

## MOBILITY MAPS FOR THE BLIND

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If you were blind and had to find your own way round a strange town, you would have two major problems. Firstly the problem of walking along pavements and crossing roads without getting seriously injured, and secondly the problem that you have no knowledge of the layout or names of the streets. If a blind person has some form of mental picture of the street layout he can then add pieces of information to this basic picture. For instance it is possible for a blind person to go to two neighbouring shops by different routes and not to realise that the shops are next door to each other. The problem becomes more serious with children who are born blind since they often have great difficulty in understanding the layout of roads and road junctions; for instance it was recently found that a considerable number of blind teenagers did not realise the purpose or shape of a roundabout. An embossed map can sometimes be useful in these situations.

In making an embossed map the first problem is to choose suitable landmarks for a blind pedestrian. This is not easy since a guidedog is trained to avoid obstacles such as pillar boxes. Noises and smells can sometimes be used but there can be difficulties when a fountain is turned off.

The information, to be included on the map, has to be embossed in a way that is both clear and unambiguous. The sense of touch is relatively poor compared with sight, so much less can be marked on an embossed map than on a visual one. Contrary to popular belief, blind people do not have a better sense of touch than their sighted counter-parts. The blind often have difficulty understanding visual symbols such as the compass rose, on an embossed map the north edge is usually marked by a row of dots.

The map designer can use change in elevation to convey extra information. For instance a line, saw-tooth in cross-section, can be used to indicate direction since it will feel smooth in one direction and rough in the other (Figure 1). This type of line is sometimes used to indicate a road going uphill which can be a useful cue to a blind person.

A road can be represented by either one or two lines (Figure 2). Blind children often think of a road as two pavements so they find a map with two lines for a road is easier to understand. However less space is taken up by a single line road which leaves more room for other information to be included on the map.

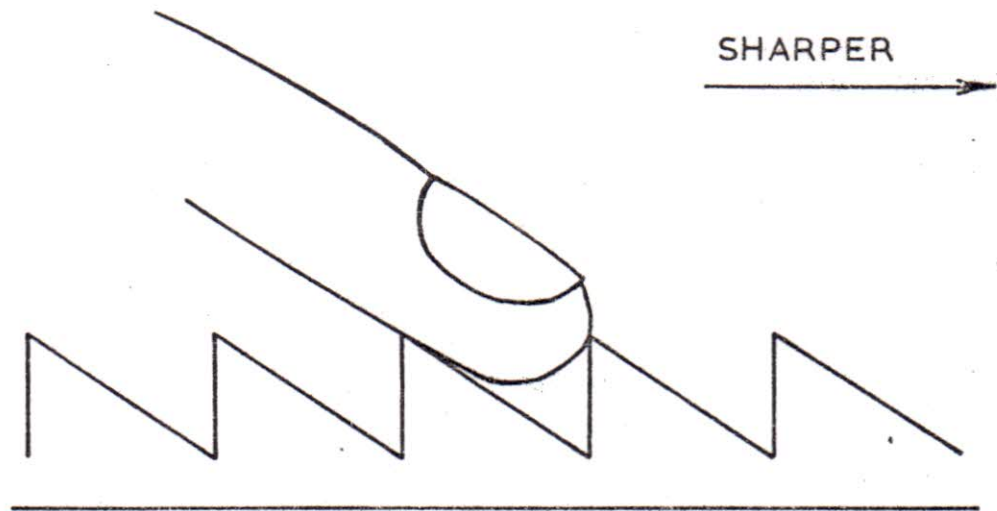
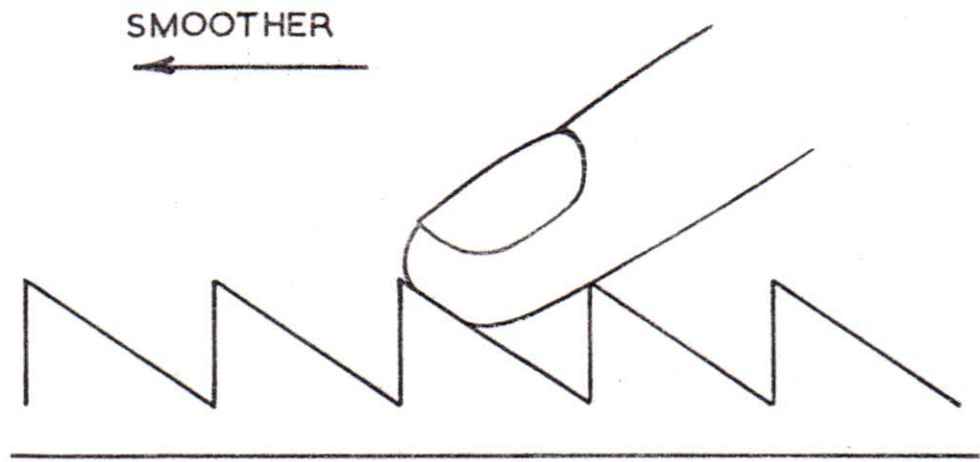


FIG. 1.

A directional line.

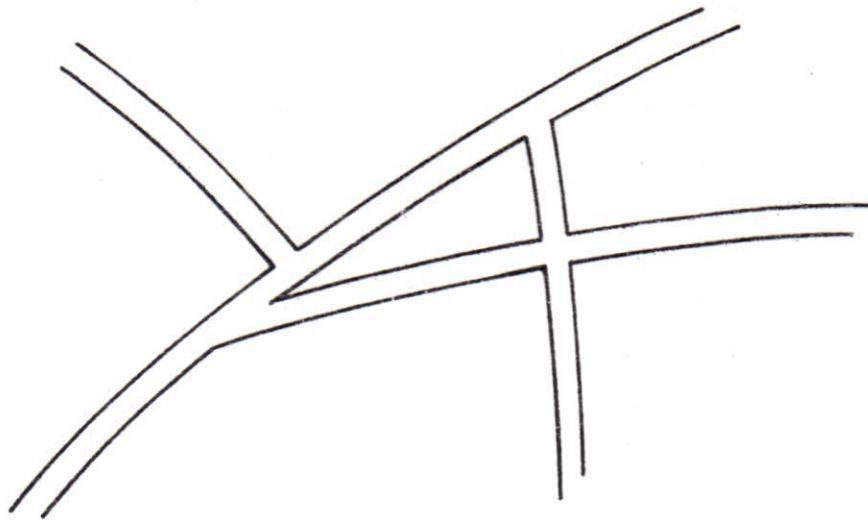
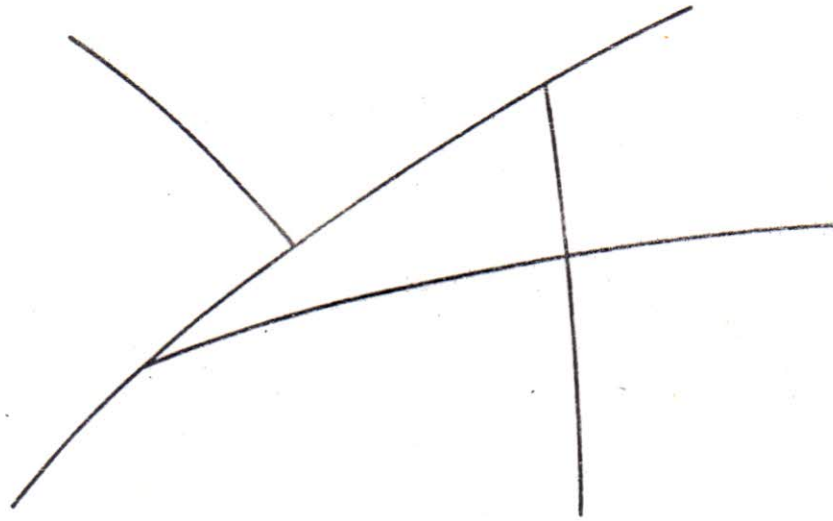


FIG. 2.  
Single and double line representations for a road.

Embossed maps are often made by sighted volunteers, for local blind people, by building them from string, sandpaper and fabrics. Plastic copies are made by vacuum-forming which involves heating a sheet of plastic and then sucking it down to conform to the shape of the mold. This method is inexpensive on materials but tends to be very time-consuming.

Most blind people have never used an embossed map. Someone who was born blind has to be taught how a map can be a scaled and coded representation of the environment. It is also necessary to teach a blind child to scan a map in a systematic manner in order to build up some form of mental picture of the area. This is similar to the problem of a sighted person reading a large wall map but only being allowed to look at one square inch at a time.

Braille is an embossed system for representing letters and numbers by the use of from one to six raised dots. Braille takes up a considerable amount of space so special methods have been developed for avoiding braille on a map. One method involves using an overlay which is a separate sheet of braille positioned over the map so that the blind person can read the map with one hand and the overlay with the other.

To make a clear map by any manual method is very time-consuming and therefore expensive if one takes into account the cost of labour. With these methods it is very difficult to change the scale of the map. This is the type of situation where computers can be of use to increase speed and quality, and to reduce costs. Such a system has been developed at Warwick University.

A large scale map is marked up with the extra information which will be useful to a blind person. This information may include gradients, bus stops, names of shops and likely destinations.

The operator goes selectively round this map with a pen which is connected to the computer (Figure 3). The map is simultaneously displayed on the screen of the visual display unit. The operator can now modify the map by inserting or deleting individual lines, moving end points of lines and changing the scale.

The ability to change the scale is important since a map is usually an aid to the organisation of information as well as a scaled-down form of representation. It is often desirable to enlarge an area around a road junction; the blind often measure distance by the time it takes to walk, so a moderate enlargement of a road junction does not create any serious difficulties in interpretation.

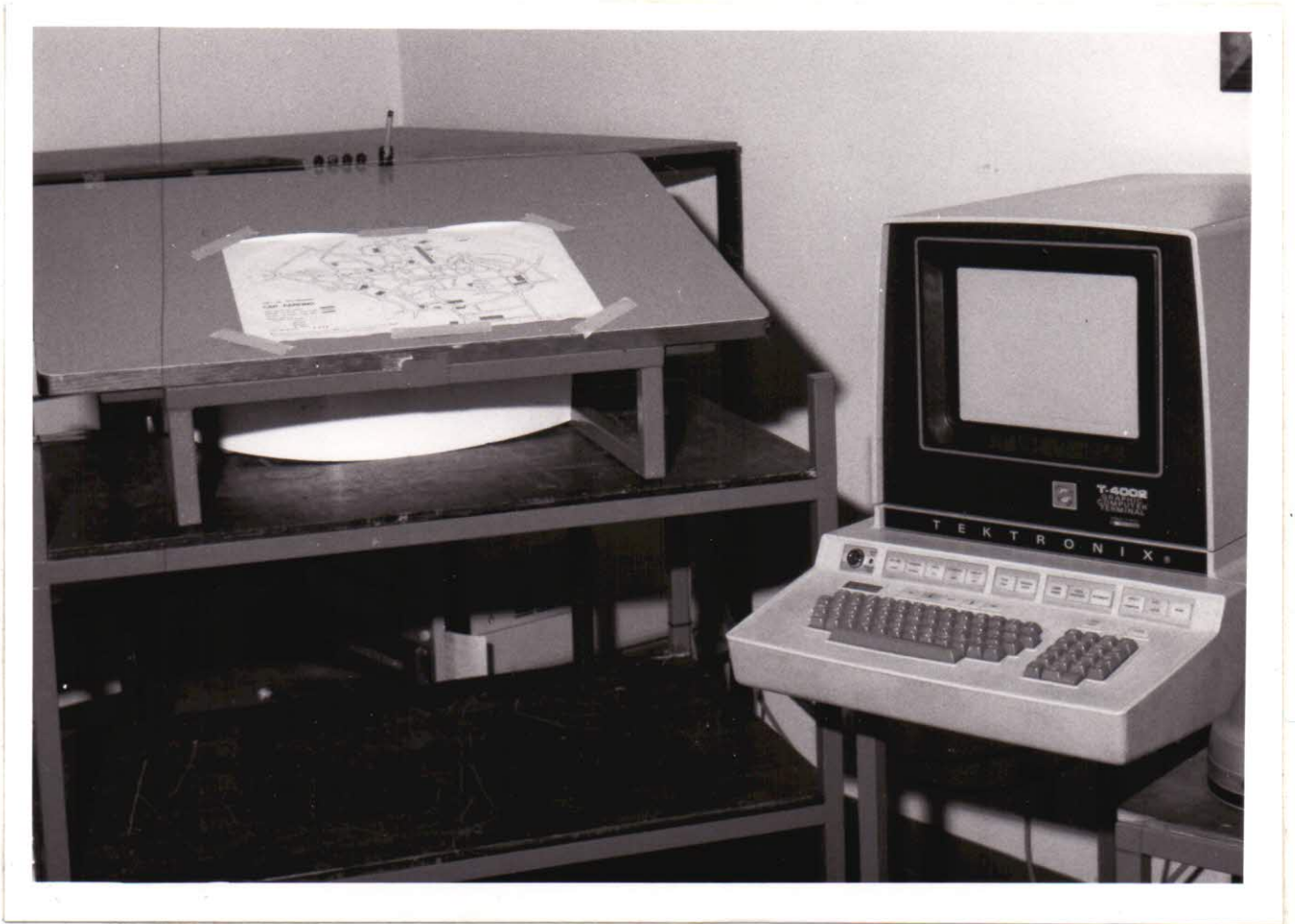


FIGURE 3. Co-ordinate table and visual display unit.

