

BRAILLE AUTHORITY OF THE UNITED KINGDOM

Computer Committee

**BRAILLE COMPUTER NOTATION**

© Braille Authority of the United Kingdom 1996, 2006  
Registered Charity No. 1001157

Printed by Royal National Institute for the Blind, Peterborough, 2006.  
Registered Charity No. 226227

# CONTENTS

Members of the Computer Committee .....	2
Introduction .....	3
Note to 2006 Edition .....	3
Braille Computer Code .....	5
General Remarks .....	5
The Eight Dot Braille Code, and Six Dot Subset .....	5
The Braille Signs .....	6
The Standard Code .....	6
Using The Code, and Layout .....	6
Examples .....	10
Tables of Computer Braille Signs .....	12
(1) Standard Code Signs Arranged by Meaning .....	12
(A) Computer Code Indicators .....	12
(B) Font Signs .....	12
(C) Numerals .....	12
(D) Letters .....	13
(E) Other Print Symbols .....	14
(F) Unassigned Braille Signs .....	17
(2) Standard Code Signs Arranged in Braille Order .....	17
(3) 8-dot Braille Signs Arranged by ASCII Number .....	22
(4) 8-dot Braille Signs Arranged in Braille Order .....	31
Flowcharts .....	41
Decision Tables .....	44
Structured Systems Analysis Diagrams .....	46

## **MEMBERS OF THE COMPUTER COMMITTEE**

R. E. West (Chairman), CCTA, British Computer Association of the Blind

D. S. Boden, British Computer Association of the Blind

J. D. Burling, British Computer Association of the Blind

Ms. V. Jones, Royal National College for the Blind

N. Octon, RNIB

I. Paget, RNIB New College Worcester

S. J. Phippen (Secretary), RNIB

W. B. L. Poole, Chairman Braille Authority of the United Kingdom

J. Wilson, HMSO, British Computer Association of the Blind

# INTRODUCTION

This publication replaces the two documents ‘Computer Braille Code’ which was issued in 1985, and ‘Structured Systems Analysis and Design Methodology’, issued in 1987.

The Standard Code appearing in the previous documents has generally been retained, although a number of seldom used graphic symbols have been deleted, and a number of common mathematical signs have been added. The latter are based on their mathematics code counterparts, in order to try to obtain some measure of coherence between the two codes.

An eight dot braille code has been included in this edition, prompted by the increase in use of braille displays incorporating eight dot cells. Although other eight dot codes have emerged from other countries and another may seem superfluous, we felt that the advantages of our new code which both nests well with the standard six dot code, and is developed systematically to eight dot characters according to ASCII values, are strong enough for us to adopt it as our standard. We have also taken the opportunity to generally state ASCII values in all the tables of braille signs, as this omission had caused confusion in the previous publication.

The section dealing with structured systems analysis diagrams has been revised from the previous document, so that it is now more flexible, and we hope more accessible to the non-expert reader and transcriber. This revision was mainly driven by the changes made to the print documentation for such diagrams, which required a more generalised approach in braille, rather than treating each type of diagram separately, as was done previously.

## **Note to 2006 Edition**

An amendment has been made to the 2006 edition, whereby the default case for letters within computer coded expressions is now lower case rather than capital. This change reflects the more common use of lower case in recent computer materials and electronic addresses, and is consistent with the default stated in the 2004 edition of British Braille, which includes a section on the use of the braille computer code.



# BRaille COMPUTER CODE

## GENERAL REMARKS

The basic purpose of the braille computer code is to represent characters or expressions used in texts relating to computers, and for material input to or output by a computer. It consists of a scheme for precisely representing a wide range of print characters used in such contexts, and is designed so that the most frequently occurring print characters have a single braille cell representation. This last feature leads to differences between the computer code and Standard English Braille and Mathematics notation. The most significant departure from these codes is the way numbers are coded.

The computer code may also be used to represent formal or semi-formal expressions in a computer context, and for this purpose a few of the most common mathematical symbols used are also included. However, mathematics code or Standard English Braille may often be more appropriate, and provide a less cumbersome method of transcription. For example, expressions of binary arithmetic or longer passages of formal expressions of syntax using logical symbolism are usually best treated using mathematics code. An effort has been made to relate the mathematics signs in the computer code to the mathematics code signs in order to achieve some coherence between the two systems. Many of these signs, e.g. union, intersection, etc., are formed by adding a dot 5 to the corresponding mathematics code signs.

### **The Eight Dot Braille Code, and Six Dot Subset.**

In addition to the standard six dot computer code which contains double and triple cell signs as well as single cell signs, this document also includes an eight dot braille code. In this each of the 256 ASCII characters is represented by a single eight dot braille character.

This eight dot code has been designed so that the subset in which dots 7 and 8 are absent agrees with the standard six dot code (apart from one or two exceptions). The remainder are assigned automatically according to their ASCII value:

- adding dot 7 to a braille character subtracts 32 from the ASCII value;
- adding dot 8 adds 128 to the ASCII value;
- adding dots 7 and 8 adds 96 to the ASCII value (as implied by the preceding rules).

(The six dot characters are not 64 contiguous characters from the ASCII set, but are characters 32 to 63 and 96 to 127.) If only six dot braille cells are available, it is possible to regard these as capable of representing any of the four ASCII characters

whose eight dot braille equivalent contains that six dot pattern as dots 1-6. In this way, capital and lower case letters, which are distinguished in the eight dot code by the capitals having an additional dot 7, are represented by the same six dot braille character. However, although this dual representation may generally be utilized in the case of upper and lower case letters without explicit explanation, in other situations the 'normal' meaning of the six dot braille character should be regarded as being the ASCII character whose eight dot braille representation contains neither dots 7 nor 8.

The 8 dot code is useful for braille computer terminal displays, and the 6 dot subset may be useful for representing such displays on 6 dot embossed paper.

### The Braille Signs.

The code is presented in this document in 4 lists:

- (1) Standard Code braille signs arranged by meaning
- (2) Standard Code braille signs arranged in braille order
- (3) 8-dot braille signs arranged by ASCII number
- (4) 8-dot braille signs arranged in braille order

In each list the standard ASCII numbers (decimal and hexadecimal) are given where appropriate.

## THE STANDARD CODE

This is the code generally used in transcription work.

Multicell signs do not exceed 3 characters, and most begin with dot 5. Many of the 3-cell signs have the character  $\mathring{\cdot}$  as the second element in the sign.

Where print symbols are composed of elementary symbols the same composition has been followed in braille. E.g. 'less than or equals' is created using a 'less than' sign and an 'equals' sign. Similarly, when a hyphen together with a less than or greater than sign is used to form an arrow in print, the same method is followed in braille.

The primary meaning of the  $\mathring{\cdot}$  sign is the print underline character, which is consistent with the 8-dot code. However, this braille sign is also assigned to visible space, and where this use of it is made an explanatory note will be necessary in the text, and the secondary sign  $\mathring{\cdot}\mathring{\cdot}$  should then be used for the underline character if required.

### Using the Code, and Layout.

Computer coded expressions occurring within ordinary text must be preceded and followed by the  $\mathring{\cdot}\mathring{\cdot}$  computer code indicators. These are spaced like brackets, i.e. the opening indicator is unspaced from the first computer character,





continuation' sign, dot 5, if the division is made at a point where there is no space in print, but the terminator is not required where the line ends at a space. The text continuation sign is not required at the point of a genuine print runover. The text continuation sign is used in the same way for expressions enclosed within the ⠆⠆⠆ computer code indicators.

Other special layouts and alignments (e.g. stacked options or tabulated items) should be set out on the same basis in braille, though it will not always be possible to follow this exactly, because of the shortness of the braille line. Runovers for items within such stacked formats should begin 4 cells further in than the start of the item, so that the stack format is preserved.

Blank lines should generally be reproduced. Blank spaces should generally be reproduced, though 3 or more spaces in print used pictorially can generally be represented as 2 spaces in the braille unless there are particular reasons to preserve them, for example, in setting out stacks. Computer expressions and programs set out in books may suffer from the spaces not being reproduced consistently or clearly due to the way the book has been typeset in print. It should be the aim to treat such ambiguities consistently in the braille, though where the print is clear, the print format should be adhered to in the braille (even if this may not be the spacing used by the programmer).

Extraneous comments annotating programs, i.e. remarks added by the author of the book, but not actually keyed into the text of the program, should normally be enclosed in Standard English Braille round brackets, and brailled with contractions. They are placed after 3 blank spaces at the end of the appropriate program line, or placed on a new line, according to the print format. Runovers are indented as for program lines. Computer code expressions within such expressions will require ⠆⠆⠆ computer code indicators as usual for ordinary text. The reader should be forewarned of such comments by an explanatory note. Comments which are intended to be keyed into the text of the program or are formatted as such, should be treated as ordinary computer text program lines.

Named keys consisting of full words or abbreviations in ordinary text, e.g. CTRL, RETURN, ALT, etc. should be placed in Standard English Braille quotes, and treated as ordinary text with contractions (without indicating capitals). Special character key names e.g. ^, \_, etc. are coded using ⠆⠆⠆ signs and computer code as usual. Function keys such as F1, F2, etc., are coded in Standard English Braille as ⠆⠆⠆⠆⠆, ⠆⠆⠆⠆⠆ or ⠆⠆⠆⠆⠆, ⠆⠆⠆⠆⠆, etc. Individual letter keys e.g. A, B, C, etc., in ordinary text can be simply coded as ⠆⠆⠆, ⠆⠆⠆, ⠆⠆⠆, etc., without ⠆⠆⠆'s. Dot 6 separation signs may be advisable here before following punctuation, especially where other mathematics notation is present.

Long brackets used, for example, in expressions of syntax, e.g.

$$\left( \quad \right) \quad \left\{ \quad \right\}$$

may be drawn out diagrammatically if possible, or may be coded in braille using the 'long bracket' signs which consist of the corresponding ordinary bracket sign preceded by a dot 6 (the latter not being regarded as a capital indicator). Thus

$$\left[ \begin{array}{c} \dots \\ \dots \end{array} \right] \quad \text{is coded as} \quad \begin{array}{c} \dots \\ \dots \end{array} \dots \begin{array}{c} \dots \\ \dots \end{array}$$

etc. Care should be taken to ensure that one set of long brackets does not lie directly below another set of the same type, since the length of such brackets would be obscured. A blank line should be inserted between these sets in such cases.

## EXAMPLES

The general format of the WHILE statement is:

```
WHILE condition DO  
  statement;
```

where *statement* can be single or compound.

Below is a program fragment containing a WHILE statement. The <> sign in the condition means 'not equal to':

```
READ(DOLLARS);  
WHILE DOLLARS <> -99 DO  
  BEGIN  
    WRITELN(DOLLARS*5);  
    READ(DOLLARS);  
  END;
```

identifier IS [NOT] { NUMERIC }  
 { ALPHABETIC }

# TABLES OF COMPUTER BRAILLE SIGNS

## (1) STANDARD CODE SIGNS ARRANGED BY MEANING

In the following list, opening and closing font signs and bracket signs are placed together under one entry.

Braille signs are followed by their ASCII numbers in decimal and hexadecimal (in brackets), where applicable.

### (A) Computer Code Indicators

Centred on a separate line:	12	⠠	's	12	⠨	's
Within ordinary text:	⠠	⠠		⠨	⠨	
Text continuation sign:	⠠					

### (B) Font Signs

bold:	⠠	⠠	⠠	⠠	⠠
inverse video:	⠠	⠠	⠠	⠠	⠠
italic:	⠠	⠠	⠠	⠠	⠠
lower case:	⠠				
subscript:	⠠	⠠	⠠	⠠	⠠
superscript:	⠠	⠠	⠠	⠠	⠠
underlined:	⠠	⠠	⠠	⠠	⠠
double underlined:	Use two levels of underlined enclosure				
upper case (capital):	⠠				

### (C) Numerals

zero	⠠	48 (30)
one	⠠	49 (31)
two	⠠	50 (32)
three	⠠	51 (33)
four	⠠	52 (34)
five	⠠	53 (35)





TABLE 1: STANDARD CODE BY MEANING

six	⋮	54 (36)
seven	⋮	55 (37)
eight	⋮	56 (38)
nine	⋮	57 (39)

## (D) Letters

ASCII numbers refer to upper and lower case respectively.


A	⋮	65 (41); 97 (61)
B	⋮	66 (42); 98 (62)
C	⋮	67 (43); 99 (63)
D	⋮	68 (44); 100 (64)
E	⋮	69 (45); 101 (65)
F	⋮	70 (46); 102 (66)
G	⋮	71 (47); 103 (67)
H	⋮	72 (48); 104 (68)
I	⋮	73 (49); 105 (69)
J	⋮	74 (4A); 106 (6A)
K	⋮	75 (4B); 107 (6B)
L	⋮	76 (4C); 108 (6C)
M	⋮	77 (4D); 109 (6D)
N	⋮	78 (4E); 110 (6E)
O	⋮	79 (4F); 111 (6F)
P	⋮	80 (50); 112 (70)
Q	⋮	81 (51); 113 (71)
R	⋮	82 (52); 114 (72)
S	⋮	83 (53); 115 (73)
T	⋮	84 (54); 116 (74)
U	⋮	85 (55); 117 (75)
V	⋮	86 (56); 118 (76)

W		87 (57); 119 (77)
X		88 (58); 120 (78)
Y		89 (59); 121 (79)
Z		90 (5A); 122 (7A)

(E) Other Print Symbols

ampersand &  38 (26)

and  $\wedge$  


apostrophe '  39 (27)


arrows:

up  $\uparrow$   24 (18)


down  $\downarrow$   25 (19)


left  $\leftarrow$   27 (1B)

left with separate single shaft  $\leftarrow$  


left with separate double shaft  $\leftarrow$  


right  $\rightarrow$   26 (1A)

right with separate single shaft  $\rightarrow$  



right with separate double shaft  $\rightarrow$  



assignment  $:=$  



asterisk (star) \*  42 (2A)



backward oblique stroke (backslash)  $\backslash$   92 (5C)

brackets:

round: (  40 (28); )  41 (29)

square: [  91 (5B); ]  93 (5D)

brace: {  123 (7B); }  125 (7D)

angle: <  60 (3C); >  62 (3E)

bullet  $\bullet$   7 (07)

cent  $\cent$   155 (9B)

circle (empty)  $\circ$   9 (09)

colon :  58 (3A)



TABLE 1: STANDARD CODE BY MEANING

comma ,  $\cdot\cdot$  44 (2C)

commercial at @  $\cdot\cdot\cdot$  64 (40)

concatenation ||  $\cdot\cdot\cdot\cdot$

contained in  $\subset$   $\cdot\cdot\cdot\cdot\cdot$

contains  $\supset$   $\cdot\cdot\cdot\cdot\cdot$

corners:

right-hand top  $\top$   $\cdot\cdot\cdot\cdot\cdot$  191 (BF)

left-hand top  $\Gamma$   $\cdot\cdot\cdot\cdot\cdot$  218 (DA)

left-hand bottom  $\perp$   $\cdot\cdot\cdot\cdot\cdot$  192 (C0)

right-hand bottom  $\perp$   $\cdot\cdot\cdot\cdot\cdot$  217 (D9)

cross, multiplied by  $\times$   $\cdot\cdot\cdot\cdot$

cursor =  $\cdot\cdot\cdot\cdot$

decimal point  $\cdot$   $\cdot\cdot$  46 (2E)

degree  $^\circ$   $\cdot\cdot\cdot\cdot$  248 (F8)

dollar \$  $\cdot\cdot$  36 (24)

double chevron:

left  $\ll$   $\cdot\cdot\cdot\cdot$  174 (AE)

right  $\gg$   $\cdot\cdot\cdot\cdot$  175 (AF)

equals =  $\cdot\cdot$  61 (3D)

equivalent to (three horizontal bars)  $\equiv$   $\cdot\cdot\cdot\cdot\cdot\cdot$  240 (F0)

exclamation mark !  $\cdot\cdot$  33 (21)

expands to ::=  $\cdot\cdot\cdot\cdot\cdot\cdot$

for all  $\forall$   $\cdot\cdot\cdot\cdot\cdot$

full stop .  $\cdot\cdot$  46 (2E)

grave  $\grave{\cdot}$   $\cdot\cdot\cdot\cdot$  96 (60)

greater than  $>$   $\cdot\cdot$  62 (3E)

greater than or equal to  $>=$   $\cdot\cdot\cdot\cdot$

hash #  $\cdot\cdot\cdot\cdot$  35 (23)

hat (caret, circumflex)  $\hat{\cdot}$   $\cdot\cdot\cdot\cdot$  94 (5E)

hyphen -  $\cdot\cdot$  45 (2D)

intersection  $\cap$   $\cdot\cdot\cdot\cdot\cdot\cdot$  239 (EF)

TABLE 1: STANDARD CODE BY MEANING

is an element of $\in$	$\cdot\cdot\cdot\cdot\cdot\cdot$	238 (EE)
is defined as $::=$	$\cdot\cdot\cdot\cdot\cdot\cdot$	
less than $<$	$\cdot\cdot$	60 (3C)
less than or equal to $<=$	$\cdot\cdot\cdot\cdot$	
minus $-$	$\cdot\cdot$	45 (2D)
mu $\mu$	$\cdot\cdot\cdot\cdot\cdot\cdot$	230 (E6)
not $\neg$	$\cdot\cdot\cdot\cdot\cdot\cdot$	170 (AA)
not equal to (character) $\neq$	$\cdot\cdot\cdot\cdot$	
oblique stroke (slash) $/$	$\cdot\cdot$	47 (2F)
or $\vee$	$\cdot\cdot\cdot\cdot\cdot\cdot$	
or (vertical bar) $ $	$\cdot\cdot\cdot\cdot$	179 (B3)
paragraph $\P$	$\cdot\cdot\cdot\cdot$	20 (14)
percent $\%$	$\cdot\cdot$	37 (25)
pipe (vertical line with gap) $ $	$\cdot\cdot\cdot\cdot$	124 (7C)
plus $+$	$\cdot\cdot$	43 (2B)
plus or minus $\pm$	$\cdot\cdot\cdot\cdot\cdot\cdot$	241 (F1)
pound $\pounds$	$\cdot\cdot\cdot\cdot$	156 (9C)
query $?$	$\cdot\cdot$	63 (3F)
quotes:		
double $"$	$\cdot\cdot$	34 (22)
single $'$	$\cdot\cdot$	39 (27)
return key (enter key) (left/right curving arrow) $\rightarrow \leftarrow$	$\cdot\cdot\cdot\cdot$	
section $\S$	$\cdot\cdot\cdot\cdot$	21 (15)
semicolon $;$	$\cdot\cdot$	59 (3B)
square (black) $\blacksquare$	$\cdot\cdot\cdot\cdot\cdot\cdot$	254 (FE)
square (empty) $\square$	$\cdot\cdot\cdot\cdot\cdot\cdot$	
square root $\sqrt{\quad}$	$\cdot\cdot\cdot\cdot$	251 (FB)
T-shape $\top$	$\cdot\cdot\cdot\cdot\cdot\cdot$	194 (C2)
T-shape inverted $\perp$	$\cdot\cdot\cdot\cdot\cdot\cdot$	193 (C1)
there exists $\exists$	$\cdot\cdot\cdot\cdot\cdot\cdot$	

tilde ~ ⠠⠠ 126 (7E)

triangle:

pointing down ▽ ⠠⠠⠠

pointing left ◁ ⠠⠠⠠

pointing right ▷ ⠠⠠⠠

pointing up ▲ ⠠⠠⠠

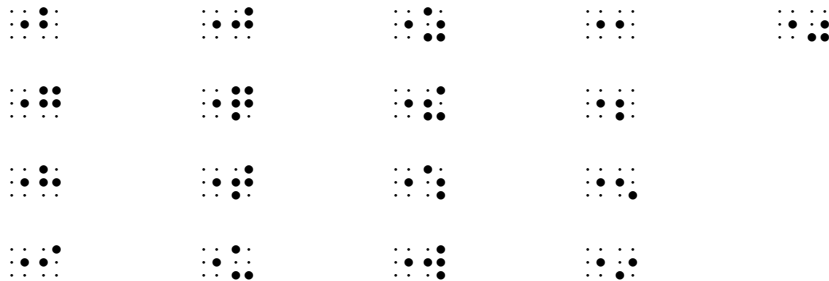
underline character \_ primary sign ⠠⠠; secondary sign ⠠⠠ 95 (5F) (See P.6)

union ∪ ⠠⠠⠠

visible space ⠠⠠

### (F) Unassigned Braille Signs

The following braille signs are unassigned, and are free to be assigned locally when required for other print characters. An explanatory note will be needed in such cases. To keep the list within reasonable bounds, only 2-cell signs beginning with dot 5 have been listed here (and even then, not all of these): this does not exclude the possibility of other free signs being used if required.



### (2) STANDARD CODE SIGNS ARRANGED IN BRAILLE ORDER

This list is arranged in the conventional order of braille characters according to the last or sole braille character of the sign. The main entries are single cell signs, and subentries are multicell signs with the same final braille character.

The signs are followed by their ASCII numbers in decimal and hexadecimal (in brackets), where applicable.

For letters, ASCII numbers refer to upper and lower case respectively.

TABLE 2: STANDARD CODE IN BRAILLE ORDER

⠠	A	65 (41); 97 (61)
⠠	B	66 (42); 98 (62)
⠠	C	67 (43); 99 (63)
⠠	cent ¢	155 (9B)
⠠	circle (empty) ○	9 (09)
⠠	D	68 (44); 100 (64)
⠠	right arrow →	26 (1A)
⠠	triangle pointing up Δ	
⠠	E	69 (45); 101 (65)
⠠	grave `	96 (60)
⠠	F	70 (46); 102 (66)
⠠	left arrow ←	27 (1B)
⠠	triangle pointing left ◀	
⠠	G	71 (47); 103 (67)
⠠	H	72 (48); 104 (68)
⠠	triangle pointing right ▶	
⠠	I	73 (49); 105 (69)
⠠	J	74 (4A); 106 (6A)
⠠	triangle pointing down ▼	
⠠	K	75 (4B); 107 (6B)
⠠	pipe (vertical line with gap)	124 (7C)
⠠	L	76 (4C); 108 (6C)
⠠	or (vertical bar)	179 (B3)
⠠	M	77 (4D); 109 (6D)
⠠	underline character _	95 (5F) (secondary sign) (See P.6)
⠠	mu μ	230 (E6)
⠠	N	78 (4E); 110 (6E)
⠠	inverse video indicator	
⠠	O	79 (4F); 111 (6F)
⠠	(centred line of 12) computer code terminator	

TABLE 2: STANDARD CODE IN BRAILLE ORDER

⠠	⠠	up arrow ↑	24 (18)
⠠	⠠	contains ⊃	
⠠	P	80 (50); 112 (70)	
⠠	⠠	paragraph ¶	20 (14)
⠠	Q	81 (51); 113 (71)	
⠠	R	82 (52); 114 (72)	
⠠	⠠	return key (enter key) (left/right curving arrow) ↵ ↶	
⠠	S	83 (53); 115 (73)	
⠠	⠠	section §	21 (15)
⠠	T	84 (54); 116 (74)	
⠠	⠠	T-shape ⊥	194 (C2)
⠠	U	85 (55); 117 (75)	
⠠	V	86 (56); 118 (76)	
⠠	⠠	terminate bold	
⠠	X	88 (58); 120 (78)	
⠠	⠠	terminate italic	
⠠	Y	89 (59); 121 (79)	
⠠	⠠	right double chevron »	175 (AF)
⠠	Z	90 (5A); 122 (7A)	
⠠	⠠	ampersand &	38 (26)
⠠	⠠	left double chevron «	174 (AE)
⠠	⠠	zero 0	48 (30)
⠠	⠠	left square bracket [	91 (5B)
⠠	⠠	left brace bracket {	123 (7B)
⠠	⠠	commercial ‘at’ @	64 (40)
⠠	⠠	right square bracket ]	93 (5D)
⠠	⠠	right brace bracket }	125 (7D)
⠠	⠠	one 1	49 (31)
⠠	⠠	subscript	
⠠	⠠	two 2	50 (32)

TABLE 2: STANDARD CODE IN BRAILLE ORDER

$\text{⠠⠨}$	underlined (as braille indicator)
$\text{⠠⠠⠠}$	three 3 51 (33)
$\text{⠠⠠⠠⠠}$	square root $\sqrt{\quad}$ 251 (FB)
$\text{⠠⠠⠠}$	four 4 52 (34)
$\text{⠠⠠⠠⠠}$	hat (caret, circumflex) $\hat{\quad}$ 94 (5E)
$\text{⠠⠠⠠}$	five 5 53 (35)
$\text{⠠⠠⠠⠠⠠}$	square (black) $\blacksquare$ 254 (FE)
$\text{⠠⠠⠠}$	six 6 54 (36)
$\text{⠠⠠⠠⠠⠠}$	square (empty) $\square$
$\text{⠠⠠⠠}$	terminate inverse video
$\text{⠠⠠⠠}$	seven 7 55 (37)
$\text{⠠⠠⠠⠠}$	terminate subscript or superscript
$\text{⠠⠠⠠}$	eight 8 56 (38)
$\text{⠠⠠⠠⠠⠠}$	T-shape, inverted $\perp$ 193 (C1)
$\text{⠠⠠⠠}$	nine 9 57 (39)
$\text{⠠⠠⠠}$	(centred line of 12) computer code indicator
$\text{⠠⠠⠠⠠⠠}$	contained in $\subset$
$\text{⠠⠠⠠}$	down arrow $\downarrow$ 25 (19)
$\text{⠠⠠}$	W 87 (57); 119 (77)
$\text{⠠⠠}$	comma , 44 (2C)
$\text{⠠⠠⠠⠠}$	for all $\forall$
$\text{⠠⠠}$	semicolon ; 59 (3B)
$\text{⠠⠠}$	colon : 58 (3A)
$\text{⠠⠠⠠}$	cursor $\_$
$\text{⠠⠠}$	full stop . 46 (2E)
$\text{⠠⠠}$	decimal point . 46 (2E)
$\text{⠠⠠⠠⠠⠠}$	right-hand top corner $\top$ 191 (BF)
$\text{⠠⠠⠠}$	degree $^\circ$ 248 (F8)
$\text{⠠⠠}$	query ? 63 (3F)
$\text{⠠⠠⠠⠠}$	there exists $\exists$

TABLE 2: STANDARD CODE IN BRAILLE ORDER

- ⠠⠠ plus + 43 (2B)
  - ⠠⠠⠠ left-hand top corner  $\ulcorner$  218 (DA)
  - ⠠⠠⠠ concatenation  $\parallel$
- ⠠⠠ equals = 61 (3D)
  - ⠠⠠⠠ is defined as, expands to  $::=$
  - ⠠⠠⠠ assignment  $:=$
  - ⠠⠠⠠ less than or equal to  $<=$
  - ⠠⠠⠠ left arrow with separate double shaft  $<=$
  - ⠠⠠⠠ greater than or equal to  $>=$
  - ⠠⠠⠠ not equal to (character)  $\neq$
  - ⠠⠠⠠ equivalent to (three horizontal bars)  $\equiv$  240 (F0)
- ⠠⠠ less than < 60 (3C)
  - ⠠⠠ left angle bracket  $<$  60 (3C)
  - ⠠⠠⠠ left-hand bottom corner  $\llcorner$  192 (C0)
  - ⠠⠠⠠ intersection  $\cap$  239 (EF)
  - ⠠⠠⠠ cross, multiplied by  $\times$
  - ⠠⠠⠠ and  $\wedge$
- ⠠⠠ asterisk (star) \* 42 (2A)
  - ⠠⠠⠠ is an element of  $\in$  238 (EE)
- ⠠⠠ greater than > 62 (3E)
  - ⠠⠠⠠ right arrow with separate double shaft  $=>$
  - ⠠⠠ right angle bracket  $>$  62 (3E)
  - ⠠⠠⠠ right arrow with separate single shaft  $->$
  - ⠠⠠⠠ right-hand bottom corner  $\lrcorner$  217 (D9)
- ⠠⠠ oblique stroke (slash) / 47 (2F)
  - ⠠⠠⠠ back oblique stroke (backslash)  $\backslash$  92 (5C)
- ⠠⠠ right round bracket ) 41 (29)
  - ⠠⠠⠠ bullet  $\bullet$  7 (07)
  - ⠠⠠⠠ terminate underlined
- ⠠⠠ exclamation mark ! 33 (21)

TABLE 3: 8-DOT SIGNS BY ASCII NUMBER

- ⠠⠠⠠ bold indicator
- ⠠⠠ underline character \_ 95 (5F) (primary sign) (See P.6)
- ⠠⠠ visible space \_
- ⠠⠠⠠ superscript
- ⠠⠠⠠ computer code indicator
- ⠠⠠ apostrophe ' 39 (27)
- ⠠⠠ single quote ' 39 (27)
- ⠠⠠ hyphen - 45 (2D)
- ⠠⠠⠠ left arrow with separate single shaft <-
- ⠠⠠ minus - 45 (2D)
- ⠠⠠⠠⠠ plus or minus ± 241 (F1)
- ⠠⠠⠠ tilde ~ 126 (7E)
- ⠠⠠ double quote " 34 (22)
- ⠠⠠ left round bracket ( 40 (28)
- ⠠⠠ dollar \$ 36 (24)
- ⠠⠠⠠ pound £ 156 (9C)
- ⠠⠠ text continuation sign
- ⠠⠠ percent % 37 (25)
- ⠠⠠⠠ italic indicator
- ⠠⠠ lower case
- ⠠⠠⠠ hash # 35 (23)
- ⠠⠠ upper case (capital)
- ⠠⠠ long bracket indicator

(3) 8-DOT BRAILLE SIGNS ARRANGED BY ASCII NUMBER

Dec	Hex	Char	Braille Sign
0	00	(nul)	7
1	01	☺	⠠⠠ + 7
2	02	☹	⠠⠠ + 7



TABLE 3: 8-DOT SIGNS BY ASCII NUMBER

3	03	♥	⋯ + 7
4	04	♦	⋯ + 7
5	05	♣	⋯ + 7
6	06	♠	⋯ + 7
7	07	●	⋯ + 7
8	08	■	⋯ + 7
9	09	○	⋯ + 7
10	0A	◉	⋯ + 7
11	0B	♂	⋯ + 7
12	0C	♀	⋯ + 7
13	0D	♪	⋯ + 7
14	0E	♫	⋯ + 7
15	0F	⚙	⋯ + 7
16	10	▶	⋯ + 7
17	11	◀	⋯ + 7
18	12	↑	⋯ + 7
19	13	!!	⋯ + 7
20	14	¶	⋯ + 7
21	15	§	⋯ + 7
22	16	▬	⋯ + 7
23	17	↕	⋯ + 7
24	18	↑	⋯ + 7
25	19	↓	⋯ + 7
26	1A	→	⋯ + 7
27	1B	←	⋯ + 7
28	1C	└	⋯ + 7
29	1D	↔	⋯ + 7
30	1E	▲	⋯ + 7
31	1F	▼	⋯ + 7
32	20	(space)	(space)

TABLE 3: 8-DOT SIGNS BY ASCII NUMBER

33	21	!	⠁
34	22	"	⠗
35	23	#	⠈
36	24	\$	⠵
37	25	%	⠼
38	26	&	⠤
39	27	'	⠗
40	28	(	⠸
41	29	)	⠸
42	2A	*	⠼
43	2B	+	⠼
44	2C	,	⠸
45	2D	-	⠼
46	2E	.	⠼
47	2F	/	⠼
48	30	0	⠼
49	31	1	⠼
50	32	2	⠼
51	33	3	⠼
52	34	4	⠼
53	35	5	⠼
54	36	6	⠼
55	37	7	⠼
56	38	8	⠼
57	39	9	⠼
58	3A	:	⠼
59	3B	;	⠼
60	3C	<	⠼
61	3D	=	⠼
62	3E	>	⠼

TABLE 3: 8-DOT SIGNS BY ASCII NUMBER

63	3F	?	⋮
64	40	@	⋮ + 7
65	41	A	⋮ + 7
66	42	B	⋮ + 7
67	43	C	⋮ + 7
68	44	D	⋮ + 7
69	45	E	⋮ + 7
70	46	F	⋮ + 7
71	47	G	⋮ + 7
72	48	H	⋮ + 7
73	49	I	⋮ + 7
74	4A	J	⋮ + 7
75	4B	K	⋮ + 7
76	4C	L	⋮ + 7
77	4D	M	⋮ + 7
78	4E	N	⋮ + 7
79	4F	O	⋮ + 7
80	50	P	⋮ + 7
81	51	Q	⋮ + 7
82	52	R	⋮ + 7
83	53	S	⋮ + 7
84	54	T	⋮ + 7
85	55	U	⋮ + 7
86	56	V	⋮ + 7
87	57	W	⋮ + 7
88	58	X	⋮ + 7
89	59	Y	⋮ + 7
90	5A	Z	⋮ + 7
91	5B	[	⋮ + 7
92	5C	\	⋮ + 7

TABLE 3: 8-DOT SIGNS BY ASCII NUMBER

93	5D	]	⠠ + 7
94	5E	^	⠠ + 7
95	5F	_	⠠ + 7
96	60	`	⠠
97	61	a	⠠
98	62	b	⠠
99	63	c	⠠
100	64	d	⠠
101	65	e	⠠
102	66	f	⠠
103	67	g	⠠
104	68	h	⠠
105	69	i	⠠
106	6A	j	⠠
107	6B	k	⠠
108	6C	l	⠠
109	6D	m	⠠
110	6E	n	⠠
111	6F	o	⠠
112	70	p	⠠
113	71	q	⠠
114	72	r	⠠
115	73	s	⠠
116	74	t	⠠
117	75	u	⠠
118	76	v	⠠
119	77	w	⠠
120	78	x	⠠
121	79	y	⠠
122	7A	z	⠠

TABLE 3: 8-DOT SIGNS BY ASCII NUMBER

123	7B	{	⸮
124	7C		⸮
125	7D	}	⸮
126	7E	~	⸮
127	7F	⏏	⸮
128	80	Ç	7-8
129	81	ü	⸮ + 7-8
130	82	é	⸮ + 7-8
131	83	â	⸮ + 7-8
132	84	ä	⸮ + 7-8
133	85	à	⸮ + 7-8
134	86	å	⸮ + 7-8
135	87	ç	⸮ + 7-8
136	88	ê	⸮ + 7-8
137	89	ë	⸮ + 7-8
138	8A	è	⸮ + 7-8
139	8B	ï	⸮ + 7-8
140	8C	î	⸮ + 7-8
141	8D	ì	⸮ + 7-8
142	8E	Ä	⸮ + 7-8
143	8F	Å	⸮ + 7-8
144	90	É	⸮ + 7-8
145	91	æ	⸮ + 7-8
146	92	Æ	⸮ + 7-8
147	93	ô	⸮ + 7-8
148	94	ö	⸮ + 7-8
149	95	ò	⸮ + 7-8
150	96	û	⸮ + 7-8
151	97	ù	⸮ + 7-8
152	98	ÿ	⸮ + 7-8

TABLE 3: 8-DOT SIGNS BY ASCII NUMBER

153	99	Ö	⋈ + 7-8
154	9A	Ü	⋈ + 7-8
155	9B	ç	⋈ + 7-8
156	9C	£	⋈ + 7-8
157	9D	¥	⋈ + 7-8
158	9E	₣	⋈ + 7-8
159	9F	ƒ	⋈ + 7-8
160	A0	á	8
161	A1	í	⋈ + 8
162	A2	ó	⋈ + 8
163	A3	ú	⋈ + 8
164	A4	ñ	⋈ + 8
165	A5	Ñ	⋈ + 8
166	A6	ª	⋈ + 8
167	A7	º	⋈ + 8
168	A8	¿	⋈ + 8
169	A9	¬	⋈ + 8
170	AA	¬	⋈ + 8
171	AB	½	⋈ + 8
172	AC	¼	⋈ + 8
173	AD	¡	⋈ + 8
174	AE	«	⋈ + 8
175	AF	»	⋈ + 8
176	B0	⋈	⋈ + 8
177	B1	⋈	⋈ + 8
178	B2	⋈	⋈ + 8
179	B3		⋈ + 8
180	B4	⋈	⋈ + 8
181	B5	⋈	⋈ + 8
182	B6	⋈	⋈ + 8

TABLE 3: 8-DOT SIGNS BY ASCII NUMBER

183	B7	⌈	⋮ + 8
184	B8	⌊	⋮ + 8
185	B9	⌋	⋮ + 8
186	BA	⌌	⋮ + 8
187	BB	⌍	⋮ + 8
188	BC	⌎	⋮ + 8
189	BD	⌏	⋮ + 8
190	BE	⌐	⋮ + 8
191	BF	⌑	⋮ + 8
192	C0	⌒	⋮ + 7-8
193	C1	⌓	⋮ + 7-8
194	C2	⌔	⋮ + 7-8
195	C3	⌕	⋮ + 7-8
196	C4	⌖	⋮ + 7-8
197	C5	⌗	⋮ + 7-8
198	C6	⌘	⋮ + 7-8
199	C7	⌙	⋮ + 7-8
200	C8	⌚	⋮ + 7-8
201	C9	⌛	⋮ + 7-8
202	CA	⌜	⋮ + 7-8
203	CB	⌝	⋮ + 7-8
204	CC	⌞	⋮ + 7-8
205	CD	⌟	⋮ + 7-8
206	CE	⌠	⋮ + 7-8
207	CF	⌡	⋮ + 7-8
208	D0	⌢	⋮ + 7-8
209	D1	⌣	⋮ + 7-8
210	D2	⌤	⋮ + 7-8
211	D3	⌥	⋮ + 7-8
212	D4	⌦	⋮ + 7-8

TABLE 3: 8-DOT SIGNS BY ASCII NUMBER

213	D5	ƒ	⋮ + 7-8
214	D6	π	⋮ + 7-8
215	D7	≡	⋮ + 7-8
216	D8	≠	⋮ + 7-8
217	D9	┘	⋮ + 7-8
218	DA	Г	⋮ + 7-8
219	DB	■	⋮ + 7-8
220	DC	■	⋮ + 7-8
221	DD	▮	⋮ + 7-8
222	DE	▮	⋮ + 7-8
223	DF	■	⋮ + 7-8
224	E0	α	⋮ + 8
225	E1	β	⋮ + 8
226	E2	Γ	⋮ + 8
227	E3	π	⋮ + 8
228	E4	Σ	⋮ + 8
229	E5	σ	⋮ + 8
230	E6	μ	⋮ + 8
231	E7	τ	⋮ + 8
232	E8	Φ	⋮ + 8
233	E9	θ	⋮ + 8
234	EA	Ω	⋮ + 8
235	EB	δ	⋮ + 8
236	EC	∞	⋮ + 8
237	ED	φ	⋮ + 8
238	EE	ε	⋮ + 8
239	EF	∩	⋮ + 8
240	F0	≡	⋮ + 8
241	F1	±	⋮ + 8
242	F2	≥	⋮ + 8



TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER

243	F3	$\leq$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
244	F4	$\int$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
245	F5	$\int$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
246	F6	$\div$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
247	F7	$\approx$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
248	F8	$\circ$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
249	F9	$\cdot$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
250	FA	$\cdot$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
251	FB	$\sqrt{\quad}$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
252	FC	$n$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
253	FD	$^2$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
254	FE	■	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$
255	FF		$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$

(4) 8-dot Braille Signs Arranged in Braille Order

Char	Braille Sign	Dec	Hex
a	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	97	61
A	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	65	41
$\perp$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	193	C1
$\beta$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	225	E1
b	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	98	62
B	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	66	42
$\top$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	194	C2
$\Gamma$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	226	E2
c	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	99	63
C	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	67	43
$\vdash$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	195	C3
$\pi$	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	227	E3
d	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	100	64

TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER

	D	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7$	68	44
	—	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7-8$	196	C4
	$\Sigma$	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 8$	228	E4
e		$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix}$	101	65
	E	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7$	69	45
	†	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7-8$	197	C5
	$\sigma$	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 8$	229	E5
f		$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix}$	102	66
	F	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7$	70	46
	‡	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7-8$	198	C6
	$\mu$	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 8$	230	E6
g		$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix}$	103	67
	G	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7$	71	47
	‖	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7-8$	199	C7
	$\tau$	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 8$	231	E7
h		$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix}$	104	68
	H	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7$	72	48
	⊥	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7-8$	200	C8
	$\Phi$	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 8$	232	E8
i		$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix}$	105	69
	I	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7$	73	49
	⌈	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7-8$	201	C9
	$\theta$	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 8$	233	E9
j		$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix}$	106	6A
	J	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7$	74	4A
	⊥	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7-8$	202	CA
	$\Omega$	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 8$	234	EA
k		$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix}$	107	6B
	K	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7$	75	4B
	⌋	$\begin{smallmatrix} \bullet\bullet \\ \bullet\bullet \end{smallmatrix} + 7-8$	203	CB

TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER

	$\delta$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 8$	235	EB
l		$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix}$	108	6C
	L	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7$	76	4C
	$\parallel$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7-8$	204	CC
	$\infty$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 8$	236	EC
m		$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix}$	109	6D
	M	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7$	77	4D
	=	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7-8$	205	CD
	$\phi$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 8$	237	ED
n		$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix}$	110	6E
	N	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7$	78	4E
	$\parallel$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7-8$	206	CE
	e	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 8$	238	EE
o		$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix}$	111	6F
	O	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7$	79	4F
	$\perp$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7-8$	207	CF
	$\cap$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 8$	239	EF
p		$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix}$	112	70
	P	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7$	80	50
	$\perp$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7-8$	208	D0
	$\equiv$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 8$	240	F0
q		$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \\ \bullet \end{smallmatrix}$	113	71
	Q	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7$	81	51
	$\bar{\top}$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7-8$	209	D1
	$\pm$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 8$	241	F1
r		$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \\ \bullet \end{smallmatrix}$	114	72
	R	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7$	82	52
	$\pi$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 7-8$	210	D2
	$\geq$	$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \\ \bullet \end{smallmatrix} + 8$	242	F2
s		$\begin{smallmatrix} \bullet \\ \bullet \\ \bullet \\ \bullet \end{smallmatrix}$	115	73

TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER

	S	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	83	53
	ll	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	211	D3
	≤	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	243	F3
t		$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	116	74
	T	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	84	54
	l	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	212	D4
	∫	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	244	F4
u		$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	117	75
	U	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	85	55
	∫	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	213	D5
	∫	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	245	F5
v		$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	118	76
	V	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	86	56
	∏	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	214	D6
	÷	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	246	F6
x		$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	120	78
	X	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	88	58
	≠	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	216	D8
	°	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	248	F8
y		$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	121	79
	Y	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	89	59
	∫	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	217	D9
	·	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	249	F9
z		$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	122	7A
	Z	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	90	5A
	∫	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	218	DA
	·	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 8$	250	FA
&		$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix}$	38	26
	♠	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7$	6	06
	å	$\begin{smallmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \end{smallmatrix} + 7-8$	134	86

TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER




































	a	 + 8	166	A6
0			48	30
	▶	 + 7	16	10
	É	 + 7-8	144	90
		 + 8	176	B0
{			123	7B
	[	 + 7	91	5B
		 + 7-8	219	DB
	√	 + 8	251	FB
˘			96	60
	@	 + 7	64	40
	L	 + 7-8	192	C0
	α	 + 8	224	E0
}			125	7D
	]	 + 7	93	5D
		 + 7-8	221	DD
	²	 + 8	253	FD
1			49	31
	◀	 + 7	17	11
	æ	 + 7-8	145	91
		 + 8	177	B1
2			50	32
	↓	 + 7	18	12
	Æ	 + 7-8	146	92
		 + 8	178	B2
3			51	33
	!!	 + 7	19	13
	ô	 + 7-8	147	93
		 + 8	179	B3
4			52	34

TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER

	¶	⠠⠠ + 7	20	14
	ö	⠠⠠ + 7-8	148	94
	┆	⠠⠠ + 8	180	B4
5		⠠⠠	53	35
	§	⠠⠠ + 7	21	15
	ò	⠠⠠ + 7-8	149	95
	≡	⠠⠠ + 8	181	B5
6		⠠⠠	54	36
	■	⠠⠠ + 7	22	16
	û	⠠⠠ + 7-8	150	96
	∥	⠠⠠ + 8	182	B6
7		⠠⠠	55	37
	‡	⠠⠠ + 7	23	17
	ù	⠠⠠ + 7-8	151	97
	π	⠠⠠ + 8	183	B7
8		⠠⠠	56	38
	↑	⠠⠠ + 7	24	18
	ÿ	⠠⠠ + 7-8	152	98
	ƚ	⠠⠠ + 8	184	B8
9		⠠⠠	57	39
	↓	⠠⠠ + 7	25	19
	Ö	⠠⠠ + 7-8	153	99
	∥	⠠⠠ + 8	185	B9
w		⠠⠠	119	77
	W	⠠⠠ + 7	87	57
	∥	⠠⠠ + 7-8	215	D7
	≈	⠠⠠ + 8	247	F7
,		⠠⠠	44	2C
	♀	⠠⠠ + 7	12	0C
	î	⠠⠠ + 7-8	140	8C

TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER































	$\frac{1}{4}$	 + 8	172	AC
;			59	3B
	←	 + 7	27	1B
	¢	 + 7-8	155	9B
	¶	 + 8	187	BB
:			58	3A
	→	 + 7	26	1A
	Ü	 + 7-8	154	9A
	∥	 + 8	186	BA
.			46	2E
	♩	 + 7	14	0E
	Ä	 + 7-8	142	8E
	«	 + 8	174	AE
?			63	3F
	▼	 + 7	31	1F
	<i>f</i>	 + 7-8	159	9F
	⌋	 + 8	191	BF
+			43	2B
	♂	 + 7	11	0B
	ï	 + 7-8	139	8B
	$\frac{1}{2}$	 + 8	171	AB
=			61	3D
	↔	 + 7	29	1D
	¥	 + 7-8	157	9D
	∥	 + 8	189	BD
<			60	3C
	⌊	 + 7	28	1C
	£	 + 7-8	156	9C
	∥	 + 8	188	BC
*			42	2A

TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER

	◼	⠠⠠⠠⠠⠠⠠⠠⠠ + 7	10	0A
	è	⠠⠠⠠⠠⠠⠠⠠⠠ + 7-8	138	8A
	¬	⠠⠠⠠⠠⠠⠠⠠⠠ + 8	170	AA
>		⠠⠠⠠⠠⠠⠠⠠⠠	62	3E
	▲	⠠⠠⠠⠠⠠⠠⠠⠠ + 7	30	1E
	ℙ	⠠⠠⠠⠠⠠⠠⠠⠠ + 7-8	158	9E
	⌋	⠠⠠⠠⠠⠠⠠⠠⠠ + 8	190	BE
/		⠠⠠⠠⠠⠠⠠⠠⠠	47	2F
	⚙	⠠⠠⠠⠠⠠⠠⠠⠠ + 7	15	0F
	Å	⠠⠠⠠⠠⠠⠠⠠⠠ + 7-8	143	8F
	»	⠠⠠⠠⠠⠠⠠⠠⠠ + 8	175	AF
)		⠠⠠⠠⠠⠠⠠⠠⠠	41	29
	○	⠠⠠⠠⠠⠠⠠⠠⠠ + 7	9	09
	ë	⠠⠠⠠⠠⠠⠠⠠⠠ + 7-8	137	89
	⌊	⠠⠠⠠⠠⠠⠠⠠⠠ + 8	169	A9
!		⠠⠠⠠⠠⠠⠠⠠⠠	33	21
	☺	⠠⠠⠠⠠⠠⠠⠠⠠ + 7	1	01
	ü	⠠⠠⠠⠠⠠⠠⠠⠠ + 7-8	129	81
	í	⠠⠠⠠⠠⠠⠠⠠⠠ + 8	161	A1
△		⠠⠠⠠⠠⠠⠠⠠⠠	127	7F
	—	⠠⠠⠠⠠⠠⠠⠠⠠ + 7	95	5F
	■	⠠⠠⠠⠠⠠⠠⠠⠠ + 7-8	223	DF
		⠠⠠⠠⠠⠠⠠⠠⠠ + 8	255	FF
,		⠠⠠⠠⠠⠠⠠⠠⠠	39	27
	●	⠠⠠⠠⠠⠠⠠⠠⠠ + 7	7	07
	ç	⠠⠠⠠⠠⠠⠠⠠⠠ + 7-8	135	87
	◦	⠠⠠⠠⠠⠠⠠⠠⠠ + 8	167	A7
-		⠠⠠⠠⠠⠠⠠⠠⠠	45	2D
	♪	⠠⠠⠠⠠⠠⠠⠠⠠ + 7	13	0D
	ì	⠠⠠⠠⠠⠠⠠⠠⠠ + 7-8	141	8D



TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER

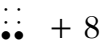

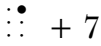
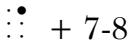
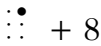

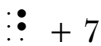
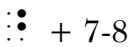
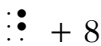

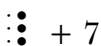
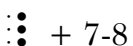
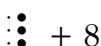

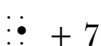
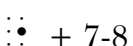
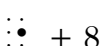

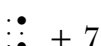
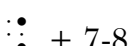
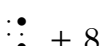

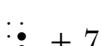
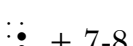
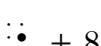

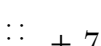
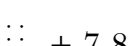

i		173	AD
"		34	22
☺		2	02
é		130	82
ó		162	A2
(		40	28
■		8	08
ê		136	88
ç		168	A8
\$		36	24
◆		4	04
ä		132	84
ñ		164	A4
		124	7C
\		92	5C
■		220	DC
n		252	FC
%		37	25
♣		5	05
à		133	85
Ñ		165	A5
#		35	23
♥		3	03
â		131	83
ú		163	A3
~		126	7E
^		94	5E
■		222	DE
■		254	FE
(space)	(blank)	32	20
(nul)	7	0	00

TABLE 4: 8-DOT SIGNS IN BRAILLE ORDER

Ç	7-8	128	80
á	8	160	A0

## FLOWCHARTS

The following is a tabular method for representing flowcharts.

Each box in the flowchart is identified in braille by a letter or number. This will require some preparation, whether or not the chart is being produced from a drawn diagram. This identifier, or label, is in the leftmost column and is followed by a column containing the 'action' statement from within the box. Incorporated into the action statement, in brackets and before the content of the statement, are the label(s) of the box(es) from which the process has flowed into that box. The 'action' statement is indented two spaces within its column when it runs over on to following line(s).

Two columns on the right indicate respectively:

1. The label of the box to which flow proceeds as the consequence of a 'yes' decision, or the normal flow when it is not a decision box.
2. The label of the box to which flow proceeds as the consequence of a 'no' decision.

If a flowchart must extend over more than one braille page, it is useful to give a heading to indicate the range of labels within the page. When calling subroutines which appear on separate braille pages, the page identification for the subroutine should be given within the 'action' column, not in the 'yes' or 'no' columns.

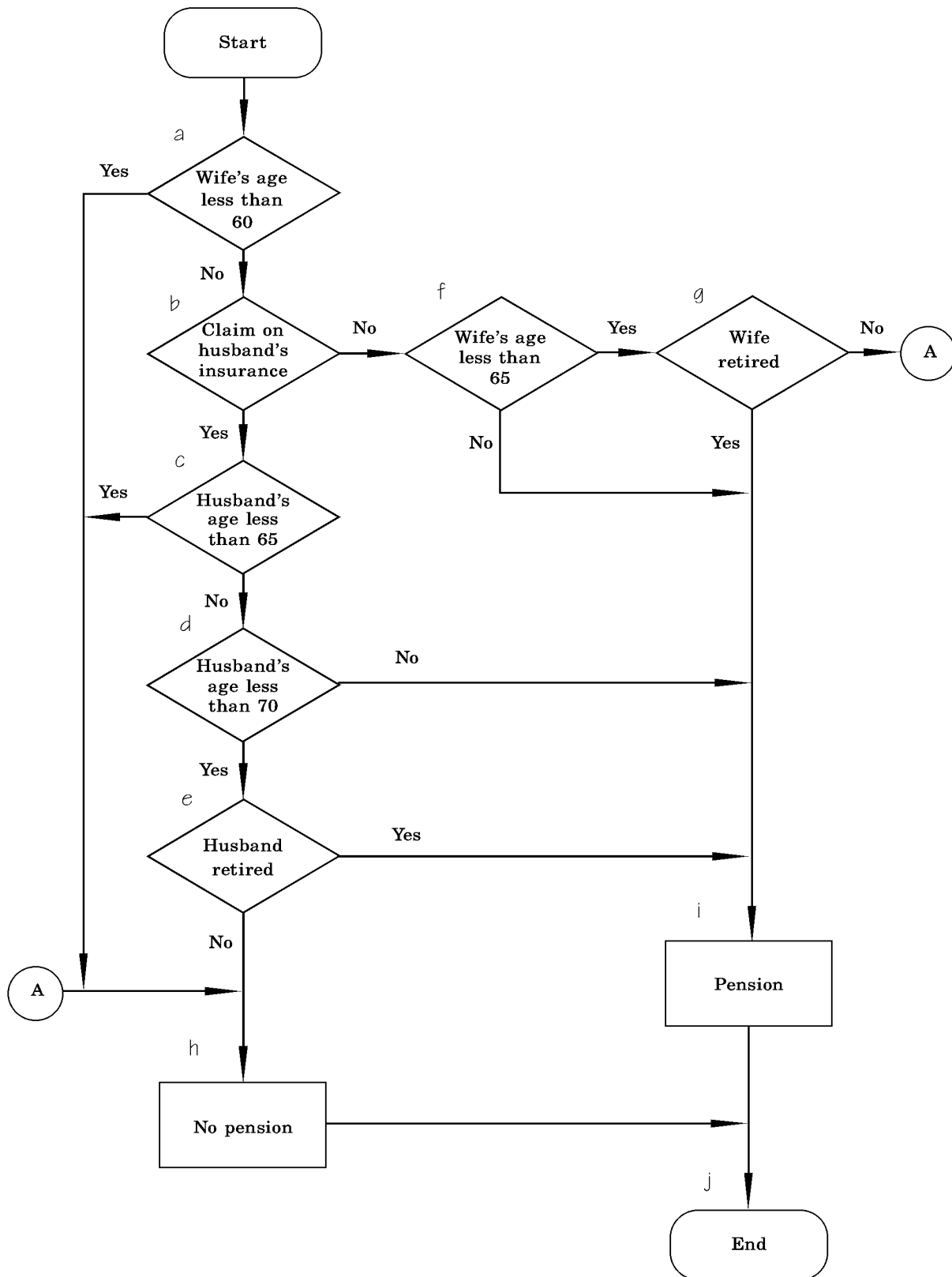
In the following example, the diagrammatic version of the flowchart [in the print version only] has been interpreted so that 'start' is included at the beginning of the box labelled 'a'. In addition, the 'connector' between boxes 'g' and 'h', which is used to avoid crossing lines, is not included in the tabular version.

Example 1  
Married Women's Flat Rate Retirement Pension  
(Braille Tabular Version)

Label	Action	Yes	No
a ....	(Start) Wife's age less than 60 .....	h	b
b ....	(a) Claim on husband's insurance .....	c	f
c ....	(b) Husband's age less than 65 .....	h	d
d ....	(c) Husband's age less than 70 .....	e	i
e ....	(d) Husband retired .....	i	h
f ....	(b) Wife's age less than 65 .....	g	i
g ....	(f) Wife retired .....	i	h
h ....	(a, c, e, g) No pension ...	j	--
i ....	(d, e, f, g) Pension .....	j	--
j ....	(h, i) End .....	--	--

[Rows of dots indicate dot 3 leadlines in braille.]

(Print diagram opposite.)



## DECISION TABLES

Transcriptions from print decision tables into braille should normally follow the ordinary methods for brailleing tables. The line separating conditions from actions can be given as a line of dot 2's from margin to margin.

The following method and examples provide a model which can be used when originating decision tables in braille or typescript.

Rule columns are headed by a number, and the 'else' column on the right by 'e' in braille or the word 'Else' in typescript. Rule columns are separated by a single space, and the else column by two spaces from these. The conditions and action sections are separated by a line of dot 2's in braille from margin to margin, or a line of underline characters in typescript. Headings 'Conditions' and 'Actions' are given before those sections, indented from the left margin.

In limited entry tables the condition rule column entries are 'y', 'n' or a dash (a hyphen in typescript). The action rule column entries are 'x' for yes, and a dash for no (a hyphen in typescript). One of these symbols is always present in a rule slot.

Space may be saved in braille by using computer code for rule column numbers, and a hyphen instead of a dash for entries. However, as always, computer code without computer code indicators should only be used with prior warning given to the reader in a note.

### Example 2 Limited Entry Table (Braille Version)

Conditions	1	2	3	e
Raining .....	y	y	n	--
Windy? .....	y	n	--	--
Rain on the way?	--	--	y	--
////////////////////////////////////				
Actions				
Take umbrella ....	--	x	x	--
Take hat and coat	x	--	--	--
Take neither .....	--	--	--	x

[Rows of dots indicate dot 3 leadlines in braille; the row of commas indicates dot 2's in braille.]

Extended entry tables can contain a variety of symbols (less than, equals, greater than, and sometimes words or expressions). The rule column must allow for the width of such variations.

Where rule merging occurs the space problem may be alleviated. However, it may sometimes be necessary to set out a decision table over two facing pages.

Example 3  
 Extended Entry Table  
 (Braille Version)

[In the following, entries in the action column show the discount. The following abbreviations are used: N.D. = No discount; wholesl = wholesale.]

	1	2	3	4	e
Customer	Retail	Retail	Wholesl	Wholesl	--
Order	<=£50	>£50	<=£50	>£50	--
Good					
Payer	y	y	y	y	n
////////////////////////////////////					
Action					
N.D.	--	--	--	--	x
10%	x	--	--	--	--
15%	--	x	x	--	--
20%	--	--	--	x	--

[The row of commas indicates dot 2's in braille.]

# STRUCTURED SYSTEMS ANALYSIS DIAGRAMS

This section sets out a general approach for representing in tabular format the type of diagrams which occur in the Structured Systems Analysis and Design Method (SSADM) and the program Structured Design Method (SDM).

SSADM is an integrated and structured method for dealing with the analysis and design of computer software systems. It provides structural, procedural and documentation standards.

SDM is a method for designing structured programs and was originated by Michael Jackson. However, some of the constructs of SDM have been incorporated into SSADM.

The approach as stated will be directed towards a braille representation, although it is easily adapted for use in typescript.

The approach may also be applied to other similar diagrams, after suitable conventions have been set up.

The diagrams consist of a number of boxes of different types, connected by lines or arrows of different types. Boxes may contain text, and boxes and lines may carry annotation.

The following lists give the notation used in this approach for various types of boxes and lines.

## Boxes

[Each entry gives box type: notation used; examples of meaning in structured systems analysis diagrams. 'Box' without further description means a plain rectangular box.]

Box: No notation; function, resource store, entity life history structure node, attribute, menu.

Box with letter o in top right corner: o; option.

Box with letter s in top right corner: s; sequence.

Box with \* in top right corner: \*; iteration.

Box with a horizontal line across the top: h; process.

Box with a horizontal line across the top and an asterisk enclosed by a diagonal line in the bottom right corner: h\*; process – lowest level.

Box open on the right: op; data store.

Box open on the right with vertical line along left-hand side: opv; data store – box repeated in diagram.

Box with rounded corners (soft box): r; entity, effect, I/O structure element, dialogue element.

Oval (lozenge): l; external entity, operational master.

Oval (lozenge) with diagonal line across top left: ld; external entity – box repeated



in diagram.

Oval (lozenge) with horizontal line across top: lh; external entity – box repeated in diagram.

## Lines

[Each entry gives line type: notation used; examples of meaning in structured systems analysis diagrams. 'Line' without further description means a plain unmarked line.]

Line: no notation; joining functions of different levels in structure diagrams.

Broken line: ⠠⠠⠠⠠

Line with arrow pointing to following box: ⠠⠠⠠⠠; data flow, access or entry point, relationship.

Line with arrow pointing to preceding box: ⠠⠠⠠⠠; data flow, relationship.

Line with arrows pointing to both following and preceding box: ⠠⠠⠠⠠; data flow, relationship.

Broken line with arrow(s): as the corresponding unbroken line with arrow(s), but replacing ⠠⠠ with ⠠⠠⠠⠠.

Line with crow's foot against following box: ⠠⠠⠠⠠⠠⠠; one-many relationship.

Line with crow's foot against preceding box: ⠠⠠⠠⠠⠠⠠; many-one relationship.

Line with crow's foot against following and preceding box: ⠠⠠⠠⠠⠠⠠; many-many relationship.

Broken line with crow's foot or feet: as unbroken line with crow's foot or feet but replacing the first, second or both hyphens by dot 3's according to whether the first half, second half or the whole line is broken (the broken line indicates that the relationship is optional).

Wide block arrow pointing to following box: ⠠⠠⠠⠠; resource flow.

Wide block arrow pointing to preceding box: ⠠⠠⠠⠠; resource flow.

An arc drawn across two or more lines entering a box is an exclusive arc. It may alternatively be shown by the relevant lines being cut by separate arcs which are then labelled with the same letter. This is indicated in braille by preceding the line notation by a letter (e.g. a, b, or c), the letter being the same as that used in print. Where letters are not present in the print, a letter will need to be assigned. Different letters should be used for different sets of lines.

### Box Identifiers

Each box in the diagram is assigned a letter or sequence of letters in braille. In

the case of diagrams or parts of diagrams which have a ‘parent-child’ structure, the ‘child’ boxes are assigned identifiers by appending letters a, b, c, etc. to the ‘parent’ box identifier. Otherwise it is recommended that boxes be assigned two letter identifiers aa, ab, ..., az, ba, bb, ..., bz, which allows for up to  $26 \times 26$  boxes. In purely hierarchical ‘parent-child’ type diagrams the top boxes should be assigned single letter identifiers so that their rank is immediately clear. If there is a single top box, it is permissible to use this as a heading to the diagram without an identifier, so that the next level of boxes have single letter identifiers. Identifiers do not require letter signs in this method.

### Non ‘Parent-Child’ Diagrams

Each box in a diagram has a cell 1 entry. This consists of: the box identifier; the notation stating the box type (if any) enclosed in brackets; the contents of the box.

The connections between boxes are stated in cell 3 entries beneath the relevant cell 1 main entries. These entries consist of: line type notation (if any); the connecting box identifier.

### ‘Parent-Child’ Structures

Where boxes have ‘parent-child’ relationship, ‘child’ boxes do not have cell 1 entries, but are placed beneath their parent’s entry, starting two cells further in than the start of their parent’s entry. Entries consist of: line type notation (if any) connecting to the parent box; the box identifier; box type notation enclosed in brackets (if any); contents of box. Where the top box has been centred instead, the next level of boxes begin in cell 1, rather than cell 3.

In general, runovers are indented by 4 cells from the position of the line start.

Example 7 (Enquiry Access Path) illustrates ‘parent-child’ and non ‘parent-child’ structure in the same diagram. Non-parent connections to child entries are indented by two cells beneath the child entry.

### Annotation

Annotation to lines is placed in mathematics code round brackets  $\textcircled{\dots}$  and inserted after the line notation, if present. Annotation to boxes is placed in mathematics square brackets  $\boxed{\dots}$  and inserted after the contents of the box. If the annotation consists of two or more distinct elements, these may be separated by suitable punctuation in braille. A semicolon is generally satisfactory for this purpose. The same procedure should also be adopted for elements within box contents.

Where line annotation is in two parts, associated with different ends or halves of the line, the part closest to the current box entry should normally be given first. The reverse order will therefore be used in the entry for the connecting box. (See Example 6: Logical Data Structure Diagram, below.)

**Additional Points**

If a box represents parallelism in a structure diagram (a 'parent-child' type diagram), it is separated from the next level down by a wide and shallow box (a 'parallel bar') from which the lines connecting to the 'child' boxes emerge. This may be indicated in braille by the box notation 'p' associated with the parent box.

Where boxes are grouped by surrounding lines this will generally need to be explained separately. It may be advantageous to mark box entries thus grouped with a characteristic sign for each grouping, in order to make the explanation brief and clear.

One should generally aim not to divide the braille version of a diagram over more than one page. If, however, it is necessary to use more than one page for a structure diagram ('parent-child' type diagram), it is generally best to remove lower level function boxes to a separate page, so that there is room to keep all the next level functions to a given function on the same page (i.e. a parent box has all its child boxes on the same page, although some of its grandchild boxes may appear on a separate page). When a box is to be expanded in this way, a letter x in Standard English Braille square brackets is inserted before the contents of the box, indicating that lower level boxes appear on a separate page. On the expansion page, the expansion should be headed by the identifier, type and contents of the expanded box, and the following boxes should have this initial part of their identifiers removed, which is common to them all. It is permissible to place more than one such expansion on the same page, but each will require its own heading, and be separated from the others by a blank line.

Standard English Braille (or mathematics code) is generally used. Use of computer code should either be announced in a note or indicated in the usual way.

Diagrams should be ended by a centred line of dot 2's.

Example 4  
Structure Diagram (SDM)  
(Braille Version)

Program XXXX - File Comparison

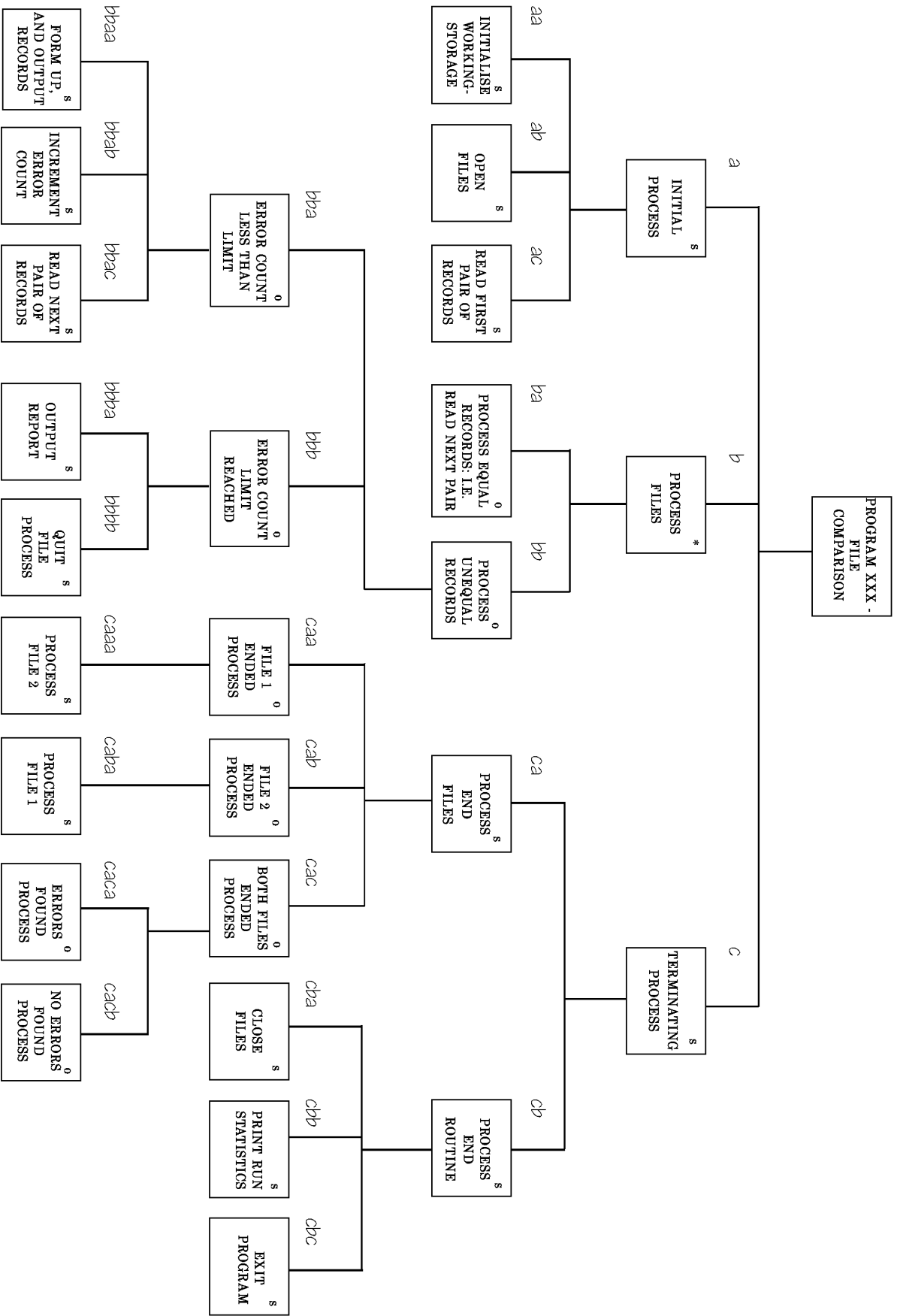
- a (s) Initial process
  - aa (s) Initialise working-storage
  - ab (s) Open files
  - ac (s) Read first pair of records
- b (\*) [x] Process files
- c (s) Terminating process
  - ca (s) Process end files
    - caa (o) File 1 ended process
    - caaa (s) Process file 2
    - cab (o) File 2 ended process
    - caba (s) Process file 1
    - cac (o) Both files ended process
    - caca (o) Errors found process
    - cacb (o) No errors found process
  - cb (s) Process end routine
    - cba (s) Close files
    - cbb (s) Print run statistics
    - cbc (s) Exit program

(End of braille page 70)

- b (\*) Process files (p.70)
- a (o) Process equal records; i.e. read next pair
- b (o) Process unequal records
  - ba (o) Error count less than limit
    - baa (s) Form up, and output records
    - bab (s) Increment error count
    - bac (s) Read next pair of records
  - bb (o) Error count limit reached
    - bba (s) Output report
    - bbb (s) Quit file process

.....

(Print diagram opposite.)



## Example 5 Data Flow Diagram

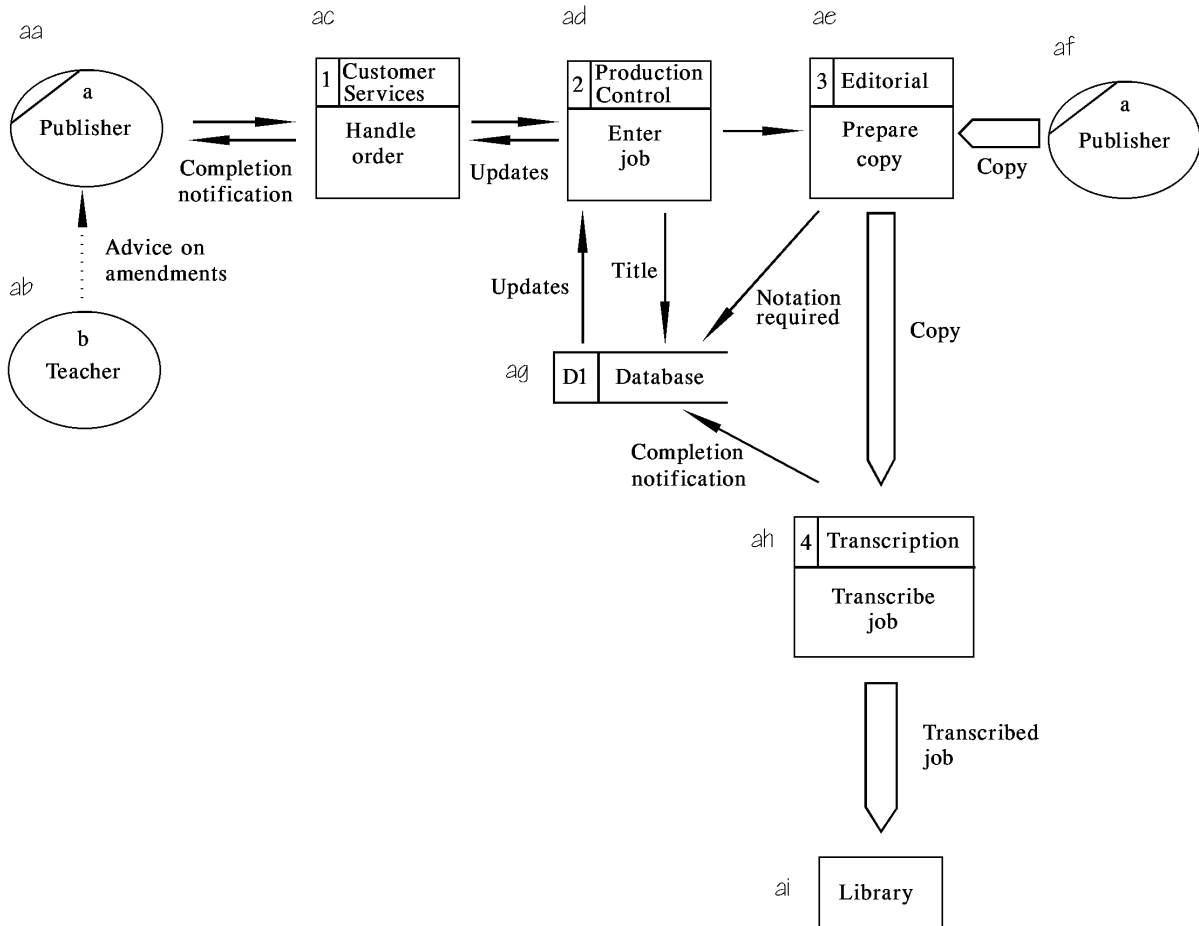
[In the following, ordinary braille arrows are shown as -> and <- . . .> is an arrow with two dot 3's replacing the ⠦ sign; => is an arrow with ⠦ replacing the ⠦ sign, etc. Line annotation is in mathematics code round brackets: ⠦ ... ⠦.]

```

aa (ld) a Publisher
  <.. (Advice on amendments) ab
  <- (Completion notification) ac
  -> ac
ab (l) b Teacher
  ..> (Advice on amendments) aa
ac (h) 1; Customer Services; Handle order
  <- aa
  <- (Updates) ad
  -> (Completion notification) aa
  -> ad
ad (h) 2; Production Control; Enter job
  <- ac
  <- (Updates) ag
  -> (Updates) ac
  -> ae
  -> (Title) ag
ae (h) 3; Editorial; Prepare copy
  <- ad
  <= (Copy) af
  -> (Notation required) ag
  => (Copy) ah
af (ld) a Publisher
  => (Copy) ae
ag (op) D1; Database
  <- (Title) ad
  <- (Notation required) ae
  <- (Completion notification) ah
  -> (Updates) ad
ah (h) 4; Transcription; Transcribe
  job
  <= (Copy) ae
  -> (Completion notification) ag
  => (Transcribed job) ai
ai Library
  <= (Transcribed job) ah

```

Example 5  
(Print Diagram)



## Example 6

### Logical Data Structure Diagram

[In the following 'one' indicates the ⠠ sign, 'many' the ⠡ sign, -- two hyphens, .- dot 3 hyphen, -. hyphen dot 3, in braille. Brackets containing annotation on lines are mathematics code round brackets in braille: ⠠... ⠠.]

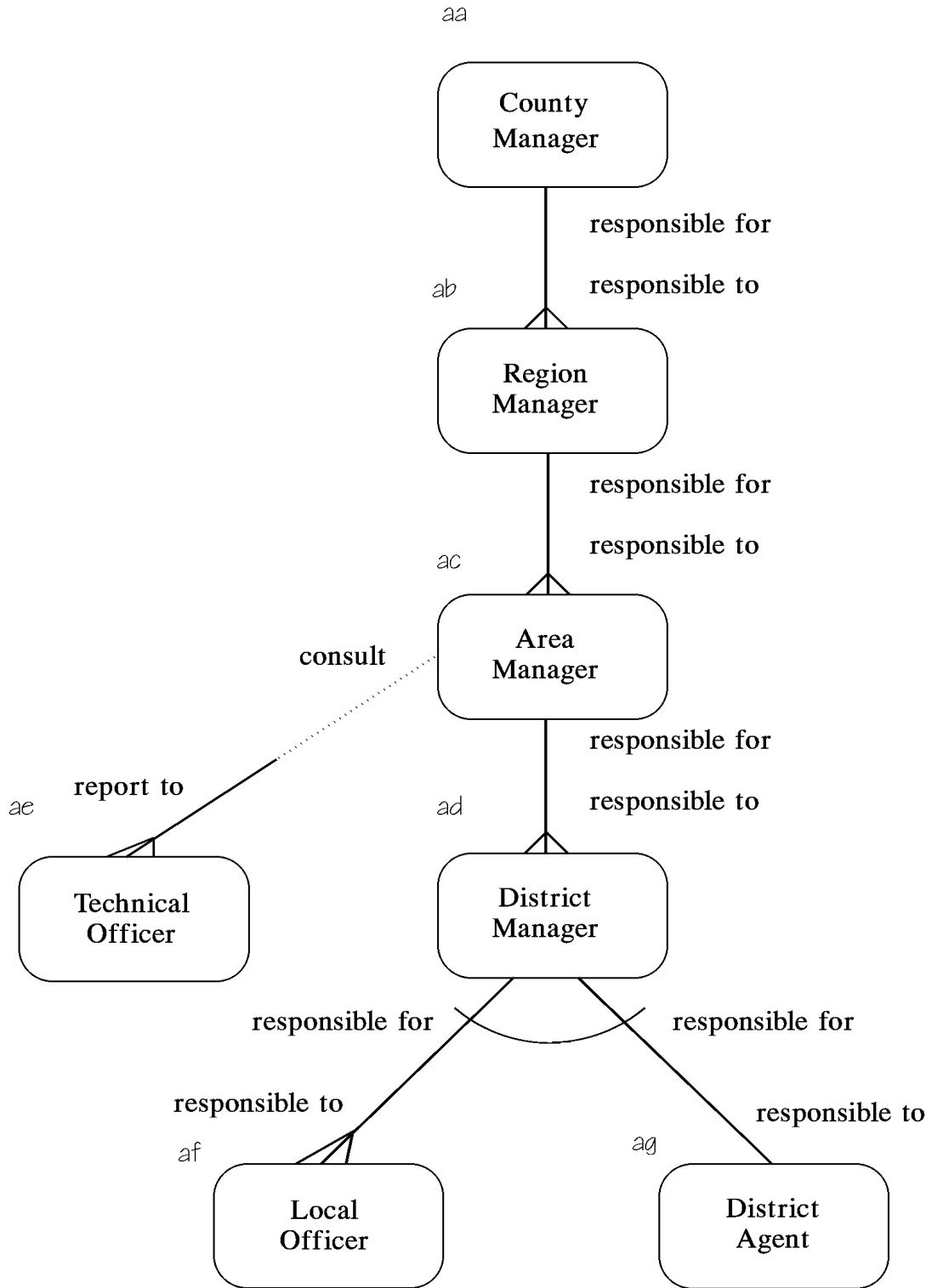
```

aa (r) County manager
   one--many (responsible for; responsible to) ab
ab (r) Region manager
   many--one (responsible to; responsible for) aa
   one--many (responsible for; responsible to) ac
ac (r) Area manager
   many--one (responsible to; responsible for) ab
   one--many (responsible for; responsible to) ad
   one.-many (consult; report to) ae
ad (r) District manager
   many--one (responsible to; responsible for) ac
   a one--many (responsible for; responsible to)
     af
     a (responsible for; responsible to) ag
ae (r) Technical Officer
   many-.one (report to; consult) ac
af (r) Local Officer
   many--one (responsible to; responsible for) ad
ag (r) District agent
   (responsible to; responsible for) ad
   .....

```



Example 6  
(Print Diagram)



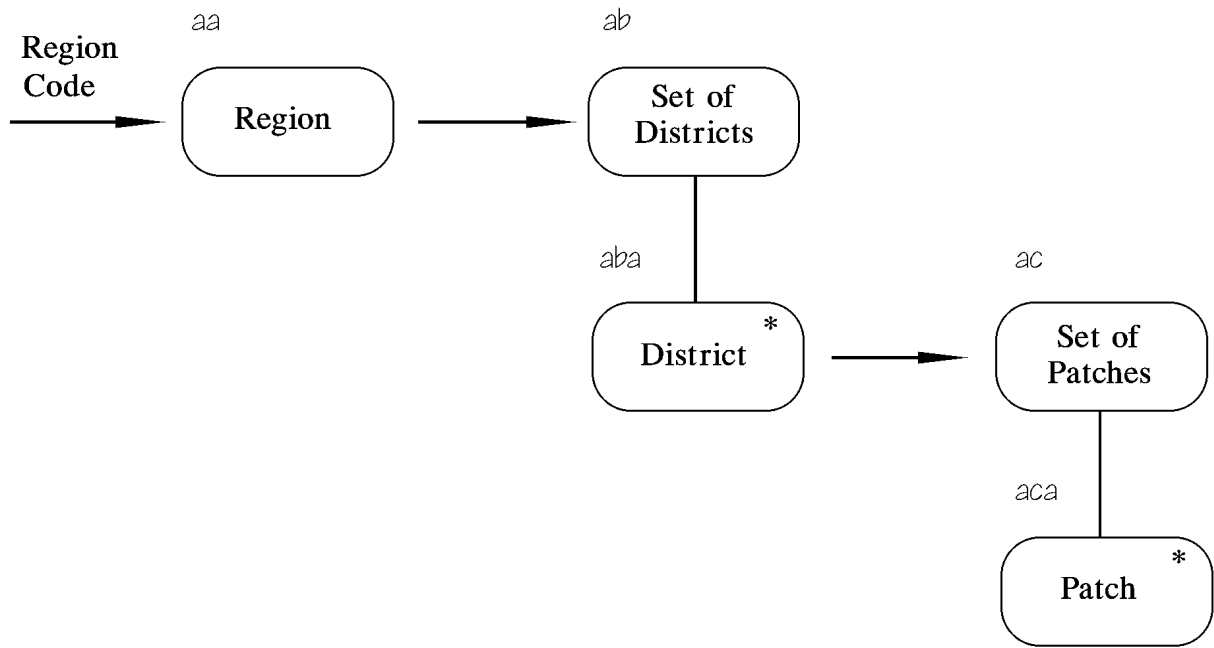
Example 7  
Enquiry Access Path

[Arrows and brackets are indicated as for examples 5 and 6.]

```
aa (r) Region
  <- (Region code)
  -> ab
ab (r) Set of districts
  <- aa
  aba (r *) District
    -> ac
ac (r) Set of patches
  <- aba
  aca (r *) Patch
```

.....

Example 7  
(Print Diagram)



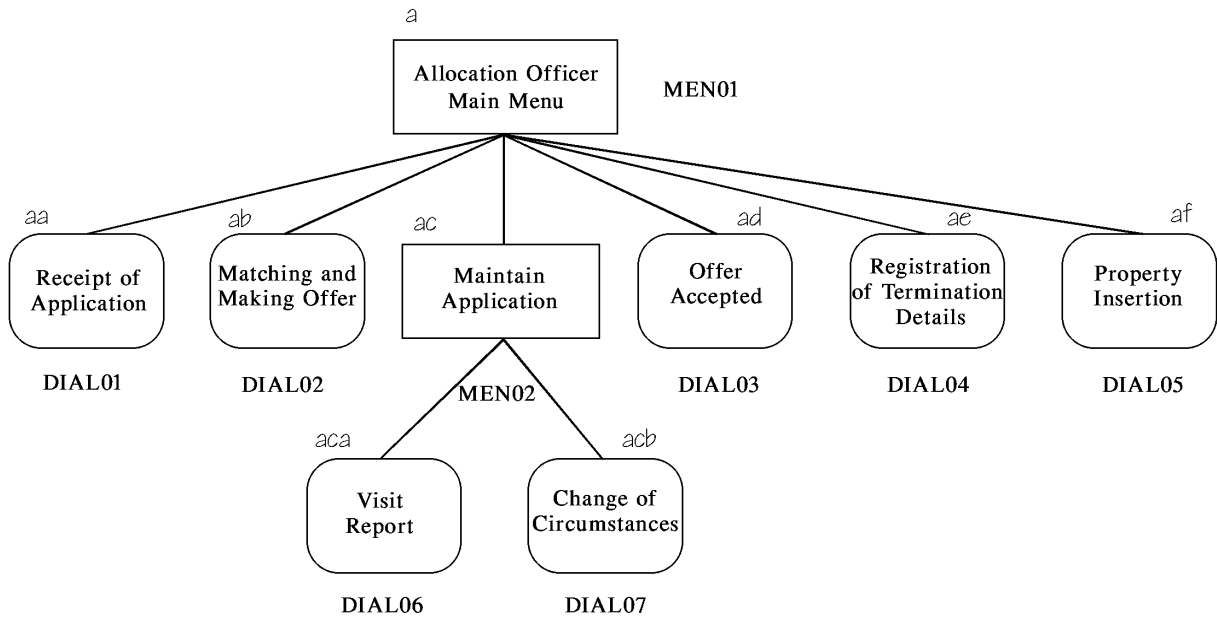
## Example 8 Menu Structure

[In the following, brackets containing annotation to boxes are mathematics code square brackets  $\square\dots\square$ .]

```
a Allocation officer main menu [MEN 01]
  aa (r) Receipt of application [DIAL
    01]
  ab (r) Matching and making offer [DIAL
    02]
  ac Maintain application [MEN 02]
    aca (r) Visit report [DIAL 06]
    acb (r) Change of circumstances [DIAL
      07]
  ad (r) Offer accepted [DIAL 03]
  ae (r) Registration of termination details
    [DIAL 04]
  af (r) Property insertion [DIAL 05]
```

.....

### Example 8 (Print Diagram)



## Example 9 Entity Life History

[In the following example the top level of boxes are alternative entry points. The 'R' numbers by these boxes are 'resume' points from a separate sheet. The 'Q' numbers associated with some boxes are 'quit' points, linking to 'resume' points on further sheets. Brackets containing annotation to boxes are mathematics code square brackets  $\ddot{\cdot}\dots \ddot{\cdot}$ .]

```

a Resignation [R1]
  aa Resignation [2-6/b]
  ab After notification of resignation
    aba (o) Withdrawal of resignation [Q4;
      8/9]
    abb (o) Officer leaves via resignation
      abba Last day of service (resignation)
        [8/10]
      abbb Possible reinstatement
        abbba (o) Reinstatement of officer
          [Q4; 10/11]
          abbbb (o) Last day plus 24
            months archive [10/-]
b Death in harness [R2; Q5; 2-6/12]
c Transfer [R3]
  ca Approval of transfer [2-6/13]
  cb After transfer approved
    cba (o) Withdrawal of transfer request
      [Q4; 13/14]
    cbb (o) Last day of service (transfer)
      [Q5; 13/15]

```

.....

Example 9  
(Print Diagram)

