

## Technological Aids for the Visually Handicapped

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There are over 120,000 registered blind in Britain, but various estimates suggest that there are about another 80,000 whose vision is such that they could be registered. The registered blind population is largely one afflicted with seriously defective vision rather than blindness in the full sense of the term.

The totally blind have severe problems with mobility particularly in unknown environments. The traditional aids are the guide dog and the long cane, which have about 3000 and 10,000 users in the UK. One of the problems with the long cane is that it does not provide information about obstacles at head height eg overhanging branches. A number of electronic aids have been developed to provide extra information to the blind pedestrian but none are in widespread use in the UK.

Aids for access to written information have either audio or tactual output for those with no useful vision. Probably the most useful technical aid is the cassette tape recorder. The main disadvantages are the user's inability to vary the speed, and the lack of a good indexing system. The variable speed problem will be partially solved with the increasing availability of inexpensive 'compressed speech' modules. These devices correct the pitch changes which result from increasing the speed. The indexing problem is not so easily solved. What is required is an inexpensive system so that the blind user can input a number or keyword, and the machine will then automatically find the information; such systems exist but they are prohibitively expensive.

A variety of devices with speech output are now commercially available. The speech can be spelled, compiled or synthetic. Spelled speech is when the output is character by character; the advantage is the very low cost but the quality is unacceptably low for any application involving prolonged listening. With compiled speech the machine has a limited vocabulary of whole words, and then spells out words not in the vocabulary. A vocabulary of 8000 words and their plurals copes with over 90% of most texts. Synthetic speech is where the machine approximates a human speaker. A reading machine with optical character recognition and synthetic speech output costs in the region of £19,000; costed over five years, it would be cheaper to employ a

sighted reader. However the cost of such machines should decrease significantly over the next few years.

The best known communication medium for the blind is braille where dots are embossed on paper or plastic. Braille utilises a six dot cell giving sixty-four possible combinations. One of the disadvantages of braille is the considerable bulk which is typically twenty times that of the print version. To reduce this bulk, a number of contractions and abbreviations are used which result in 25% saving in space. There is an acute shortage of people skilled in transcribing text to contracted braille. Therefore a number of computer-based systems have been developed to translate text to contracted braille. Such systems mean that a typist with no knowledge of braille can produce documents in both ink-print and contracted braille from a single typing operation (Fig. 1).

A recent development is that information can be directly input from the British Telecom Prestel viewdata system. This is particularly important for those who are both deaf and blind since they do not have ready access the news and weather forecast.

Braille has not been superceded by other forms of non-visual media despite numerous predictions to the contrary; braille is still supreme in its use for reference and technical material. A number of systems have been developed for storing braille digitally on cassette or floppy disc. The braille is output on a transitory display such as an array of pins which can be raised to represent the braille characters.

A number of devices have been developed for converting printed characters to some form of tactual output. Most of these devices do not recognise the characters but present some form of tactual display which has to be recognised by the human reader. The most widely used device is the Optacon which gives a ten-times enlarged tactual image of the letter being scanned. The advantage of this device is that it can be used on any printed or typewritten material. The disadvantages are the considerable training and practice required to reach speeds of 50 words per minute, and the cost of about £2000.

As mentioned earlier most of the registered blind have residual vision, but it is only very recently that modern technology has been used to produce reading material for this group. One development has been the application of laser printers for the fast production of large or 'clear' print. A laser printer is capable, with special computer programs, to produce good quality

print of any size at speeds up to four pages per second. These printers are very expensive so it is only economically viable to use an existing printer which has spare capacity. This work was pioneered by Lloyds Bank since they had a need to produce large print statements of account for their visually handicapped customers.

It must be emphasised that the majority of useful aids are simple and inexpensive. These include simple plastic templates to assist the visually handicapped in hand-writing addresses on envelopes. Another simple device is one to re-locate objects in the house or garden. The device emits a bleep when triggered by a hand-clap within a 7 metre radius. The usual applications include re-locating a lawnmower or deckchair. One unusual application was a blind man who had difficulty in finding his wife who was both deaf and blind; his wife now wears the device and he claps his hands when he wants to find her.

The problems with aids for for the visually handicapped are less with the development of new aids than with the conversion of existing prototypes to reliable aids at a reasonable price.

### Figures

Figure 1 Braille and Ink-print Text-processing System (courtesy RB Aids for the Blind)