal Workers Union
Phoenix, Arizona**

“[The DataHand keyboard can] eliminate hours of lost work by employees suffering from carpal tunnel syndrome...I haven’t found a downside yet.” •

**George Lasica, Postal Worker
United States Postal Service, Phoenix, Arizona**

“[The] DataHand [keyboard] should be the standard keyboard deployed throughout the Postal Service.” •

**Dan Delatoso, Manager of Flat Mail Sorting
United States Postal Service, Tempe, Arizona**

“[The DataHand keyboard] saves time and is easier on the wrists.... The cost of installing DataHand [keyboards] would be compensated by savings on a single case of carpal tunnel syndrome.” •

**Gary L. Penn, Formerly Plant Manager (now Postmaster)
United States Postal Service, Phoenix, Arizona**

“...this device could be used to replace every keyboard in operation right now. This would allow us to support a ‘universal’ keyboard for all equipment we use to distribute and support distribution of the mail. Please make plans now to see for yourself the positive results we are experiencing with [the DataHand keyboard].” •

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Nolan Grant, Manager of Human Resources
SaraLee Corporation, Winston-Salem, North Carolina

[If all of SaraLee used the DataHand keyboard], “we would completely eliminate cumulative trauma.” •

Jill Yost, Manager of Order Processing
SaraLee Direct, Winston-Salem, North Carolina

“We have saved tens of thousands of dollars in Workers’ Compensation costs, [and] the operators love it; there would be better quality and more productivity if everyone used DataHand [keyboards].” •

“With the DataHand system, we have brought a number of employees back from disability.”

David Stoff, Industrial Engineer, and
Gene Sydor, Manager, Computer Forwarding System
United States Postal Service, Rochester, New York

“We are pleased to recommend the DataHand system based on its application at the United States Postal Service in Rochester, N.Y. The DataHand system has added substantial value to our operations.

“A number of DataHand units were purchased for use in the Processing and Distribution Plant and the Computer Forwarding System Departments beginning in June 1996. These units were installed in different applications, including: Flat Mail Sorting, Small Package/Bundle Sorting, and Mechanized and Flat Forwarding Terminals.

“The DataHand system has helped operators alleviate health and comfort problems related to data entry functions. Users like the DataHand system because it is more comfortable, reduces tension on the wrists, and reduces stress on the shoulders and arms. In all cases, users are able to maintain productivity and, in some cases, improve productivity with the

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DataHand System. With the DataHand system, we have brought a number of employees back from disability.

“As a final note, DataHand training was professionally conducted and tailored to meet our requirements. Based on the excellent results ... we have experienced ..., we are pleased to recommend the DataHand system.” •

“Most, if not all, DataHand users would not willingly return to the standard keyboard.”

Rochester (New York) Postmaster John A. Montague *sent a similar letter which goes on to state:*

“... The DataHand system was provided to users who had pain and to uninjured users as a pain prevention. [The] DataHand [keyboard] has proven to be an excellent solution, and users support continued DataHand use. Most, if not all, DataHand users would not willingly return to the standard keyboard.

“... [DataHand] training was conducted over a two day period and live key coaching was available for a number of days afterwards. Users were productive on DataHand thereafter and back to their [previous] productivity within sixty days. Some...have exceeded their prior productivity.

“Users were ...back to their [previous] productivity within sixty days.” •

“...one of the best moves the USPS has made. There will be less injuries, less strain, and I see productivity rising.”

Ann Field, SPBS Operator
United States Postal Service, Rochester, New York

“It’s one of the best moves the USPS has made. There will be less injuries, less strain, and I see productivity rising.” •

Peggy Rector, SPBS Operator
United States Postal Service, Rochester, New York

“For any good postal employee who has been keying for years—knowing sometime down the road they will develop carpal tunnel—how could you not use it?” •

“I’m up from 650 on the flat keyboard to almost 900 on the DataHand [system].”

Luis Oliver, SPBS Operator
United States Postal Service, Rochester, New York

“I prefer [the] DataHand [keyboard] hands down. First, because of the macros, my hands hurt less, and I don’t have to reach for the repeat keys. I’m up from 650 [pieces of mail per hour] on the flat keyboard to almost 900 on the DataHand [system].” •

“I would [tell the] USPS management to get it.”

Frank Barattini, SPBS Operator

United States Postal Service, Rochester, New York

“My preference is [the] DataHand [system]. I like the lighter touch and the repeat key on the thumb. I would [tell the] USPS management to get it.” •

Joyce Scott, SPBS Operator

United States Postal Service, Rochester, New York

“I don’t have to reach with my fingers, don’t have to look at the DataHand to know if I’ve hit the right keys. The training is excellent. Anybody can [work] on the DataHand [keyboard].” •

Todd Stephany, SPBS Supervisor-in-training

United States Postal Service, Rochester, New York

This worker is self-trained on the DataHand device. All other workers at the facility received several days of standard DataHand training conducted before they returned to the production line.

“I saw the DataHand [keyboard] three years ago on television and thought it was a great idea. I liked it more as I used it more and keyed faster.” •

“I don’t experience any pain in [my] hands, wrist, arms, neck, and shoulder.”

Debbie, Data Entry Computer Operator

Card Catalogue Company, Topeka, Kansas

This worker was diagnosed with arthritis at the age of 21.

“For the past three years I could not extend my fingers without feeling pain. Today (after using [the] DataHand [keyboard] for ten days), I can do

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that easily, and all my swellings on my hands came down! I used to wear special gloves and a wrist brace. Since [I started using the DataHand keyboard] I never touched them.... [The] DataHand [keyboard] helps me...work with speed and stay alert, because I don't experience any pain in [my] hands, wrists, arms, shoulders, and neck. If I give up this job, I won't give up my DataHand; I will call you to give me the name of a company that uses [the] DataHand [keyboard].” •

**Kendra, Data Entry Computer Operator
Card Catalogue Company, Topeka, Kansas**

“[The] DataHand [keyboard] helps me to think less and move my fingers more spontaneously.” •

**Sheri, Data Entry Computer Operator
Card Catalogue Company, Topeka, Kansas**

[On the first day back at production work after training,] “I am very impressed about [the] DataHand [keyboard] and my results....

“[After two weeks working on the DataHand keyboard],[working on the] DataHand [keyboard] seems like all I have ever done....” •

**Tamika W.
Wachovia Bank, Charlotte, North Carolina**

“Thank you for the support and...encouragement [during DataHand training], and also for the ‘change management.’ I needed it. ...I like my results, and I feel very happy. I learned a lot” •

“...I can fix errors easier.”

**Peggie T.
Wachovia Bank
Charlotte, North Carolina**

“This is really cool! I am happy that I can fix errors easier. ... Our training during these four days felt like a speed reading course. I like my DataHand [keyboard] and will allow nobody to touch it because it fits my hands perfectly now.” • *The discussion about “fit” refers to the adjustment features designed to enable each user to customize the DataHand keyboard to fit his or her personal hand size and shape.*

“Within weeks of getting the DataHand keyboard, I had regained much of my productivity. Within a month, I was regularly working all day without difficulty.”

Robert Ringrose
Development Scientist
Ascent Technology, Inc.
Cambridge, Massachusetts
ringrose@ascent.com

September 28, 1999: “When I was a graduate student at M.I.T. working on my Master’s thesis, my hands became painful enough that I was regularly unable to work even a half day on a standard keyboard. Within weeks of getting the DataHand keyboard, I had regained much of my productivity. Within a month, I was regularly working all day without difficulty. I have since finished my Master’s and Doctoral theses and gone on to work in the private sector. I have been using the DataHand keyboard for about six years.

“Without a doubt, the DataHand keyboard was a major factor in changing my hands from a problem which was steadily getting worse to one which is steadily getting better. In my case, I was lucky enough to address the problem before it caused permanent damage to the carpel tunnel.” •

“If I were running a company of computer workers, I would encourage everyone to use the DataHand keyboard even if they didn’t feel any wrist pain, because it would prevent many repetitive stress injuries from happening in the first place.”

Bob Wilber
Programmer
DesCartes System Group
Westbury, New York
bwilber@descartes.com

October 14, 1999: “I have been using the DataHand keyboard for several years. It is certainly better than any other key-based input device I know about. I have carpal tunnel syndrome, and I can use the DataHand system without my hands hurting badly.

“If I were running a company of computer workers, I would encourage everyone to use the DataHand keyboard even if they didn’t feel any wrist pain, because it would prevent many repetitive stress injuries from

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happening in the first place. If you compare the price of a DataHand keyboard to that of a flat keyboard, it is expensive, but if you compare it to the cost of disability insurance and lost worktime, it is cheap.

“My productivity is about the same as it was on a flat keyboard before I got carpal tunnel syndrome. Possibly, I am a little faster. I have not timed myself. Certainly, I am much faster now than I would be if I still had to use a flat keyboard, which I now find intolerable.

“As an Emacs user, the fact that I can hit the Alt and Control keys so easily is very convenient. Flat keyboard makers always put those keys in the most inaccessible possible places.

“I hope DataHand Systems does well....” •

The reports in the following sub-section were received from people at major national corporations with a policy against allowing the corporate name to be used without going through an involved approval process. To save time, the comments are shared without any company name included. The name of the employer is not considered as important as the views of the DataHand user.

“This [DataHand] keyboard saved my career.”

C. K.
Seattle, Washington

October 1, 1999: “This [DataHand] keyboard saved my career. I used a voice system for a while, but I found it was too cumbersome. I have had carpal tunnel surgery in both wrists, but I still suffer from tendinitis. The DataHand keyboard has enabled me to continue my work in information technology.” •

**“...the DataHand keyboard
can be extremely
beneficial.”**

Monty Carson
Phoenix, Arizona

October 8, 1999: “If you are motivated to learn a new system, the DataHand keyboard can be extremely beneficial. Now that I use the DataHand [system], I no longer have the discomfort I was experiencing from typing on the flat keyboard.” •

**“My productivity has
increased 100%—from
inability to work to the
ability to do my job again.”**

Lee Allen Castellion
Boise, Idaho

October 13, 1999: “Without the DataHand keyboard, I would not be able to work— because of forearm tendinitis. My productivity has increased 100%—from inability to work to the ability to do my job again. As a result of using the DataHand keyboard, the pain of my forearm tendinitis has now pretty much gone.

“I use some voice entry for large documents, but most of my work is done on the DataHand system. It is not possible to use a voice system too extensively for two reasons: first, voice entry is not good enough yet, and second, too much voice work wears out the voice.”

More material from other companies to be added—

Thoughts about the DataHand Minimum Motion Keyboard From Employees of DataHand Systems, Inc.

As people might expect, all keyboard operators at DataHand Systems, Inc. are DataHand operators. No full-time flat keyboard operators work at the company. Some people do carry laptops when they travel, but when people are in the office they do their work on DataHand keyboards. Potential users might reasonably ask: “What do the people who work at the company think about their product?” Just as they might worry about a restaurant where the cooks do not eat their own creations, they might worry if the employees of a company do not believe in their own product. Let’s allow several of the company’s employees to answer this question in their own words.

The only person excluded from the invitation to submit a comment was the inventor of the DataHand keyboard, Dale Retter. People might expect him to have a biased view. He would not come at the project from the same point of view as other company employees, some of whom may have never heard of the DataHand keyboard long before coming to work at the company.

The invitation to write a comment was sent to all employees who perform keyboard work as part of their job. Because of time pressures, vacations, and travel, not everyone was expected to respond—especially when everyone was asked to respond within three days. The following sample of views was selected for inclusion.

“Since learning to use the DataHand keyboard, I have become a better typist. I love using the DataHand mouse because it keeps your hands on the keyboard at all times, and it’s fun to use.”

Lynn R. Martineau
Executive Assistant
DataHand Systems, Inc.
Phoenix, Arizona
lmartineau@datahand.com

October 12, 1999: “I have been using the DataHand [keyboard] for 15 months, and I love it! My experience in learning to use the DataHand [system] was easy and fast. Since learning to use the DataHand keyboard, I have become a better typist. I love using the DataHand mouse because it keeps your hands on the keyboard at all times, and it’s fun to use. I am less tired at the end of the day, and my hands and wrists don’t hurt. I can type all day long and still be able to do other activities knowing that my hands and wrists will not hurt. Since being trained on the DataHand [system], I have not wanted or needed to use the flat keyboard again. In fact, I use the DataHand [keyboard] at home, and my husband has learned to use it. The DataHand [system] is definitely the keyboard for me, and I will continue to use it wherever I go.” •

“Before using the DataHand keyboard, I would need to take extensive breaks from keying to reduce the ache in my wrist—with the DataHand [system] I can key as much as I need to, and the ache has been relieved.”

Dennis J. Monroe
Vice President for Operations
DataHand Systems, Inc.
Phoenix, Arizona
dmonroe@datahand.com

October 11, 1999: “Over many years using a personal computer with a conventional mouse, I established a bad habit of supporting the weight of my hand and arm on my right wrist. This practice finally caused a continuous dull ache in my right wrist. Fortunately for me, the DataHand keyboard provides hand support and a built-in mouse that enable comfortable keying and mouse operation. Before using the DataHand keyboard, I would need to take extensive breaks from keying to reduce the ache in my wrist. With the DataHand [system] I can key as much as I need to, and the ache has been relieved.” •

“Learning the DataHand system is truly easier and faster than you might expect at first sight.”

Shelley J. Johnson
Training Director
DataHand Systems, Inc.
Phoenix, Arizona
sjohnson@datahand.com

October 13, 1999: “People I’ve trained all say the DataHand system was easier to learn than they expected, PLUS they don’t feel tired at the end of the day. Learning the DataHand system is truly easier and faster than you might expect at first sight. AND, the benefit of eliminating fatigue and pain is well worth the hours you will spend learning this incredible new technology. If you review the User Guide and follow the Training Manual exercises, you will be keying within hours. Like any new skill, it simply takes practice. Enjoy it and make it fun.” •

“Yes, the DataHand system looks different, but it feels different too. ...I welcome everyone to experience the DataHand difference.”

**Dan Pavicich - datahand@datahand.com
Vice President, Sales and Business Development
DataHand System, Inc.
Phoenix, Arizona**

“The moment I saw a DataHand keyboard, I was intrigued and wanted to learn more. I visited the company, met the employees, played with a DataHand Professional II, and did plenty of research. My initial intrigue cascaded into a sales and marketing position with the company. I am very happy to be involved with this company and our wonderful product. Most importantly, I am delighted to offer people a more comfortable and productive alternative to the traditional keyboard and mouse.

“Like most DataHand users, I was frustrated with the initial learning curve and kept switching back to my traditional keyboard as my ‘To Do list’ backed up. Even though I am not a victim of keyboard-related injury, I could easily feel the difference between the traditional keyboard and mouse and the DataHand system. Finally, I went cold turkey and have not turned back to the flat keyboard since that day. The DataHand design simply makes sense and offers real advantages. The DataHand keyboard is more comfortable and much less fatiguing than a traditional keyboard and mouse. Yes, the DataHand system looks different, but it feels different, too.

“As the lead salesman for DataHand Systems, I correspond with many individual DataHand users and also with corporate buyers. Common to both groups are passionate feelings about the benefits of the DataHand keyboard. Based on testimonials, positive outcome studies, and my personal experience, I am pleased to recommend the DataHand minimum motion keyboard. I welcome everyone to experience the DataHand difference.” •

“Even though I am a reasonably competent flat keyboard worker, the flat keyboard is so demanding athletically compared to the DataHand system, I greatly prefer to avoid using any flat keyboards... [or any] of the modestly ergonomic alternatives which are based on the basic flat keyboard layout....”

Don Patterson
DataHand Systems, Inc.
Washington, DC
datahand@datahand.com

“Because I am a grand-daddy DataHand user as well as the editor of this collection of DataHand user reports, people might like to hear my point of view. I received my first DataHand keyboard in 1992—about the same time as Clifford Lasser, Rosemary Ursutz, and Charles Mesarosh. I am an early DataHand investor and founding board member who has also worked in journalism, publishing, government, and academic research.

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“I learned about the DataHand concept from an August 1988 article in the *Wall Street Journal*. The front page report surveyed several alternative keyboard concepts, but only the DataHand idea was compelling to me. Immediately, I requested more information from the company. After several exploratory trips to Phoenix, in January 1989 I made an initial investment and became a board member of the fledging company.

“From the beginning, I have been involved in product critique and beta testing. Like Clifford Lasser, I use the Dvorak key layout, and most recently I have been beta testing a new DataHand ROM which enables users to toggle back and forth between QWERTY and Dvorak whenever they may need to. This feature is valuable when I am showing my DataHand system to QWERTY typists. They can begin work without stumbling over a key layout they do not know. This new ROM will also be valuable for users of operating systems like the MacOS, which do not provide a built-in Dvorak option.

“I do not suffer from keyboard-related work injury; thus, I use the DataHand keyboard primarily for comfort and productivity. In the past when I was traveling more often, carrying a laptop computer, I used my DataHand system only at home.

“Now I have mounted my laptop on the DataHand Laplander™ (lap work platform) together with my DataHand Professional II. This is such a superior arrangement, I carry the whole combined system with me wherever I go. The case I made for it is bigger than my old computer case, but the convenience of being able to do DataHand typing portably, anywhere, makes a little larger case no sacrifice. The brackets and modifications needed to offer my innovation to other DataHand owners will soon be made available from DataHand Systems.

“Even though I am a reasonably competent flat keyboard worker, the flat keyboard is so demanding athletically compared to the DataHand system, I greatly prefer to avoid using any flat keyboards. Similarly, I avoid the modestly ergonomic alternatives which are based on the basic flat keyboard layout—even though I do own an Apple Ergonomic Keyboard.

“I do not mind having to do a little bit of editing on a flat keyboard or the derivative ergonomic versions, but for even a small amount of original entry, I want to use the DataHand system. Even though I have never taken a timed test, I am definitely more efficient on the DataHand keyboard.

“Mostly I use my computer for writing and editing, so I can only work as fast as my mind can think. Modest speed is valuable, but the great speed

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of an old-fashioned stenographer is not necessary for me. Occasionally I do some transcription, but even then I am often editing as I go. I am not a high-volume, production-line keyboard worker. Ease of operation, including the elimination of hand movements and long finger reaches, is much more important to my kind of productivity. Because the keys and all the necessary functions are within easy reach while the hands are resting on the palm pads, greater productivity is easily enabled without any increased stress.

“When necessary, I do not have any problem changing back and forth between the flat keyboard and the DataHand keyboard. Just as the mind is able to keep two different spoken languages straight, so does it keep flat keyboard skill separate from DataHand skill—without memory confusion. The hands know instantly the different movements required by the two different keyboards.

“Though I have avoided pain and injury, I do not forget the fatigue resulting from long hours on a flat keyboard. Frequent stretching and work breaks were necessary because my shoulders and back would get exhausted and stiff. By comparison with flat keyboard work, I find work on the DataHand keyboard virtually relaxing. DataHand work is so effortlessly easy, it is hard to imagine why such an innovation had to wait so long to be invented and offered to the market—but then the market has not embraced a valuable innovation it has had available for fifty years: the superior Dvorak key layout.

“I converted to the Dvorak layout during the mid-eighties to reduce the stress of QWERTY typing and to improve productivity on a flat keyboard. Dvorak was an enormous improvement, but it was not as big as the conversion to the DataHand system. The difference between QWERTY and Dvorak is not as big on the DataHand system as it is on the flat keyboard, but still I prefer to stay with Dvorak for the same reasons of efficiency and reduced stress that caused me to prefer it on the flat keyboard. It increases the amount of work accomplishable on the home row and reduces the work done on the upper and lower rows.

“The DataHand keyboard makes my workday a pleasure instead of a fatiguing travail. Even after many hours of keying, work remains gentle, quick, and comfortable. In 1992, as a test, I dedicated myself to work on my DataHand beta model for sixteen continuous hours—just to see if I would experience musculoskeletal stress in the hands, arms, shoulders, neck, or back. The stiffness and muscular tension from trying to do that on a flat keyboard would have been terrible.

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“At the end of my marathon, the only part of my anatomy feeling fatigue was the part in contact with the seat of the chair! Such feats are not recommended, but I believe similar trials would reveal the same result.

“The other thing I like about the DataHand keyboard is the ease with which I can work in dim light. My fingers easily know where all the keys are on the DataHand layout without looking. No hand movements or reaches are necessary, so I do not need to see the keys or the display.

“This benefit may seem inconsequential, but it is the essence of what touch typing should be all about. If my observations are accurate, very few people can touch type all the keys on the flat keyboard without looking at the keys. Many people, who can easily touch type the alphabet, often cannot touch type numbers or symbols—not to speak of function keys—without looking.”

To facilitate use of the DataHand keyboard by blind users, who can also benefit from the ease with which the fingers tactily understand all the key locations on the DataHand keyboard, DataHand Systems is developing a tone box to audibly report mode changes. At present, mode shift information is provided only by a row of four lights for each of the four modes: Numbers and Symbols, Normal (Alphabetic), Functions and Mouse, and Ten-key.

“The DataHand keyboard makes my workday a pleasure instead of a fatiguing travail. Even after many hours of keying, work remains gentle, quick, and comfortable.” •

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Section Three:

Opinions About the DataHand Minimum Motion Ergonomic Keyboard Expressed on a Variety of Internet Sites

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page 64

**“I stepped up to the
DataHand keyboard about
four months ago. ...
The design of this animal is
so outrageously different,
it’s only vaguely
recognizable as a keyboard.
But it’s worked wonders for
me.”**

September 28, 1999: “I was having some serious trouble with my wrists and forearms between ten hours of coding and my weight workouts. I bought the Kinesis Ergo Classic with the footpad to help ease typing pain. And it helped a lot. But my condition was pretty severe, and it wasn’t long before, even with the new keyboard, I was in pretty serious discomfort.

“I stepped up to the DataHand keyboard about four months ago. This is the final solution. The design of this animal is so outrageously different, it’s only vaguely recognizable as a keyboard. But it’s worked wonders for me. I bought a ‘Professional II’ demo unit for 1/2 off. That came to 600 USD. Yup. That’s a full order of magnitude more than most ergo keyboards. And that was at 50% off!

“Here’s how I rationalized the purchase... I could either hurt myself, stop typing, or try out the most expensive keyboard I’d ever seen. I gave it a try and, after a week of getting used to it, never looked back. My lifting has improved, my productivity is up, and I no longer dread the workday.” •

—<http://www.massquantities.com>

“I swear by [the DataHand keyboard] ... I can type all I want...”

May 13, 1997: “I received a plethora of letters [asking me about my DataHand keyboard], so I decided to post my letter to the group. (Even though [this] is a voice user group). I have Dragon Dictate and no longer use it... because it crashes my compiler when I debug. ...

“I swear by [the DataHand keyboard]. ...I can type 10 hours on mine (with a few breaks of course) and feel better than [after] 30 minutes driving or 10 minutes on a Gateway 2000 keyboard. I used to think \$1000 was a lot to pay for a keyboard, and it may be. But I can type all I want and just being able to work again made it worth it.” —**James and his DataHand**

(jjday@hemi.com <http://www.hemi.com/~jjday>) •

Posted on <http://www.voicerecognition.com/voiceusers/archive/1997/0923.html>.

“...single-handedly responsible for my recovery from RSI...”

“The DataHand keyboard is pretty much single-handedly responsible for my recovery from RSI (sorry about the pun). The first week I had it, my hand strength went up four pounds from almost nothing, because my hands had gotten so bad that I almost couldn’t use them at all. I couldn’t turn a key in a lock or lift a full mug of coffee. Now I still use my DataHand all day every day at work, and I type at least as quickly as I ever did on a normal keyboard. I also type just as much as I did before I got RSI. One day at a normal keyboard, though, and I’m in pain again.” •

—<http://www.mit.edu:8001/people/nightowl/comp.html>

“It saved my (typing) life.”

“If you don’t mind the price (\$1000) or learning curve (two weeks) the DataHand [keyboard] is the way to go. It saved my (typing) life.” •
—Adam (asr@unixboy.ccm)

“Cannot express enough happiness with my DataHand [keyboard].”

“Must agree, I love my DataHand [keyboard].... I figure if I can spend \$1000 on a keyboard and two weeks getting proficient using it, am looking at a \$59,000 savings over surgery and physical therapy. Cannot express enough happiness with my DataHand [keyboard].” •
—DrHayt (too lazy to log in)

“...DataHand [Systems] is on the right track—we need to...drop the old paradigms”

February 23, 1999: “...I think DataHand [Systems] is on the right track—we need to completely rethink how we input into a computer, and drop the old paradigms.” •
—Soulfry (www.soulfry.com)

“...well worth the price.”

February 23, 1999: “I’ll have to do a ‘me too’ post. I tried various so-called ergonomic keyboards before the DataHand [keyboard] and was

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still suffering badly. I was to the point that five minutes of typing would cause my hands to knot up, and [I] was looking for an alternate career. As a last resort, I bought a DataHand [keyboard], and after a couple of weeks, I had no pain in my wrists and haven't had any since. There is almost no movement required of one's fingers on this thing, and your hand is kept in a very natural position. It is an expensive keyboard but well worth the price." •

—**Clinton Popetz, Metrowerks Java compiler guy**

(www.cpopetz.com/~cpopetz)

**“... my wrists have
improved considerably.”**

February 23, 1999: “DataHand [keyboards] are pricey (\$900 with a student discount), but well worth it. I've had one since September, and my wrists have improved considerably. All the MS [Microsoft] keyboards do is make my wrists hurt more..." •

—**Pascal Q. Porcupine** [*pseudonym*] ([//trikuare.cx/~pascal](http://trikuare.cx/~pascal))

**“...I couldn't live without it.
...this keyboard is a
lifesaver.”**

September 4, 1998: “I tried a lot of keyboards and was about to give up and find another career, as the pain in my wrists kept me from getting anything done. I found www.datahand.com by accident. Their keyboard is \$1000, and I couldn't live without it. You hardly move your fingers to use it, and you don't move your wrists at all. I went from being able to type five minutes and having my hands knot up in pain, to being able to code for twelve hours-or-so straight with no pain (is that a good thing?). If you really have problems with your wrists/hands/fingers, this keyboard is a lifesaver.” •

—**Clinton Popetz, Metrowerks Java compiler guy**

(www.cpopetz.com/~cpopetz)

“...the best \$900 I’ve ever spent...”

December 21, 1998: “After several months of deliberating over what to do about my slowly-worsening RSI and getting increasingly fed up with my HMO’s desire to use traditional (i.e. non-helpful) ‘treatment,’ I saved up and bought a DataHand. It’s the best \$900 I’ve ever spent, and I’m positive that it’s saved my life and future.

“My wrists still hurt when I need to use a normal keyboard..., but at least I don’t have excruciating wrist pain 24 hours a day anymore. ...” •
—Pascal Q. Porcupine [*pseudonym*] (<http://porcupine.ml.org>)

“...the pain is almost totally gone now, and that is priceless.”

December 21, 1998: “I couldn’t get by without my DataHand keyboard. It’s expensive, but the pain is almost totally gone now, and that is priceless. (I don’t have carpal tunnel, by the way, I have arthritis). ...I recommend it highly.” •

—RockyMountain [*pseudonym*]

“...the lightest touch I [have] found...I highly recommend it.”

September 11, 1996: “It saved my career.... The DataHand [keyboard] has the lightest touch I [have] found, and I highly recommend it. It takes a while to get used to (it’s unlike every other ergonomic keyboard out there)....” • —D. E.

“I [have] found the company to be really great to work with.”

September 11, 1996: “[The DataHand keyboard] is the only keyboard I’ve found that allows me to do my job (my injury is bilateral flexor tendinitis). I need the light touch [the DataHand keyboard provides]. [In addition], I’m using a combination of foot pedals and voice commands to replace the more thumb-intensive operations.”

July 14, 1999: “I found the DataHand was easy enough to learn ... I was productive with it right away. You have to be a touch typist, though. Almost all the letter keys are in the same position as on a QWERTY keyboard, but there are four keys [to relearn]. It takes a while to learn those four keys, but you...can...use the keyboard right away and correct your errors as you go.

“After a while the keyboard did create a problem with my thumbs. I recommend getting the foot pedals which replace some of the thumb keys. I am very prone to tendinitis, and I occasionally got some pain in strange places

“I may be an extreme case,.... My hand doctor once told me he had 20 patients using the DataHand [keyboard], and no one, except me, had problems with the thumb keys. ... I would not be able to work on a computer without this keyboard.

“I [have] found the company to be really great to work with. I had my older model retrofitted with foot pedals, and they sent me a loaner keyboard to use in the meantime. They've bent over backwards to help me. They have a liberal return policy, so I would recommend you try the keyboard and see if you like it. ...”

—L. R.

“...try the keyboard and see if you like it.” •

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The following detailed report from Clifford Lasser is more than five years old, and it reports on experience using the first publicly released model of the DataHand keyboard, the black beta model. The report is included because it still contains valuable information which has not been made irrelevant by the passage of time. The report is still found on several Internet sites where information for stress injured keyboard workers is posted.

Since DataHand beta testing was concluded in 1993, two subsequent DataHand models have been released: the DH200 and the Professional II. A third model, the Personal Edition is the same as a Professional II except that it is without macro programming capability.

“... [In] my opinion, [the DataHand keyboard] has an inherently better design.”

August 20, 1992: “Lots of people have been asking me for this evaluation.... This report describes my experience with the DataHand keyboard. I have had a beta version of this keyboard for eight weeks in the hopes of solving the tendinitis in my forearms While the keyboard has not cured my injury, it has permitted me to significantly increase my typing and reduce my pain. I have had no particularly difficult problems in using the DataHand [keyboard] although people with especially small hands might find it difficult to use. After a couple of weeks of using the DataHand [system], I was typing as fast as I was [previously] on a regular keyboard.

“Based on my limited experience, I would recommend that people with tendinitis in their forearms try the DataHand [answer]. I am not a doctor, and only time will tell whether the DataHand [concept] is truly a better keyboard, but it is my opinion that it has an inherently better design that is less likely to lead to repetitive stress injuries of the hands and wrists.

“What Is The DataHand [Keyboard]: The DataHand [minimum motion keyboard] is an alternate keyboard device. ‘Keyboard’ is really the wrong description since that would imply a board of keys. This does not

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properly describe the DataHand [keyboard], and I won't try in this message. However, since many of the people who come into my office to take a look at it say "that looks weird," I will describe it in the following way: Imagine that an alien from outer space came across one of our [standard flat] keyboards. What would he/she/it deduce about [the] physical appearance [of its operator]? [They might conclude] humans would have a single arm coming out of the middle of [their] trunk, with [probably] 13 antenna-like fingers all hinged in a straight line, and with the outer fingers fatter than the inner fingers. (How else would you explain the wide shift, control and return keys?) Weird, indeed.

"Of course we know what we really look like, and it should be apparent to all that the current [flat] keyboard design is an abomination. No wonder so many typists are suffering from repetitive stress injuries. So what does a DataHand [keyboard] look like? Again, I'm not going to try [to describe it], but you will agree with me when you see one that it really does look like it was designed for the human hand. And, it feels that way.

"How Does The DataHand [Keyboard] Interface With My Work Environment: I have an X terminal that accepts IBM PS/2 compatible keyboards, and so I just simply plugged my DataHand [keyboard] into it. There were a few keys that did not appear to match up properly, but there was nothing I couldn't fix with the X command "xmod map." The DataHand [keyboard] has its own interesting mouse capabilities, but I'm not able to use them. I use the standard mouse that plugs directly into my X term. The DataHand mouse capability can be used with Macs and PCs. I've also made some adjustments such as placing the DataHand [unit] in a keyboard tray and adjusting the height of my chair—all things you should do anyway.

"Why Do I Have A DataHand [Keyboard]: As you might have guessed, I'm one of those people suffering from a repetitive stress injury. I contracted tendinitis in both of my forearms a year ago. The pain was sufficient to keep me from typing for a couple of months, and I still type much less and far slower than I used to. Fortunately for me, I have not had to go on disability leave, but I know others who have. The pain has been bad enough to interfere with my sleep. I don't know if this problem will ever really go away. I got a DataHand [keyboard] with the hope that it would solve or at least minimize my problems.

"How Long Have I Had My DataHand [Keyboard]: I received my DataHand [minimum motion keyboard] almost eight weeks ago. [Since then], I have been using it exclusively.... Although eight weeks is not enough

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to make final pronouncements about a new product like this, I do feel I have seen a sufficient ... improvement in my condition to warrant this report.

“How Long Did It Take Me To Become Proficient At Using It And How Has My Typing Speed Been Affected: The short answer is less than two weeks and my typing speed is the same as before using the DataHand [system]. The long answer is: I used to be one of the faster ‘hunt and peck’ typists around. Six months after I was injured, I decided to learn to touch type. I also decided to switch to the Dvorak keyboard layout. (As an aside, did you know the standard QWERTY keyboard layout was designed to prevent typists [from typing so] fast [they would] jam the hammers on old mechanical typewriters?) I went even beyond [the Dvorak layout] and started moving keys around as I recognized which motions were causing me the most pain. My keyboard layout is non-standard, but I believe it has helped me a lot.

“In any case, about one week after receiving my DataHand [keyboard], I was typing pretty reasonably. Two weeks after receiving it, I was typing at least as quickly as I was on a regular keyboard. As far as actual speed is concerned, I no longer type nearly as fast as I used to with just four fingers, but I am getting faster.

“The manufacturer of the DataHand [keyboard] claims that an experienced typist should be able to type faster on the DataHand [keyboard], and I believe there is some merit to that claim. However, in my case, being able to type at all is the real issue. My speed is at least as good as it was for touch-typing on a regular [flat] keyboard, and that is good enough for me.

“What Has The DataHand [Keyboard] Done For My Condition: I would say that my condition has improved significantly since I have been using the DataHand [keyboard]. Before [starting to work on] the DataHand [keyboard], if I did more than a small amount of typing I would certainly suffer a flare-up that would prevent me from typing for a couple of weeks. Especially difficult was coding, which requires hitting many of the numeric, punctuation, and special function keys. Editing with Emacs, the only editor I am willing to use, was also difficult, because hitting Shift, Control, and Meta along with other keys requires contorting one’s hands.

“[People do] not realize what typing does to [their] hands until they have been injured. User interfaces were not designed to minimize stress on the hands [of keyboard workers]. Since I have been using the DataHand [system], I have substantially increased my amount of typing. I have also done a certain amount of coding and plenty of editing.

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“While I do not have any quantitative measurements of my amount of typing, I am certain I am now typing a lot more and with far less pain. I would not even consider trying to do the amount of coding and editing I do now without the DataHand [keyboard] because I know from previous experience I would certainly have a flare-up that would put me out of commission for a couple of weeks.

“Am I cured? Unfortunately, not yet. I still have pain, although substantially less than before. I also suffered a flare-up a few weeks ago. My suspicion is that I was typing far more than I used to, and my forearms are not ready for that yet. However, I continued typing through the flare-up—something I would not have dreamed of doing on a [standard flat] keyboard. I did cut back on my typing, but I did not stop. This may sound backwards, but it was the fact that I was able to continue typing during the flare-up that convinced me that I was doing much better.

“I have typed this entire report in about three hours, composing it and editing on the fly, and while I do have some minor pain, it is not stopping me. I am very thankful I am able to type this much again.

“What Real Problems Have I Had: The biggest problem I’ve had with the DataHand [keyboard] has been related to the thumb unit. The DataHand thumb has [four switches on each thumb] that correspond to Shift, Control, Meta (Alt), Space, Return, [Tab and Backspace], and so thumb work is quite important, especially for those of us who use the Control and Meta for their editors. I have small hands with short stubby fingers, and the DataHand has clearly been designed for a larger hand than mine.

“While the finger units can be partially adjusted, the thumb unit is too far away from the rest of my hand. I have been able to partially solve the problem by sticking pieces of cardboard to the thumb keys to reduce the distance my thumb has to travel. You have to see a DataHand [keyboard] to understand what I’m talking about. I have also been doing some thumb stretching to increase its reach.

“The makers of the DataHand [keyboard] have told me they are looking into adding some adjustability to the thumb unit. [*The current DataHand ProII model does have greater adjustability. In addition, two sizes of palm pad are provided.*] I think that should be a requirement for people with even smaller hands than mine, as I can barely get by [without greater adjustability].

“My other problem is related to the fact that I have totally re-mapped the keys to my modified Dvorak layout. Unfortunately, the programming in

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the DataHand [system] prevents the sending shifted values for some of the keys. If you intend to use the DataHand [keyboard] as it has been designed, then you have nothing to worry about. By the way, the key layout is very similar to the standard QWERTY layout, which should make it very easy for most people....

“I hope that it might be possible to change DataHand’s firmware to remove these restrictions for those of us who want to move things around.” •

—**Clifford Lasser**

Greater programmability, greater flexibility, and more optional features are provided on the DataHand Professional II.

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Section Four:

Facing the Need for Improved Keyboard Ergonomics and Computer Productivity in the Information Age The Necessity of a Better Keyboard Paradigm

**A Short History
of DataHand Systems, Inc.
and the DataHand Ergonomic Keyboard**

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Summary Overview of DataHand History

In 1993, DataHand Systems began selling the first pre-production model of the DataHand minimum motion keyboard—mostly to individuals suffering from musculoskeletal injuries. Most of the early testimonials come from people who had sought an easy-to-operate keyboard with a soft touch and good ergonomic support as a means of easing pain and discomfort. More recently the company also has begun to focus on the needs of corporate clients seeking a more productive method of data entry as well as a safer, more comfortable keyboard. This order of sales priorities was necessary to prove the ergonomic value of the DataHand keyboard before entering the productivity market. Any other approach would have risked the achievement of greater work output at the expense of worker safety.

The DataHand productivity advantage was initially demonstrated at seven different worksites with a total of over 100 workers. Average performance improvement of sixteen percent with a minimum of seven percent was documented. Inasmuch as testimonial reports in this document focus more on DataHand ergonomic advantages than on productivity, readers interested in the DataHand productivity value need to request copies of the DataHand productivity studies. A Brief Summary of DataHand Features, Benefits, and Results is also available. It summarizes the results of all of the productivity studies conducted over the past two years.

In spite of the early sales emphasis on keyboard-related musculoskeletal injury, the DataHand minimum motion keyboard was invented to improve data-entry productivity. Comfort and safety were necessary, but they were not the primary goal. Long before repetitive stress injury became a national epidemic, effective ergonomic design was considered basic and inseparable from the productivity objective.

Reducing Repetitive Motion and Addressing Keyboard-related Musculoskeletal Injury

The DataHand keyboard is not a medical device, and no medical claims are made on its behalf. Relief is provided to injured workers by reducing exposure to the stress factors associated with work on other traditional keyboard products. Most other alternative computer keyboard designs employ the traditional, flat QWERTY key layout; thus, they are saddled with many of the same incumbent limitations and dangers.

Some ergonomic issues are addressed by the alternative keyboard designs which are based on the basic flat keyboard layout, but often major, important elements of a complete response are neglected, overlooked, or are impossible to address because of the inescapable ergonomic inadequacies of the flat keyboard layout. Whether cupped, humped, twisted, angled, split, tilted, or tented, the limitations of the old-fashioned flat keyboard cannot be escaped. The flat keyboard is a paradigm from another century intended to meet the work requirements of mechanical typewriters. Workers had to be slowed down to avoid the clash and snarling of the mechanism. Neither the productivity shortcomings nor ergonomic limitations can be fixed until the paradigm is changed.

The DataHand minimum motion keyboard is the only alphanumeric data input device, so far known, which addresses all of the musculoskeletal stress factors identified with work on the flat keyboard. This does not mean all risk of pain and discomfort is removed; people can have different thresholds of musculoskeletal injury depending on a variety of factors. Nobody can know the threshold of injury for all people, but some medical studies have been conducted. Studies of key activation suggest forces under 48 grams are likely to be below the threshold of percussive injury for most workers. Forces on the flat keyboard and most of its derivative keyboard cousins range between 55 and 100 grams.

DataHand key activation forces range between 18 and 24 grams. The flat keyboard encourages workers to use more force than necessary, because quick travel between keys governs typing speed. The faster workers move their fingers, the harder they tend to hit the keys. Many people use much more force than necessary. On the DataHand keyboard, the effort to go faster does not lead to an inevitable tendency to hit the keys harder as the operator increases speed. Because the travel distances between the keys are

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so much smaller, the touch remains light even while the operator works quickly. With the keys virtually right at the tips of the fingers on the DataHand system, fast operating speeds do not lead workers to exceed healthful levels of key activation force.

As important as key activation forces are to injury causation, they are not the only pertinent risk factor—especially for people with pre-existing injuries. (A full review of the DataHand difference on the entire range of musculoskeletal stress management issues is available upon request.) Other stress factors include: the intensity of the repetitive motion; the distance the hands must travel; the level of strain on muscles of the hand, wrist, arm, shoulders, and neck; the extent of carpal tunnel and other similar nerve pressures; the position or deflection of the hands as they address the keyboard; and the nature of the support provided to the hands as work is performed.

Some ergonomic issues cannot be addressed without the acceptance of trade-offs or alternative strategies. For example, the elimination of hand movement on the DataHand system requires the thumb to perform more work. From a design perspective, this is desirable, because the thumb is the most intelligent and competent of all the fingers—even though the added thumb work can be a source of physical stress for people with thumb injury.

To benefit people with thumb pain, a foot pedal shift system is offered as a DataHand accessory. This enables the feet to help with the work normally assigned to the thumbs.

Improved ergonomic design was an essential step toward the achievement of improved productivity with the DataHand system—even before repetitive musculoskeletal injury became an epidemic affliction among computer operators. Improved productivity without the musculoskeletal protection of workers would have been unacceptable.

The DataHand Chronology

The DataHand concept was developed by Dale Retter, a Phoenix inventor who sought assistance from Leland Knight, a professor of design at Arizona State University. Together, they formed the DataHand Development Group, completing the first DataHand prototype by 1988. Soon thereafter, Industrial Innovations, Inc. was formed to manufacture and market the DataHand minimum motion ergonomic keyboard.

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Preliminary testing of an alpha product was successfully completed during 1990 and 1991, and by 1992, the company was ready to beta test its first full product design. Much unique and innovative engineering was incorporated into the DataHand switch modules. Creating a key module with the right touch and feel was not a simple task. Time and testing were required to make the ground-breaking design robust and reliable.

Low volume production of a pre-production DataHand model, called the DH200, was begun in 1993. During 1994 and 1995, units were marketed and sold to both stress injured individuals and corporate buyers wanting to provide a safer, more healthful keyboard solution for valuable workers. Users at Fortune 500 companies and major national institutions were counted among DataHand clients.

In the spring of 1996, the company, by then renamed DataHand Systems, Inc., introduced the DataHand Professional II and the DataProof ten-key model. These models incorporated a number of improvements, including additional adjustability, an improved interface without a separate power supply, a redesigned palm support system, repositioned key modules, and improved keyswitch technology.

With the introduction of these models, marketing to major corporate data-processing facilities was commenced. The marketing focus was adjusted to include greater emphasis on worker productivity. Studies to prove the productivity advantages of the DataHand system in a variety of corporate settings were initiated and completed between 1996 and 1998.

In 1996, the capacity of the DataHand keyboard to help companies overcome the high cost of keyboard-related Workers' Compensation claims was established. A division of the SaraLee Corporation, with a keyboard workforce of 300 operators, used twenty-five DataHand units to benefit all its stress injured, pain afflicted workers. This strategy has demonstrated annual Workers' Compensation savings of over \$100,000. A press statement affirming this result was released by SaraLee. The text of the statement is available upon request. It is also posted on the DataHand website at www.datahand.com.

In 1998, DataHand Systems added the DataHand Personal Edition to its product line. This model provides the same ergonomic support and facilitates the same productivity as the Professional II, but it comes without the programmable features of the professional model. This lower priced model is made for those operators who do not need programmability to set up macros or reconfigure keys.

Injury Prevention and Productivity

Fearing the dangers of flat keyboard work, some buyers have wanted a better data entry system as a preventive measure against the possibility of future injury. Also, tightening local labor supplies have caused some companies to begin employing the DataHand productivity advantage to avoid having to find, bid for, and train new workers. This approach appeals not just to managers but also to workers who look forward to translating improved productivity into higher wages. When the health risks of workers and Workers' Compensation costs of companies can be lowered, while also increasing productivity, the changeover to the DataHand minimum motion keyboard provides a win for workers, corporate management, and shareholders—all at the same time.

In the existing climate of corporate uncertainty concerning the best answers to offer their stress-injured keyboard workers, many companies have done nothing. They have waited to be assured about some widely agreed “right answer.” Influential decision makers in the business community and business-oriented political leaders have been fearful about the costs associated with any move away from the traditional flat keyboard—even though such timidity has not been historically characteristic of the American approach to problem solving.

With robust confidence in reliability and functionality, the DataHand system provides data-entry managers with an overwhelming purchasing justification—based on worker protection, health cost savings, and productivity improvement—if they are willing to allow workers the time needed to learn the new and different DataHand paradigm.

Overcoming Academic, Political, and Judicial Lags

Inadequately designed, cursory studies examining the health-related performance of several alternative keyboards during the early nineties left many Americans believing no alternative keyboard would be capable of significantly reducing injury and pain. Because the DataHand minimum motion concept was new on the market, very unusual in its design, and not yet supported by even much preliminary performance data, it was not included in the studies. This research was advanced quickly as keyboard-

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related injury was first coming to be considered a national epidemic. Perhaps, it should be forgiven for its shortcomings. Time was needed to better establish and refine the appropriate methodologies.

One major federal study looked only at keyboards based closely around the traditional flat keyboard layout. The group of keyboards included in this brief and severely limited study was tightly constrained—under the assumption the market would not be interested in any ideas divergent from the standard keyboard paradigm already well-known to many people. Any concepts needing more than a week of transition time were deemed unacceptable. This arbitrary yardstick replaced cost-benefit analysis of any new concepts possibly capable providing great advantage.

The findings from this brief, preliminary study were widely disseminated, and they greatly influenced the attitudes of both potential customers and investors. Because the findings were broadly generalized, the market for all alternative keyboards was dampened—even for those models not involved in the study. The news reports written about this research reinforced public uncertainty about just how best to address repetitive stress injury among keyboard workers. This outcome would have been acceptable if the findings—and the broader generalizations extended from them—had been true. Not only were they questionable and criticized by prominent medical researchers, but they caused many people to suffer for years longer without badly needed help.

As often happens, the subsequently stated reservations about the study never received the same public attention accorded to the original findings. The critical analysis of the study's shortcomings received attention only in professional circles, while the original study was major national news supported by the release of a government flyer cautioning keyboard workers against placing undue hope in alternative keyboards. In spite of all the present mistrust of government, people still expect government research to be authoritative and thorough. It has taken years for other research to begin to revise the government conclusions.

More recent research has shown some of the flat keyboard based alternative keyboards to be modestly helpful for some people—especially those with wrist-related health issues. No research to date has shown these keyboards capable of addressing the full range of stress issues, but minimal support on one basic issue may help some workers just enough to make their lives better. More time will be needed before people begin to see the advantages of an entirely new paradigm. The world does not ever make a

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paradigm shift until people understand an overwhelming justification for doing so. These things always take time. Companies leading a paradigm shift must have the capacity to endure the time needed for the public to revise its thinking.

The results of the early keyboard research during the early nineties were reinforced by several successive Congressional actions deferring for a total of eight years the issuance of federal standards governing repetitive stress injury in the workplace. Finally, in early 1999, before an additional delay could be enacted, the Occupational Safety and Health Administration issued its preliminary draft of rules designed to prevent injury and regulate the corporate response to the needs of workers injured from activities involving repetitive motion. At the time, the final rules were expected before the end of the year—if continuing Congressional efforts to defer the release for two more years proved unsuccessful.

The additional delay was called for because the proponents argued insufficient knowledge about the nature and cause of repetitive motion injury was available from previous studies—even though nearly two thousand studies of repetitive motion injury have been conducted during the Twentieth Century. Congressional advocates of the delay and their supporters in the private sector wanted OSHA to wait for the results of one more specially-funded Congressionally-mandated study conducted by the National Academy of Science. The results of this study were expected to be released some time early in the year 2001.

The effect of the Congressionally sponsored delays has been to sustain the market dominance of the traditional flat keyboard and retard both innovation and incentives designed to encourage corporate problem solving. Pain afflicted workers have had to accept the discouraging reality: no help would be forthcoming from the government. Realizing they were on their own, many workers have turned inward, no longer expecting employers to relate positively or empathetically to the issue. Some people have sought solutions on their own; others have suffered in silence or changed their careers.

Many employers and supervisors, who do not do computer work themselves, still do not believe the repetitive motion problem is either real or significant. Cynically, some believe it is an ailment “contagiously communicated by mouth.” Insurance representatives have publicly charged workers with abusing their health insurance coverage by making spurious claims not supported by medical evidence. Clearly, these spokespeople do

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not believe the workers are truly afflicted with any real problem. Again, better knowledge is needed to enable clear indisputable diagnosis.

Court decisions in keyboard-related product liability cases further served to strengthen the dominant position of the flat keyboard in relation to all alternative keyboard products. In none of the lawsuits was the truth or extent of the workers' injuries ever denied, yet judges and juries were reluctant to take any decision which might derail the substantial economic benefits of the computer revolution. To resolve their dilemma without the benefit of clear medical testimony, courts seem to have been generally receptive to any arguments pointing toward causation outside of the workplace.

Meanwhile, the corporations charged in the lawsuits—and others worrying they could be charged in the future—spent lavishly to defuse the threat. None had sold any keyboards with the clear, documented knowledge injury to workers would result, but they reacted defensively nonetheless. At the time when the suing workers had started to work on the flat keyboard, no credibly proven alternatives had yet existed. Workers were plausibly suffering as the result of long and intensive hours of computer work, but actual attribution of causation was difficult and confusing. The same work was found to cause pain to some workers but not to others. With precise causation difficult to determine, it was hard to know just what steps were needed to repair the problem. It was even more difficult to assign responsibility.

Computer and keyboard companies had offered the only keyboard available at the time. Their situation was not analogous to the case of tobacco companies or the asbestos companies. The arrival of a range of alternative keyboards is a relatively recent development, and even now—several years after national discussion of keyboard-related musculoskeletal injury commenced—objective knowledge about the benefits they offer from a range of credentialled medical sources is still scarce. Anecdotal evidence from individual workers—like that contained in the pages that follow—is virtually the best evidence available.

Medical experts are still trying to sort out the valuable alternative keyboard models from those which are not helpful. It even takes time to credibly determine whether any of the alternative designs offer a measurable improvement over the old-fashioned flat keyboard. In this uncertain environment, the most radical ideas have been treated with scepticism by many people—unless they have great need for a better answer and great

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confidence in their own ability to evaluate unusual, new concepts. Fortunately, as the opinions documented in this report show, a sufficient number of such people do exist. The opinions cited are just a small representative sample.

Before the challenge posed by the early wave of keyboard lawsuits was resolved, computer and keyboard companies waged aggressive and creative advocacy in the press, the workplace, the Congress and other political arenas, academia, as well as in the courts. The effort was well designed to defend the established market position of the flat keyboard. Many different organizations and consulting groups were created, funded, and deployed to handle their assigned portion of the effort. Some of the work is even handled with tax deductible money given to newly created organizations with a charitable or a research charter.

One such organization teaches workers to take rest and stretch breaks, sends speechmakers to preach about the importance of these precautions, and gives out prizes to companies with exemplary palliative programs. While it could be mostly sound and fury, these things can help some people. Even if a new paradigm is a good idea, it is not going to bring instant change. Many people will need to work on the flat keyboard and its derivative concepts for years still.

Nevertheless, the combined effect of all interrelated efforts by the flat keyboard and computer industry has been to communicate one simple message: if any real problem exists, it can be easily managed. The management program consists of modest ergonomic advisories which operate to obscure, defuse, defer, and dilute the real medical issue. The credibility of injured workers is undermined until they think they should take the blame and the full responsibility quietly upon themselves.

The industry strategy has mostly worked. The resources have been available to make it work. The tempestuous waters of worker pain and frustration have been calmed. Damage awards have been avoided and the status quo has been protected. Judges and juries put responsibility for the repetitive motion injury problem on the backs of the workers and their health insurance providers. The risk of injury had to be accepted by workers as part of a job doing computer work. Political leaders with close ties to business organizations put out material talking about the burdensome and unnecessary costs of implementing the anticipated OSHA rules. They, their allies, and their backers seem to believe the proposed regulatory guidelines are unwarranted and harmful to the welfare of business enterprise.

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In part, this outcome resulted from a shortage of indisputable research information about the nature and incidence of keyboard-related worker injury. Business leaders have not yet seen the information they need to understand an advantage for them in joining with workers and their advocates to bring greater productivity for the benefit of everyone—through the implementation of an entirely new keyboard concept.

Department of Labor statistics on lost workdays are regularly cited by industry spokespeople to show the musculoskeletal injury problem is going away on its own. In fact, the statistics may simply record the increasing tendency of workers to find ways to deal with the problem on their own—without losing work or expecting help from their employers. Seeing workers stigmatized for speaking up about their injuries, many workers have learned to keep their mouths shut—to avoid jeopardizing their future advancement opportunities.

In the court cases, the computer companies effectively attributed musculoskeletal injury to factors outside the workplace. Smoking, diabetes, hobbies, housework, and heredity were all blamed. In the face of these claims, workers feel maligned and angry, but they also feel powerless. If they want to be able to earn a living they have to swallow their troubles and deal with the world as it is. The ideal climate for worker support does not exist yet, and even the OSHA rules may only be a beginning step toward the achievement of productivity for the benefit of everyone.

Efforts are ongoing by many investigators to better prove clear injury causation. Federal funding plays an important part in advancing this work, even though the availability of funds can be the subject of political influence and diversion. To solve the puzzle, life-style factors and other factors outside the workplace must be separated from work-related causation. The question to answer: is work the main cause or are other factors equally or even more important? Some say work is not a cause at all, that it only exacerbates a pre-existing hereditary condition. Others say work on ergonomically inadequate equipment is the primary cause of the injury. Researchers are working to resolve these differences, but the answers do not come quickly.

An increasing number of people and companies have begun to break the impasse on their own—without waiting for the medical community, the political leadership, or government bureaucrats to resolve the issue for them. Extended clinical studies could and should take years to accomplish. Data from significant populations of workers using a variety of different keyboards needs to be gathered for many months, even years. In addition,

the design and execution of the studies is fundamental, but first, the priority must be focused and funded.

*The consensus of seventy prominent scientists meeting at the National Academy of Sciences in August 1998 agreed: **work-related causation is real**—even though other factors were recognized as playing some possible secondary role. This conclusion was reached after a National Institute of Occupational Safety and Health study of the scientific literature was carefully reviewed by all the attending experts. This was a good beginning, but many specific follow-up details must be addressed before help gets to workers and to companies.*

The Psychological Barriers

In spite of the increasingly recognized physical stresses associated with work on the traditional flat keyboard, most people expect a keyboard to look as their mental image tells them it should. A striking or startlingly different alternative concept is counter-intuitive to people until they stop to re-examine the process through which they have formulated their ideas.

Most people are constitutionally conservative and cautious about embracing strange, new ideas. According to psychologists, only about one percent of the population has a native capacity for farseeing visionary insight. A large percentage of people defer the acceptance of change or the fixing of problems as long as possible—especially when they must manage increasing amounts of it.

In the absence of a compelling, clearly identified, and immediate need for something different, people often wait until a new idea becomes irresistible or ubiquitous. Such human hesitations have deferred the acceptance of many innovative, forward looking ideas, including the telephone, the microcomputer, the steamship, the common zipper, and the agricultural tractor. The telephone floundered for a time under the perception that it was no more than an interesting novelty without practical application. Acceptance of steamships was slowed while the makers of sailing ships tried every conceivable means to improve the efficiency of their sail design and deployment. The zipper, invented at the turn of the last century, was not widely accepted until almost fifty years later—when the government brought it to the attention of many people by using it on military clothing.

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The more unusual, strange, or unconventional an idea is, the more time it takes before people begin to accept it. Political and economic forces can conspire with public hesitation to make the process take even longer. Companies with a strong stake in the status quo can go to great lengths and spend prodigious resources to preserve their position. Some even strive to preserve short term profitability at the expense of longer term rationality. Sometimes they need others to protect them from their own anxious and defensive shortsightedness, but as large as this problem can be, the bigger barrier is the psychological resistance of individuals who have trouble grasping the advantages of an unusual new paradigm. Until they are able to understand the benefits of a new idea, people do not begin to seek the tools to correctly evaluate its worth.

The Economic Calculation

In spite of initial doubts about the usefulness of computers—particularly microcomputers, which some prominent experts once called a passing fad—the public now expects all computer technology to be better and cheaper almost every day. All keyboards are expected to cost about the same, regardless of their features or benefits. Many do not understand how a very different new paradigm might be worth much more than an antique concept residual from the age of mechanical typewriters when worker speed and efficiency had to be retarded to prevent the clash and snarling of mechanical keys. Some analysts and potential customers have questioned the price of the DataHand keyboard in the public press and on the Internet. These comments are made before a careful analysis of the benefits and the cost savings have been made. They are usually simply a first reaction.

The economic requirements associated with the introduction of a new technology can be difficult for consumers to understand. Ultimately, potential purchasers of new products must ask: even if the price seems high, are the benefits worth the higher price? Reading the opinions of others can help people with this decision. For that reason, this collection of DataHand user opinion is provided.

Many people are not accustomed to making productivity and risk prevention assessments and translating them into dollars. Commonly, without careful thought, we all use whatever tool is most easily available. Many of us push ahead blindly until we get into trouble or somehow become

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forced to change our practices. This is nothing more than another example of using a wrong or inadequate tool when a better tool is available. Of course, better tools always cost money.

Very few capital investments offer sufficient productivity increase to cover the cost of the capital investment in less than a year—even when labor costs are modest. Yet, this result has been demonstrated by the DataHand keyboard. The calculation does not even consider Workers' Compensation and other medical savings—or the intangible cost of human discomfort.

Any full discussion of DataHand productivity should examine the price paid for worker fatigue during the course of the normal workday. Using many months of actual United States Postal Service worker performance data, Dr. Roberto Fernandez of Stanford University compared the fatigue patterns of DataProof ten-key users with those of standard flat ten-key operators. He found the traditional ten-key operators could keep up with the performance of DataHand workers for only the first two or three hours of the workday. By the fourth hour, the flat ten-key operators showed a fatigue-related productivity decline. By the end of an eight hour shift, the DataHand operators consistently showed significantly greater, double-digit productivity margins. A copy of the Fernandez/Stanford study is available upon request. It is also available on the DataHand Systems website at www.datahand.com.

On the full keyboard, the DataHand advantage is even greater than it is on the DataProof ten-key system, which is, of course, used by only one hand. More exhausting hand and arm motion is required in the operation of the full flat keyboard than is required to operate a ten-key device.

While it is more difficult to calculate, it is no less important to assign a cost to the relief of pain and to the avoidance of future pain. For computer operators seriously concerned about pain avoidance, the goal should be to find a product capable of making a real difference.

Setting the Backdrop for a New Keyboard Paradigm— The DataHand Difference for the Future

The foregoing background and DataHand Systems corporate history introduce the personal experiences and evaluations reported by a wide variety DataHand users—even though this entire report provides no more than a sampling of DataHand user opinion. The DataHand minimum motion keyboard is designed to provide unique value, which for many has been both unexpected, and surprising. This value is especially significant for those workers who spend many hours each day working at a keyboard. The more intensive the work and the longer the hours of computer work, the greater the value of a less stressful keyboard alternative.

Finally, those people who have never learned to touch type on the flat keyboard may want to take a look at the DataHand minimum motion keyboard for another reason: for beginners, learning to touch type for the first time on the DataHand keyboard is faster than learning on the traditional, flat keyboard or its more recent derivative designs. New users may no longer want to learn the traditional, more stressful method of keying, realizing it is risky to health and less productive—as well as time consuming and more difficult to learn. In contrast, the differentiated tactile feel of each different key activation movement on the DataHand keyboard makes the learning process easier and faster to assimilate.

This point may not seem important to those who already know how to type on the flat keyboard, but it should be. The same features which allow beginners to learn faster also enable DataHand users to work with greater certainty and less stress—once the fingers become accustomed to the tactile feel of DataHand work.

Instead of depending on the arms and even the brain to support a complex range of hand and finger movements—without any differentiated feel—the DataHand keyboard allows a much greater portion of the work to be managed by the tips of the fingers. Each touch on a DataHand key has a different feel. The nerve endings in the fingers are able to understand and affirm each distinctive, differentiated key activation movement without the brain having to make up for what the fingers are unable to know.

Because all the keys on the flat keyboard feel the same, and because a complex array of finger flight patterns have to be learned to move quickly among all these keys, a high level of tactile understanding in the tips of the

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fingers is not achievable. Finger movement on the flat keyboard gets no tactile reinforcement as a result of differentiated key feel; thus the learning process is more complex. It involves more participation of the brain.

On the DataHand keyboard a greater portion of the work is managed by the tips of the fingers without involvement of the hands, wrists, arms, shoulders, and back. This is possible because the hands are rested and supported on an ergonomically designed handrest. This eliminates upperbody stress and delegates the work to the fingers—especially the tips of the fingers. This issue is at the core of the DataHand difference. The fundamental value of the DataHand paradigm resides in this elegantly simple concept.

Statement of Appreciation to Contributing DataHand Users, Advisory to Readers, and Mission Statement

DataHand Systems is grateful to DataHand users who have sent their views to the company and have been willing to share their experience with others. In the face of public skepticism about the ability of any alternative keyboard to help people very much, DataHand owners understand the acceptance of an unusual, new paradigm can be daunting.

No doubt, some DataHand owners have told their stories and are willing to answer e-mail questions from prospective DataHand purchasers because they wish someone might have been available to assist them when they were making their purchasing decision. The judgment of one customer can sometimes be more valuable and credible than the words of a thousand salespersons.

Most comments in this compilation have been made by individual DataHand users, not by managers with a broad overview concerning a larger group of DataHand operators. The perspectives offered may or may not reflect the point of view of the management of the companies where the individuals work. When the statement made reflects a more broad managerial point of view, the context and focus of the statement make clear the conclusions are not just the opinions of one individual DataHand operator. Such statements appear in the section quoting corporate users.

Apart from the corporate users, no systematic effort was made to solicit these testimonial letters and comments—although in some cases, calls were made to update information received years previously. Where they are known, the dates of both the original comment and the update are noted. The section quoting Internet postings captures publicly posted information.

The e-mail addresses of the DataHand users are provided for the exclusive purpose of enabling inquiries about users' keyboarding experience. The facilitation of these inquiries is intended to benefit interested individuals and corporate buyers deciding about the potential benefits of the

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DataHand minimum motion keyboard for themselves and their companies. Prospective DataHand purchasers are requested to respect the goodwill and commitment of those DataHand users who are willing to answer questions and offer counsel.

Please do not abuse the privilege of having access to these e-mail addresses. The publication of e-mail addresses should not be taken as an open invitation to enter these addresses on electronic mailing lists or to distribute them to others for any purpose other than to facilitate individual inquiries about the DataHand experience. DataHand Systems thanks you for relating to everyone in the community of DataHand owners with sensitivity, appreciation, and goodwill.

Larger requests for information or assistance should be directed to DataHand Systems, Inc., 3032 N. 33rd Avenue, Phoenix, Arizona 85017-5247; 800-875-7171; 602-233-6000; fax: 602-233-3434; website: www.datahand.com. A small but dedicated team of workers is available to assist you the very best we can.

DataHand Systems intends to bring the world of computer workers a better, safer, more user friendly, healthful, and productive data entry concept—based on improved ergonomic principles. Introducing an innovative, new paradigm to the world is never easy or fast—even when the concept being replaced is greatly deficient. Paradigm change is always hard for people. Perseverance in the face of skepticism and uncertainty is a necessity.

Long-standing habits of an entire culture are not relinquished any more quickly than the harmful substance dependencies afflicting individual citizens. DataHand Systems, Inc. needs all the help possible to enable more people to avoid unnecessary discomfort or pain and discover new levels of computer productivity in the Information Age.

This report of DataHand User Testimonials and Evaluations was assembled, edited, and designed for DataHand Systems, Inc. by Don Patterson using a DataHand ProII data entry system with a Dvorak key layout connected to an Apple Macintosh PowerBook® with a Serial to ADB interface from the Silicon Valley Bus Company. Both the DataHand minimum motion keyboard and the PowerBook are mounted on a DataHand Laplander™ to make a compact portable combined unit.