
INTERNATIONAL STANDARD



1073 / I

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Alphanumeric character sets for optical recognition — Part I : Character set OCR-A — Shapes and dimensions of the printed image

*Jeux alphanumériques de caractères pour la reconnaissance optique — Partie I : Jeu de caractères ROC-A —
Formes et cotes de l'image imprimée*

First edition — 1976-12-01

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UDC 681.3.048 : 655.24

Ref. No. ISO 1073/I-1976 (E)

Descriptors : data processing, optical recognition, alphanumeric character sets, OCR-A character sets, specifications, dimensions.

Price based on 26 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1073/I was drawn up by Technical Committee ISO/TC 97, *Computers and information processing*, and was circulated to the Member Bodies in May 1975.

It has been approved by the Member Bodies of the following countries :

Belgium	Japan	Turkey
Czechoslovakia	Netherlands	United Kingdom
France	New Zealand	U.S.A.
Germany	Romania	Yugoslavia
Hungary	South Africa, Rep. of	
Italy	Switzerland	

The Member Body of the following country expressed disapproval of the document on technical grounds :

Brazil

This International Standard, together with ISO 1073/II, cancels and replaces ISO Recommendation R 1073-1969.

Alphanumeric character sets for optical recognition – Part I : Character set OCR-A – Shapes and dimensions of the printed image

1 GENERAL

1.1 Scope

This International Standard for character shapes and sizes is intended to facilitate and foster the use of Optical Character Recognition (OCR) in data processing, by defining character shapes suitable for both human and machine reading.

It establishes a common basis for printing equipment and optical scanning equipment for OCR interchange applications.

Additional International Standards will cover the print quality and the relevant characteristics of the formats needed to satisfy interchange requirements.

1.2 Field of application

This International Standard specifies the printed image shapes and sizes of alphanumeric characters, graphics and symbols designed for use in Optical Character Recognition. They are also suitable for general purposes.

In order to satisfy present requirements and encourage the wide extension of OCR applications, two sets of characters are specified. These are named OCR-A and OCR-B.

Character set OCR-A includes the numeric sub-set which was recommended in draft ISO Recommendation No. 890 (now part of this International Standard). The shapes of the characters have been designed to be suitable for use in many applications of OCR. Dimensions of OCR-A are given in three sizes.

The shapes of the OCR-B characters have been designed for use in OCR systems without undue sacrifice of their suitability for general purposes in a wide range of applications. Dimensions of OCR-B are given in three sizes. (See part II.)

1.3 Definitions

For the purpose of this International Standard the following definitions apply :

1.3.1 OCR-A : A repertoire of 69 characters of which 56 are graphics included in the ISO 7-bit coded character set (ISO 646-1973). It comprises digits, capital letters, capital national letters and other graphics.

1.3.2 OCR-B : A repertoire of 121 characters comprising digits, capital and small letters, all the graphics specified in the ISO 7-bit coded character set (ISO 646-1973), national letters, diacritical signs and further graphics. (See part II.)

1.3.3 printing frame : The smallest rectangle the sides of which are horizontal and vertical and which includes the centreline shapes of all characters with the exception of long vertical mark.

1.3.4 sizes of a repertoire : The sizes specified by the height H and the width W of the relevant printing frame.

NOTES

1 Three sets of sizes are specified in order to permit the use of the OCR character sets with a wide range of printing equipment with different print quality characteristics. Devices such as typewriters, cash registers, numbering machines, high-speed printers, credit card imprinters and non-impact imprinters, and printing processes such as letterpress and offset, are all involved.

2 For applications which involve circulation of documents across boundaries between areas in which different national characters are in use, agreement between the sender and the recipient of the documents is required.

3 The metric and inch dimensions in this International Standard are rounded and therefore consistent but not exactly equal. Either system may be used but the two should not be intermixed.

4 It is recognized that some type-making and printing processes will not be able to produce sharp corners. Corners not specified as having a specific radius should be as sharp as practicable. However, it is not necessary for OCR purposes that the radii of the corners of the nominal printed image be less than 0,08 mm (0.003 5 in).

5 All OCR-A characters are designed to be free-standing individual characters, and therefore are not intended for dual use with (or as) diacritical marks in OCR applications.

2 CHARACTER SET OCR-A

2.1 Name

The name of the character set is OCR-A.

2.2 OCR-A sizes

Table 1 below specifies the dimensions of the printing frame (W, H) of the total repertoire in three sizes. It also indicates the nominal strokewidth T and the minimum length L of the long vertical mark ($14 H/9$). The maximum length of the vertical mark is not specified as there is no intention of restricting it.

2.3 OCR-A repertoire

2.3.1 The 69 characters of the OCR-A repertoire are as follows (see also 2.5) :

10 digits	0 to 9	
26 capital letters	A to Z	
17 graphics		Space (non-printing character)
	&	Ampersand
	'	Apostrophe
	*	Asterisk
	:	Colon
	,	Comma
	=	Equals sign
	.	Full stop (period)
	-	Hyphen, Minus sign
	(	Left parenthesis
	%	Percent sign
	+	Plus sign
	?	Question mark
	"	Quotation mark
	)	Right parenthesis
	;	Semi-colon
	/	Solidus
7 capital national letters	À	
	Å	
	Æ	
	Ñ	
	Ø	
	Ö	
	Ü	
3 currency symbols	\$	Dollar sign
	£	Pound sign
	¥	Yen sign
3 abstract symbols	℄	Hook
	℥	Fork
	℄	Chair
1 long vertical mark		
2 erase characters	■	Character Erase
	—	Group Erase

2.3.2 The 14 characters comprising the OCR-A numeric sub-set are the following :

10 digits	0 to 9
3 abstract symbols	℄ Hook
	℥ Fork
	℄ Chair
1 long vertical mark	

2.4 Use of characters

2.4.1 Letter Y and symbol fork ℥

It is recommended that the letter Y and the abstract symbol for fork ℥ should not both be used in the same application.

2.4.2 OCR-A numeric sub-set

For applications requiring numeric reading only, it is suggested that the numeric sub-set (see 2.3.2) be used.

2.5 Alternative shapes

For the characters	Apostrophe
	Comma
	Full stop
	Hyphen
	Question mark

two shapes are shown. The first shape is indicated as the preferred one and should generally be the one used. However, some particular applications may require the use of the standard alternative shape shown.

3 CHARACTER SHAPES AND DIMENSIONS

The character shapes and dimensions are specified by the drawings given on pages 6 to 25 and by the table of values on page 4. The nominal printed image of each character is specified by its centreline and by its nominal strokewidth.

TABLE 1 – OCR-A printing frame dimensions

Size	millimetres				inches			
	W	H	T	L	W	H	T	L
I	1,40	2,40	0,35	3,7	0.055	0.094	0.014	0.146
III	1,52	3,20	0,38	5,0	0.060	0.126	0.015	0.196
IV	2,04	3,80	0,51	5,9	0.080	0.150	0.020	0.233

OCR-A REPERTOIRE

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

0 1 2 3 4 5 6 7 8 9

· ¸ ÷ = + / \$ * " & |

' - { } % ? ¡ ¢ £ ¤ ¥



Ü Ñ Ä Ø Ö Å Æ £ ¥ SPACE

4 USE OF THE TABLE OF VALUES (Table 3)

4.1 Table 3 specifies in both millimetres and inches the dimensions for each character in each of the three sizes I, III and IV.

4.2 Table 3 lists character height, width and stroke dimensions based on

- the height H of the printing frame,
- the width W of the printing frame,
- the nominal strokewidth T .

4.3 Table 3 also lists, as items r_1 to r_6 , the values of the centreline radii specified for use in the characters listed in table 2.

The formulae for calculation of r_1 to r_6 are given on page 5.

TABLE 2 — Radii

Character	Radius
O and Ø	r_1
	r_2
Q	r_3
S	r_4
Ö	r_5
	r_6

5 RADII AND CORNERS

All radii specified for the OCR-A characters are given on the drawings and in table 3. All edges should be blended, with rounded corners.

TABLE 3 — OCR-A values

	millimetres			inches		
	I	III	IV	I	III	IV
<i>H</i>	2,400	3,200	3,800	0.094 0	0.126 0	0.150 0
<i>W</i>	1,400	1,520	2,040	0.055 0	0.060 0	0.080 0
<i>T</i>	0,350	0,380	0,510	0.014 0	0.015 0	0.020 0
$1/2 T$	0,175	0,190	0,255	0.007 0	0.007 5	0.010 0
$3/2 T$	0,525	0,570	0,765	0.021 0	0.022 5	0.030 0
$2 T$	0,700	0,760	1,020	0.028 0	0.030 0	0.040 0
$1/8 W$	0,175	0,190	0,255	0.006 9	0.007 5	0.010 0
$1/4 W$	0,350	0,380	0,510	0.013 8	0.015 0	0.020 0
$3/8 W$	0,525	0,570	0,765	0.020 6	0.022 5	0.030 0
$7/16 W$	0,612	0,665	0,892	0.024 1	0.026 3	0.035 0
$1/2 W$	0,700	0,760	1,020	0.027 5	0.030 0	0.040 0
$9/16 W$	0,788	0,855	1,148	0.030 9	0.033 8	0.045 0
$5/8 W$	0,875	0,950	1,275	0.034 4	0.037 5	0.050 0
$3/4 W$	1,050	1,140	1,530	0.041 3	0.045 0	0.060 0
$1/16 H$	0,150	0,200	0,238	0.005 9	0.007 9	0.009 4
$1/8 H$	0,300	0,400	0,475	0.011 8	0.015 8	0.018 8
$3/16 H$	0,450	0,600	0,713	0.017 6	0.023 6	0.028 1
$1/4 H$	0,600	0,800	0,950	0.023 5	0.031 5	0.037 5
$9/32 H$	0,675	0,900	1,069	0.026 4	0.035 4	0.042 2
$5/16 H$	0,750	1,000	1,188	0.029 4	0.039 4	0.046 9
$3/8 H$	0,900	1,200	1,425	0.035 3	0.047 3	0.056 3
$7/16 H$	1,050	1,400	1,663	0.041 1	0.055 1	0.065 6
$1/2 H$	1,200	1,600	1,900	0.047 0	0.063 0	0.075 0
$17/32 H$	1,275	1,700	2,019	0.049 9	0.066 9	0.079 7
$9/16 H$	1,350	1,800	2,138	0.052 9	0.070 9	0.084 4
$5/8 H$	1,500	2,000	2,375	0.058 8	0.078 8	0.093 8
$11/16 H$	1,650	2,200	2,613	0.064 6	0.086 6	0.103 1
$3/4 H$	1,800	2,400	2,850	0.070 5	0.094 5	0.112 5
$13/16 H$	1,950	2,600	3,088	0.076 4	0.102 4	0.121 9
$7/8 H$	2,100	2,800	3,325	0.082 3	0.110 3	0.131 3
$15/16 H$	2,250	3,000	3,563	0.088 1	0.118 1	0.140 6
r_1	0,635	1,022	1,084	0.024 8	0.040 1	0.043 1
r_2	0,283	0,283	0,398	0.011 1	0.011 2	0.015 6
r_3	0,255	0,266	0,366	0.010 0	0.010 5	0.014 3
r_4	0,223	0,310	0,360	0.008 7	0.012 2	0.014 2
r_5	0,476	0,755	0,807	0.018 6	0.029 7	0.032 0
r_6	0,336	0,327	0,468	0.013 2	0.012 9	0.018 3
<i>L</i>	3,7	5,0	5,9	0.146	0.196	0.233

FORMULAE FOR CENTRELINE RADII r_1 to r_6

$$r_1 = \frac{H}{16} \left(\frac{7H}{6W} + \sqrt{\left(\frac{7H}{6W} \right)^2 + 1} \right)$$

$$r_2 = \frac{W}{8} \left(\frac{6W}{7H} + \sqrt{\left(\frac{6W}{7H} \right)^2 + 1} \right)$$

$$r_3 = \frac{W}{8} \left(1 - \frac{H}{2W} + \sqrt{\left(\frac{H}{2W} \right)^2 + 1} \right)$$

$$r_4 = \frac{H}{16} \left(1 - \frac{4W}{3H} + \sqrt{\left(\frac{4W}{3H} \right)^2 + 1} \right)$$

$$*r_5 = \frac{H}{16} \left(\frac{5H}{6W} + \sqrt{\left(\frac{5H}{6W} \right)^2 + 1} \right)$$

$$*r_6 = \frac{W}{8} \left(\frac{6W}{5H} + \sqrt{\left(\frac{6W}{5H} \right)^2 + 1} \right)$$

6 RELATIVE VERTICAL POSITION OF PRINTED CHARACTERS

6.1 Base line

The base line is a horizontal line used to specify the nominal vertical position of characters printed in the same line of text. The position of the base line is indicated on the drawings of all characters (except for the long vertical mark).

6.2 Base line displacement

The base line displacement, Y , of each character is the shortest distance between the base line and the centreline of that character. This value is indicated on the drawings of all characters for which it is not zero.

6.3 Vertical position

The nominal vertical position of characters printed in the same line of text is such that the base lines of all characters should be aligned.

7 RELATIVE HORIZONTAL POSITION OF PRINTED CHARACTERS

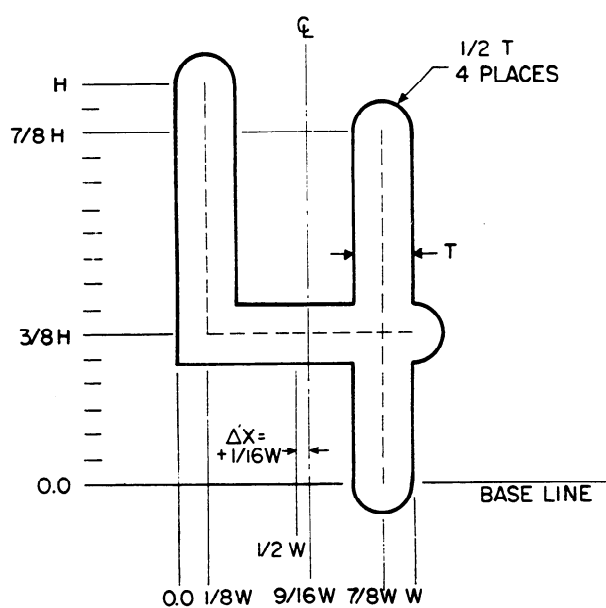
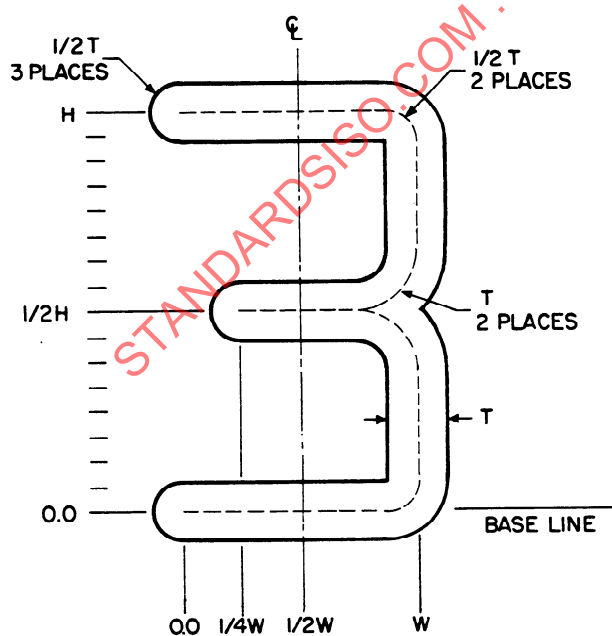
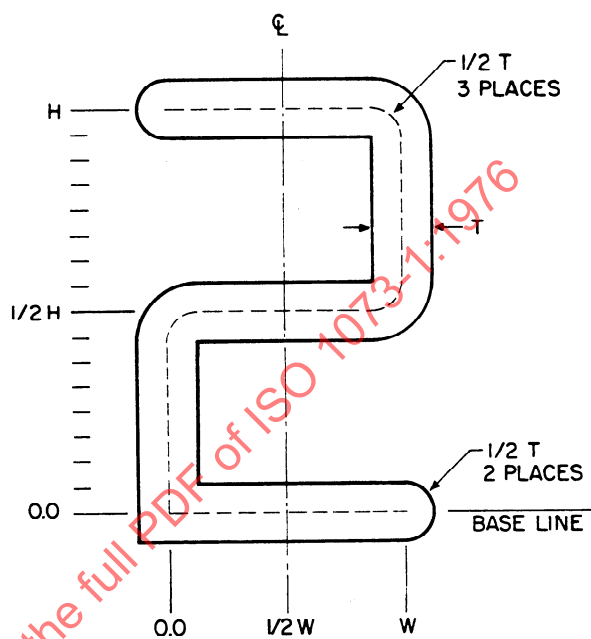
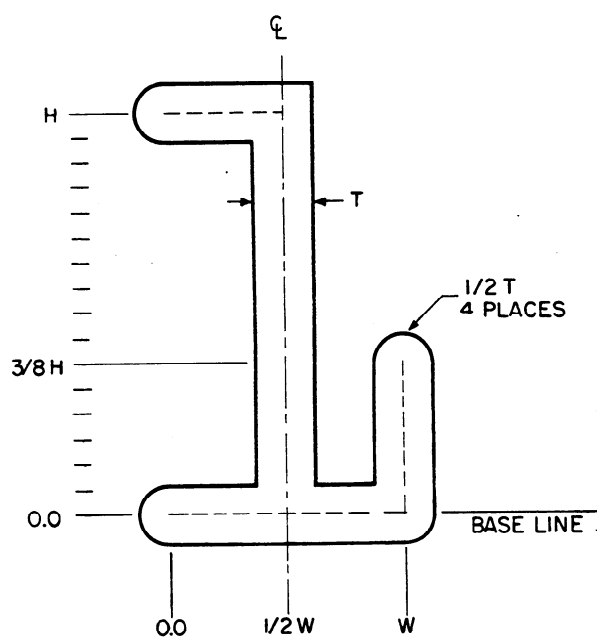
7.1 Reference line for the horizontal location of any character

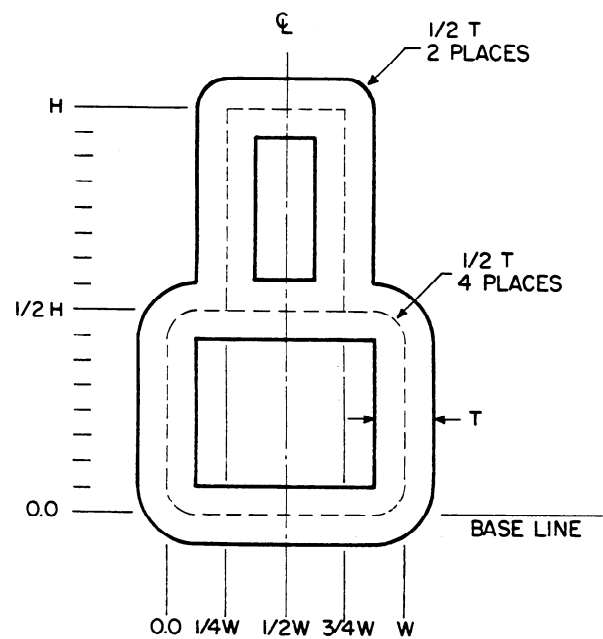
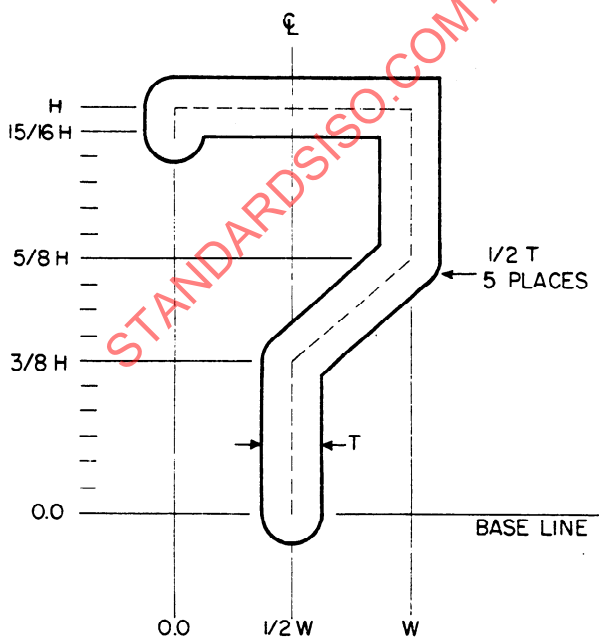
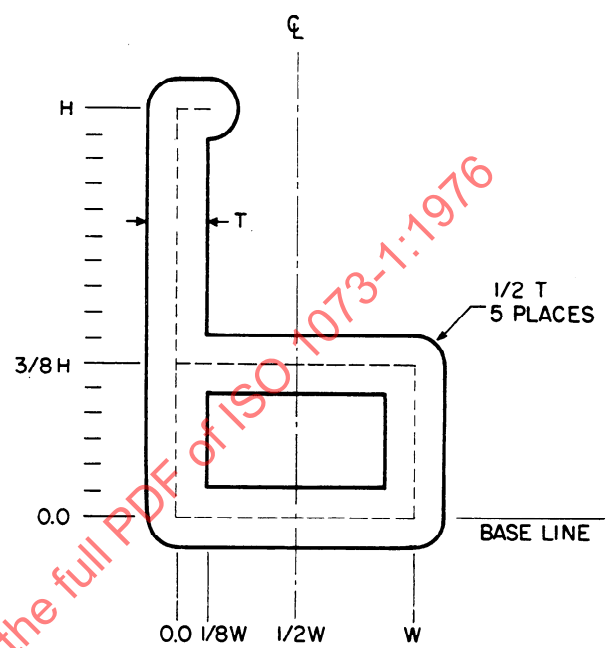
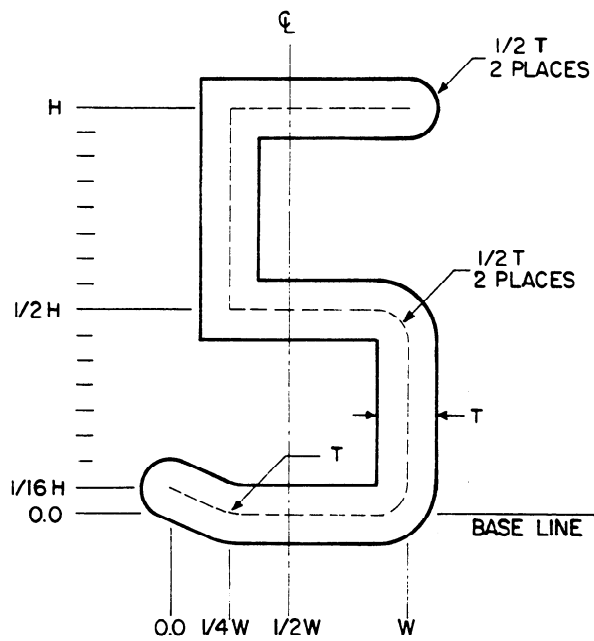
The horizontal location reference line of a character is perpendicular to the base line and divides the printing frame of that character equally. This line is indicated on each drawing.

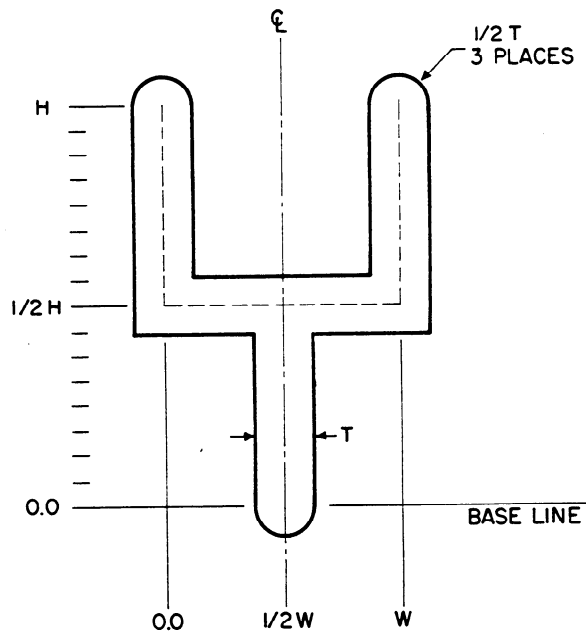
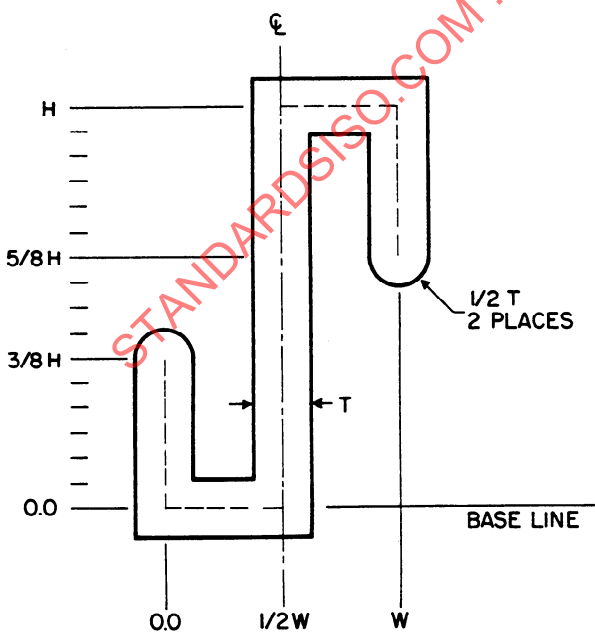
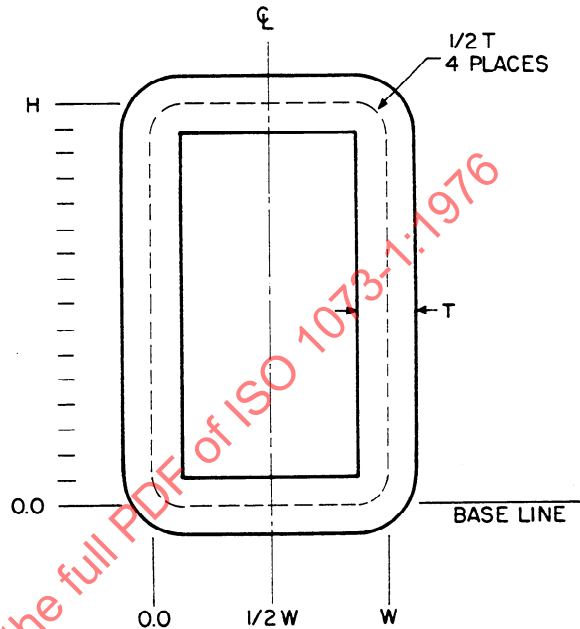
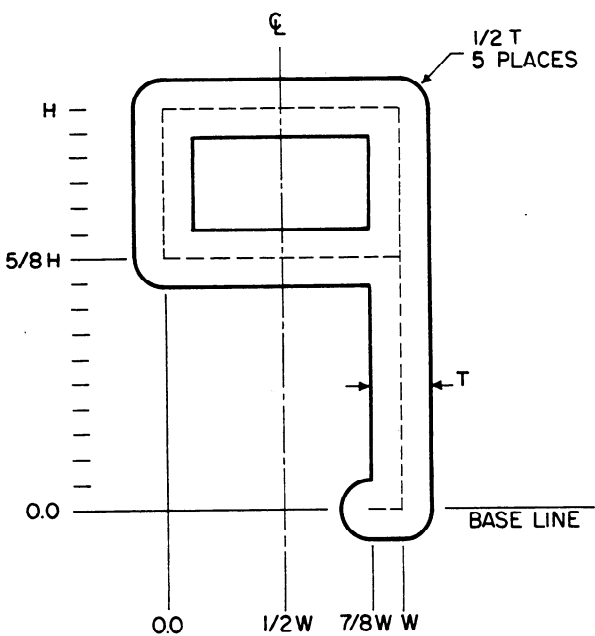
7.2 Horizontal position

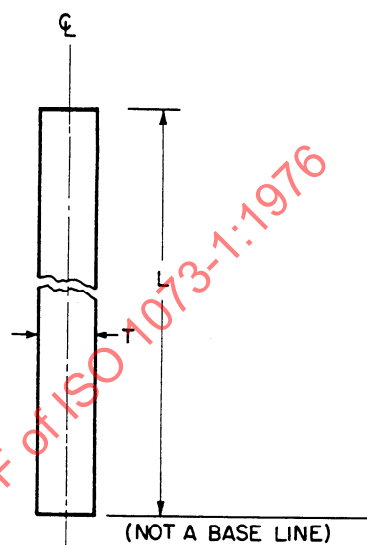
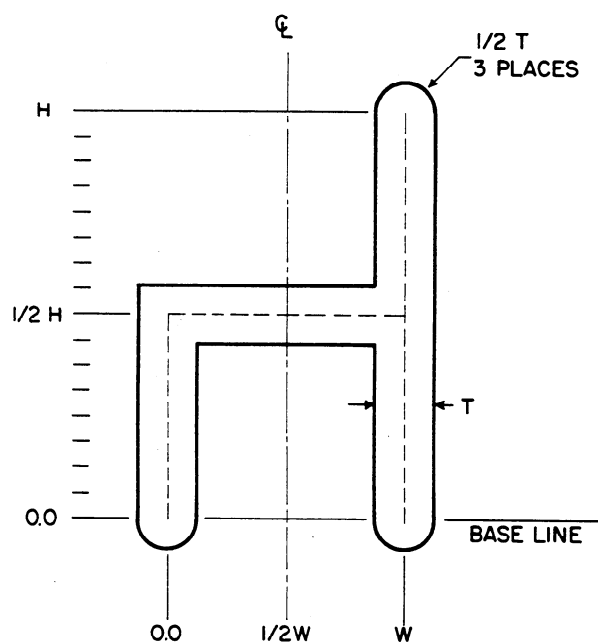
In constant pitch printing, the distance between horizontal location reference lines of adjacent characters should be uniform.

* Radii for $\bar{O}$ only.

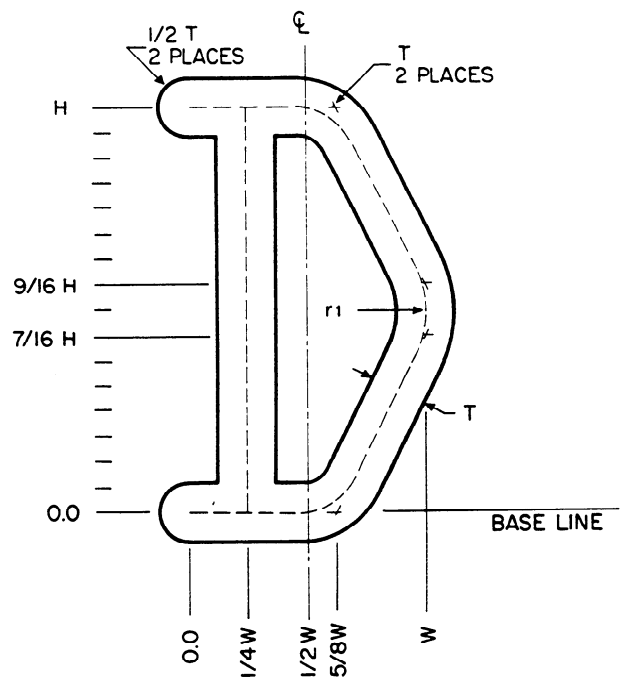
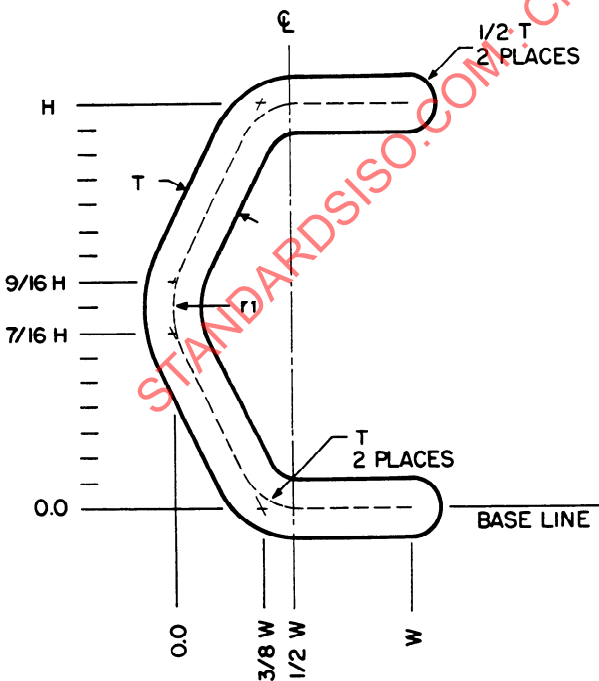
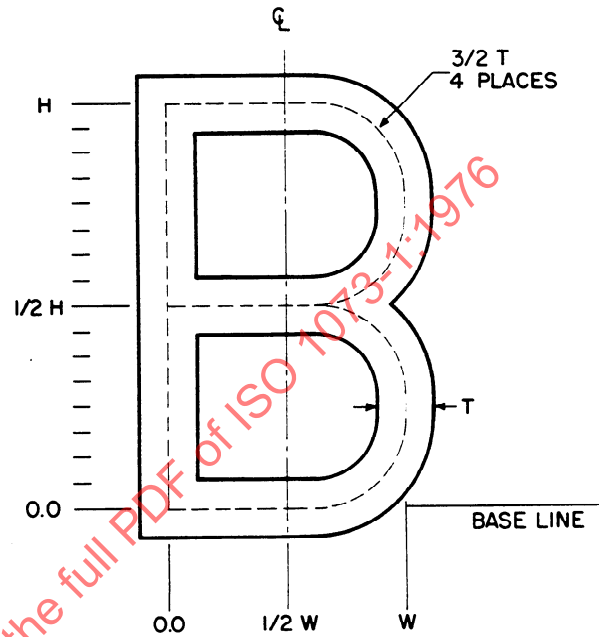
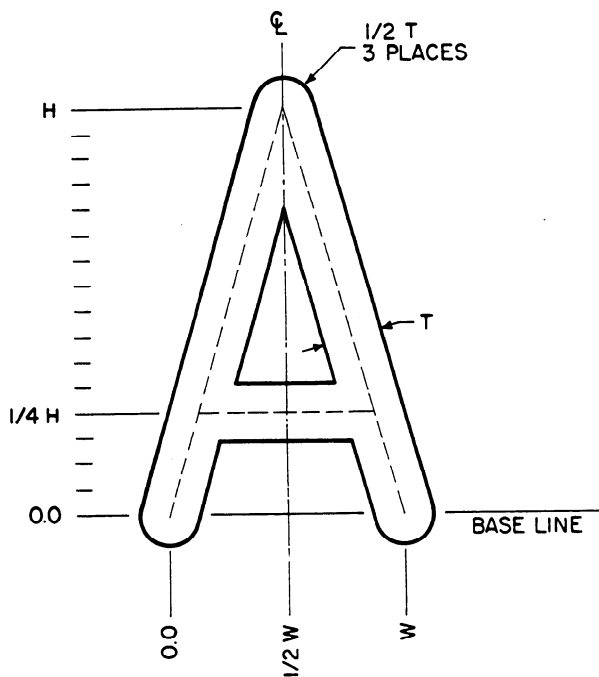


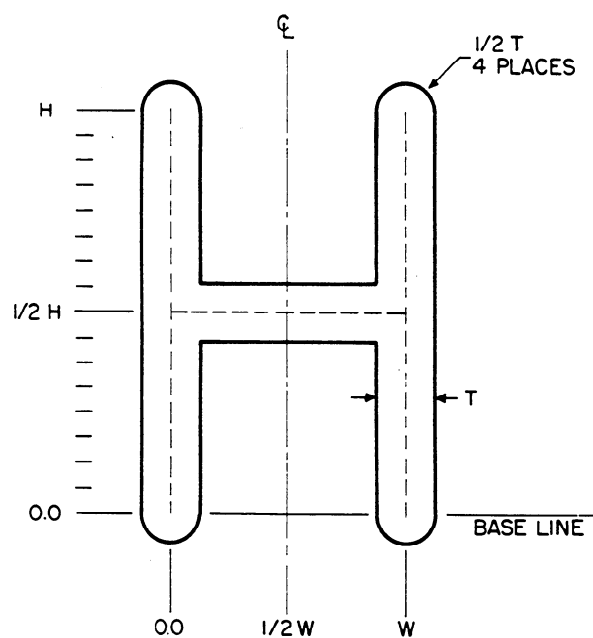
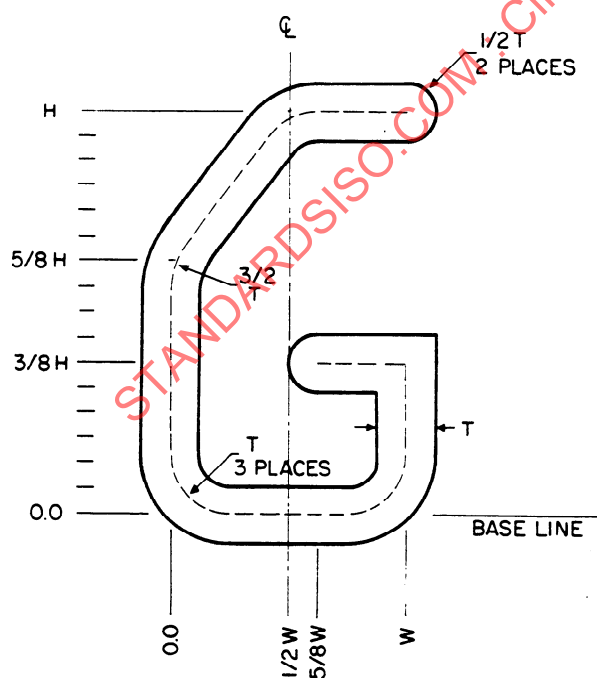
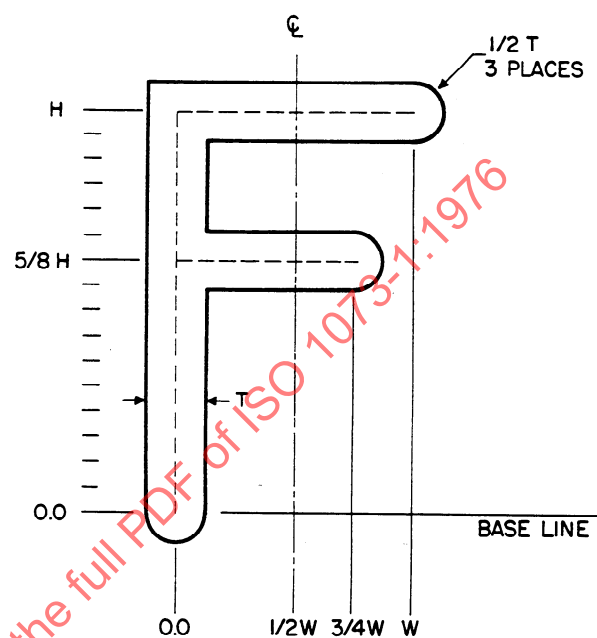
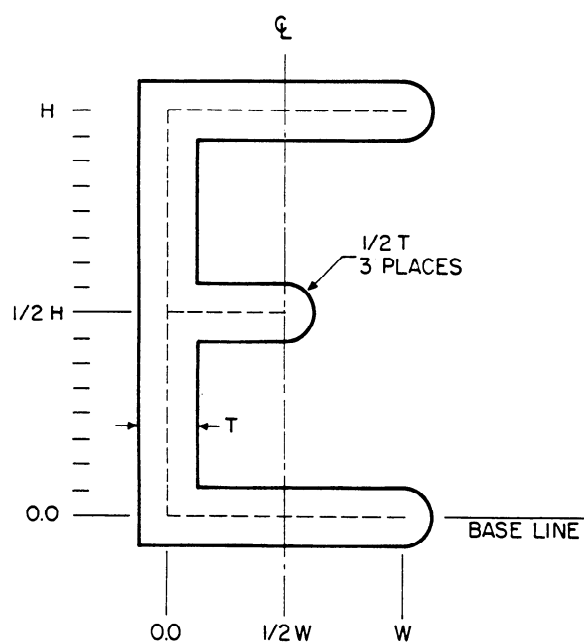


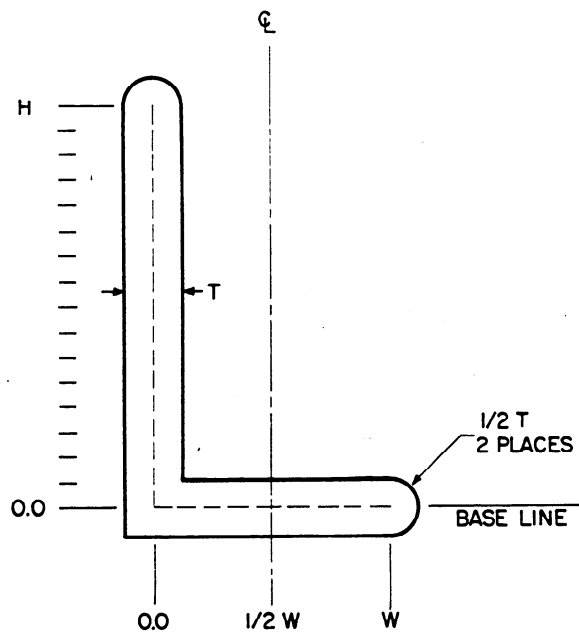
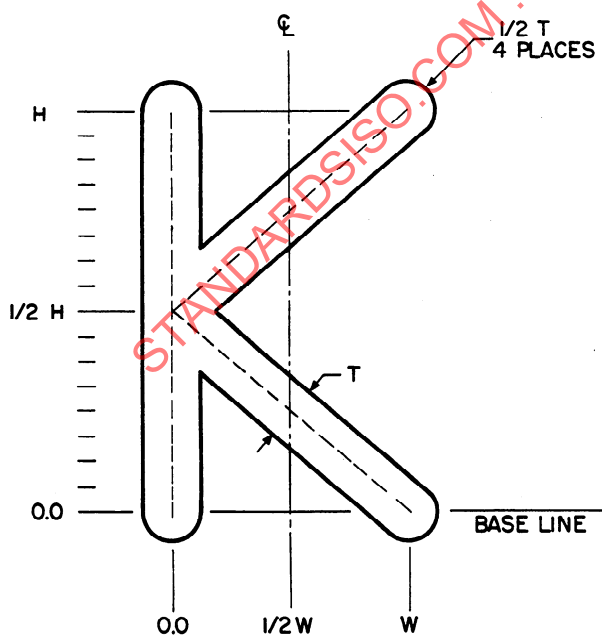
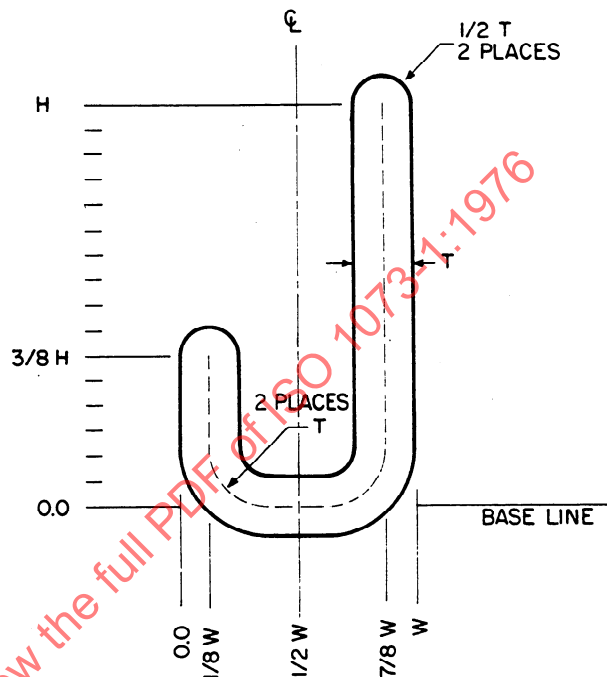
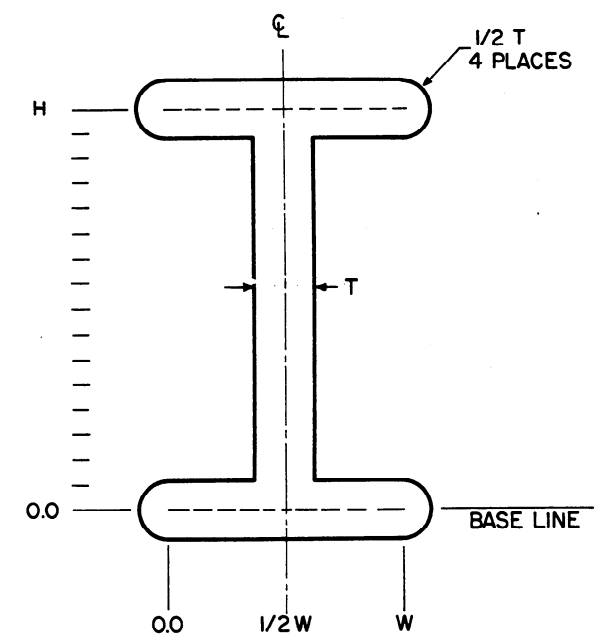


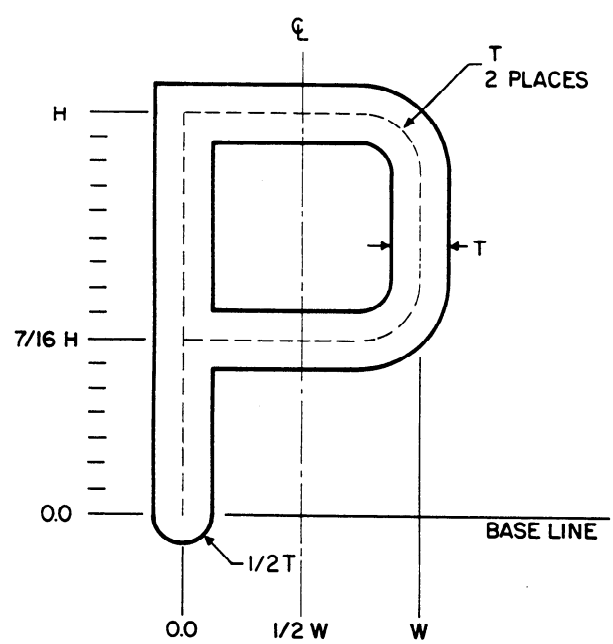
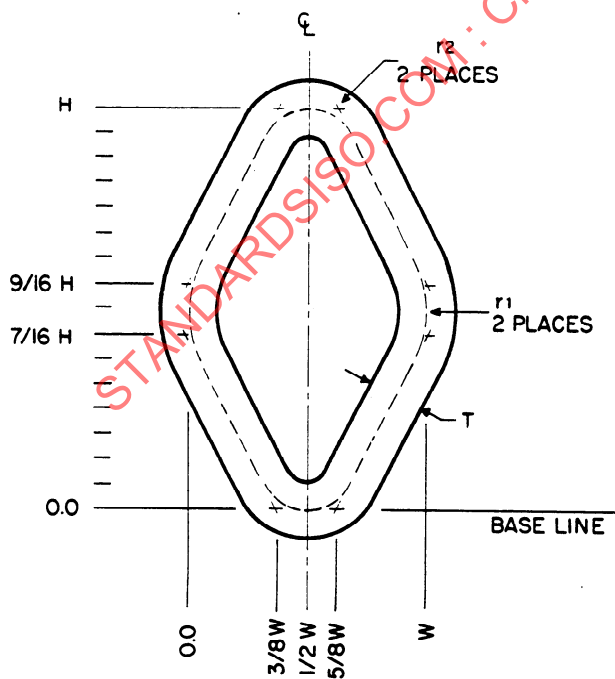
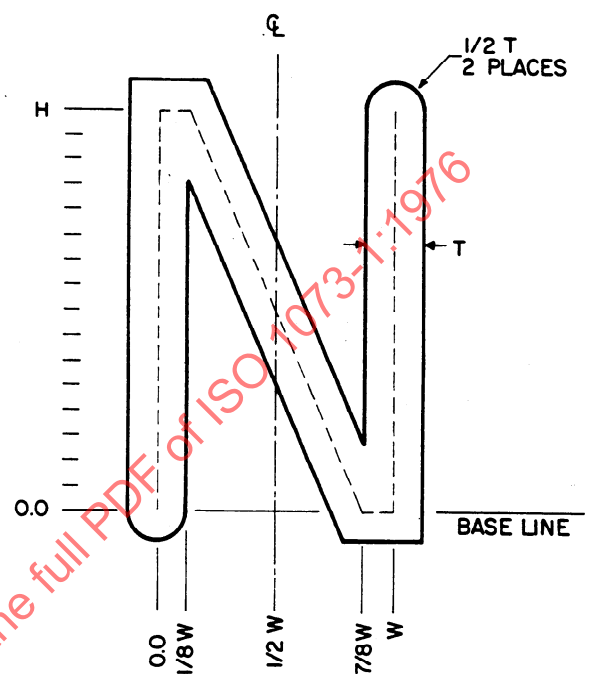
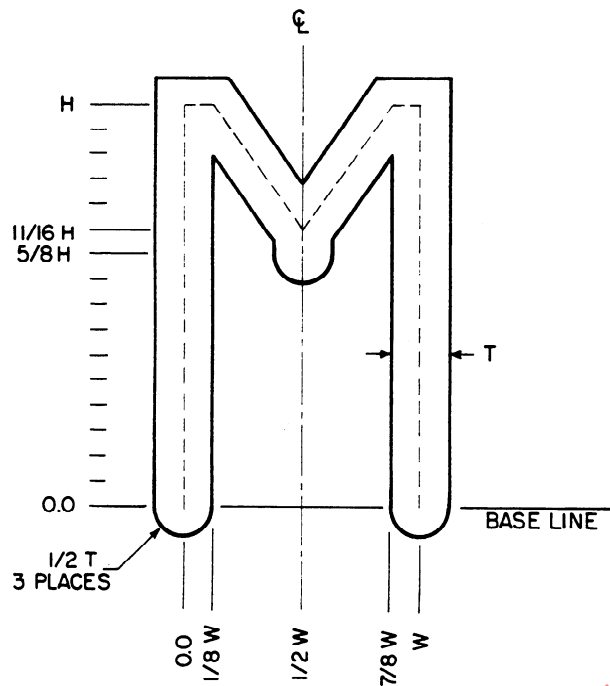


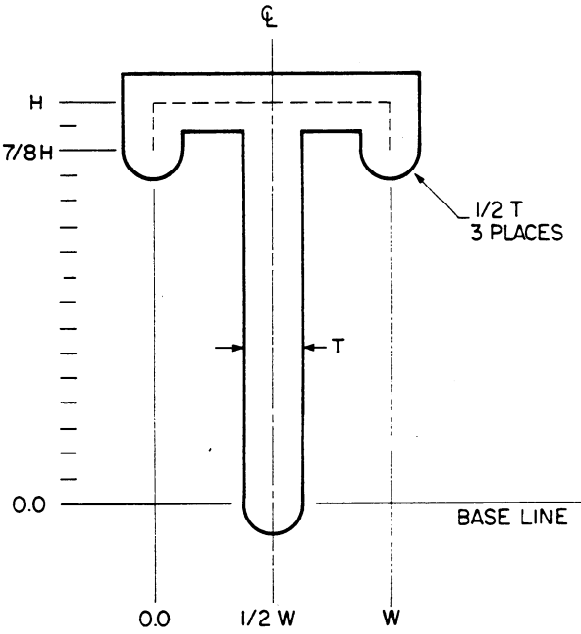
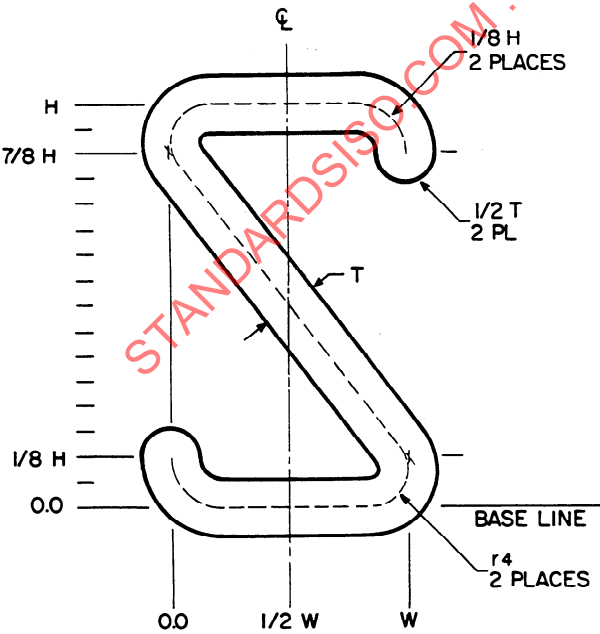
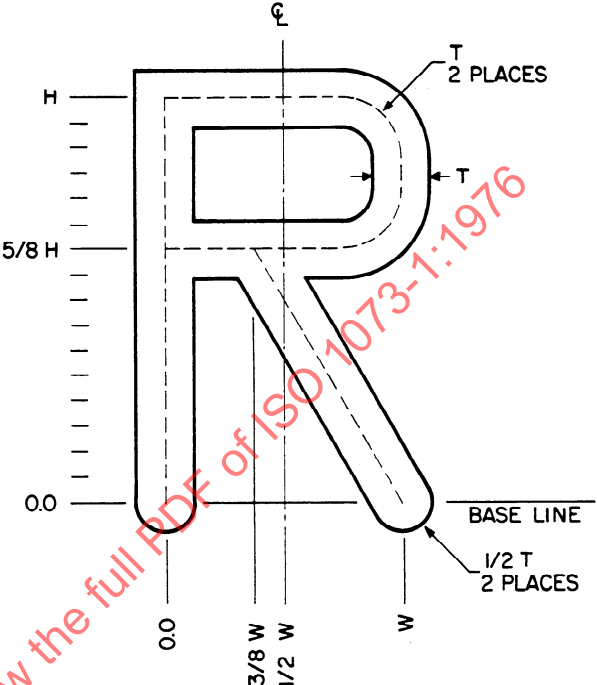
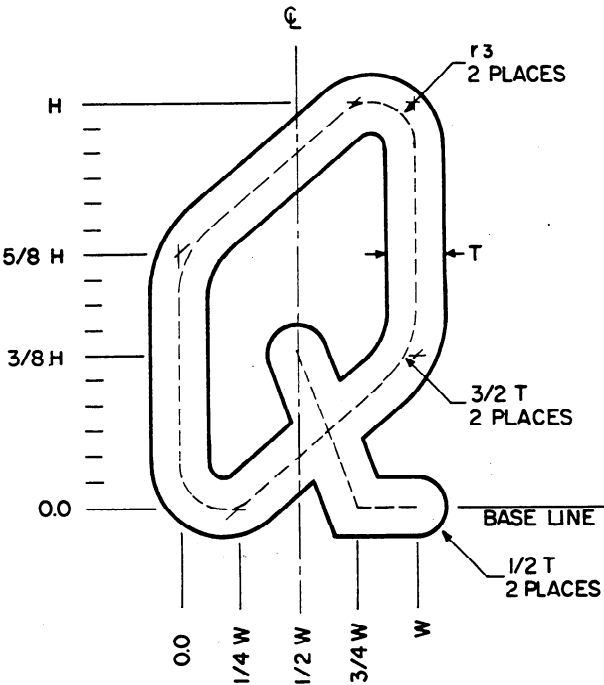
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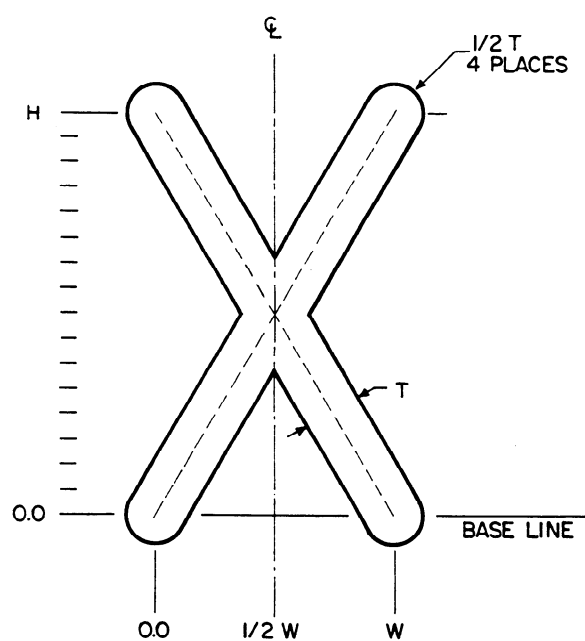
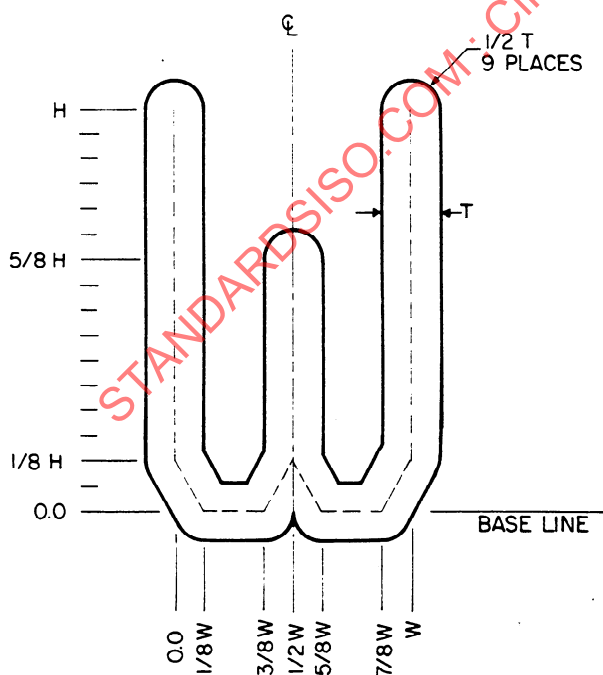
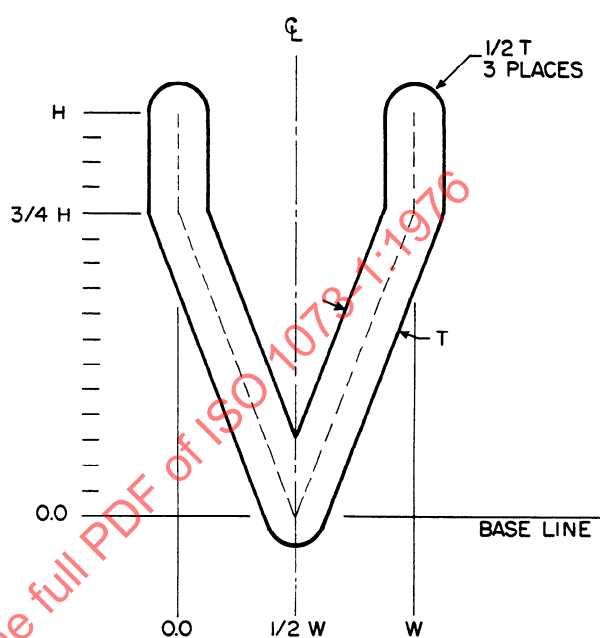
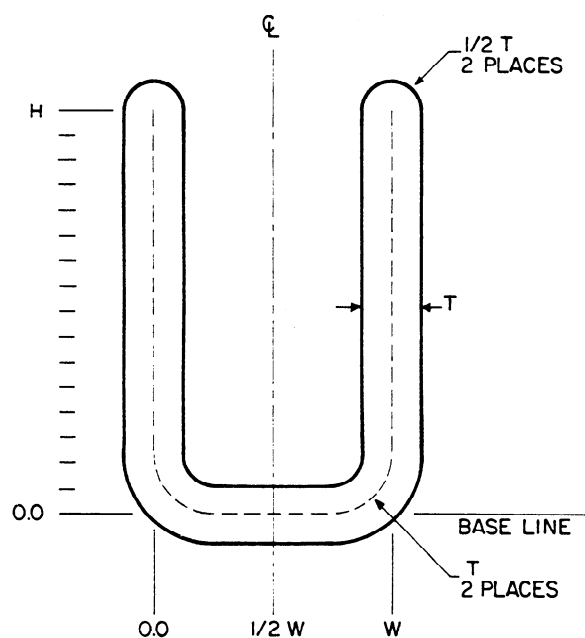


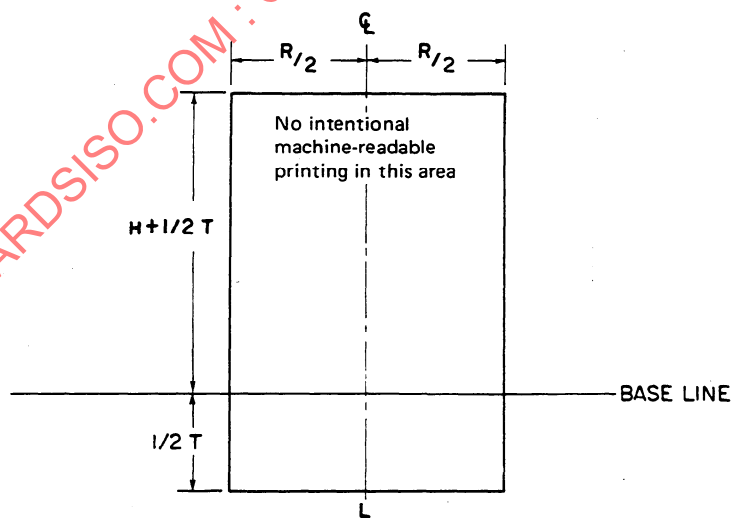
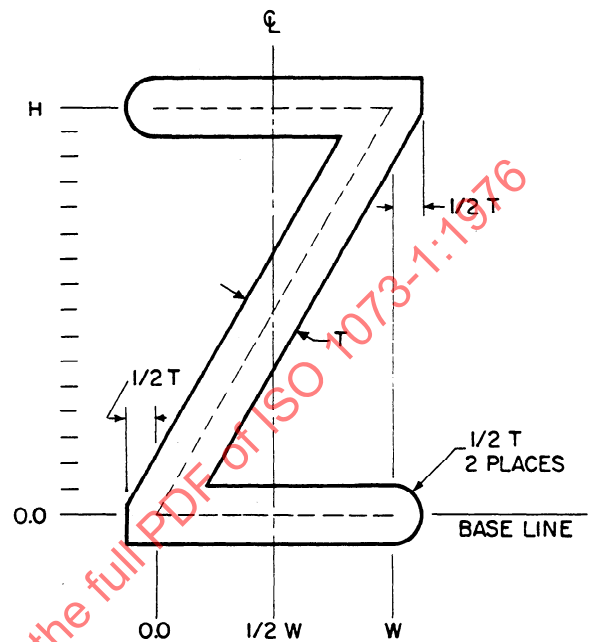
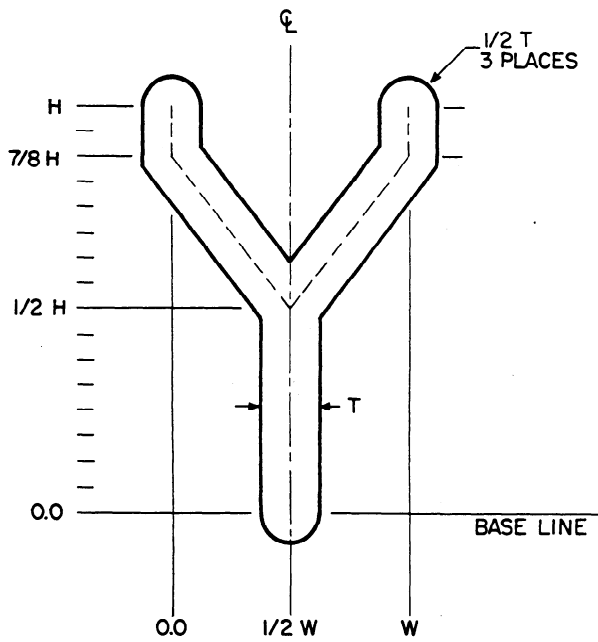








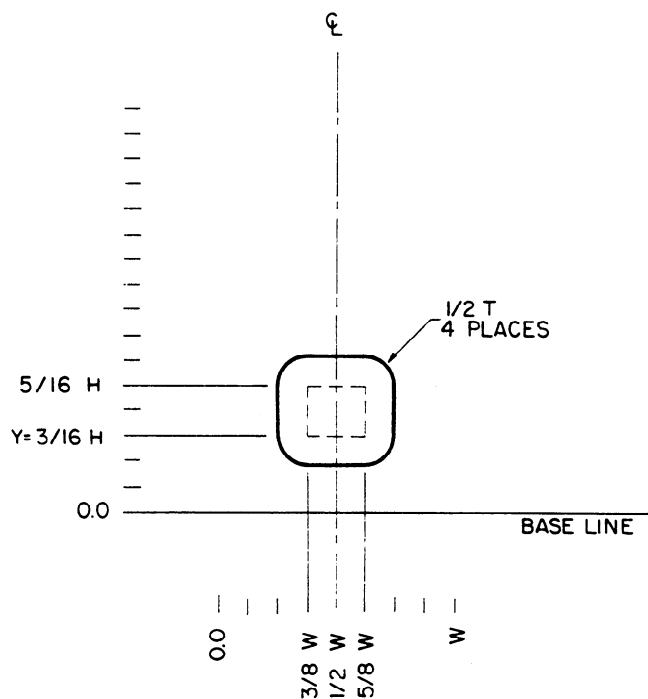




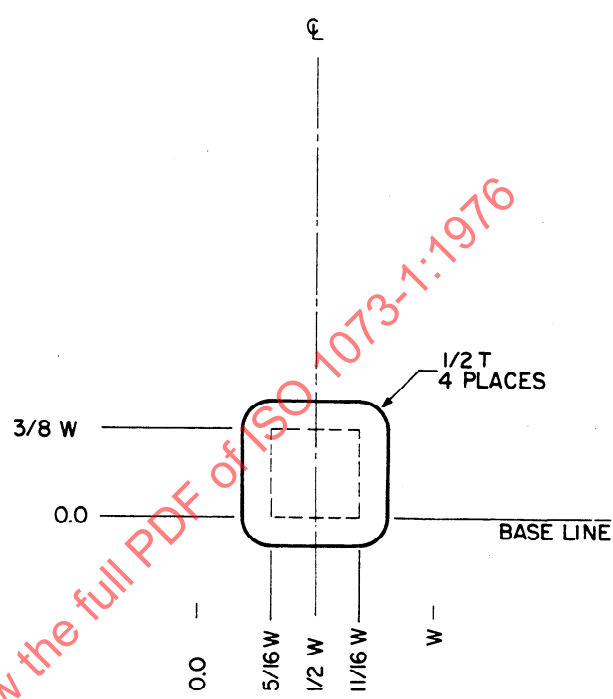
L is the nominal centreline position for a character as defined by the pitch of the printing mechanism and characters on the line

R = nominal character spacing (pitch of printer), W + 2T minimum

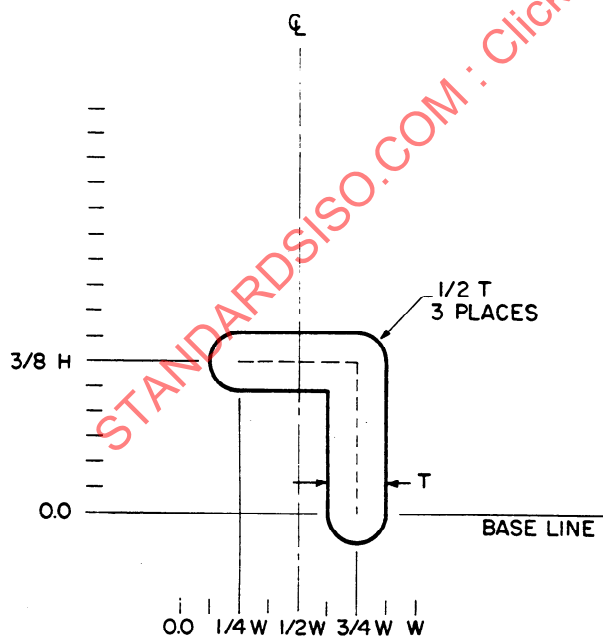
CHARACTER SPACE



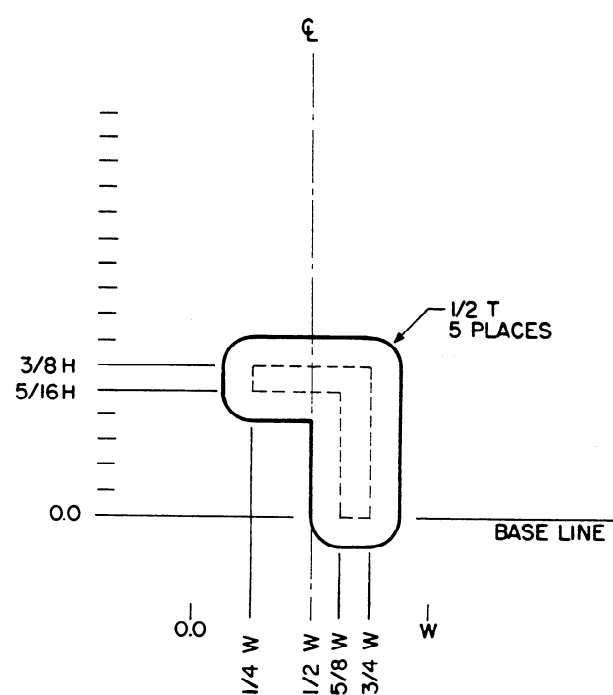
PREFERRED



ALTERNATIVE



PREFERRED



ALTERNATIVE

