

Telephone-Linked Communication Aids for the Deaf-Blind

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People with no useful vision or hearing have tremendous communication problems; the main methods for communicating are tactile such as embossed on paper (eg braille and moon), vibrotactile displays (eg morse-type vibrators), and direct from another person (eg manual alphabet, or block letters traced on the hand).

The unmet needs most frequently mentioned are those expressed by braille readers; this might be because this group are more articulate and more aware of the potential offered by modern technology. The problems of the deaf-blind who do not read braille are even greater. Moon has the advantage of being easy to learn to read even for those with a poor sense of touch; however its major disadvantages are the lack of any available device for writing moon, and the limited material printed in the system.

Because of the modular nature of many microprocessor-based systems, it is frequently possible to substitute a vibrotactile display for a braille display, or to employ a large visual display for those with some useful residual sight. The term "vibrotactile displays" includes simple devices such as a pin tapping a morse-type code, as well as more complex two dimensional displays such as is used in the Optacon reading aid.

Telephone-linked systems

The first telephoned-linked systems for the deaf were very similar to telex except that they worked over ordinary telephone lines; each terminal consisted of a typewriter-style keyboard and a printer (Fig 1). If one user types a message on his keyboard, it will simultaneously appear on the printer at the other end. Since the two machines are connected by telephone, they can be at

any distance from each other - a few miles or a few hundred miles (the latter would increase the telephone call charge).

It is possible to use braille terminals so that a deaf-blind person can communicate to a sighted person or another braille reader (a). The braille code used is such that each key corresponds to a braille cell; the letters are the same as grade 1 braille but the numbers are single cell signs.

Even a simple system as this is not cheap. The least expensive braille page embosser (a device which automatically embosses braille on a sheet of paper) with a keyboard costs £3315, a print terminal costs about £1500, and each terminal requires a modem (a device permitting the embosser or printer to be connected to a telephone line) costing about £400. This system operates in the same manner as the system for the deaf; the characters typed on the keyboard appear in braille at the other end. In addition there are running costs which include maintenance, telephone charges, and paper for the terminals. Maintenance charges are typically 10% of the capital cost per annum. An additional adaptation will be required for alerting the deaf-blind person to the telephone ringing; this is similar to the deaf-blind doorbell system.

The price of the braille equipment can be slightly reduced by substituting a device which embosses braille on paper tape (Fig 2) for the embosser which produces braille on conventional pages. But set against the small cost advantage, the deaf-blind user has the problem of handling long lengths of paper tape.

Transitory displays

It is not essential for the braille to be embossed on paper - it can be displayed in the form of raised pins. The simplest terminal has just one cell of six dots; this can be difficult to read if the person at the other end does not type at an even speed. A better, but more expensive, terminal would have a line of braille cells. With both systems it is not possible to go back and re-read the message.

A more sophisticated system would use a paperless braille device (b); this would provide the deaf-blind person with the ability to store messages. The material could be prepared or read without the device being connected to the telephone, and the information could be sent at high speed (typically 120 braille cells per second) to minimise telephone charges. The obvious disadvantage of such a system is cost - typically each terminal will cost £5000 for a paperless braille device with interface and modem. Also the more sophisticated the system, the fewer elderly deaf-blind people will be able to learn to use it competently.

BITS

A different approach is that adopted by the National Deaf-Blind Helpers' League in Peterborough who have installed a BITS (Braille and Ink-print Text-processing System). This system enables a sighted typist with no knowledge of braille to produce documents in both ink-print and contracted braille from a single typing operation. The system consists of a microcomputer, a printer and a braille embosser (Fig 3). The computer programs give the typist full word-processing facilities including insertion and deletion of text, automatic search for words or phrases, and printing self-adhesive address labels. This system can be used for transcribing print into contracted braille for the deaf-blind; multiple copies can be produced quickly since the embosser operates at 120 braille cells per second.

There are numerous possible extensions to this system. Firstly a second braille embosser could be installed at another centre for the deaf-blind, and connected by telephone to the existing BITS in Peterborough.

BITS can send the information to a paperless braille device instead of a braille page embosser. This can be done by plugging the paperless braille device, such as a Digicassette or VersaBraille, directly into the BITS computer. Alternatively the two machines can be at different locations, and connected via telephone using modems.

