

LETTERS TO THE EDITOR

"Ergonomic" keyboard maker comments on "wipe" keyboard

Editor:

I was very interested to read the article by Professor Montgomery, concerning keyboard development, in the March issue of *Computer*, but a little sad and somewhat surprised to find no mention of our Maltron development, although it is mentioned and illustrated in the paper by Professor Hisao Yamada listed in the bibliography.

The Maltron keyboard, characterized by a new letter layout and an entirely new shape, was first described in a paper presented at the Printing Industries Symposium in London in 1977 by Mrs. Lillian G. Malt and later in a progress review and background paper which I presented at a meeting of the West Midlands Ergonomics Society in November 1980. This was published in *The Inventor* in January 1981. The concept was granted US Patent No. 4244659 on January 13, 1981. The patent also discloses the idea of a single-handed keyboard of similar design for data entry or for persons who are disabled.

While appreciating Professor Montgomery's development from the points

of view of reduced finger movement, simplicity, and cost, I feel that the continued use of a flat keyboard that requires the hands to be held close together is not a big enough step forward in the ergonomic understanding of operator needs. The work of H. Osanai (*Journal of Science of Labour*, July 1968, and *Ergonomics Abstracts*, July 1974, p. 227) and of D. Ferguson and Joan Duncan (*Ergonomics*, November 1974) shows very clearly that, apart from the letter layout, the present design imposes a surprising amount of physical stress on the operator. *Thus the cost of continuing to use the Sholes keyboard can no longer be estimated only in cash, but must include a measure of human suffering and occupational hazard.*

It is in response to this knowledge that the Maltron keyboard has been designed to fit the hands and to separate the keys into two distinct groups to minimize stress. The total width is certainly wider than Professor Montgomery's arrangement but no wider than the standard typewriter or VDU keyboard. Machine function keys can now be fitted in the central area and

around the thumbs, where they are much more accessible and require less hand movement.

Operator reaction to the new keyboard has been favorable as indicated in the August 1980 International Word Processing Report. "Very comfortable," "great fun," and "productivity can be increased by nearly 50%" are comments from this report, which also confirms that operators have no problems in switching between keyboards. It seems likely that this ability is similar to speaking another language or playing another musical instrument. It is closely associated with the different shape of the Maltron.

An essential difference about the Maltron keyboard is that in use the fingers rest lightly on the "home" row keys, with the thumbs resting on the letter E and Space keys. (The right thumb rests on Space, which comprises 17 percent of the keystrokes; the left thumb—normally not used—rests on E, the next most used key with 11 percent of the keystrokes.) The hands are held horizontally with the fingers bent so that the fingertips meet the keys almost vertically. This technique provides tactile feedback to the operator, so the position of the fingers is always accurately known, a concept that has been found particularly helpful by a blind computer consultant, whose report on the use of the keyboard comments that "the keyboard is a joy to use—comfortable, fast and giving a confidence and sureness of touch, which is only fully appreciated after some use."

This is the opposite approach to the technique needed by the touch keyboard, which gives no positional information to the operator.

Tactile information also plays an important part in the learning process, and tests at Basingstoke Technical College with commercial typing students show a 3-4:1 reduction in learning time. Engineers and businessmen confirm ease of learning and use. Recent results from a typesetting company indicate that a 10:1 reduction in error rate is also possible.

Along with Professor Montgomery we believe that the end of the keyboard is not nigh and that the need for fast, accurate input from keyboards will be with us for many years to come. We feel that the Maltron keyboard offers a significant step forward in matching at the man-machine interface, and we expect this to be sufficient to overcome—at last—the inertia of the past.

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Maltron keyboard for computer terminal with central number group and cursor control keys on right-hand letters, U up, K down, T left, H home, and O right. These are accessed in the shift and control condition, thus avoiding the need to move the hand to another group.