

| | | Operator 1 | | Operator 2 | |
|---------------------------|----------------|------------|----------|------------|----------|
| | | Keyboards | | | |
| Sequence | Letters | Mechanical | Electric | Mechanical | Electric |
| <i>Inward</i> lateral | asdf;lkj | 5.4 | 6.6 | 6.0 | 11.4 |
| | contra-lateral | a;slckfj | 5.5 | 6.4 | 7.0 |
| <i>Outward</i> lateral | fdsajkl; | 5.0 | 5.1 | 5.6 | 10.6 |
| | contra-lateral | fjdksla; | 4.8 | 4.4 | 7.7 |

Table 4

Ten second keying on four-fingered inward lateral, outward lateral and contra-lateral sequences.

Average kps rate for two experienced operators, each operator on both mechanical and electric keyboards.

These lateral sequences are all keyed faster than the contra-laterals. Even Operator 1 who had never used an electric machine before was able to achieve higher speeds on contra-laterals.

The fact that lateral keying is faster is important in considerations for letter layout. If letter layout provides for high use of lateral keying, speed and accuracy will be increased.

Table 5 gives detailed results for 20 operators in four groups of five. Two groups keyed on electric and two groups on mechanical. Two groups were experienced operators, one group had been in training for six weeks at a technical college, and one group had had no keying experience of any kind.

These figures confirm results already given in Tables 1-4 and provide much useful information for determining optimum letter layout. They also raise some as yet unanswered questions.

5 New design for keyboards

If we accept that the constraints of forcing fingers of unequal lengths to key on a horizontal plane reduce speed, cause errors and human suffering, then it seems logical to think that key heights should fit the length of the fingers. This would provide for greatest ease and speed of finger movements. To support this suggestion, Ferguson and Duncan report that there is neither extension nor flexion of middle fingers. As the middle fingers are the longest, they are naturally less distorted in their keying positions, and not surprisingly the Tables above show that these are the fingers which are the fastest on contra-lateral keying. If key heights are varied to fit the lengths of fingers, it is possible that extensions and flexions could be avoided for all the fingers. Key heights may also be varied to fit stretch positions for the index and little fingers which key six keys on two vertical rows. If the key-tops on the outside rows are tilted to meet the fingers the stretches would be reduced.

These suggestions have now been given physical shape in the PCD-Maltron keyboard shown in figure 1.

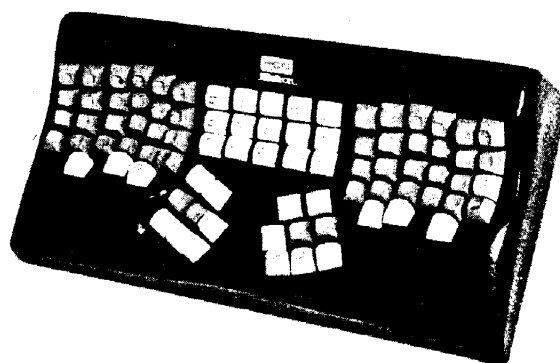


Fig 1
PCD-Maltron keyboard with Maltron Mark II letter layout and control keys for print production

There are many advantages to this shaped-to-the-finger keyboard design which is also separated in the centre to eliminate wrist, arm and shoulder deviations and to provide space for up to eight keys for each thumb. Adjusting key height and slope to fit fingers rather than forcing fingers to stretch to keys, has the potential of providing considerable speed increase, even if only by raising the speed of all lateral keying. Through reduction of fatigue, higher speeds will be maintained for longer periods.

Training will become easier and higher keying levels will be attained by more aspirant operators, just because fingers are relieved of keyboard constraints. Because key heights vary for each finger, the kinesthetic sense of reach and distance which is essential for high speed touch keying will be learned with greater ease as fingers will readily sense they are not resting on their own keys. There will be no possibility of two fingered operation because of the fit of the keys to the fingers. In addition to fingers sensing their own keys, uneven and difficult stretches are eliminated and the combined effect makes it easier to be accurate.

Both left and right thumbs may now be used quite extensively. These two digits are the strongest and most flexible of all and have the back-up of a considerably larger section of the brain than other digits. Nine times the brain size in fact.