THE N.S.W. TACTUAL AND BOLD PRINT
MAPPING COMMITTEE

A GUIDE FOR THE PRODUCTION OF TACTUAL AND BOLD PRINT MAPS

3rd Edition

CONTENTS

FOREWORD

The New South Wales Tactual and Bold Print Mapping Committee (TABMAP) is a group of volunteer producers and consumers who design and test a wide range of tactual and large-print graphic material, most of which is based upon requests from clients. Copies of this material are supplied by VISION AUSTRLIA (VA) upon demand. In addition to tactual design TABMAP also:

- Explores new methods of production (both materials and equipment);

- Promotes public awareness of, and support for, the supply of graphics in alternative formats;

- Provides advice on tactual design and production.

Over the years the membership of TABMAP has included individual producers and users, and representatives from a number of organisations with an interest in the supply of graphics for people who are blind or vision impaired.

Queries relating to any aspect of this Guide or requests for assistance may be directed to TABMAP at the following address:

C/o VISION AUSTRALIA
4 Mitchell Street, Enfield
N.S.W. 2136,
Australia.
Phone: (02) 9334 3333
Fax: (02) 9334 3500

"It is what it feels like that counts"
(Anonymous)

1. INTRODUCTION

Background

TABMAP has been supplying tactual graphics to people who are blind or vision impaired for nearly 30 years. Maps constitute the majority of tactual requests (and probably the most difficult to prepare), but TABMAP has also provided a wide range of other drawings including diagrams for textbooks, Christmas, condolence and greeting cards, family trees, illustrations for children's books, diaries, crossword puzzles, and embroidery patterns.

Although the Guide is mainly devoted to maps, most of the contents apply to other types of graphics. The guide offers a few basic rules that will apply to most tactual graphics but the actual drawing should be considered as something of an art and unusual problems need new and imaginative solutions. Remember too that clients' abilities vary considerably. This text will provide some understanding of what makes a tactual map clear and tactually readable.

While this Guide was originally developed when maps were hand drawn, computers are now the most common form of production. The methods described here may be applied by computers or used with pen-and-ink drawings. There is a special section for those who have no prior drawing experience.

Types of Map

This manual has been prepared to aid in the production of maps and diagrams for blind and partially sighted users. There is a wide range of mapping needs, from mobility maps (which help people find their way around), to maps that assist with education, work, daily living and many others.

Firstly, an original print map is scanned into the computer or traced by hand to form the basis of the map to be drawn. For many mobility maps no suitable original is available. In these cases a sketch of the area involved must be made with the requested features marked and labeled.

The partially sighted user requires a simplified map with larger lettering and thicker line work than is usual. These are called **BOLD PRINT** maps. Users' abilities vary over a wide range, from those who can read the maps directly to those who have to use high power magnifiers. Map readers with very limited or no vision can view only a very small area of the map at one time, and may find it difficult to relate widely separated points on a map to one another. It is as if a sighted person had to read a map bit by bit through a 1 cm. hole in an opaque sheet.

The blind user requires a simplified map that can be read by touch alone. These are called **TACTUAL MAPS** and the labelling on them is usually in braille. Those blind people who are unable to read braille require tactual maps labelled with normal print which is large enough to be read by touch. This lettering must be at least 48 point (12 mm high), so the amount of information that can be printed onto these **NO-BRAILLE TACTUAL** maps is severely limited.

If a given map is required in both bold print and tactual forms, time can be saved by drawing a **BASE MAP**, which contains the line-work, symbols and patterns only. Two separate versions are then produced with print and braille lettering.

A labelled base map becomes the **MASTER** copy for each type, and is kept to provide copies for clients. Maps in this form are very simple to store (either in printed form or as electronic files) and can be modified directly or by starting again with the base map.

By whatever method a map is drawn it should be easy for a person with normal sight to distinguish its main features from a distance of 2-3 metres. If this is not possible the map is almost certainly too small or overcrowded.

Copying Maps

It is essential that the master copy of a map can be copied easily into the form required by the client. Bold print maps are produced as simple black-on-white drawings on standard paper and a normal office copier can be used to supply any number of copies.

The best way of producing tactual maps depends upon the number of copies required. Many maps are drawn to suit individual clients and only one copy of each is produced. Other maps may require multiple copies but not usually in very large numbers. In these circumstances the most effective way of producing tactual maps is by using SWELL or CAPSULE PAPER, and it is this technique that underlies most of the methods described here. Other methods of producing good tactual maps exist including thermoform, collage diagrams, screenprinting of puff inks, and embossing from specialised machines such as the TIGER embosser from VIEWPLUS Technologies.

Swell Paper
(Also known as Capsule, Microcapsule, Puffpaper,etc)

Swell paper is usually available in A4, B4, A3 and braille size sheets. The paper is coated on one side with plastic which contains many tiny bubbles (or capsules) of alcohol. When heated, the plastic softens and the alcohol evaporates, thus forcing up the surface. If the swell paper has a drawing on it and is exposed to radiant heat in a FUSER the black dots and lines absorb more heat than the lighter background, causing them to swell up. Upon cooling the raised plastic hardens and the drawing has been converted from a black image to a tactual surface.

With use, the black image may wear off the paper or smudge onto the previous page, but the raised areas are retained so the tactual qualities are unaffected. Spraying the completed tactual map with two or three coats of varnish or lacquer (hair spray) reduces the tendency for the toner to wear off. This is always useful, but is very important for drawings that will be used frequently such as the illustrations in a child's book.

Drawings can be made directly onto the swell paper itself provided the ink contains sufficient carbon for heat to be absorbed. A copier's toner is ideal for the fusing process and for this and other reasons it is much better to prepare the drawing and then copy it onto the swell paper. Some copiers cannot handle swell paper due to its weight and

stiffness, and machines with a direct manual feed should be used. Also, even if the temperature within a copier is kept to a minimum it may still be sufficient to give the background of the swell paper a slightly "wrinkled" feel.

A further consideration is the variation in quality of swell paper from different manufacturers, and over time. The paper may vary in thickness or stiffness (which affects the copier feed) or in the consistency and sensitivity of the swelling surface. The latter affects the range of line thicknesses which can be used and how close together they can be drawn. Thus a crowded area may swell up excessively ("overcooked" with patches of "cauliflower" texture) before the thinner lines are perceptible. This also means that drawings prepared for more sensitive paper may no longer be fused successfully.

Fusers

Once the drawing is copied onto the swell paper, it can be heated in a FUSER - a source of high-temperature radiant heat. The correct exposure time must be found by trial and error. It is best to start with a short exposure because an 'undercooked' sheet can safely be run through the fuser again and again with gradually increasing times until a satisfactory result is obtained. A crowded drawing requires less heat than a sparse one, and as a succession of sheets is processed the fuser warms up and the time has to be gradually reduced. After fusing, each sheet should be examined to ensure that the faintest marks can be detected by touch, and that no black areas have been overcooked.
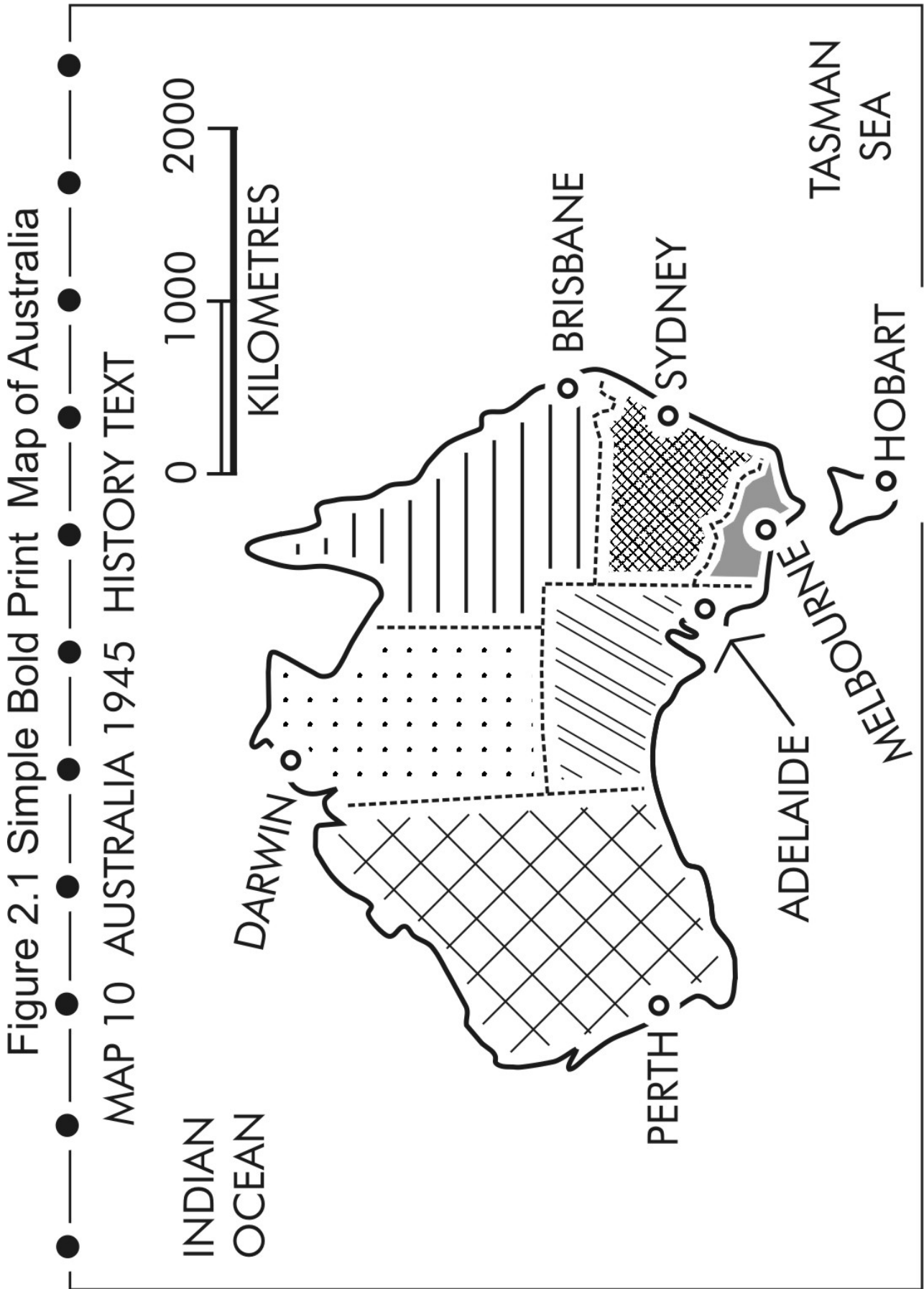
The most easily obtainable fuser in Australia is the PIAF (Pictures In A Flash) which can be obtained from Quantum Electronics. The PIAF is simple to operate and works well. TABMAP can supply details of the simple modifications required to enable it to produce effective tactual graphics on A3 or braille size sheets.

Multiple Copies of Tactual Maps

When a large number of tactual copies are required the high cost of swell paper becomes an important consideration. An alternative method of production involves converting the master drawing into a SILK SCREEN, and printing copies onto plain paper using FOAM or PUFF INK. These inks dry into a material with properties similar to the surface of swell paper and when fused, the individual dots and lines swell up to form the tactual surface. It is possible to set up a small-scale screenprinting and fusing production system. Alternatively the whole process can be contracted out to a specialised printer who has knowledge of raised ink or embossing systems.

Tactual copies (of any material) need to be stored with some care due to bending (if on edge) or flattening (if piled on top of each other). The number to be produced at one time should be carefully considered as a storage problem may arise.

Figure 2.1 – Simple Bold Print Map of Australia

Figure 2.1 Simple Bold Print Map of Australia

MAP 10 AUSTRALIA 1945 HISTORY TEXT

INDIAN
OCEAN

KILOMETRES

0 1000 2000

DARWIN

PERTH

ADELAIDE

MELBOURNE

BRISBANE

SYDNEY

HOBART

TASMAN
SEA

2. BOLD PRINT MAPS

Specification and Procedures for Bold Print Maps.

A base map was used to produce the simple bold print map in Figure 2.1, which is used below as an example. Maps are usually drawn on A4 or A3 paper, or cut to braille size paper if necessary. A blank margin of at least 1 cm must be left round the edges because copiers do not work outside this limit and space must be left for binding. If commencing with a Base map, the requirements of the tactual version must also be considered. The top of the map is normally North and can be indicated by the dash-dot line shown. A map name (and number if required) is usually labeled just below the dash-dot line. If drawing to scale, a bar scale should be used because it remains correct even when the map is enlarged or reduced. If the map is too crowded, the scale may be put on the KEY SHEET (see Section 6 - Key Sheets).

Graphs and other diagrams can be treated generally in the same way as maps (see Section 7 - Examples).

When copied from the original, the map should be simplified by omitting all irrelevant detail, and generalizing coastlines, contours etc. One major feature should be drawn using lines 1 mm thick (like the coast in Figure 2.1). If more than one type of line has to be used it is important to ensure a good contrast in line width or pattern. Section 4 contains examples of these.

Symbols may be used for features which appear frequently, or to mark positions (as for the cities in Figure 2.1). If the symbol has to be recognised (as opposed to just being detected) a gap of at least 3mm should be left all round it (Figure 2.2), and a LEGEND must be provided to explain its meaning (see Section 6 - Key Sheets). The use of symbols is also discussed in Sections 3 - Tactual Maps, and 4 - Drawing Methods.

Patterns should be used to allow large areas to be identified and/or distinguished from other areas. Various hatching and shape patterns can be used or ruled lines and dots (see Section 4 - Drawing Methods). For clarity, patterns should be kept 3 mm clear of lettering and symbols, and of any boundaries which may be hard to identify (Figure 2.2). If a patterned area or other feature is too small it can sometimes be replaced by a symbol or an abbreviation (see Sections 3 - Tactual Maps, and 4 - Drawing Methods). The meaning of patterns should be made clear in the LEGEND.

The print should be of a very simple (sans serif) style such as Arial Bold or Univers Bold, and, where possible, 32 point (7.5 mm) upper- and lower-case letters should be used. If there is insufficient room the minimum size to be employed on maps is 18 point upper case only. Letter and word spacing should be set at NORMAL or EXPANDED but not condensed. In Figure 2.1 the lettering is 24 point Univers Bold.

Where possible, all lettering should be horizontal, although labels can be arrowed in or sloped if necessary (Figure 2.1). If sloping labels are used, try to maintain a consistent direction so the reader is not continually rotating the map. A gap of at least 3mm must be left around the print of complete labels. If space is limited names may be abbreviated or replaced by numbers (Sections 3 - Tactual Maps, and 4 - Drawing Methods). On maps having upper- and lower-case lettering, an abbreviation should start with the same upper-case letter as the complete word, all the rest being lower case.
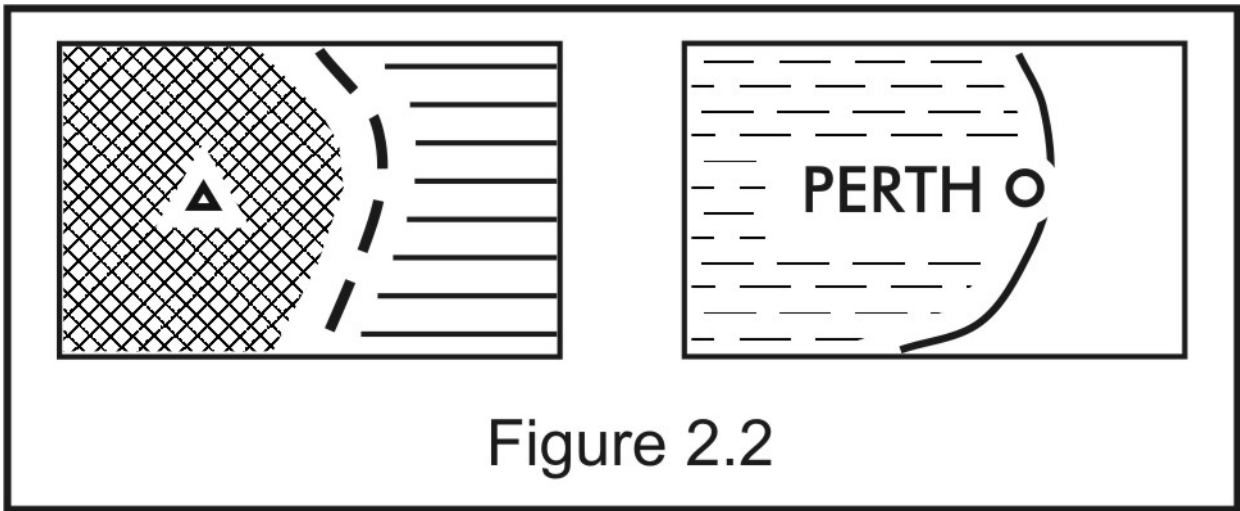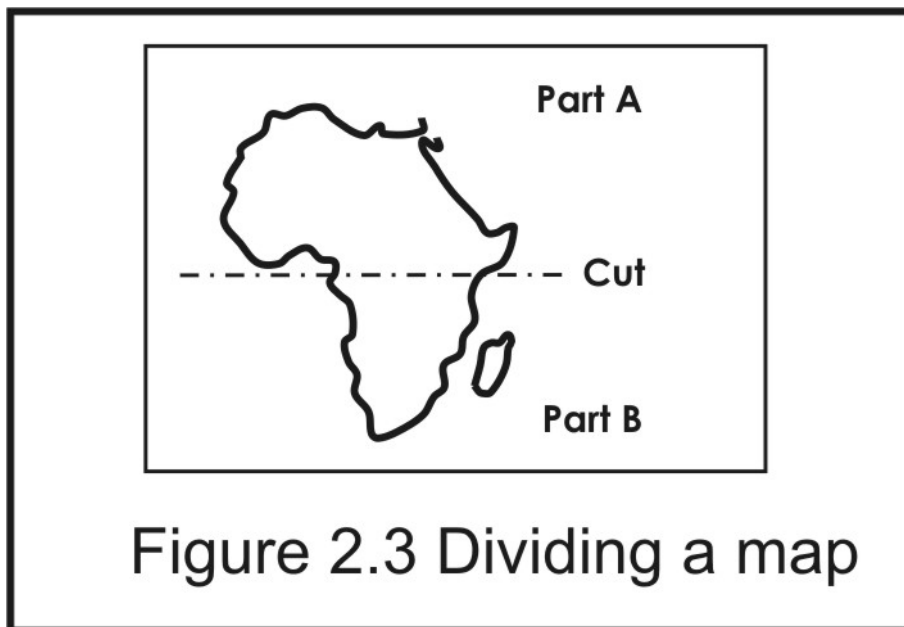
Figure 2.2

Figure 2.2

Figure 2.3

Figure 2.3 Dividing a map

If a map is very large it can be drawn on two or more sheets divided as in Figure 2.3. The cuts should not interfere with any important information and some overlap is usually an advantage (but should be noted in the KEY). The normal margin requirements must be met and it is sometimes useful to add notes along some edges such as "Joins Map 2". Include "Part A" or some other suitable indicator with the title to ensure that all parts of the drawing can be identified even when separated.

In many cases a **set** of maps has to be drawn, perhaps because:

(a) the map is so large that it has to be divided onto two or more sheets;

(b) the map is so crowded that some parts have to be enlarged (see Section 3 - Tactual Maps and Figure 7.3);

(c) two or more maps of the same area each show one different theme, e.g. separate sheets for climate, relief, towns and cities, and so on;

(d) the set includes the different floors of a multi-storey building;

(e) the drawings form the diagrams for a book.

In (a) a layout diagram may be required to show how the sections fit together (Figures 7.4 and 7.5). (b) may require the Key to explain which parts have been enlarged, or reference points should enable the enlarged sections to be located on the area map. In (c) and (d) the outlines should be the same size within each map of the set, and points of reference should be introduced so that one map can be related easily to another. In (d) it is essential that the transfer points between floors such as lifts, ramps, staircases, etc. should be identified on all maps. There may be special requirements in (e).

If the Legend cannot be fitted onto the map it should be included in the Key (Section 6).

Upon completion, mobility maps should always be field tested.

Figure 3.1

Figure 3.1 Simple Tactual Map of Australia

14
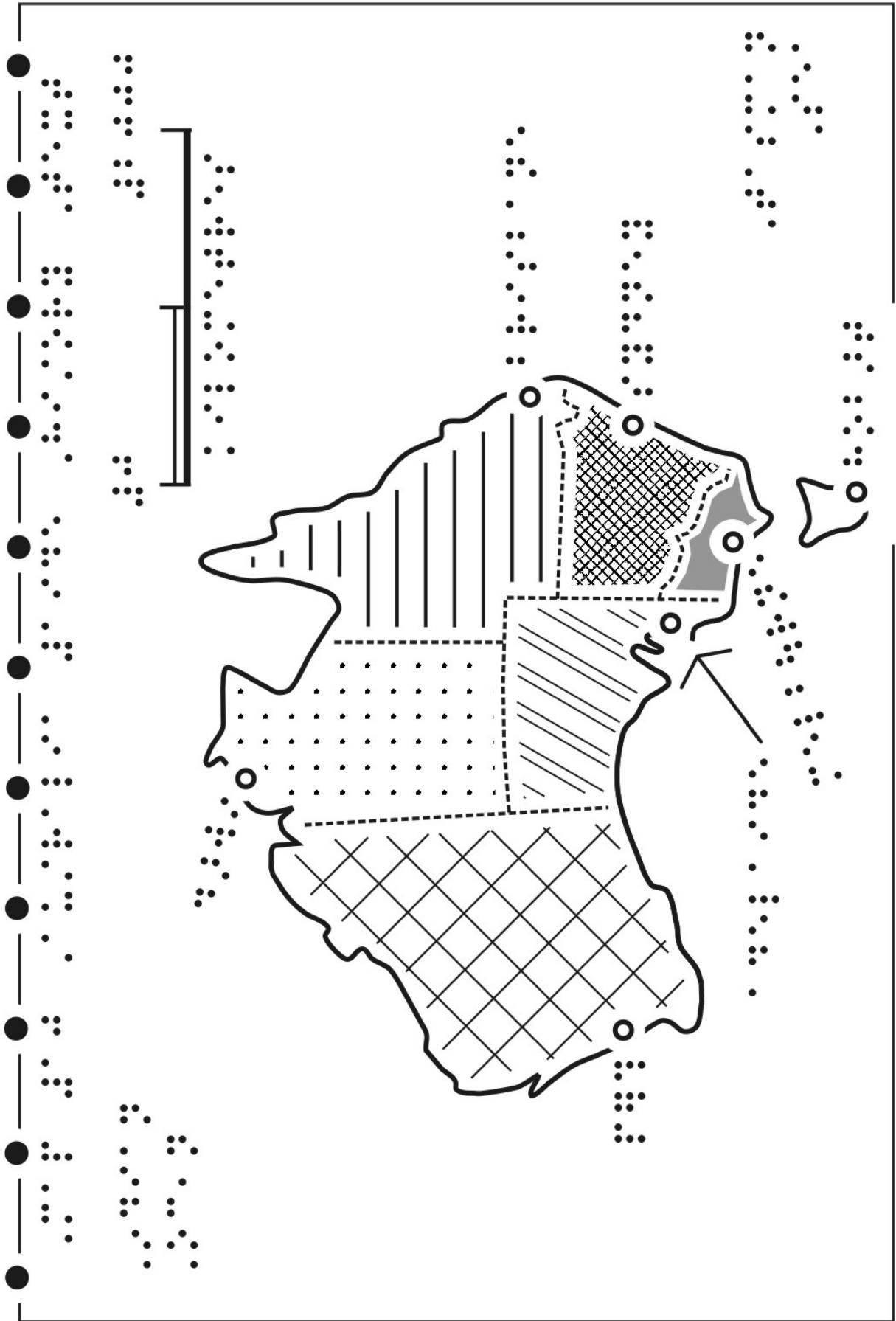
3. TACTUAL MAPS

General Considerations

Generally the drawing style should follow that described for bold print maps in Section 2 which should be studied first. However tactual maps are subject to more constraints, and these additional restrictions are introduced below. Great restraint must be used to ensure that tactual maps are not overcrowded. While the map may not be of much use if too little detail is included, too much will make it unreadable. **The clarity of the map outweighs all other considerations**. Sometimes there are reasons to make a map visually attractive as well as tactually readable. This is quite acceptable provided the modifications do not detract from the map's tactual qualities in any way.

The full-size tactual map of Figure 3.1 was derived from the same base map as Figure 2.1, and a swell paper copy is included at the end of the manual. A blank margin of at least 1 cm should be allowed all around, although on A3 and braille sheets the margin must be 2 cm along the long sides due to the width restrictions introduced by the fuser. The coastline and similar features should be simplified since items smaller than about 5 mm cannot be distinguished from their surroundings.

Headings must be kept within the same page limits and should be inside any border if possible. The TITLE (map number and name) should be kept reasonably short since braille takes up so much room. The top of the map should be indicated by the dash-dot line shown, and a bar scale should be used if required, not a statement of equivalence.

Braille labels should be placed horizontally, although names can be arrowed in or abbreviated and placed in a key. Braille labels should be sloped only if necessary and should maintain a consistent direction if possible so the reader is not constantly rotating the map. If reducing or enlarging tactual maps, always do so **before** adding braille labels so the braille remains in it's standard size. Arrows must be of the style described in Section 4.

It is important to field check mobility maps. Local maps frequently have errors and often omit features of importance to blind people generally or to a particular client.

The Design of Tactual Maps

- Map Size

The required size of a tactual map can sometimes be determined by enlarging (or reducing) the original until the smallest feature that has to be recognised occupies 0.5-1.0 square cm. This may be a coastal inlet, a building, the symbol for traffic lights or some other important item. Often this feature can be enlarged on its own to make the map clearer. Sometimes it is the degree of crowding of important features which requires a map to be made larger. In some cases the room required for the braille itself determines the size of the map, although this is more likely to occur with graphs and diagrams. On the other hand, provided the map can be read it should be as small as possible since this makes it easier to relate widely separated features to one another.

To avoid enlarging a complete map, it is often possible to use an overall map with only

major features shown (an OVERVIEW or AREA map), and then draw one or more enlargements of important crowded areas. For example a town map might show only the main roads, while the shopping centre is enlarged on a second map (see Figures 7.4 and 7.5)

- Braille labels

To assist with the application of the braille or for other reasons it may be found useful to make minor modifications or exaggerations to a map, e.g. enlarge some items, or move a river slightly to make room for the braille label. This is quite acceptable since clarity is far more important than absolute accuracy.

Braille is added easily on computer drawings using a braille font that is obtainable from Duxbury or downloaded from other sources via the Internet. If a computer is not available, braille can be produced as a series of black dots using dry-transfer ("rub-on") sheets. With very great care a suitable felt-tip pen can also be used but this is not recommended. Lettering should be in UEB and follow normal practice regarding the use of contractions, spacing, etc. It should only be applied by a competent braille writer (Section 9). The braille should be horizontal as a rule although in some instances sloping the label calls attention to, and helps locate, the item named. A space of at least 3 mm must surround all of the braille cells, including the empty dot positions (Figure 3.2).

Figure 3.2 - Braille labels

Figure 3.2
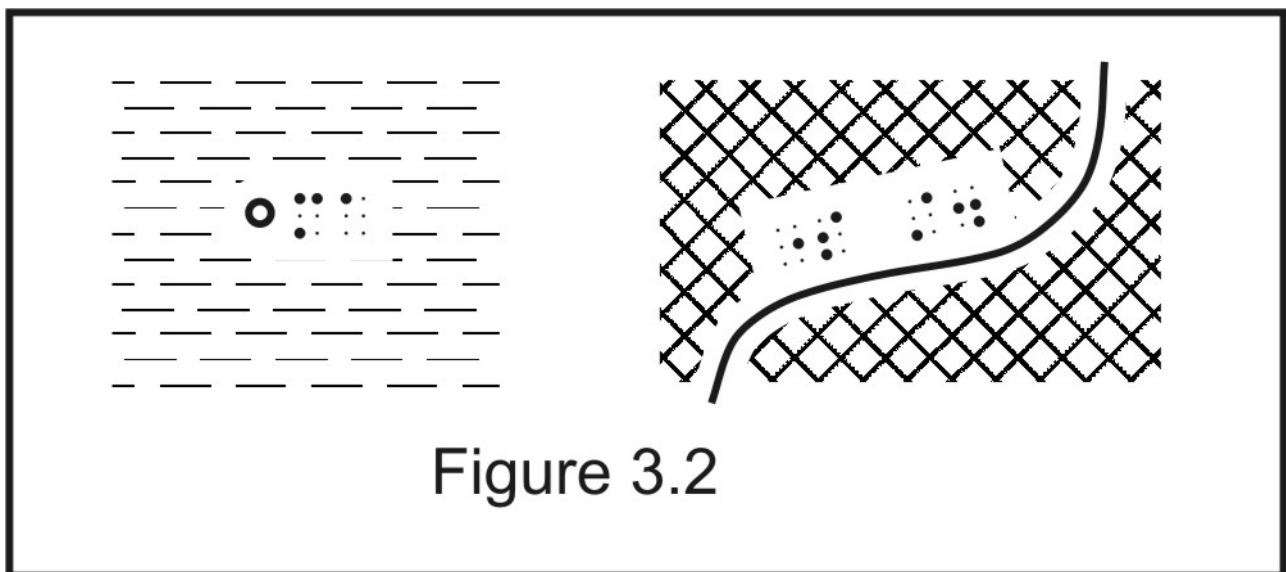
- Abbreviations

Where possible the full names of features should be used. Only where this makes the map unduly crowded should abbreviations or symbols be introduced. In simple cases the abbreviations can be listed elsewhere on the map, but otherwise this will be done in the Key. Carefully chosen abbreviations are better than identifying numbers or symbols. For instance, it is much easier to remember that "ma" stands for Malta, rather than having to look up a number in a list. Symbols should be used only as a last resort except where a

particular item occurs frequently in a given set of maps (e.g. telephones or escalators in a railway station). Symbols have to be learned (not a trivial task) whereas braille can be read immediately (see also Section 4).

Abbreviations should avoid introducing unwanted contractions - only contractions that form part of the full word should be used. The letter sign (grade 1 sign) is omitted since it does not assist identification. Thus "ma" conveys far more information than "lettersign m". Similarly capital signs are used only when there is plenty of room, to make some items stand out. A set of names (eg. towns) should never be part capitalized and part not. Letter and capital signs are only essential in diagrams where it is necessary to distinguish between upper- and lower-case letters. For abbreviations (or for any other purpose) single cells should never be used on their own, two cells being the minimum, and three preferable.

4. DRAWING METHODS

Linework

In tactual maps one major extended feature (e.g. road, coast) should use a 1.0 mm line: if lines wider than 1.5 mm are required they should not be solid because they tend to overcook. However a 2 mm or wider line can be obtained using two or more parallel lines of perhaps 0.7 mm. It is difficult to use lines less than 0.4 mm because the copying and fusing processes tend to widen them and they may not swell reliably. Thin lines of this type have their main use in constructing patterns where they swell up primarily because they are close together.

It is important that contrasting lines should be used for different purposes. If this contrast is obtained by varying the line thickness, a ratio of at least 2:1 is necessary (Figure 4.1). To be identifiable tactually, the gaps in broken lines must be at least 3 mm wide but they can be smaller if the broken line is contrasting with a full line. Figure 4.2 contains some examples of contrasting lines and possible uses.
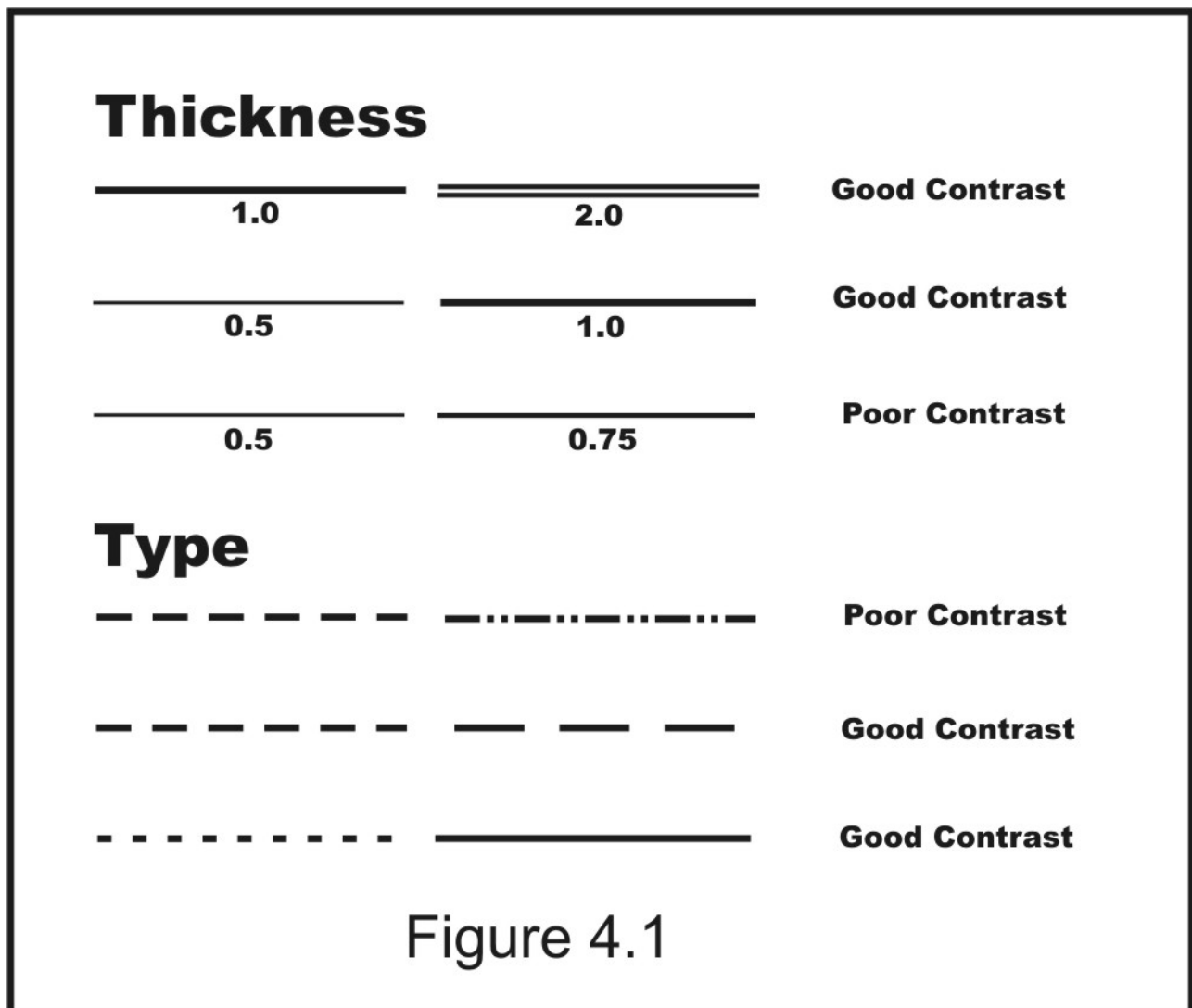
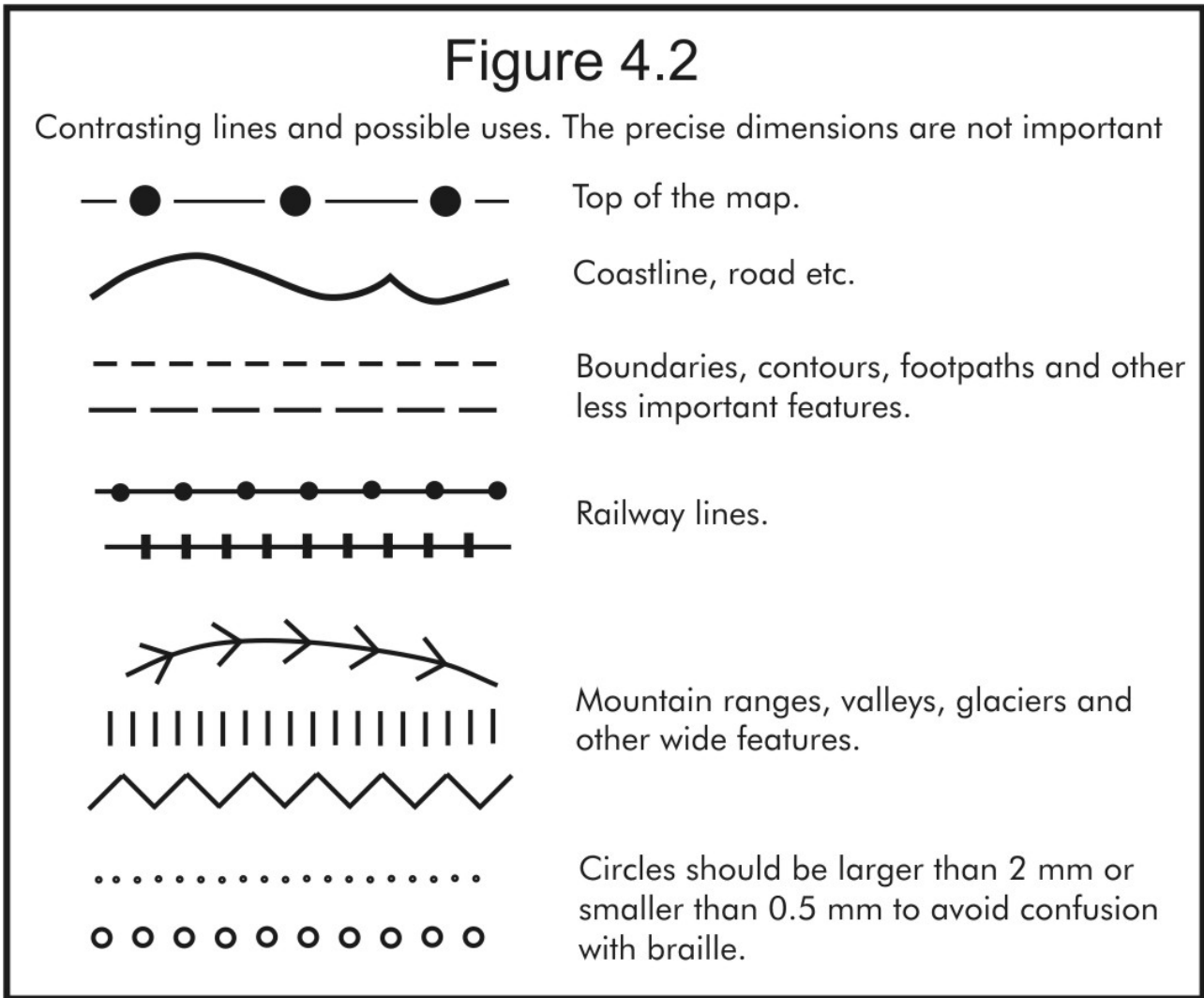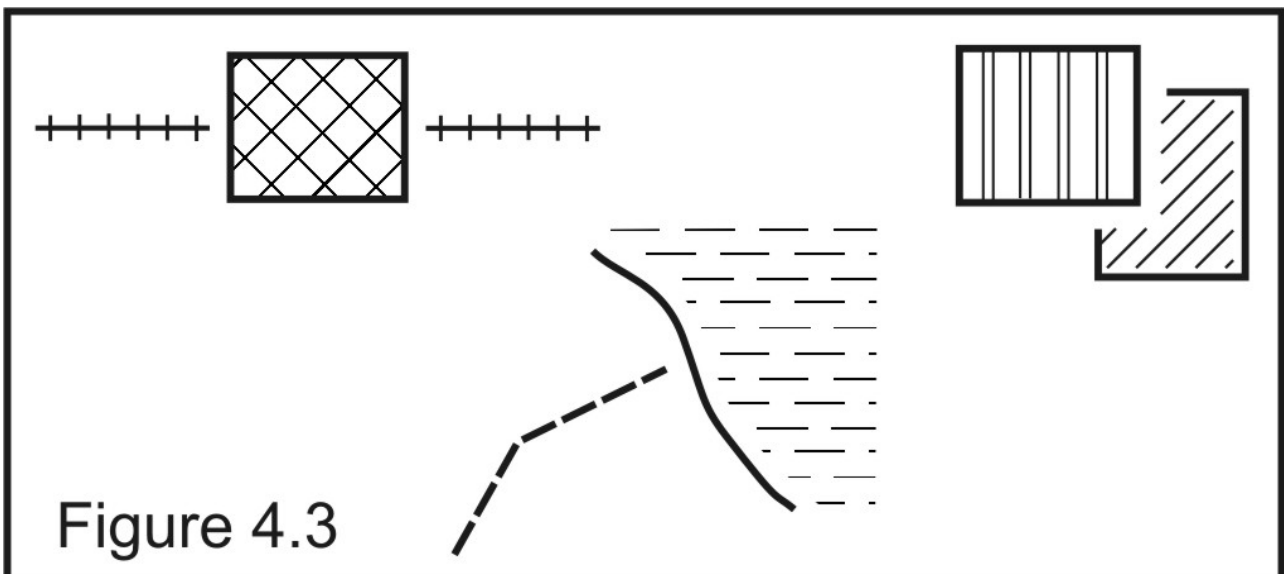## Figure 4.1 - Line types

Figure 4.1

Figure 4.2

Figure 4.2

Contrasting lines and possible uses. The precise dimensions are not important

— ● — ● — ● —　Top of the map.

Coastline, road etc.

Boundaries, contours, footpaths and other less important features.

Railway lines.

Mountain ranges, valleys, glaciers and other wide features.

Circles should be larger than 2 mm or smaller than 0.5 mm to avoid confusion with braille.

Figure 4.3 - Line gaps

Figure 4.3

Whenever dots are used in lines or patterns they should be larger than 2 mm or smaller than 0.7 mm to avoid confusion with braille. The dot spacing should also be chosen with this in mind.

Where lines representing different features meet (railway lines and stations, roads and political boundaries, separate buildings etc.) the lines should not join, leaving a 2-3 mm gap. This is particularly important if the lines are of similar types (Figure 4.3).

Patterns

Patterns are used to distinguish areas of different significance, i.e. land and sea, historical regions, parts of a plant, etc. They are comparable to colours for a sighted person, and should always be used unless there are important reasons for not doing so (on an already crowded map say). Amongst other things patterns permit the reader to recognise local conditions wherever the fingers are placed on a map.

A major difficulty with patterns is that some which appear to be quite different to a sighted reader may be indistinguishable to the touch. The patterns in Figure 4.4(a) are very difficult to tell apart tactually. Simply rotating a pattern may make it more suitable in a given situation (the right hand island in Figure 4.4(b) is much easier to recognise than that to the left) but this does not make the two patterns tactually distinct. Although these restrictions apply to tactual maps only, if the same base map is to be copied for both tactual and bold print use it must follow these guidelines.

Figure 4.5a shows how patterns can be characterised by their;

- style (dots, lines, squares, etc.)

- pitch "P" (distance between pattern elements) and

- thickness "t" (width of pattern elements)

If they have to be identified via the Legend, all patterns used on a single map should be tactually distinct so that they can be recognised. Ideally this means that each should have characteristics which are all quite different from those of the other patterns. In practice this is seldom possible for more than four patterns.

There are eight patterns in Figure 4.6 and all have at least two unique characteristics. The style of patterns 2 and 7 is the same, as is that of 3 and 6, but in each case the pitch and thickness are quite different.

Tests have shown that under good conditions a skilled reader can distinguish the eight patterns in Figure 4.6. The precise dimensions are unimportant and the patterns can be traced over squared paper by non-computer users. Variations can be used provided that at least two characteristics vary markedly from all other patterns on the same map. Some computer programs provide their own set of patterns but many of these are not suitable for tactual work and new ones may need to be created. Maps can usually be enlarged or reduced slightly without affecting the readability of patterns. All patterns should retain the same significance throughout a set of maps, and should be explained in a Legend.

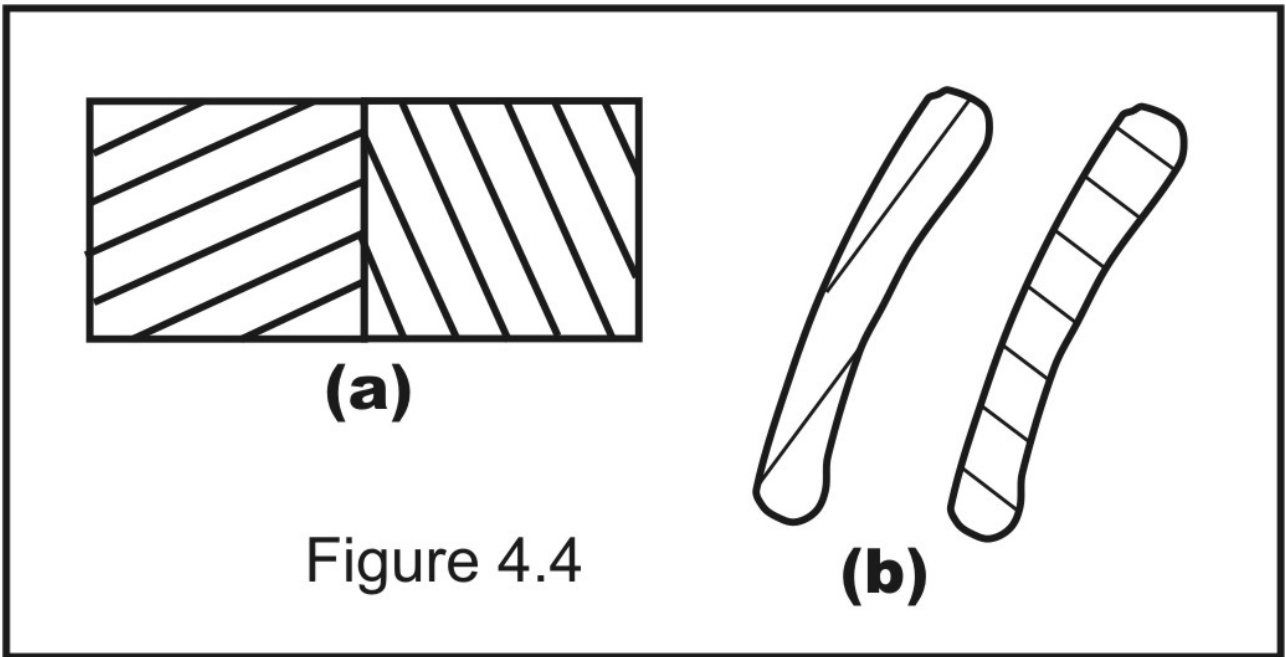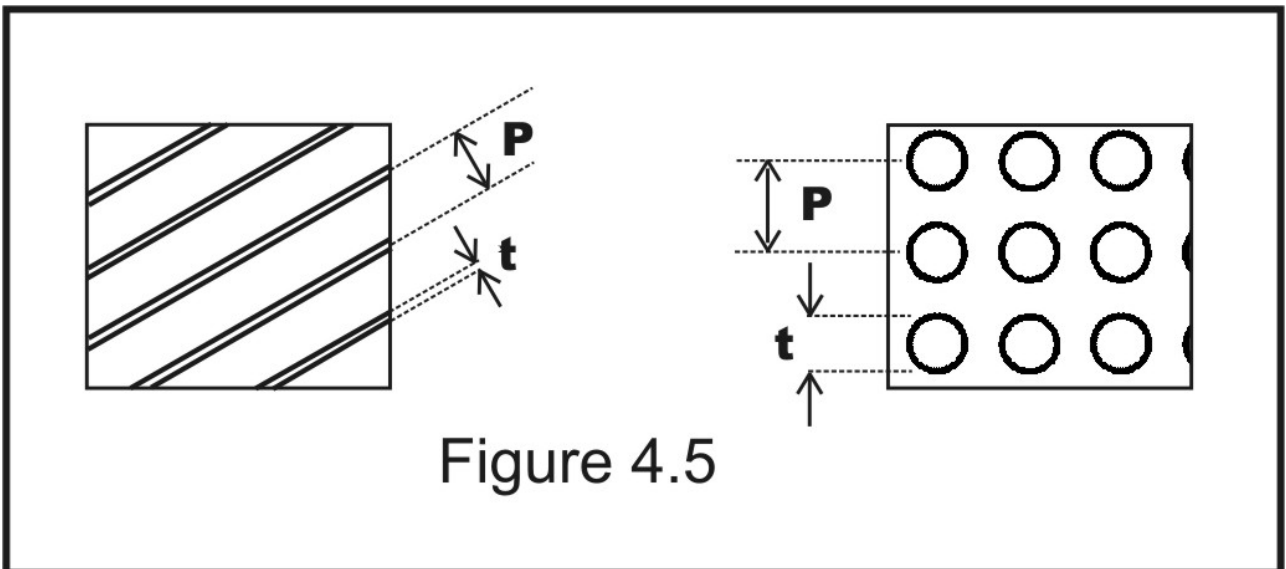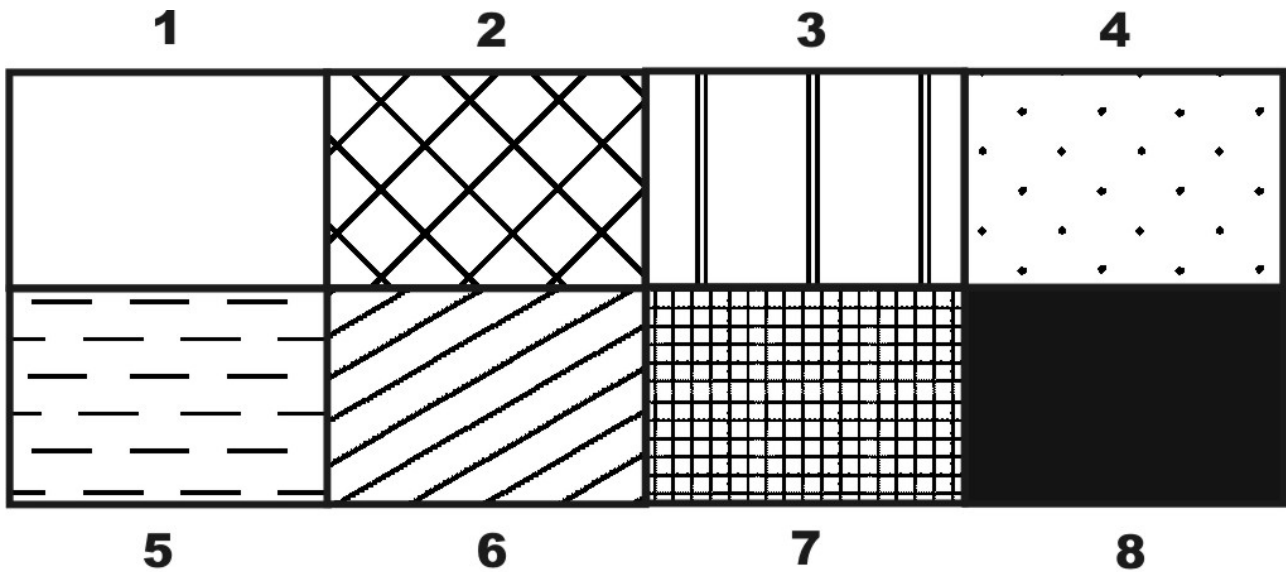**Figure 4.4 - Orientation of patterns**

Figure 4.4

(a)

(b)

Figure 4.5 - Pattern pitch

Figure 4.5

Figure 4.6 - A selection of tactual patterns

Figure 4.6

Selection of Patterns

As illustrated for rotation, Figure 4.4(b) shows how patterns should be selected and oriented to suit the area to be marked. Pattern 1 in Figure 4.6 has no texture but is always used to some extent. For large areas a large pitch and medium thickness is most suitable (patterns 1, 2, 3 or 4) but the pitch should not exceed 10-12 mm or the gaps are so large that the lines tend to be mistaken for parts of the map linework. Line thickness should not be less than 0.3 mm. Pattern 5 is usually reserved for bodies of water.

A small pitch (patterns 4, 6, or 7) is essential for small areas, or there may not be enough of the pattern to be recognized. Since copying and fusing tends to widen lines, a pitch of less than 2 mm rarely gives a clear texture and the pattern is liable to overcook in the fuser. Pattern (8) has no distinct texture and must be reserved for very small areas—larger areas distort the swell paper when fused and tend to overcook. Using a light grey shading can overcome this, particularly for larger areas. A compromise may be required when selecting a pattern if there is a conflict—a large area of sea and some small lakes for example.
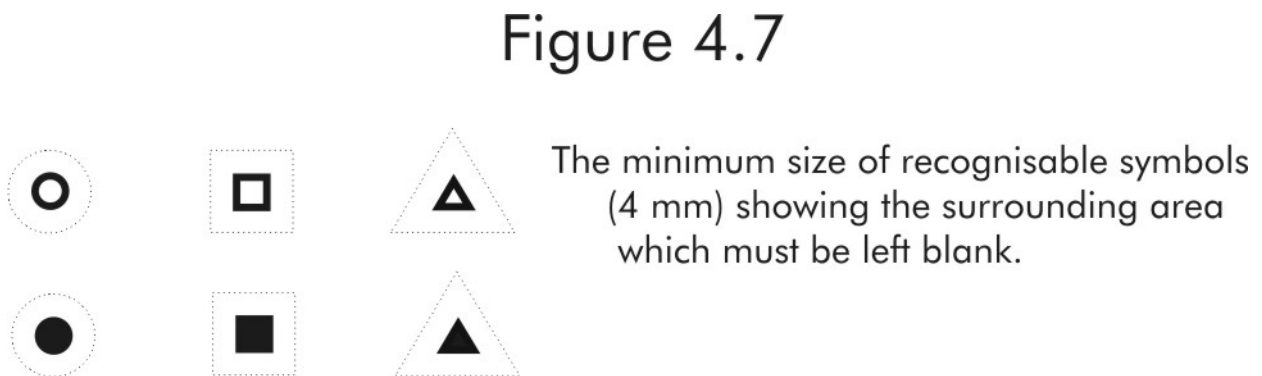
When creating patterns, lines used should take into consideration, the pitch, thickness, size of area, and existing map patterns. Dots within the range 0.7 - 2 mm should only be used with care, to avoid confusion with braille. Fine dots and lines should always be examined after fusing to ensure they can be detected since copier performance and fusing time can dramatically affect the end result. In some instances patterns are intended only to distinguish areas from one another, not to identify them via a Legend (Figure 3.1). In this situation, a pattern needs only to be distinct from all its immediate neighbours.

General Symbols

The only symbols that can be recommended for general use are the circle, square and triangle (Figure 4.7). The cross [x], the plus sign [+] and the asterisk [*] can be used individually with these main symbols, but not with one another because they cannot be distinguished. If the symbols have to be recognised, one dimension should be **at least** 4 mm, and preferably 6 mm. If they are simply to mark positions (e.g. named cities) any symbol can be used but should not be less than 2 mm across. Any symbol larger than 4-6 mm should be open (unfilled) to avoid overcooking, with a line width of about 1 mm.

Symbols should only be used when a feature appears a number of times. When many different symbols are required it is often better to use abbreviations (see Section 3). It is essential that all symbols be surrounded by white space at least 3 mm wide.

Figure 4.7 - Recognising symbols

Figure 4.7

The minimum size of recognisable symbols (4 mm) showing the surrounding area which must be left blank.

Specialised Symbols

Well-chosen symbols can be very useful within a set of maps dealing with a common topic. When a wide range of graphics has to be dealt with, standard or universal symbols are of more use to the producer than to the reader, and it is better to use whatever symbol seems most appropriate to the map. When a special symbol has been invented (and tested) it usually applies to a limited range of maps, and is probably only a little smaller than a two-cell abbreviation. As pointed out earlier, a symbol has to be memorised by the reader whereas braille can be read straight away. However, a few standard symbols and abbreviations are suggested below.

The preferred arrow shape has a long shaft (20 mm minimum), a wide-angle head (90°-150°) and arms which are at least 6 mm long (Figure 4.8). Narrow heads should not be used. When an area is to be indicated rather than a single feature, a round-headed pointer is more suitable.

For building plans and street maps, the symbols and abbreviations given in Figures 4.9 and 4.10 have been used successfully. It is also helpful if pedestrian crossings with audible signals can be identified in some way.

Figure 4.8 - Arrows and lead lines

Figure 4.8
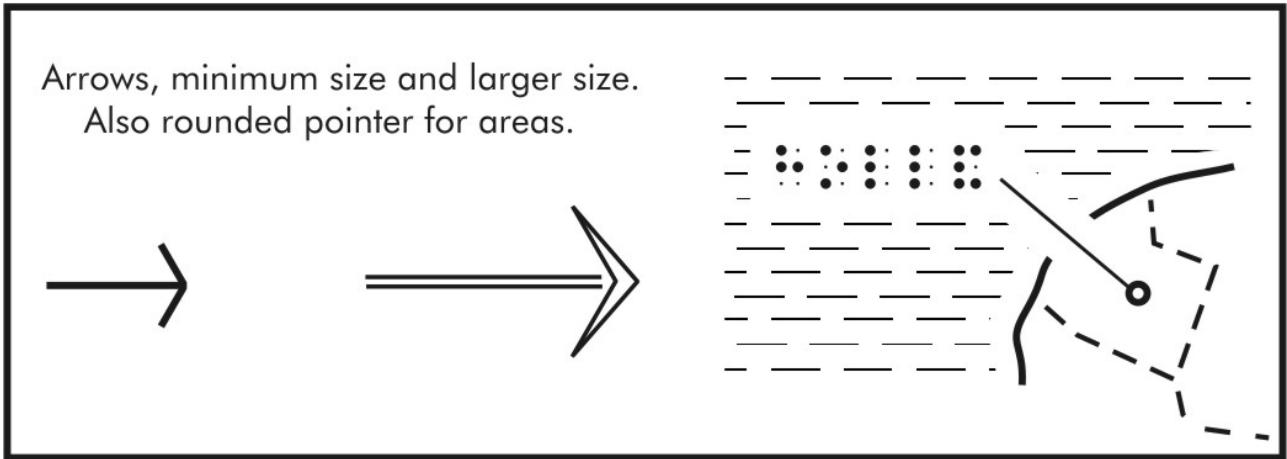
Figure 4.9 - Tactual symbols

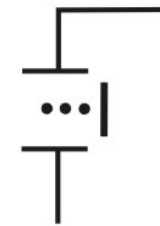# Figure 4.9

Although these symbols and abbreviations are used frequently they must always be identified in the Legend.

Stairs, top shown to the right.

Parts of the drawing should prevent access to the sides, implying that both top and bottom are accessible on the levels shown. These levels should be identified

Only the bottom is accessible, implying that the stairs go up to the next level not shown on this map. By reversing the stairs symbol they can be shown going down.
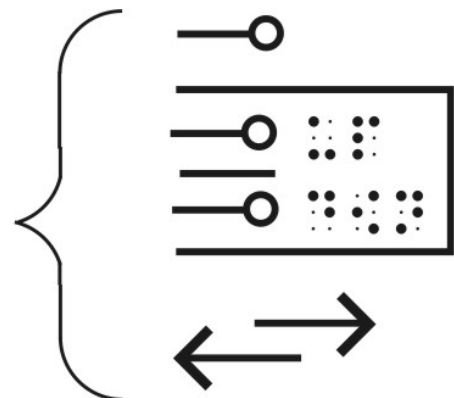
Escalators, top shown to the right. The above methods can be used to explain accessibility, but it remains to be shown whether the escalators are double or single, and if the latter, whether they are moving up or down. The halved symbol should be used only if both are required.

Ramp, top shown to the right. Accessibility must be made clear as for stairs.

Travellators. The same information is required as for escalators and alternative methods are suggested. If there is no conflict it is better to use the ramp symbol.
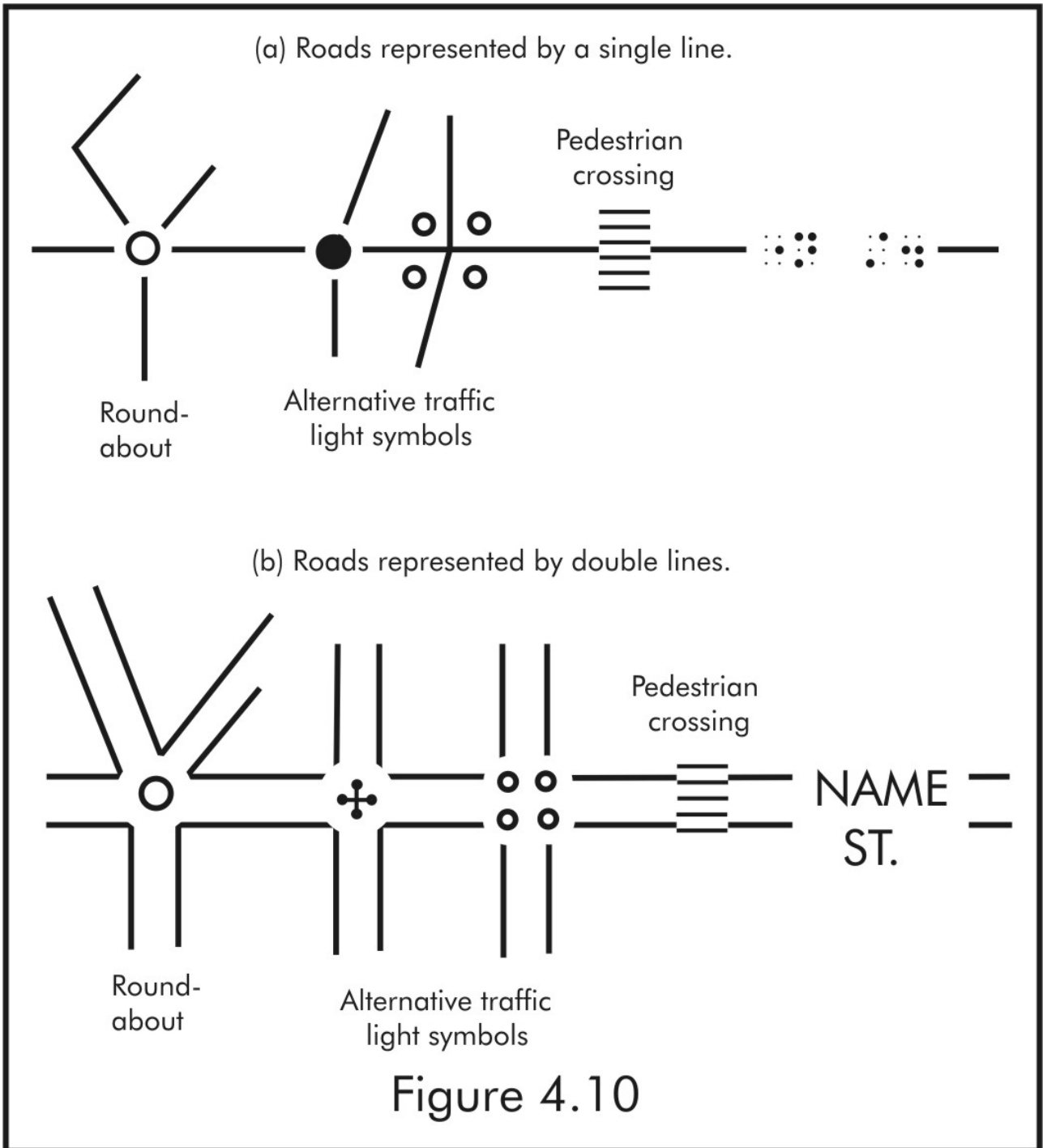
Toilets -- female   TF

male   TM

accessible   TA

Figure 4.10 - Roads

(a) Roads represented by a single line.

Pedestrian crossing

Round-about

Alternative traffic light symbols

(b) Roads represented by double lines.

Pedestrian crossing

NAME ST.

Round-about

Alternative traffic light symbols

Figure 4.10

5. Representation of Three Dimensions

It must always be kept in mind that the ideas a tactual drawing conveys to a blind reader may be quite different from those a sighted person might expect. This is nowhere more evident than in the representation of three dimensions.

Blind readers do not, as a rule, have an immediate perception of distance from the way it is implied in two-dimensional drawings. Visual conventions such as foreshortening, shading and perspective can be tactually confusing and irrelevant. For instance, while a blind person can easily understand the physics of perspective, a tapered shape in a tactual drawing does not represent to them a building that is receding into the distance, it merely looks crooked (Figure 5.1 a). Similarly it is not obvious that an object in the "foreground" of a tactual drawing will hide items "behind" it. Figure 5.1 b simply looks like two rectangles stuck together. The fact that a more distant object is smaller does not immediately suggest distance, it is just smaller.

With suitable entries in the Key, a reader will recognize that Figure 5.1c represents a road bridge over a railway line because of the gap, but each case must be considered on its merits. In general, no satisfactory method for representing the third dimension on tactual drawings has been found.

Figure 5.1 - 3D Figures

Figure 5.1
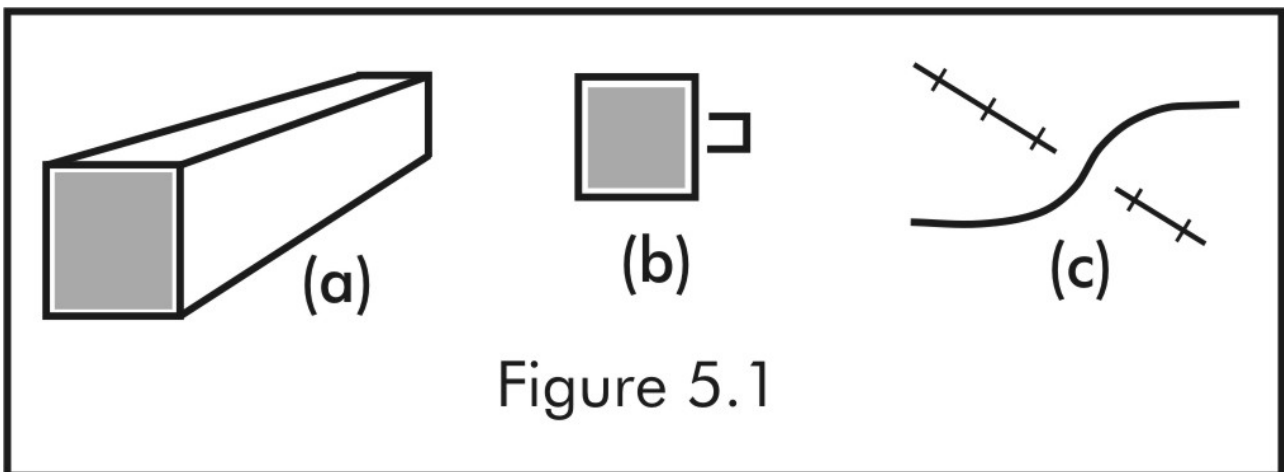
6. KEY SHEETS

General

Key Sheets (or "Keys") are supplementary print or braille pages that accompany a bold print or tactual map/diagram. Alternatively, they may be supplied in audio or e-text format. They contain descriptive material relating to the map, and may be essential for the map to be understood. In fact, the way in which a map is drawn, may depend upon whether there is to be no Key, a short Key or a detailed Key. The form of the Key depends upon the type of map, its intended purpose, the abilities of the user and other considerations. The contents may take any form, and the writer is free to compose a Key in any way which provides the most help for the reader. The Keys for bold print and tactual maps are very similar and, except where specifically stated, the following comments apply to both.

In some instances a Key is not required, typical cases being:

(a) Very simple drawings (Figures 3.1, and 8.1).

(b) Maps whose purpose is obvious. For example a map might be entitled "Road Map of …" and consist of circles named as towns joined by lines to represent the roads. (This does not mean that road maps never need a Key.)

(c) Book illustrations which are accompanied by a wealth of information in braille or some alternative format.

The Legend

This identifies all the line types, symbols and patterns used on a map and is essential for any but the simplest drawings. Figure 3.1 would need a Legend only if the patterns were intended to identify the States, as opposed to making them stand out more clearly.

If there is room, the Legend should go on the map itself since it is easier for the reader to compare the two and the braille Key is easier to produce without it (Figures 7.2, 7.3, 7.4 and 7.11). If the Legend has to be part of the Key, it should be of the general form shown in Figure 6.1, and the dimensions indicated are important except for the line spacing which does not always have to be considered. To be recognized reliably by a reader with average tactual skills the lines and patterns in the Legend must not be less than 5 cm across; and the patterns must be at least 2 cm top to bottom whether the Legend is on the map or in the Key.

List of abbreviations

There may be no abbreviations or there may be only a few which should go onto the map if possible (Figures 7.11 and 8.2). Alternatively, there may be several pages of abbreviations for a set of maps or diagrams, and their use is discussed in the following sections – **Typical Key Sheets** and **Detailed Description of Maps**.
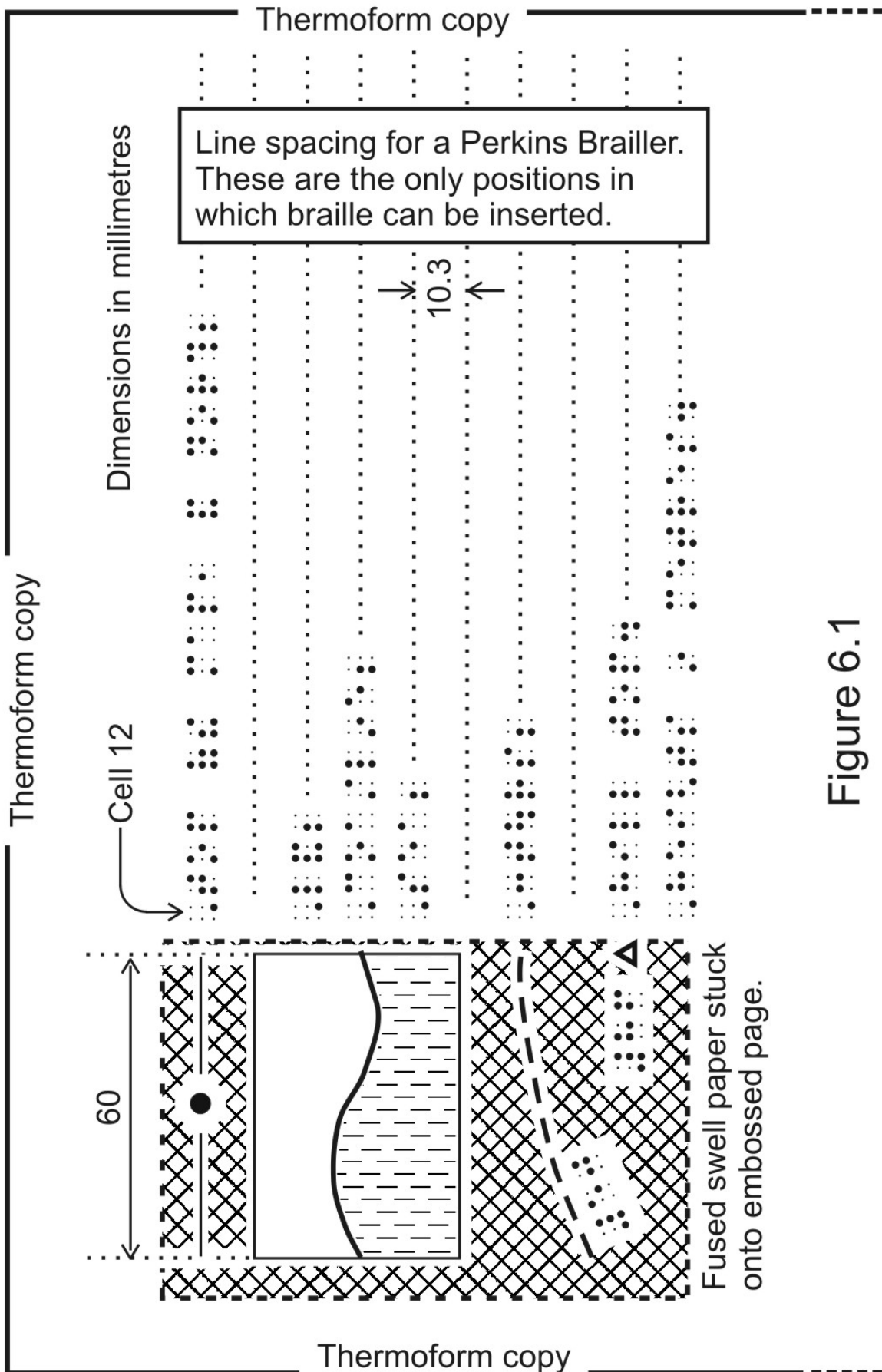
Figure 6.1 - Legend within the Key

Figure 6.1

Typical Key Sheets

A key sheet should commence with a title relating it to the maps it describes, and may contain the following items (not necessarily in the following order). These suggestions can usually be simplified but illustrate the type of information a reader may require.

(a) A legend as described above.

(b) If there is not room for it on the map, the bar scale should be reproduced in tactual form. Do not use a statement of equivalence.

(c) A Contents, or list of maps in a set.

(d) A **short** description which relates the maps within a set to one another. This might describe how the maps can be aligned; or explain which part of Map 1 was enlarged to form Map 2; or introduce the various topics dealt with. The description may require an additional diagram to show how the maps fit together, and this can be incorporated with the Key or supplied as another map in the set (Figure 7.5). This short description can be combined with (a), (c) or (f) in some cases.

(e) An alphabetical list of all abbreviations used and the full name for which each stands (see Section 3) eg.

ma--Malta;

The list can be included with the Legend in simple cases. Alternatively the list may contain other information such as the number of the map upon which the item is used and its approximate position, or even a brief description (island in Med., population xxx, frequently bombed during WW II) etc.

(f) Detailed description of each map

Other less common components of a Key might be; time-tables for bus routes; a Directory to the shops in a shopping center; distances between towns on a road map; historical or geographical descriptions of some areas; and many others. These or other entries depend upon the type of map and the user's requirements. Occasionally a separate Key is required for each map in a set, particularly if a very wide range of topics is included.

Detailed Description of Maps

An important component which sometimes forms the major part of a Key is a detailed description of each map. These are not easy to compose and may take several braille or print pages so they should be used only when essential and only in the detail needed by the user. Whenever a name is mentioned, the abbreviation (if any) should follow in brackets.

The descriptions may be composed in either of two main styles. There are other possible methods, as well as other formats such as audio or e-text.

In the first method, the map is (conceptually) divided into smaller parts — say quadrants — and any significant feature in each part is described. This makes the feature easier to

find, and the method is used in Example 1 of Section 7. It is sometimes better to divide the map into nine sections — NW, N, NE, W, central, E, SW, S and SE; or in other words top left, top, top right, left, central and so on. The method of subdivision and any abbreviations used must be described. Not all clients are familiar with compass directions and these should be made clear.

Where more detailed locations have to be described, letters and/or numerals can be spaced along the top and sides of the map to form a grid, like latitude and longitude. It would be necessary to describe this method of defining points in the Key.

If this description becomes a simple list of towns, it may be better to use an alphabetic list of all the towns named in a set, combined with any abbreviations, and describing where each town is using the divisions suggested above, e.g.

  kl-- Kuala Lumpur; Map 3; br.

- where br stands for bottom right, and the word "Map" can be omitted provided the list is properly introduced. The population, height above sea level or any other appropriate information can be included in the list.

The second approach to describing maps follows one or more major features and sets out to emphasise the structure of the map. By following the description on the map the reader is provided with a framework to which all other features can be related. This style is not always appropriate but when it can be employed, may be better than the first method, and is particularly suitable for tactual maps (Example 2 of Section 7). An alphabetical list of the type suggested above may still be required.

It is **essential** that the reader clearly understands whether the description applies to the **map** itself or to the **features represented** on the map, and this type of misunderstanding is most likely to occur in mobility maps. Unless the area is very well known by the writer it is better to describe the map, and to emphasise this by using such phrases as "to the left of the map"; "top right of the page"; "lower down the sheet"; and so on. If the items on the map are described (streets, shops, toilets etc.), the reader must know exactly where she is and which way to face before "left" and "right" and similar instructions have any meaning. Well-chosen terms such as "lower down the hill", "closer to the park" can sometimes provide very good descriptions but great care must be exercised—one misunderstood comment may make everything that follows meaningless; or even dangerous.

Presentation

- Bold Print

Bold Print Key Sheets are usually produced on the same size paper as the map (A3 or A4). The print size should be based on the clients requirements, or, if requested for a general audience, should be at least 18 point (4 mm) Arial or other suitable sans-serif font. Upper- and lower-case letters should be used although in the case of abbreviations the key must follow exactly what is used on the map. Drawings for the Legend or any additional diagrams should be produced with the text or can be stuck onto the pages if hand-drawn. (Example 1 of Section 7). The final Key should be stored with the Master copy of the map.

- Tactual

Tactual Keys may have only one page or may be over a volume. If the Key is produced on a braille program such as Duxbury, it can be embossed as each copy is required. If only one copy of the Key is available (punched on a Perkins say) it can be copied using the THERMOFORM process.

If there is a graphical component (the Legend), that whole page can be produced on swell paper and processed with the maps, the rest of the Key being embossed normally. Alternatively, only the graphical parts of the Legend need to be produced on swell paper, and this can be stuck onto the sheet which has all the associated braille. (A spray adhesive is essential.) If this method is used, care must be taken so that the graphics align with the inflexible braille line spacing. Figure 6.1 shows a typical layout with a line spacing of 10.3 mm produced by a Perkins. The precise value of the spacing is only important if there are a large number of entries in the Legend, when those towards the end can easily be misaligned. The line spacing has to be measured on whatever embosser is used.

The samples of the patterns drawn in the Legend should not be smaller than 50x20 mm or the patterns may not be easy to recognise.
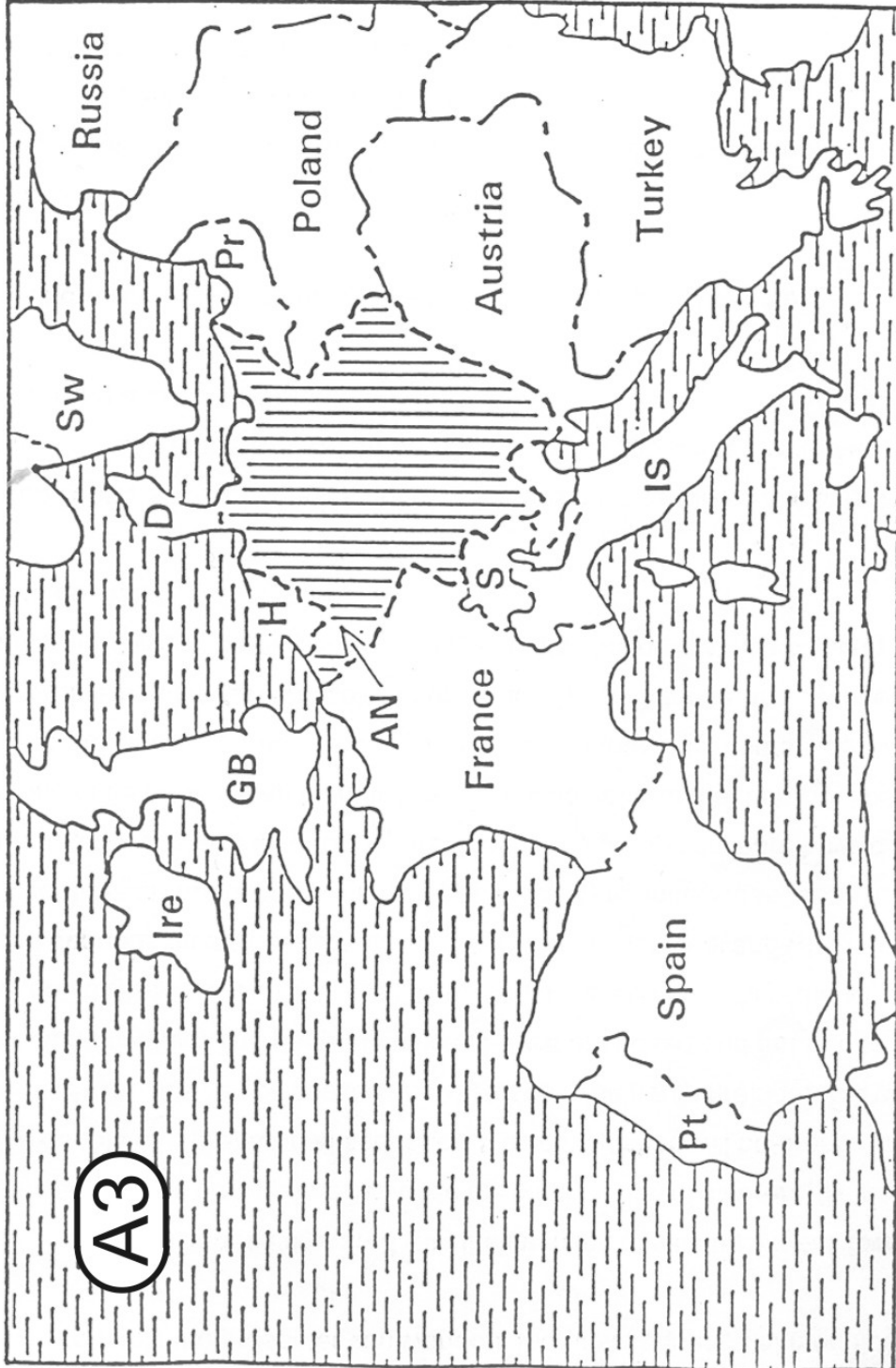
7. EXAMPLES

Many of the maps shown in this section are reduced in size for convenience. However the true size is very important, particularly for the tactual maps, and this is always marked on the map or mentioned in the text. Some of the examples in Sections 7 and 8 were produced before the current standards were developed and before UEB was introduced so they may not conform to these standards in all respects. However the examples are introduced mainly to indicate the style of the drawings and the range of topics which can be covered successfully.

Figure 7.1 - Example 1

"Two Centuries" Map 11A
Europe on the Eve of the French Revolution, 1789

Figure 7.1

Prepared by Rod Bashford, A.I.C. and Macquarie University E.S.

Example 1
- Bold print map of Europe

The bold print map in Figure 7.1 was derived from Map 11 of the book "Two Centuries", and shows the national boundaries of Europe and the extent of the Holy Roman Empire in 1789. It can be used at this size but would be better enlarged onto A3 size paper to bring the lettering up to 32 point. (If this is done the graphic part of the legend would have to be enlarged as well.)

- Key Sheet for the Bold Print map of Europe
(described in section format)

(The following should be prepared with print of 18 point minimum.)

Key Sheet - Map 11A

"Two Centuries"
Europe on the eve of the French Revolution, 1789

This map shows the national boundaries of Europe on the eve of the French Revolution, 1789, and also the position of the Holy Roman Empire. North is at the top of the map.
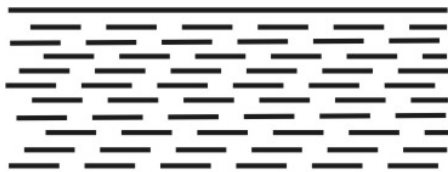
A FULL LINE REPRESENTS THE COAST. THE PATTERN IS THE SEA. LAND HAS NO PATTERN.

THE CHAIN DOTTED LINE IS USED FOR NATIONAL BOUNDARIES.
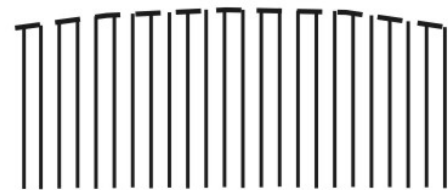
A DASHED LINE SURROUNDING THE VERTICAL PATTERN REPRESENTS THE HOLY ROMAN EMPIRE

(Legend for insertion into Section 7 Example 1)

If the map is divided into four quadrants then:

The **top left** contains Ireland (Ire) and Great Britain (GB), with the Atlantic Ocean to the west.

The **top right** consists mainly of Prussia (Pr), Poland and Russia but also contains Holland (H), Denmark (D) and Sweden (Sw); the North Sea separates Great Britain from Denmark and Sweden, and the Baltic Sea separates Sweden from Russia and Poland.

The **bottom left** consists mainly of Portugal (Pt), Spain and France, with the Atlantic Ocean to the west and the Mediterranean Sea to the south.

The **bottom right** contains the Italian States (IS), Austria and Turkey, with the Mediterranean Sea to the south.

Switzerland (S) is almost in the **centre** of the map.
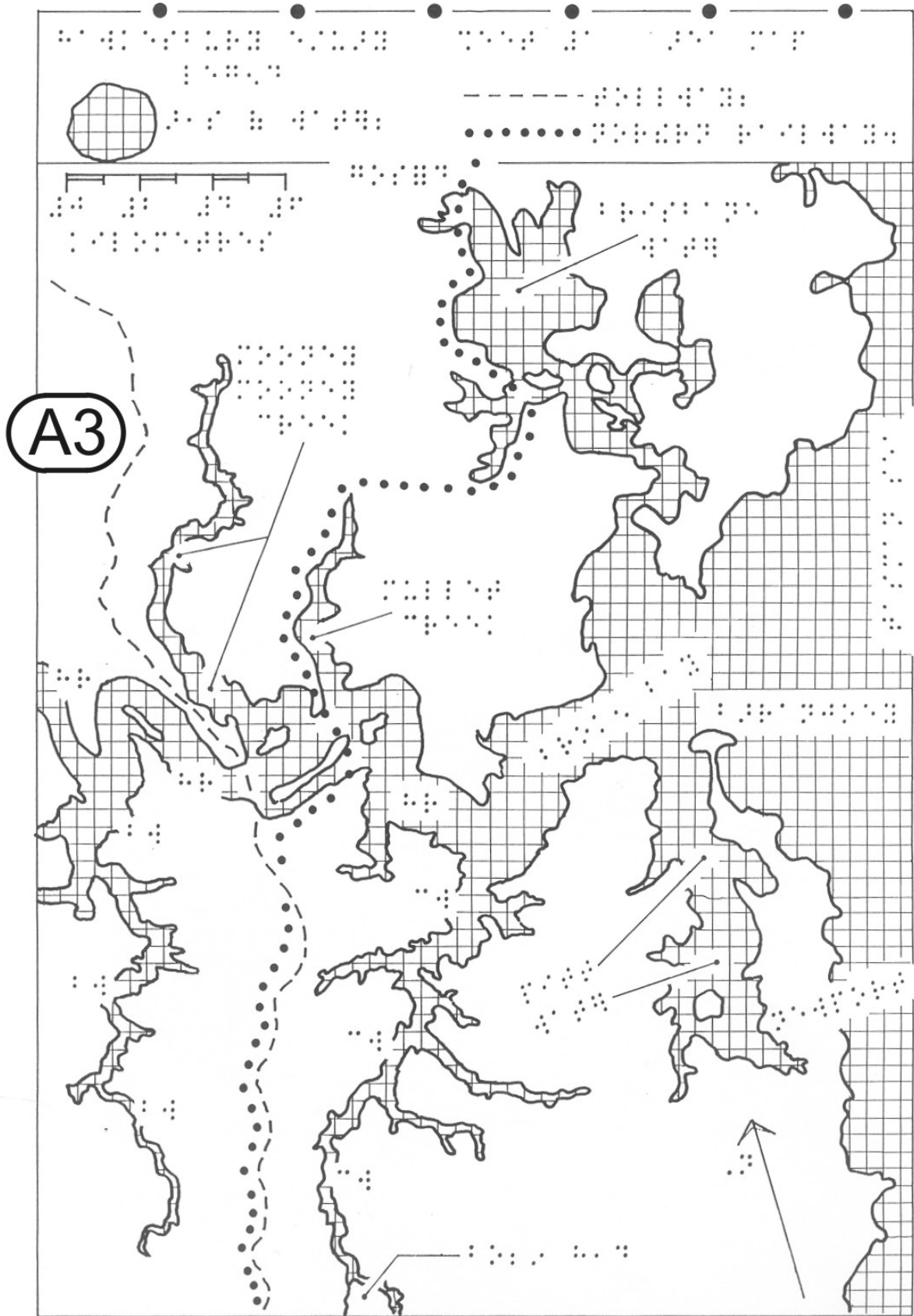
The names that have been abbreviated are:

AN   Austrian Netherlands
D   Denmark
GB   Great Britain
H   Holland
IS   Italian States
Ire   Ireland
Pr   Prussia
Pt   Portugal
S   Switzerland
Sw   Sweden

(Both the Prussian and Austrian national boundaries extend into that of the Holy Roman Empire and are shown in more detail in Map 11B.)

******

Figure 7.2 - Example 2

Figure 7.2

Example 2
- Tactual Map of the Hawkesbury Estuary

The area map in Figure 7.2 is the first in a set prepared for a radio operator working for the Volunteer Coastal Patrol. It is intended for use on A3 swell paper.

- Key Sheet for the Hawkesbury Map
(described in major features format)

(This would be brailled in the normal way [ie without graphics glued in] since the Legend is included with the map.)

Key Sheet for the Tactual Map of the Hawkesbury Estuary

Sheet 1, Area Map.

This map gives an overall view of the Hawkesbury Estuary 24 km by 31 km, and the other maps in the set show each quarter in greater detail. The top of the map is approximately north, magnetic north (mn) being represented by the arrow in the bottom right corner. The Title and Legend are at the top of the sheet, the scale being to the left.

Abbreviations used are:

bw--Berowra Water;
cw--Cowan Water;
hr--Hawkesbury River;
mn--Magnetic north.

The Tasman Sea bounds the eastern edge of the map. Halfway up the sheet the coastline tends to the west and forms the entrance to Broken Bay. From the south west of the bay the Hawkesbury River (hr) can be followed upstream in a westerly direction to the left-hand edge of the map, passing several narrow reaches and islands. There are a number of bodies of water draining into the river and these will be considered in turn, from the east.

The southern extremity of Broken Bay is marked by the lighthouse on top of Barrenjoey. Immediately to the west, separated from the sea by a narrow strip of land, Pitt Water stretches about 9 km south to Newport. Pitt Water is 1-2 km wide, and is deep and free from obstructions except at the extreme southern end.

North across Broken Bay from Pitt Water is the rapidly narrowing entrance to Brisbane Water, with Gosford at the north-west extremity. The entrance has strong tide rips, and where it widens there are dangerous shoals. Brisbane Water itself is free from obstacles but some of the connecting creeks and lagoons are very shallow.

Following the river upstream from Broken Bay the next tributary is Cowan Water (cw) which is navigable as far south as Bobbin Head. The surrounding land is steep and heavily wooded, and there is little road access.

Continuing west the river is joined from the north by Mullet Creek, and slightly further west by Mooney Mooney Creek whose upper reaches are very shallow.

Finally, at the extreme west of the map, the river is joined by Berowra Water (bw). This extends south and is very similar to Cowan Water but is not navigable beyond the car ferry.

The freeway and railway run north together from the south-west of the map. At the river the freeway tends to the west, then continues north. The railway goes east to cross the river and follows the western shore of Mullet Creek. It then turns east through a tunnel, and follows the shore of Brisbane water north to Gosford and beyond.

******

Example 3
- A Tactual Map with Enlarged Section

The map shown in Figure 7.3 is difficult to read, but was produced for a client who possessed the necessary skills. The Legend and abbreviations were included in the Key which also points out that the upper part of the Western Front, from Ypres south to Arras is also shown as an enlargement down the right-hand edge of the map. This avoided enlarging the whole map just because of one small crowded area. Each section of the map has its own scale.

******

Example 4
- A Tactual Map Drawn in Sections

One of four detailed maps of Olympic Park is shown in Figure 7.4, and its relation to the whole park and to the other detailed maps is illustrated in the top left corner. The Legend and the list of abbreviations is given in the Key, which also describes the purpose of each building.

******

Example 5
- The Assembly of Nine Detailed Maps

Where the arrangement of the details is more complex, a map such as that in Figure 7.5, has to be used. This can be issued as an additional map or can form part of the Key.

******

Example 6

- No-Braille Tactual Map of the Indian Ocean

Figure 7.6 shows the course of a ship sailing from Sydney to the Gulf of Oman. The map would have to be restored to A3 size before being copied onto swell paper. So that it can be read tactually very large print is used (minimum 48 point, 12 mm) and only upper-case letters are used. The map was accompanied by a Key explaining the abbreviations, and this was also produced on swell paper with 48 point lettering.
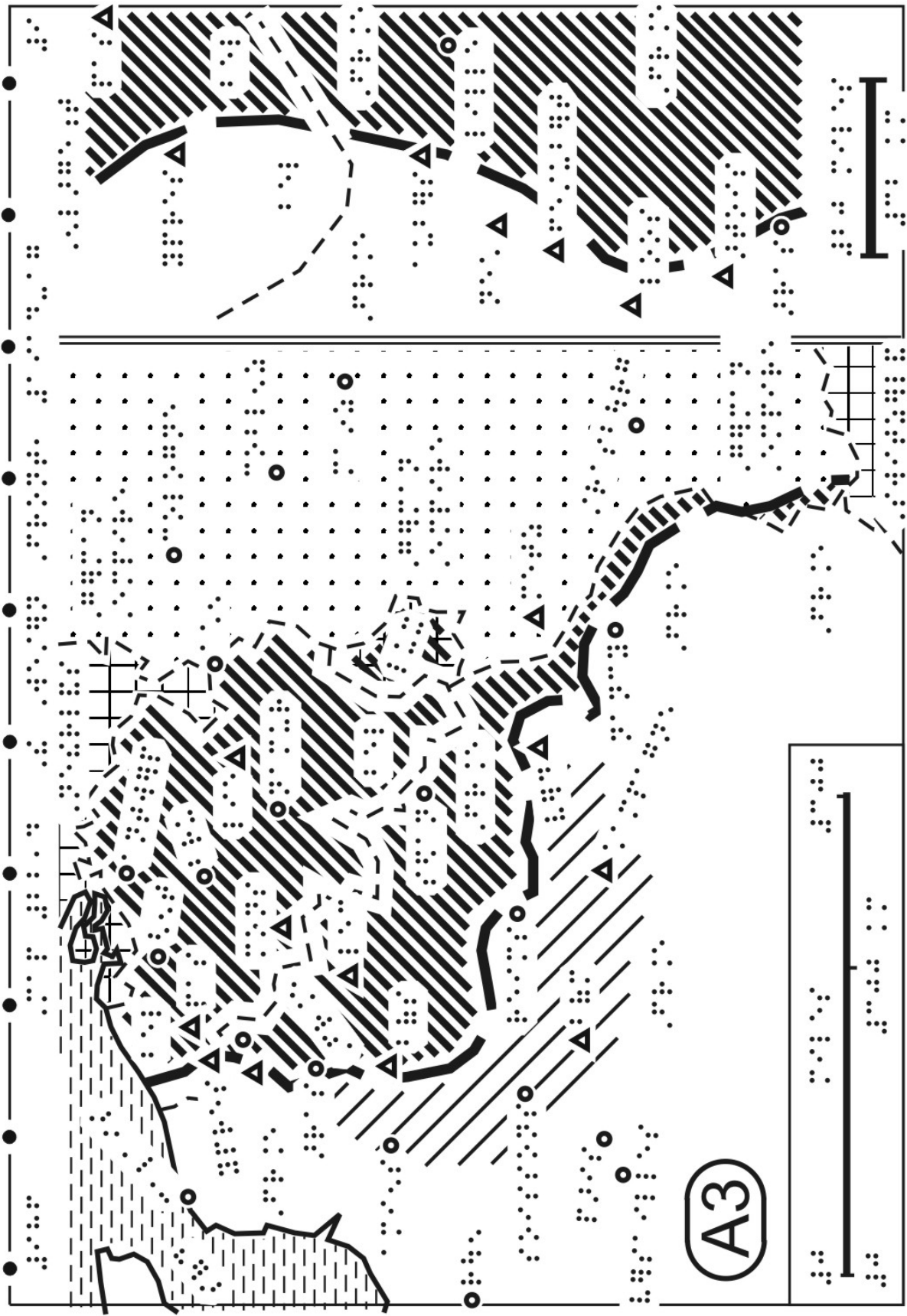
******

Figure 7.3 - Example 3

Figure 7.3
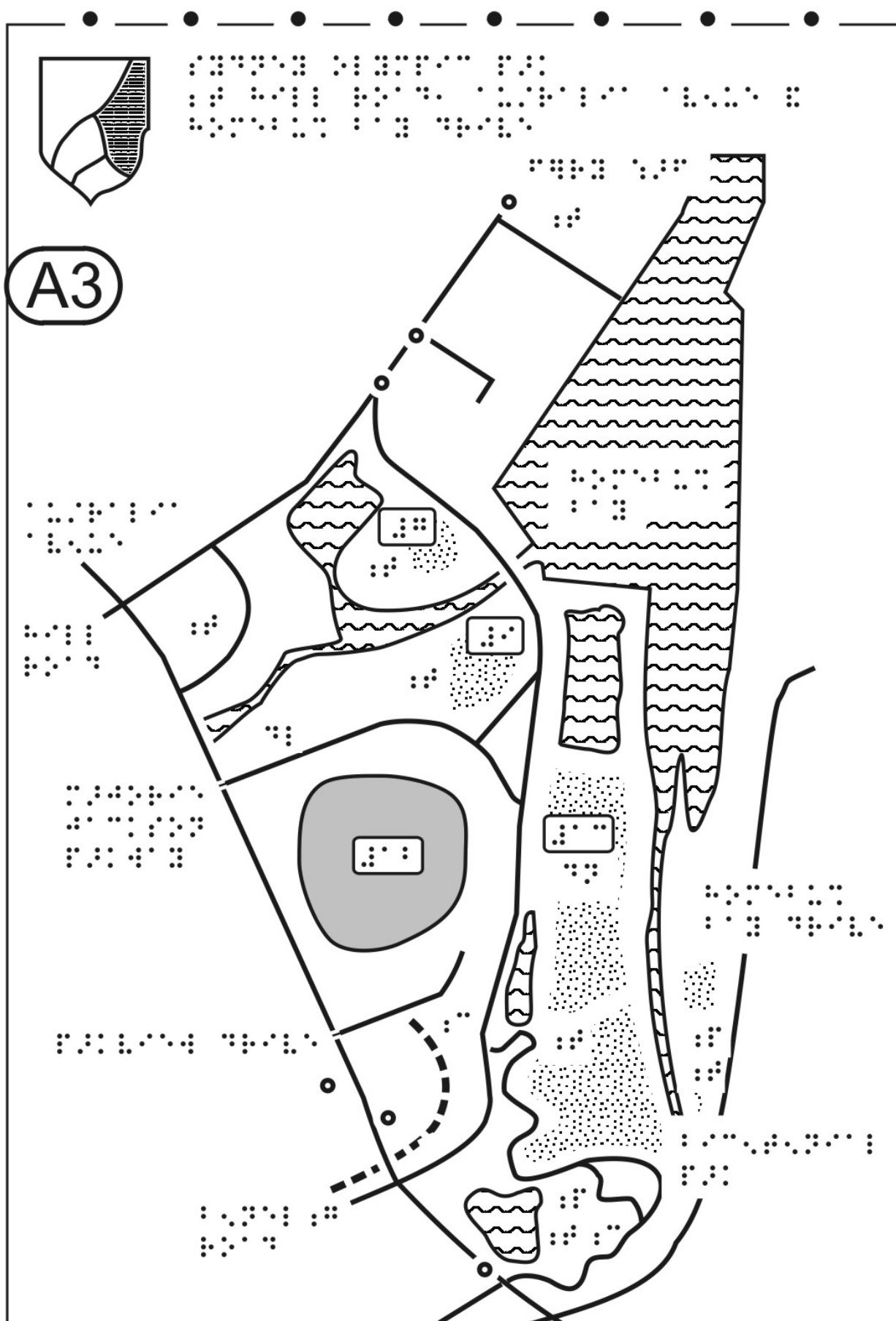
Figure 7.4 - Example 4

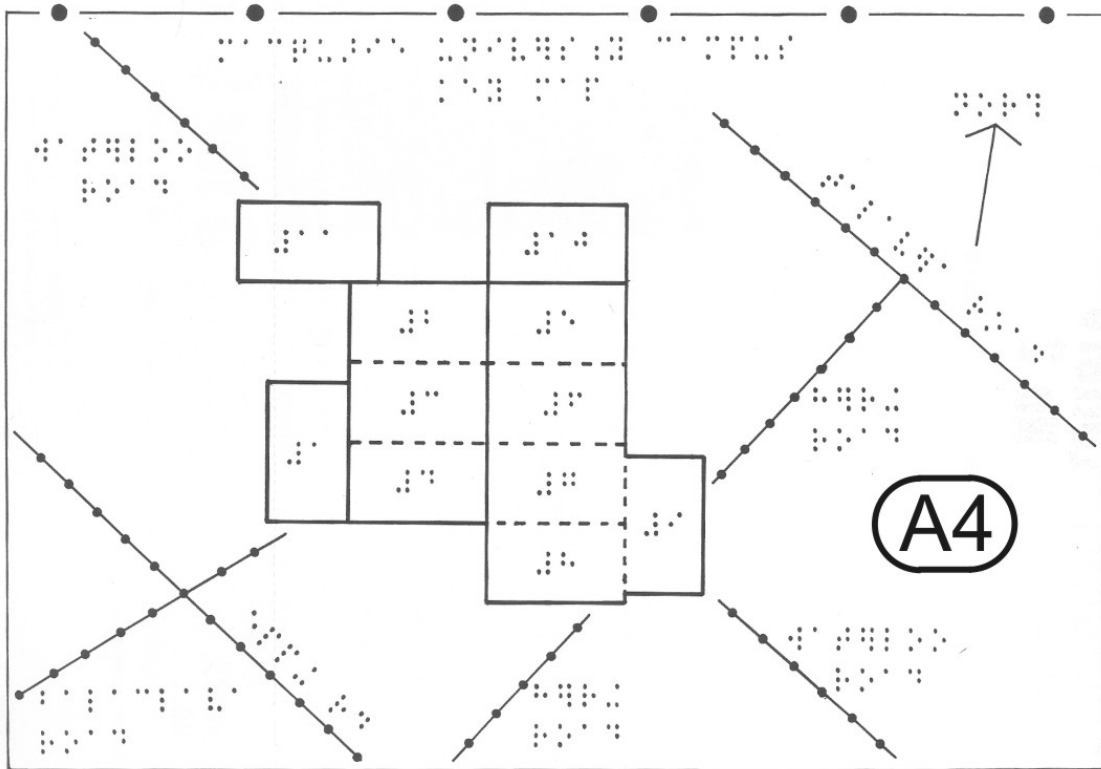**Figure 7.5 - Example 5**
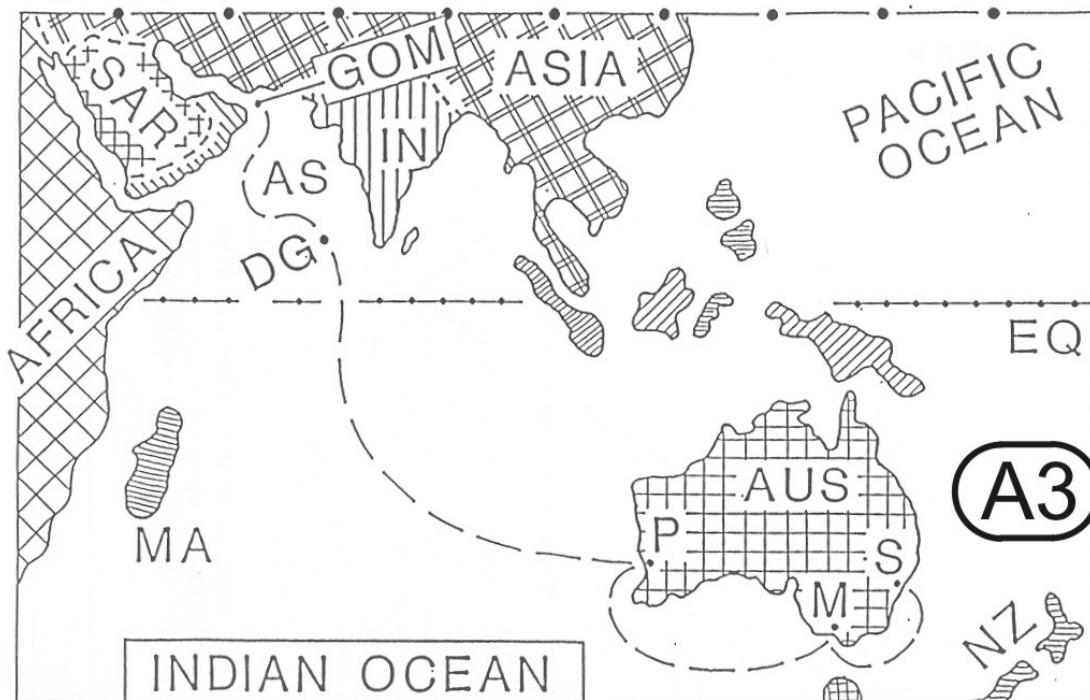

Figure 7.5

Figure 7.6 - Example 6

Figure 7.6

Example 7

- Graphs and Other Diagrams.

In general, graphs and diagrams are often easier to produce than maps, but all the previous recommendations should be kept in mind. The bold print diagrams shown could be enlarged or reduced as the situation demands, but the tactual diagrams are shown at full size and if enlarged the braille would have to be rewritten.

Bar Charts are a means of representing statistical data and are shown in Figure 7.7. Pie Charts, which are used to compare quantities as parts of a whole, be shown in tactual format but can usually be described if their percentages are given.

If a graph is complex and contains considerable data, it may be necessary to provide descriptive information in a Key, or an explanatory paragraph associated with the graph. The tactual version might contain the title, the Legend for the lines used, the units of the scales, etc (Figures 7.8).

The graph should be enclosed (as with maps) so that the reader will know that all the information is within this boundary. There should be a fine grid line (0.5 mm) over the graph to aid in the reading of scale values even if it is missing in the original. Should this grid interfere with the graph's clarity, then all or part of it should be omitted or replaced with point markers. Where more than one trend is shown, it is particularly important to ensure that the lines used are easy to distinguish. Also, due to the sizing within tactual graphs, sometimes the numbers along the horizontal axis must be written on alternating lines. (See Figure 7.8) They should be written at an angle or vertically only if necessary.

******

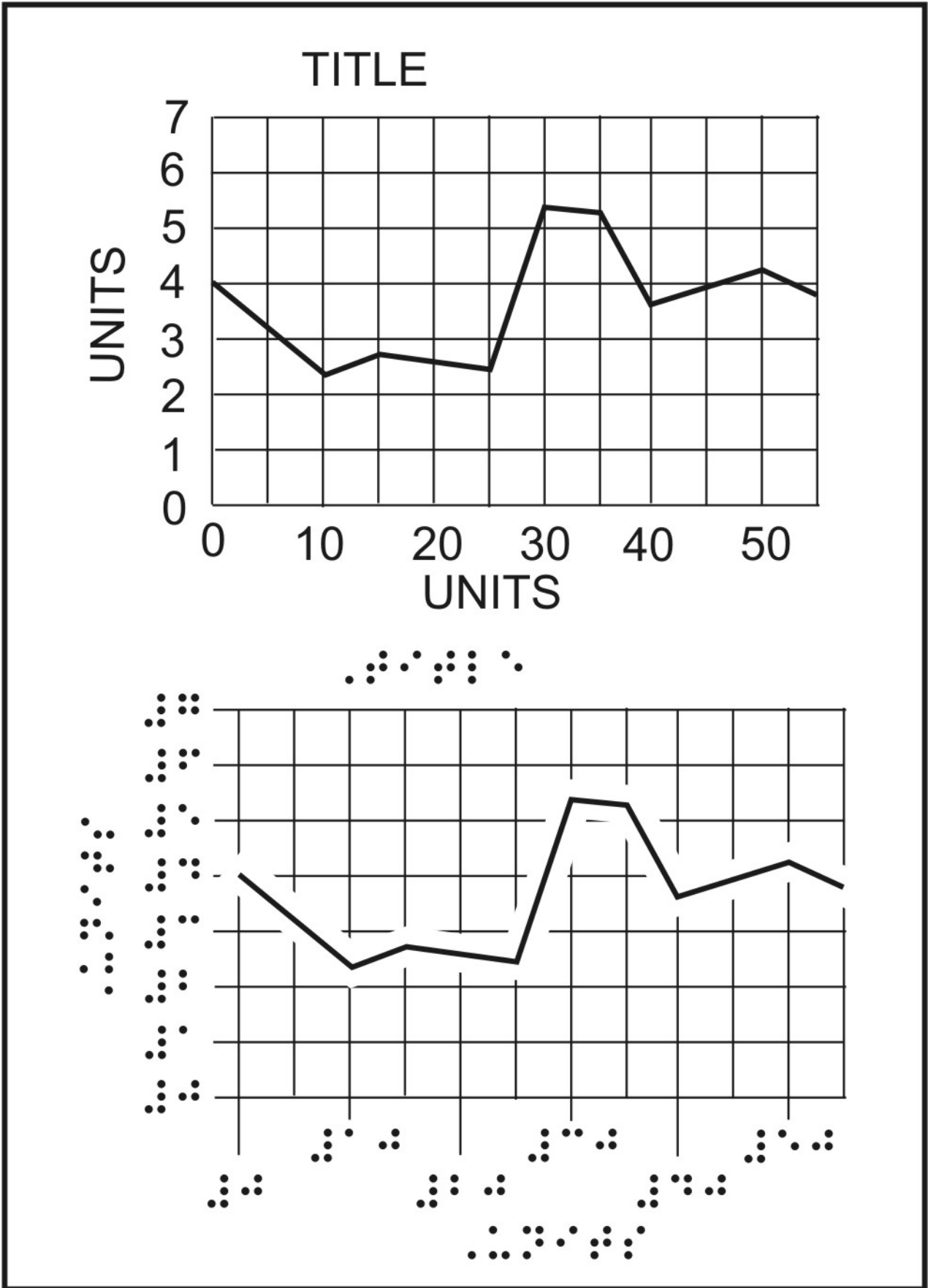**Figure 7.7**
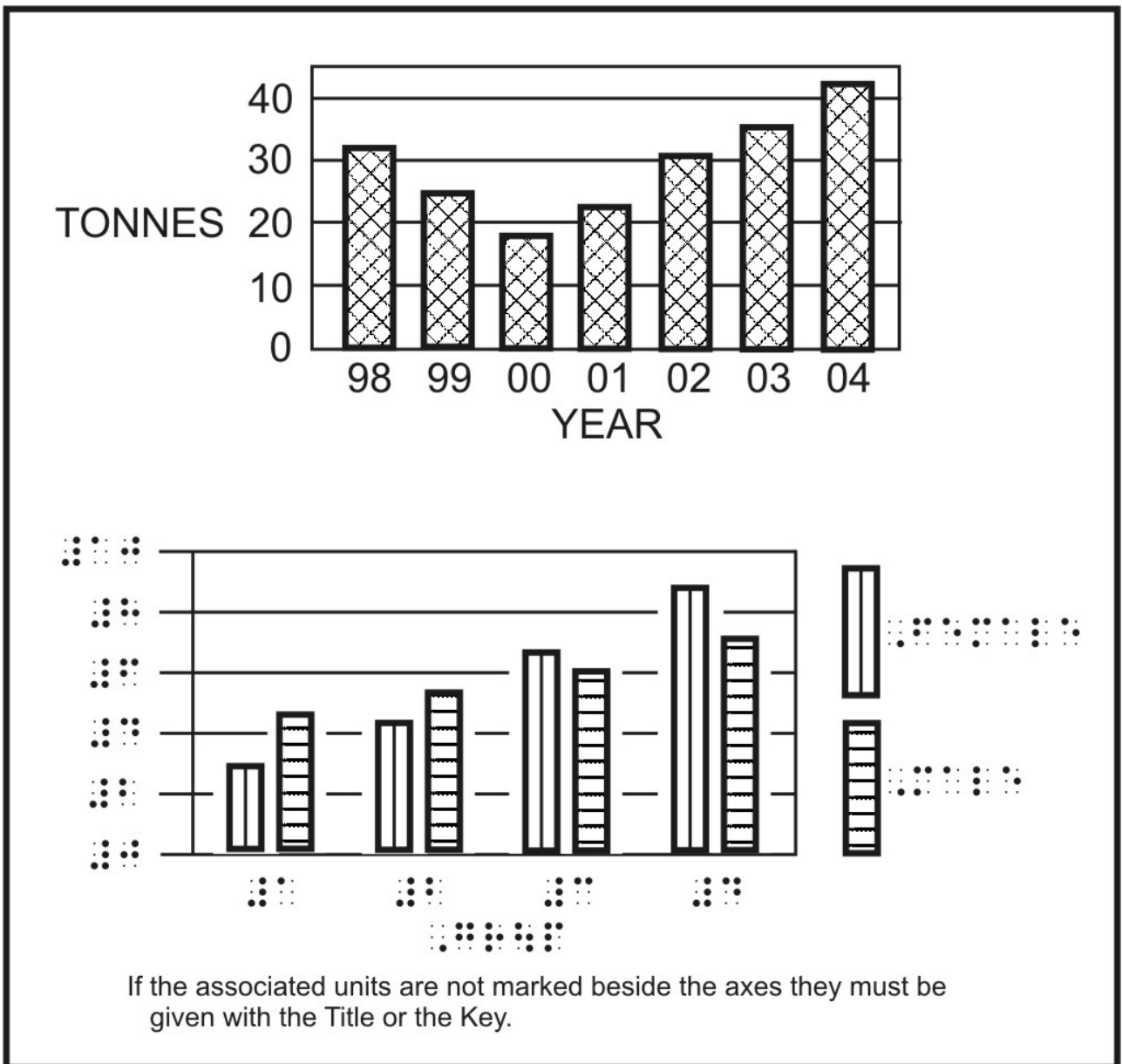
Figure 7.7

Figure 7.8

TITLE

UNITS

UNITS

Miscellaneous Examples

So many possibilities exist that there is scope for considerable ingenuity in producing graphics. Figures 7.9 to 7.14 show a range of examples, each marked with its correct size.

Figure 7.9 shows a sample business card (full size) as provided for clients attending an international conference - the cards were cut to be as small as the name and address permitted, and were folded along the dotted line. On the reverse side the name and address were repeated in large print.

The Christmas card of Figure 7.10 can be provided on an A5 sheet as illustrated, or on a folded A4 sheet. The latter arrangement was always used for the braille version of the card so that the clients could add a personal message using a Perkins brailler or frame on the unused half.

Figure 7.11 shows one floor of a multi-level shopping centre. Only the larger stores can be named, and there is not much room for all the shop numbers. However sufficient numbers are given for the reader to be able to estimate the position of any particular shop whose number had been selected from the Directory provided in the key.

Figure 7.12 is part of a set of maps devoted to the eye and vision generally.

The layout of most ATMs is quite straightforward (Figure 7.13). The difficulty is due to the fact that the machines are non-standard and differ between banks, and between different branches of the same bank. Also the processes guided by the instructions on the screen differ depending on the type of card used - for example, a "foreign" VISA card may not get the same response as the card of a client of that particular bank, even when requesting the same service. The Key must list the precise button-pressing sequence to be used by the client so that it can be memorised.

Figure 7.14, was required in Grade 1 braille, and shows how a technical process can be described. This is much easier to understand than a diagram with the description in the Key.
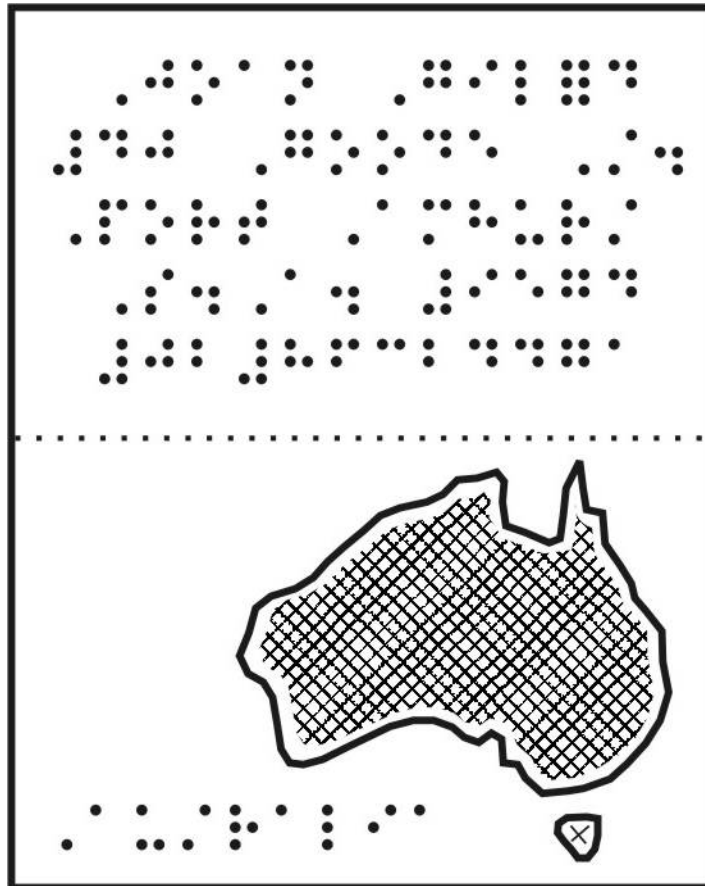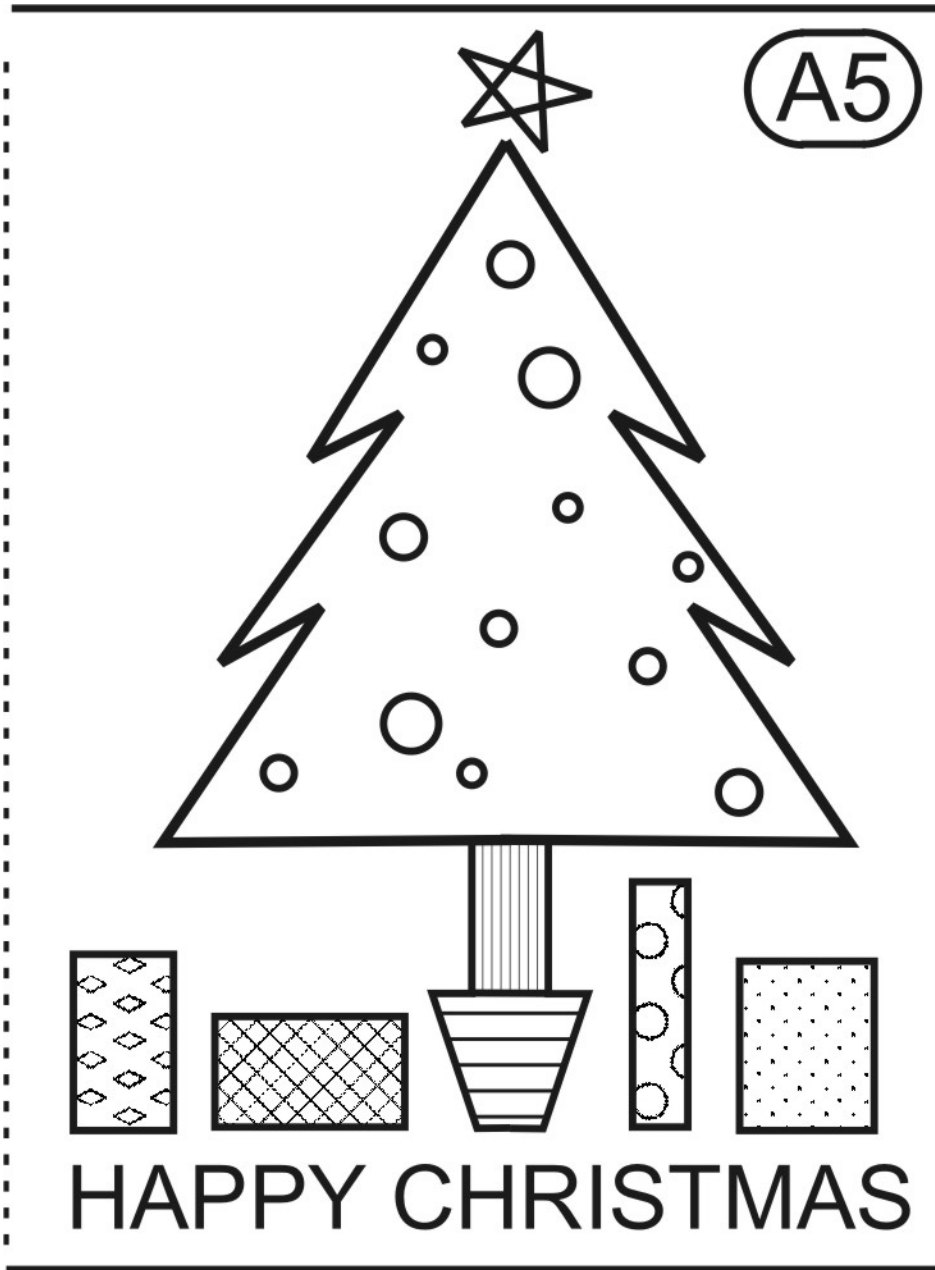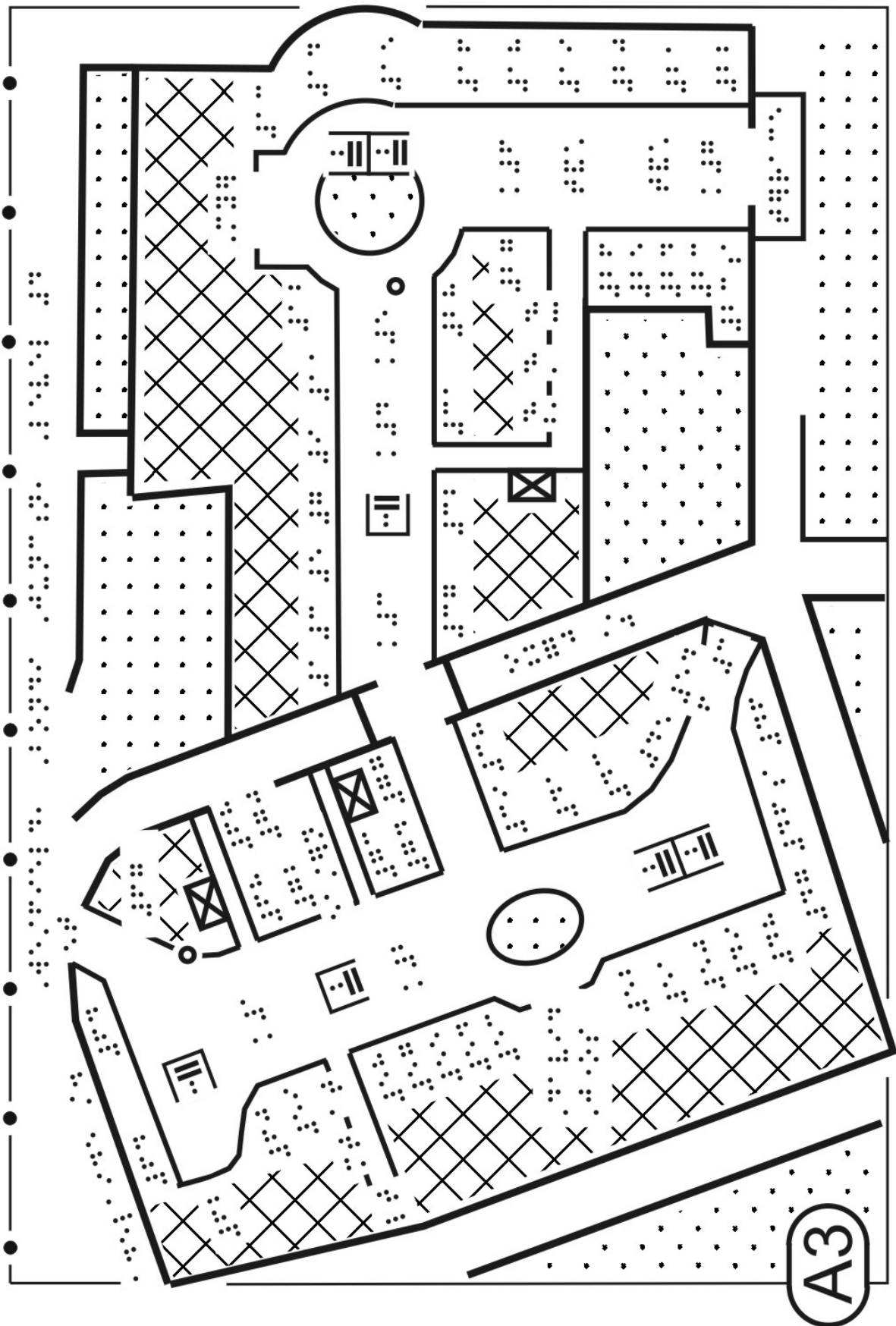
Figure 7.9

Figure 7.10

HAPPY CHRISTMAS

Figure 7.11

Figure 7.12
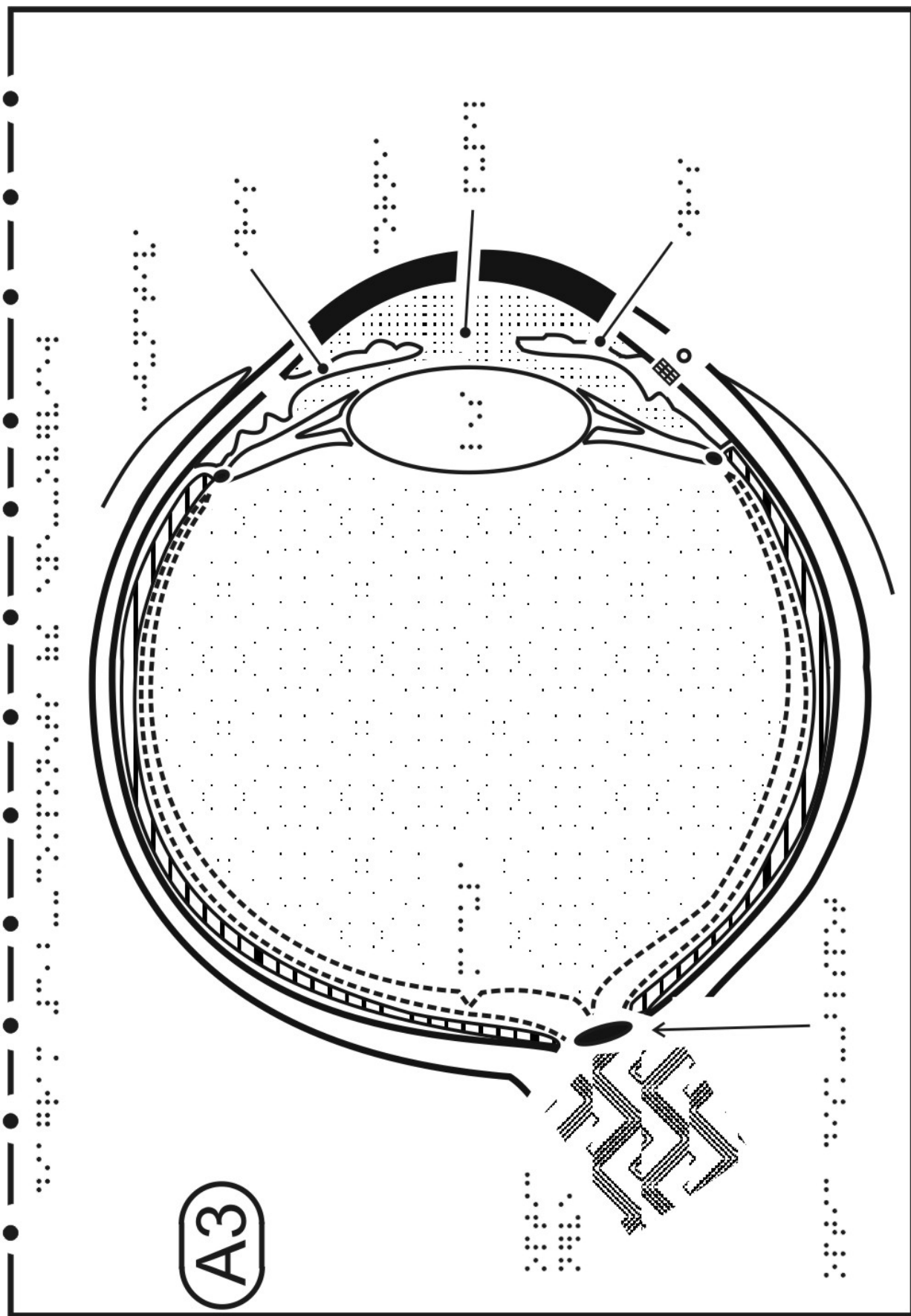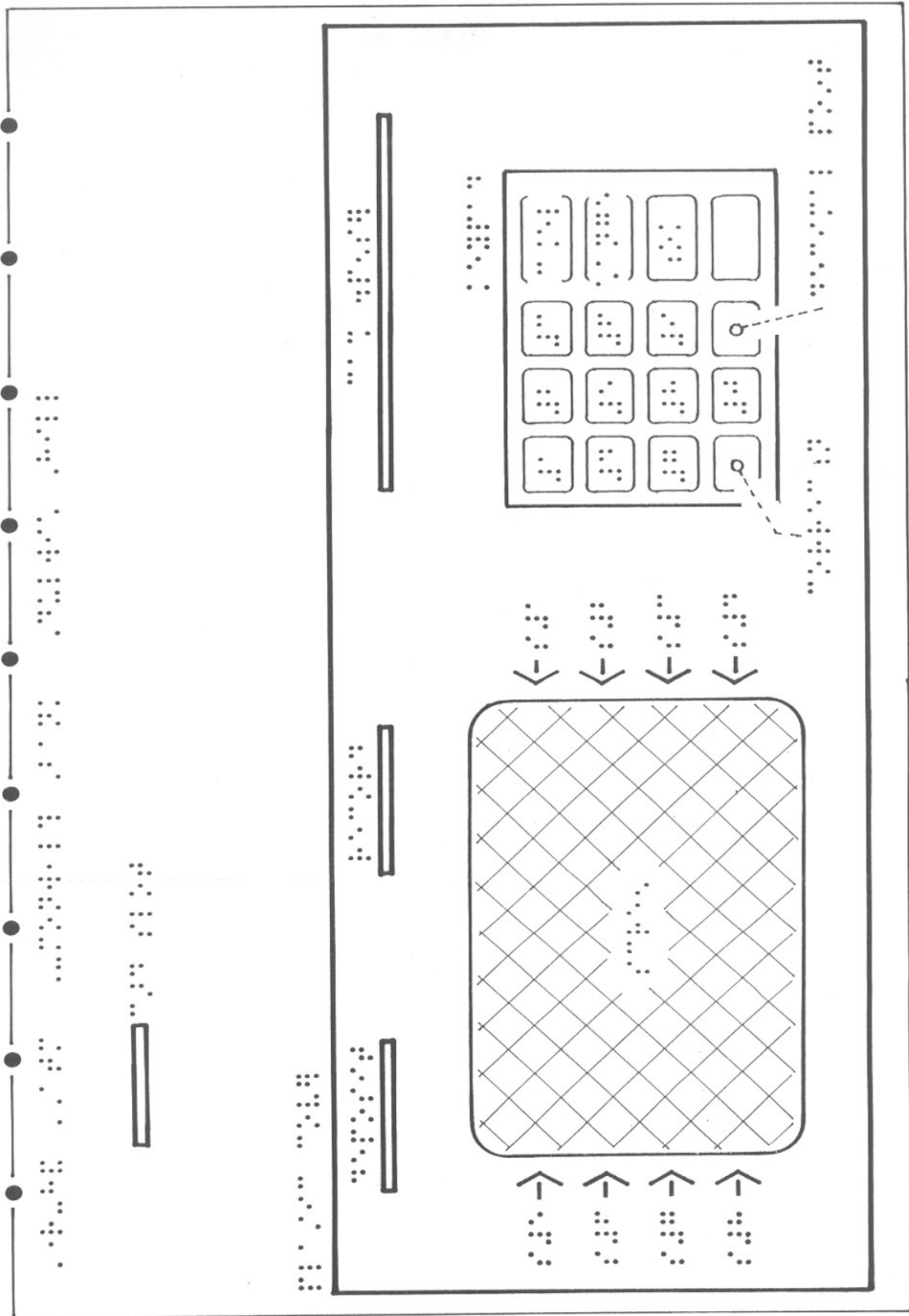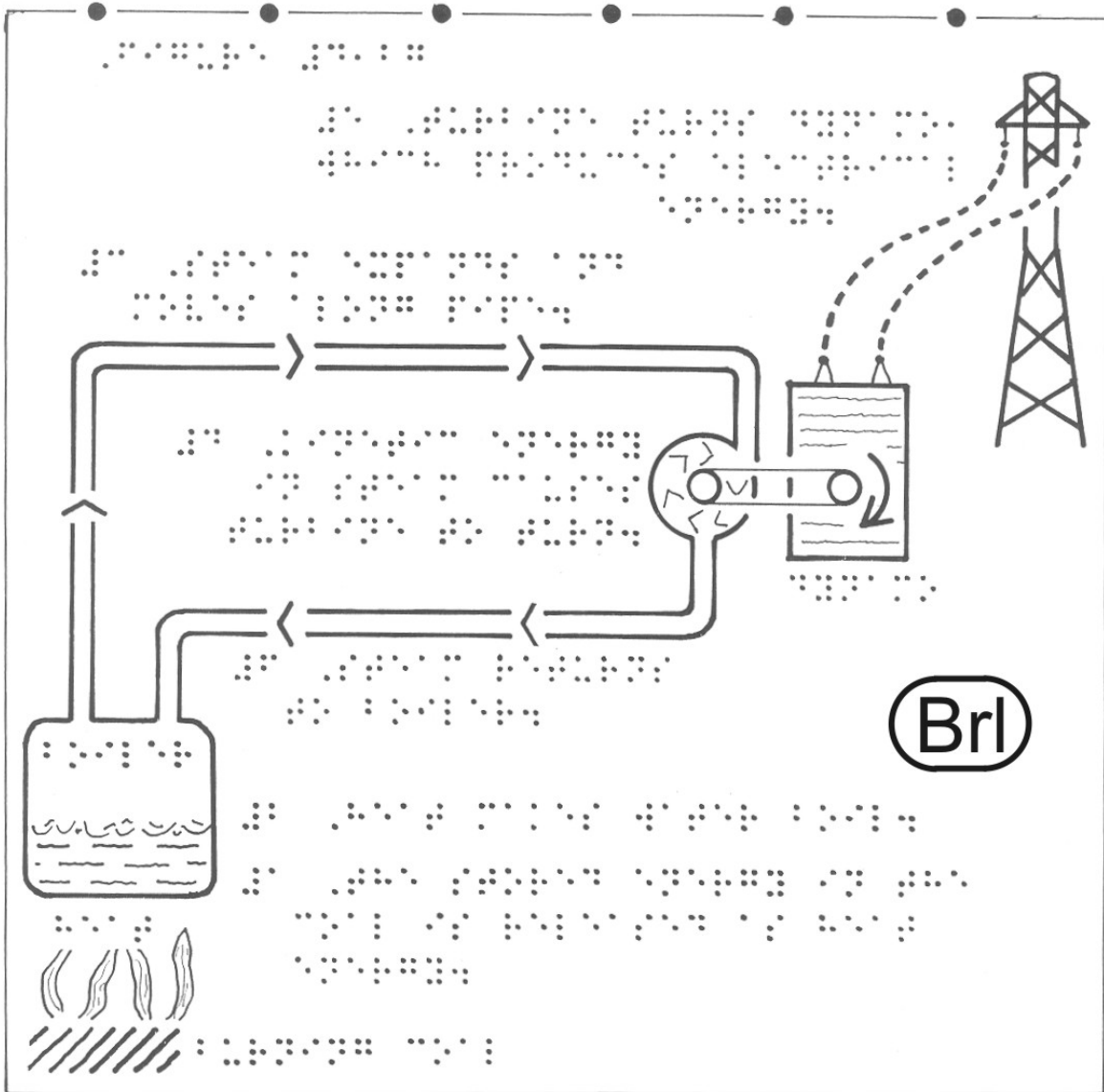
Figure 7.13

Figure 7.14

8. DRAWING HINTS FOR THE BEGINNER
(Without a Computer)

General

Before the advent of computers, all tactual graphics were produced by hand. There are definite advantages in computer drawing, including the ability to "Undo" mistakes, copy and paste shapes, change lines and patterns instantly, add and alter braille labels quickly and redesigning saved graphics. If you are just starting to use a computer for tactual work, see TABMAPs guide "Computer-Aided Tactual Graphics - Getting Started". If you prefer to work in the traditional method, the points below may assist...

Reasonable drafting skills are necessary for producing the more complex maps and diagrams, but anyone who is prepared to draw a freehand sketch for a sighted person can just as easily provide an equivalent sketch in Bold Print or tactual form. One of the appealing features associated with the employment of swell paper is its ease of use, although it is essential to have access to a fuser (Section 1).

Photocopiers make everything so much easier that their use should be considered essential. Some copiers will not handle swell paper and only those with a manual feed-through facility should be used. Check with your copier technician or supplier before attempting to copy with swell paper.

Tactual sketches require a knowledge of braille. If producing a no-braille tactual diagram with print, capital letters only should be used, and they should be at least 48 point (12 mm) high. The letters must not be too close together. In bold print maps the letters should be at least 18 point (4 mm high), and similar in style to those in the examples provided here. Even though maps may be produced freehand, a knowledge of the ideas put forward in the earlier sections of the Guide is still necessary.

Drawing details

A felt-tip pen giving a line roughly 1 mm wide is very good for sketches, with a ball-point pen for filling in patterns. Any colour is acceptable provided the copier reproduces it clearly in black. Plain A4 copying paper (or anything similar) can be used, although tracing paper has some advantages in the early drawing stages.

It is very easy to start a sketch at the wrong scale, to get it too far to one side, or to forget something important, so it is better to practise the drawing until an acceptable result has been obtained. Or the sketch may be drawn lightly in pencil, and inked over only when it is correct. Free use of correcting fluid will completely mask most errors and corrections. Several trial sketches may be required until the correct form and scale has been developed and the items to be included have been selected.

If there is an original map, tracing it is very simple. Most originals are too small for the purposes discussed here, but a copier can be used to enlarge them until a direct tracing is satisfactory (Section 3). Also, tracing paper allows patterns to be sketched easily and accurately using graph paper as a guide. Tracing paper should always be backed by a clean sheet of paper when copied, and because it tends to be fragile (and can be put into the copier upside down!) a plain paper copy should be used as the master.

Lettering

The practice drawing should ensure that there is enough room for the braille or print, and in some cases it is easier to apply the print or braille first and then draw round it.

Braille is best applied using rub-on dots. Care must be taken to ensure that none of the dots fall off before the map is copied, and if essential, they can be attached more firmly by spraying with varnish (hair spray will do). When corrections have to be made the dots can be scratched off easily.

If it is a bold print drawing, a print copy of the master can be sent to the client. When copying a tactual map it is not always easy getting some types of swell paper the right way up. While the differences are sometimes very small, the swelling side is smoother, glossier and deeper in colour than the reverse side. If the correct side has been chosen the map will leave the copier with a slight "orange-skin" texture to its background, but the drawing itself should stand out clearly. Errors or blemishes can be removed from swell paper by scratching with a sharp blade, and while it is better to do this before fusing it can be done after.

Figure 8.1 was produced using the methods outlined in this section.

Figure 8.1

Figure 8.1

55
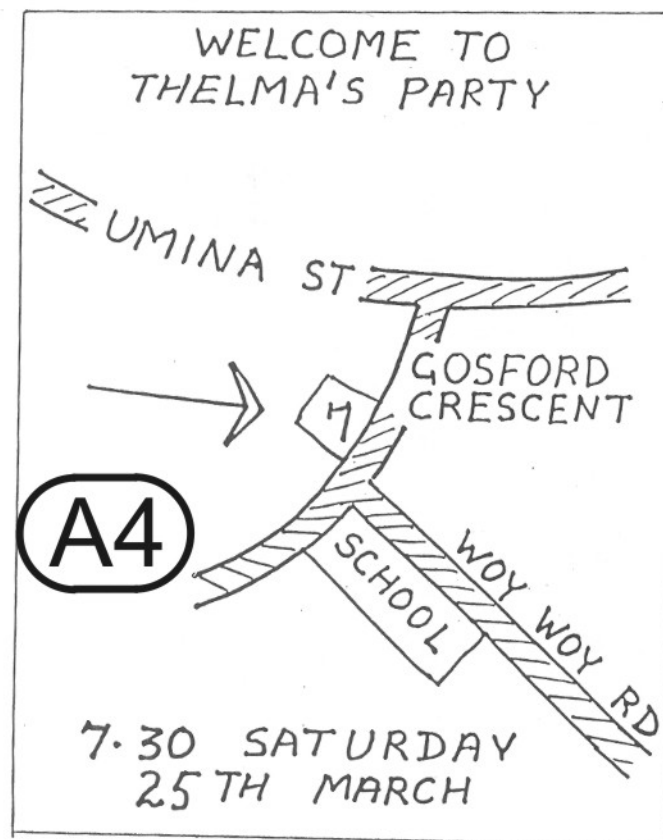
9. BRAILLE

Braille is a system of raised dots which can be read by touch. The braille "cell" consists of 6 dots ⠿. By varying the number of dots, a code is built up which may represent letters, numerals, punctuation, groups of letters or whole words; or even Greek or Russian characters.

Most Australian organisations using braille have adopted the new Unified English Braille (UEB) code for most braille transcriptions and tactual diagrams. The UEB code is intended to simplify the existing rules of braille across a range of countries. It contains a number of significant changes to the standard Australian braille code and guidelines can be obtained from most Australian braille producers.

The alphabet is:-
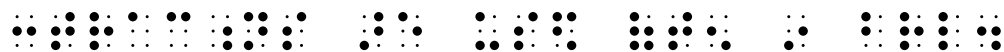
⠁	⠃	⠉	⠙	⠑	⠋	⠛	⠓	⠊	⠚	⠅	⠇	⠍	⠝
a	b	c	d	e	f	g	h	i	j	k	l	m	n

⠕	⠏	⠟	⠗	⠎	⠞	⠥	⠧	⠺	⠭	⠽	⠵
o	p	q	r	s	t	u	v	w	x	y	z

To write numbers, the letters "a-j" are used, each preceded by the number sign ⠼, as in

  3   ⠼⠉   25   ⠼⠃⠑

Groups of dots may also stand for groups of letters or words, such as "-tion", "ar", "ed", "of", "in", etc.

⠿⠿⠿⠿⠿⠿⠿ ⠿⠿ ⠿⠿⠿ ⠿⠿⠿⠿ ⠿ ⠿⠿⠿⠿⠿

means: "contractions are used often in braille".

Many groups of dots vary in meaning depending on their context. For example, the symbol ⠲ means the syllable "dis" if placed at the beginning of a word; a full stop at the end of a word; and it also stands for the 4 forming the lower part of a fraction such as ¾.

⠇⠑⠞ ⠥⠎ ⠲⠉⠥⠎⠎ ⠁⠙⠙⠊⠞⠊⠕⠝⠎ ⠞⠕ ⠍⠁⠏⠎⠲

means: "let us discuss additions to maps."

The spacing of the dots and cells is very important and the size of the braille cell cannot be changed by more than a few percent without it becoming increasingly difficult to read. Unlike print, there is very little redundancy in braille characters and errors are far more significant. In many cases a few cells of braille can be read upside down with a totally different meaning from that intended, so care must be taken, particularly with

abbreviations that are nearly vertical on the map. For example "mo" ⠍⠕ means "owing" if read upside down, and many other examples could be found.

For this and other reasons it is important that all braille should be written on a map by a qualified braille writer, and proof read if possible.

CONTACTS

TABMAP (The N.S.W. Tactual and Bold Print Mapping Committee)
c/o
Computer Aided Transcriptions Team Leader - Enfield
Business Development Vision Australia
4 Mitchell Street
ENFIELD NSW 2136
(02) 9334 3540

VISION AUSTRALIA
4 Mitchell Street
ENFIELD NSW 2136
AUSTRALIA
(02) 9334 3333