MANUAL
OF GRAPHIC TECHNIQUES 3

FOR ARCHITECTS, GRAPHIC DESIGNERS, & ARTISTS

TOM PORTER AND SUE GOODMAN

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Charles Scribner's Sons · New York

Acknowledgments

The authors would like to thank the following people for their help in providing material and information for the production of this manual:

Roy Barris, Colin Catron, Ian Cole, Jack Foreman, Martin Gordon, Dennis Hall, Betty Hill, Gary Jemmett, John Kirby, David Koh, Jean Lodge, Pat Osborne, Roger Osborn-King, Nigel Somner, Kathleen Tramner.

Special thanks are also due to Iradj Parvaneh and Jon Davidson for the photography, to Pat McNiff for typing the text, and to Richard A. Abbott (Execuscope, Bournemouth, Dorset, England) for his expert advice and supply of visual material for the section on modelscope photography.

Library of Congress Cataloging in Publication Data

Porter, Tom.

Manual of graphic techniques 3.

Includes index.
1. Graphic arts--Techniques. I. Goodman, Sue.
II. Title. III. Title: Manual of graphic techniques three.
NC1000.P666 1983 741.6 83-14087
ISBN 0-684-18018-9

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3 5 7 9 11 13 15 17 19 O/P 20 18 16 14 12 10 8 6 4 2

Printed in the United States of America.

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Introduction

Manual of Graphic Techniques 3 has been developed specifically as a companion volume to its forerunners, Manual of Graphic Techniques 1 and 2. Based on the self-contained page layouts and step-by-step frames of information devised for its predecessors, this manual examines wider design techniques together with some disciplines often overlooked or ignored in basic design courses.

For example, as the appearance of student presentations is often marred by the quality of lettering, this manual opens with an introduction to a basic pen-lettered alphabet. Also studied is the basic construction of a sans-serif display alphabet and roman lettering, the latter providing the elegant standard against which all other letter forms are judged. Also, in surviving over two thousand years, roman lettering exists as an important link between written communication as a stone-carved medium and its adaption in modern print technology.

Hand lettering is followed by some basic principles of graphic reproduction and typography. These are included because of the shift of designers toward a proliferation of ideas through the print medium and--in a competitive climate--an increasing search for wider exposure. Also included in this section are hints and tips when preparing artwork for transformation by the reproduction camera, as well as layout methods and techniques for combining words and pictures in the printed format.

Another method of image transformation and proliferation is the more accessible processes of manual printmaking. These range from the immediacy of monoprinting and relief printing to basic procedures of linocutting, screenprinting, and lithography. These occupy the next section. The rudiments of each process are described for the beginner.

The application of printmaking in the creation of models is well known. However, it is the recent resurgence of modelmaking as a means of realizing design ideas "in the round" that is considered an important trend by the authors. The concluding section therefore examines the various methods and materials of model construction, their roles in design and, via the introduction of the camera and modelscope, how they can be translated into photographs conveying powerful illusions of reality.

1 LETTERING DESIGN

Basic Freehand Pen Lettering

1

Very often, hand lettering is used to annotate, identify, and clarify information that is carried in a design drawing. It is also used because it is sometimes faster, more convenient, and more economical than drawing by mechanical means, such as instant lettering and stencils. However, when hand-lettered information is badly formed, it can appear the weakest element in a design presentation, with its malformation distracting the viewer from the message it conveys.

As the central function of lettering is that of communicating information quickly, it is crucial that the designer develop a legible style. For example, in architectural design, production drawings usually include written notes that communicate directly with those who will construct the building. In this context, hand lettering will be hampered by clever or overstylized treatments. Therefore, the simpler and clearer the formation of letters and words, the more legible the means of communication.

Although the following alphabet is based on the use of a lettering pen, it is a good idea for the beginner to approach hand lettering as an extension of normal handwriting. Initially, a pencil, fountain pen, or technical pen can be used in the practice of basic letter formation. Once a degree of control has been established, the lettering pen technique should then be attempted.

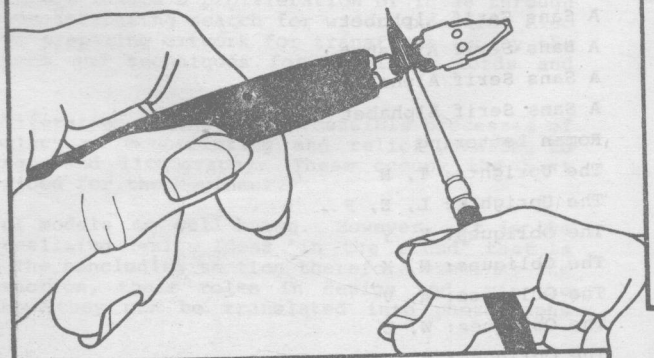
ABCDEFGHIJKLMNOPQRS
TUVWXYZ 1234567890
abcdefghijklmnopqrstuvwxyz

N.B.: Don't worry too much about early mistakes. Practice sessions aiming at the achievement of individually proportioned letters should progress to speed tests in which letters are drawn with the minimum number of strokes.

2

The following alphabet results from the use of a lettering pen such as a Graphos, and a chisel- or square-cut nib.

First, remove any protective lacquer from a new nib by immersing it briefly in boiling water. Pens not fitted with an integrated ink-feeding system are loaded by drawing an ink-loaded brush over their up-turned reservoir.



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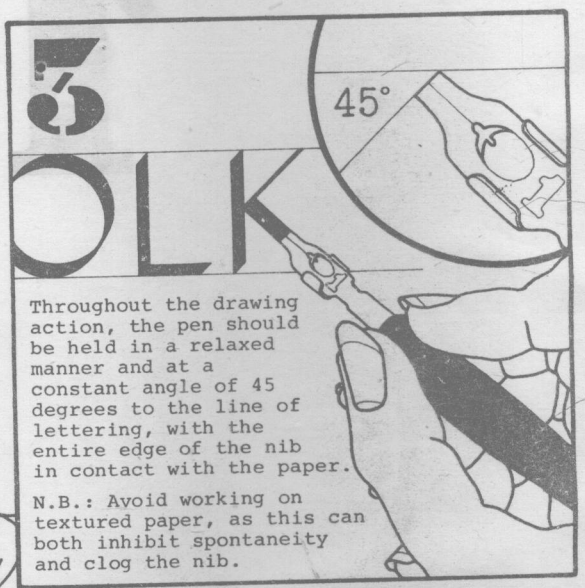
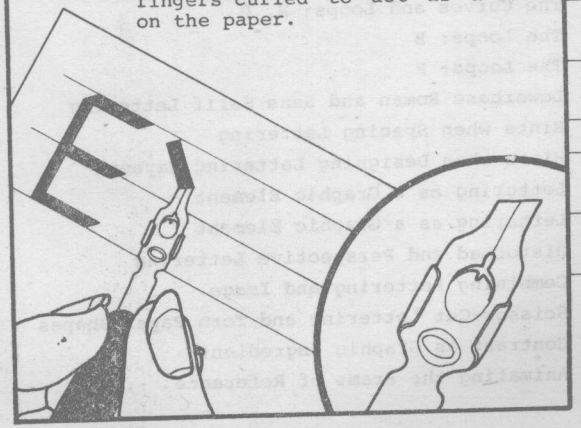


Throughout the drawing action, the pen should be held in a relaxed manner and at a constant angle of 45 degrees to the line of lettering, with the entire edge of the nib in contact with the paper.

N.B.: Avoid working on textured paper, as this can both inhibit spontaneity and clog the nib.

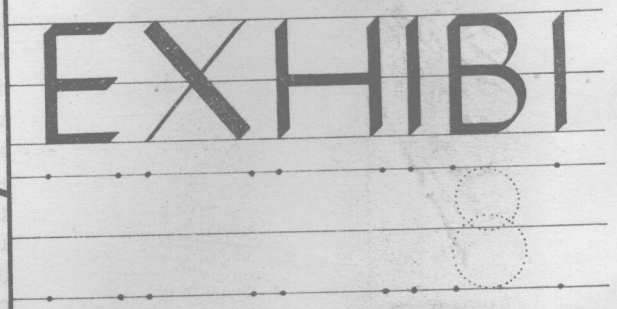
4

An oblique-cut nib is available for left-handed calligraphers. However, in both left- and right-handed drawing positions, a comfortable drawing hand position should be found, with the unused fingers curled to act as a rest on the paper.



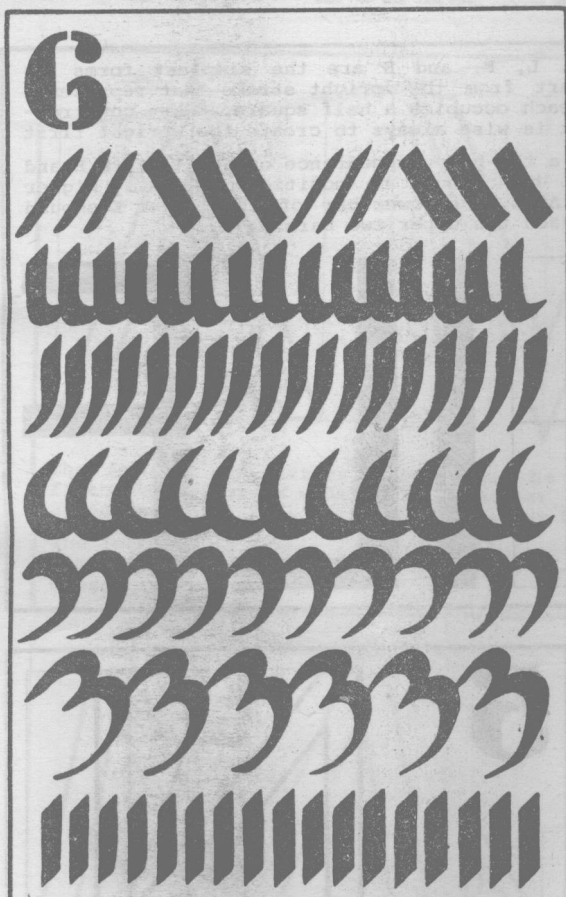
5

As an aid to accuracy, beginners should use lightly penciled guidelines. These should be of a height equal to seven or eight times the thickness of the lettering nib in use.



A further aid is preliminary plotting of proportions using penciled dots. However, as the ultimate goal is a spontaneously formed letter, this practice should be abandoned when confidence is gained.

Basic Freehand Pen Lettering



A trial exercise in forming various strokes will develop sensitivity toward the mark-making ability of the pen as well as find the best position in which to hold it. Initial experiments in making continuous strokes should be followed by exercises in forming individual strokes that practice the presentation and removal of the nib in a clean, decisive manner.

N.B.: Make deliberate strokes, always drawing toward yourself. Never exert pressure--allow the pen to do the work.

Once you have established a degree of familiarity with the pen, attempt the alphabet. Aim for simple, well-formed letters, remembering to draw them by using the slightest of pressure and holding the pen at a constant 45-degree angle. Also, aim to make each letter form distinct, with no chance of its being mistaken for another.

Each of the above capital and lowercase letters is shown with a suggested order and direction of pen-stroke. Some letters can be formed in several ways. After much practice you will be able to form them using fewer strokes.

N.B.: This alphabet can be drawn using a technical pen or a pencil, in which case the drawing instrument should be held in the upright position.

A Sans Serif Alphabet

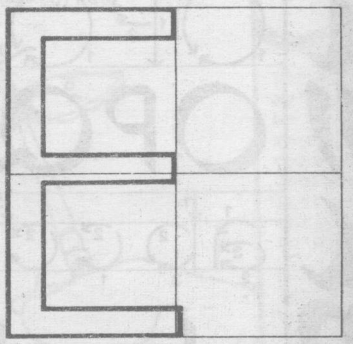
1 The construction of the following alphabet is based on the proportion of the square. It is sans serif, that is, without serifs, and can be quickly drafted using a T-square, set square, and a pair of compasses with pencil or pen. Its main construction is based generally on roman lettering. This accounts for adjustments to its relationship with the square as reductions in the overall width of some of its full letters respond to the existence of serifs in the original. The thickness of the strokes is shown as one-ninth that of the letter height. However, depending on its design application, letter thickness can be reduced for delicacy or made heavier or bolder for added emphasis.

HHHHH

N.B.: When making letters bolder than those shown here, the extra thickness should be added on the inside of the strokes.

2 The letters I, L, F, and E are the simplest forms to construct. Apart from the upright stroke that represents the letter I, each occupies a half square. When constructing letters it is wise always to create the upright first.

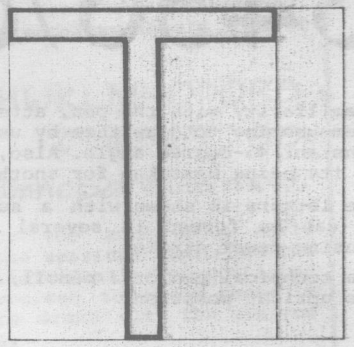
N.B.: To avoid a top-heavy appearance on the letters E and F their central bar should be positioned slightly higher than halfway. Also, the lower bar of the letter E should slightly overreach the upper two bars.



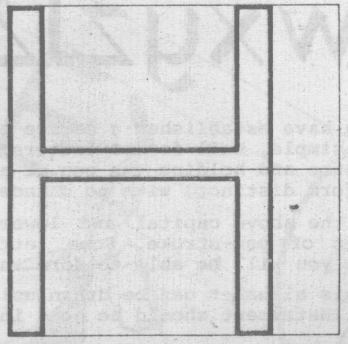
ILF

3 The letter T fills the square, its crossbar being reduced to four-fifths the width of the square to avoid top-heaviness.

N.B.: Another optical refinement is a slight reduction of thickness in the crossbar, which can be applied to all horizontal strokes in the alphabet.



4 The letter H fills the square, its overall width reduced to four-fifths the width of the square. Apart from the slight reduction to its thickness, the crossbar should be positioned slightly higher than halfway to compensate for an optical effect of top-heaviness if the crossbar is drawn centrally.



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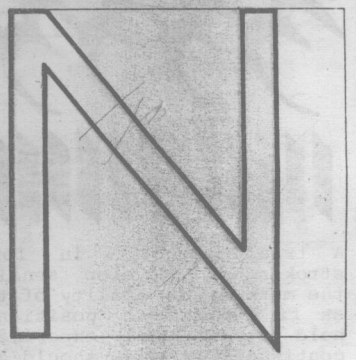
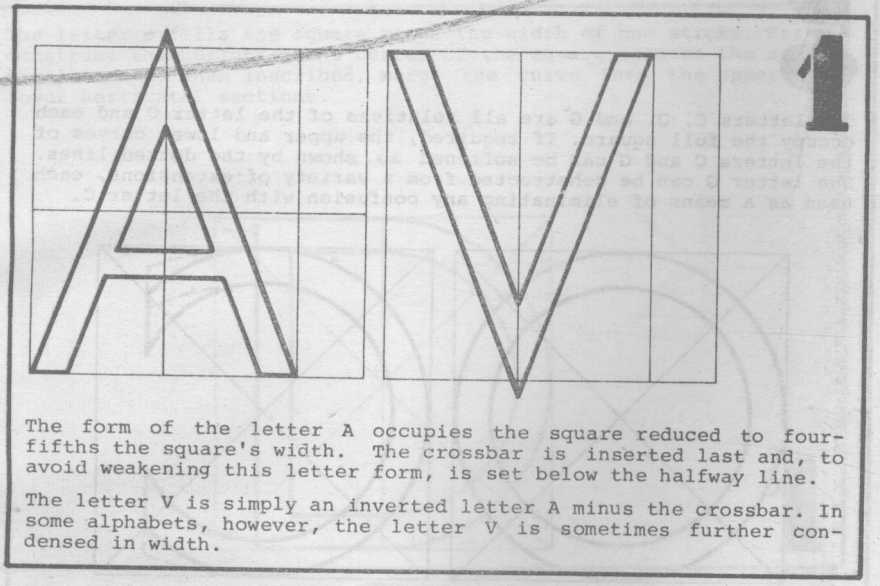


The letter N occupies the same width as the letter H. Notice that the upper intersection of the diagonal is blunted while the lower intersection is pointed--the latter sitting just below the baseline.

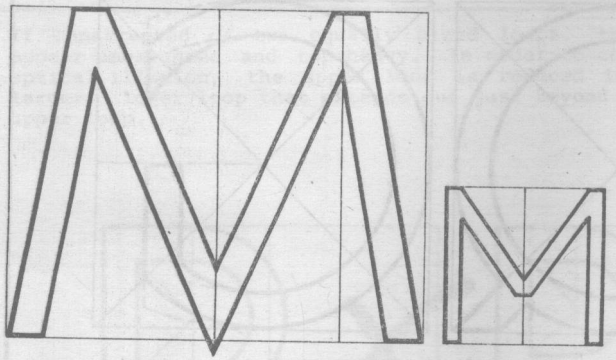
A Sans Serif Alphabet



1

The form of the letter A occupies the square reduced to four-fifths the square's width. The crossbar is inserted last and, to avoid weakening this letter form, is set below the halfway line.

The letter V is simply an inverted letter A minus the crossbar. In some alphabets, however, the letter V is sometimes further condensed in width.



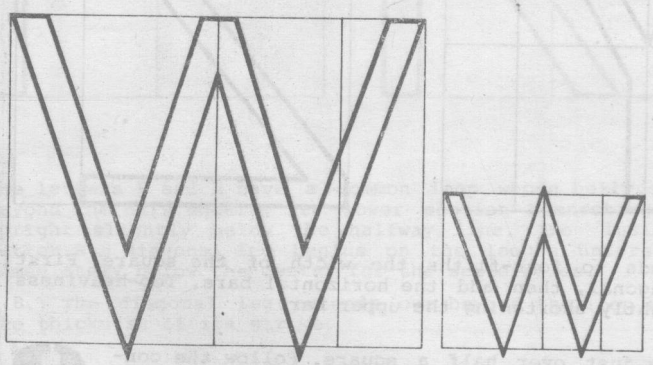
3

The letter M also fills the 1 1/4-square format, reversing that of the letter W but with a different optical adjustment. In this letter the central, inverted triangular space is drawn as slightly larger than its outer counterparts, which have narrower baselines.

N.B.: This letter can also be made to fit the square, but this contraction necessitates the introduction of rather ugly, shortened center strokes to avoid an appearance of being overcrowded.

In its double role when forming the letter W, the V does become condensed, with the two V's occupying 1 1/4 squares. A proportional adjustment should be made when constructing this letter so that the central, triangular space is made slightly smaller than its outer and inverted counterparts. This optical adjustment is achieved by giving the central triangle a narrower base when constructing the two outer strokes.

N.B.: This letter can be constructed with pointed intersections if required. When they are used, however, the points should sit just above and below the line.



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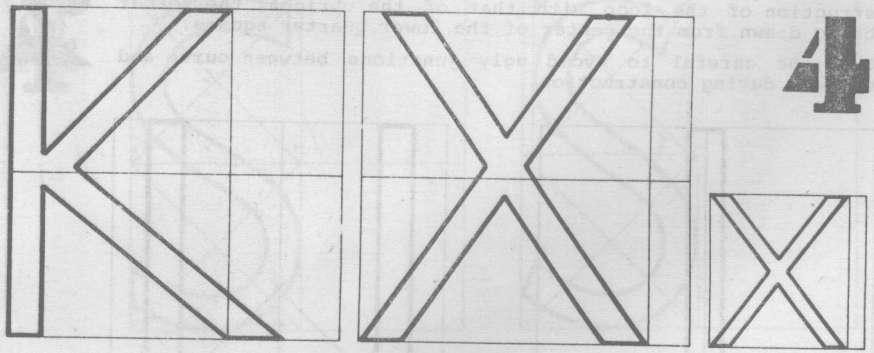


4

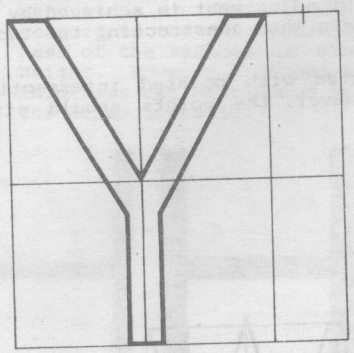
The upper arm of the letter K extends approximately two-thirds the width of the square. Draw the upright first and then add the upper diagonal stroke so that its left-hand edge penetrates halfway into the upright on the center line. An optical adjustment that makes this form appear more balanced is to allow the lower stroke to overreach the limits of its overhead counterpart slightly.

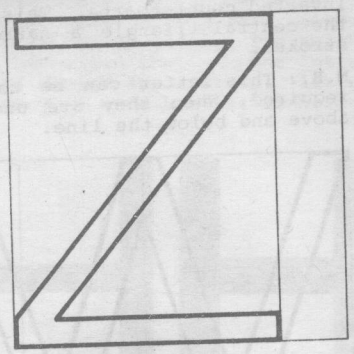
The letter X occupies the square minus the width of one stroke. Its center of balance can be raised to avoid a squat appearance by slightly reducing the upper triangular space.

A Sans Serif Alphabet

1

The arms of the letter Y extend to within two stroke widths of the full square. Construct the inverted triangle first so that the arms make their connection with the upright just below the halfway line.



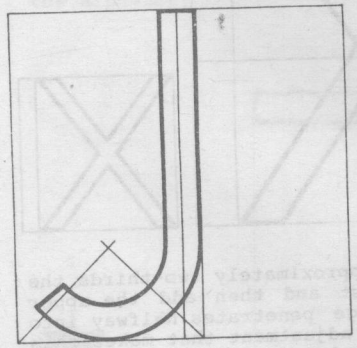


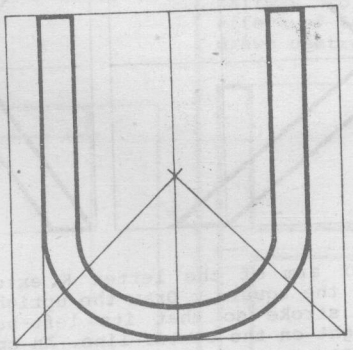
The letter Z extends to four-fifths the width of the square. First construct the diagonal, then add the horizontal bars. Top-heaviness is avoided by slightly shortening the upper bar.

2

The letter J fills just over half a square. Follow the construction of the loop with that of the upright, the former being drawn from the center of the lower quarter square.

N.B.: Be careful to avoid ugly junctions between curve and upright during construction.

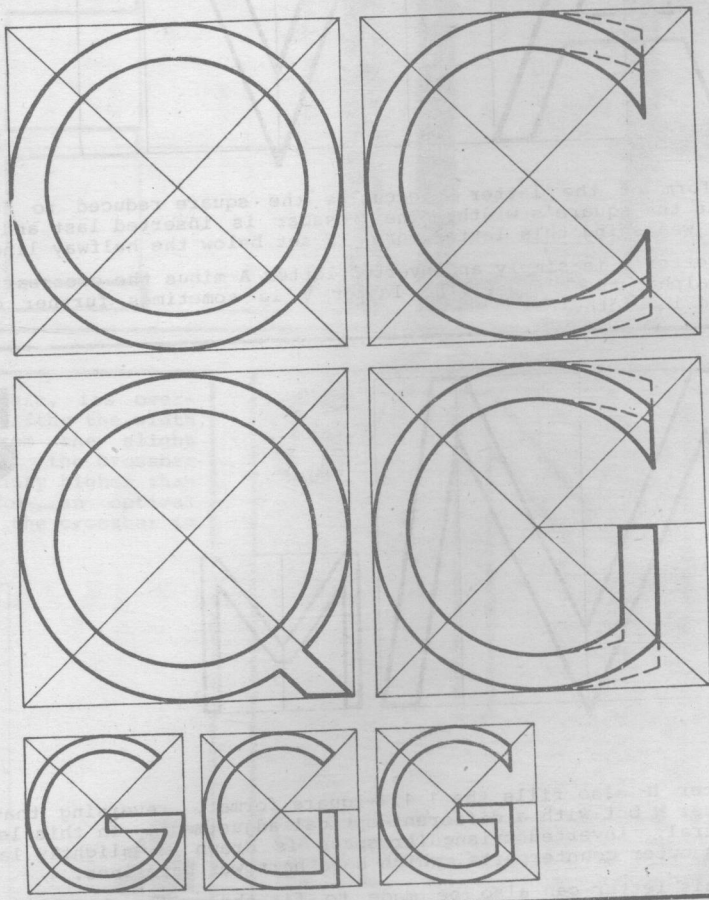




The letter U occupies the square reduced by one-fifth of its width. Once again, it is better to draw the curve first and then add the two upright strokes.

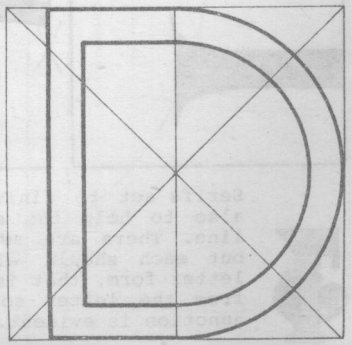
3

The letters C, Q, and G are all relatives of the letter O and each occupy the full square. If required, the upper and lower curves of the letters C and G can be softened as shown by the dotted lines. The letter G can be constructed from a variety of extensions, each used as a means of eliminating any confusion with the letter C.



A Sans Serif Alphabet

The letter D fills the square minus the width of one stroke. First construct the upright. The center of the square locates the semi-circles that, when inscribed, merge the curve into the upper and lower horizontal sections.



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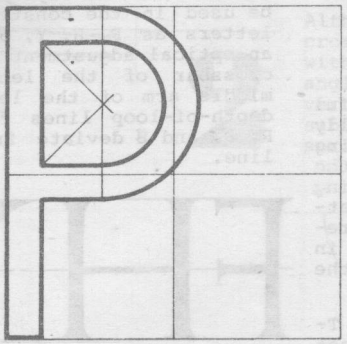
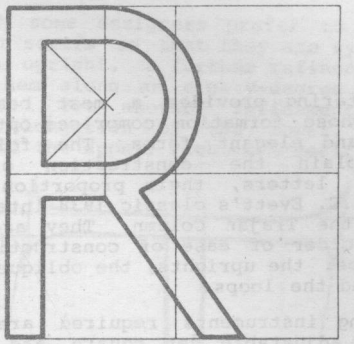


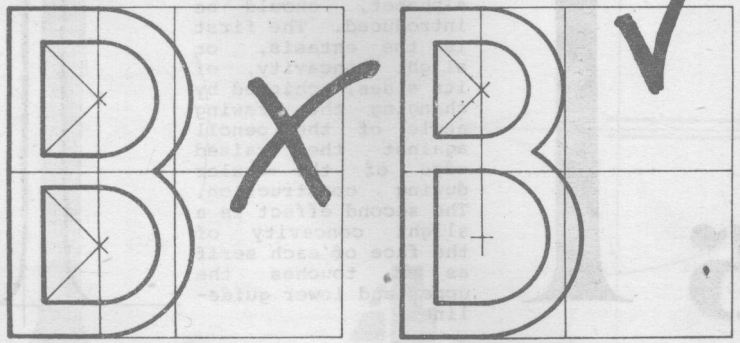


2

The letters P and R have a common loop whose belly extends out just beyond the half square, its lower section connecting back with the upright slightly below the halfway line. The inside edge of the letter R's diagonal leg begins on the loop's underside at a point immediately below the center for the semicircles.

N.B.: The diagonal leg extends out beyond the loop by approximately the thickness of its stroke.

If constructed of two equally sized loops, the letter B can appear unbalanced and top-heavy. In order to compensate for this optical illusion, the upper loop is reduced in size to allow a larger, lower loop that extends out just beyond the limits of the upper loop.



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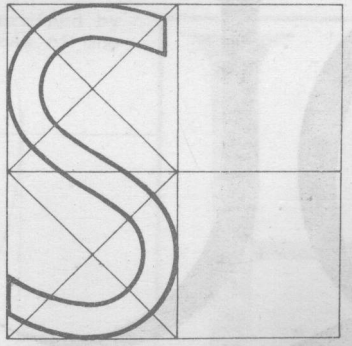
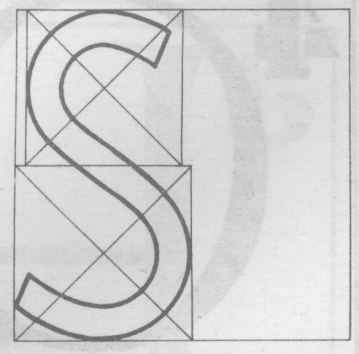




The letter S is formed by two circles occupying a half square. Again, rigid use of these guidelines to form this letter can result in a mechanical appearance not in character with this letter form.

It is better to use the basic construction as a framework on which to build up this letter. In doing so, it should not be necessary to make part of the line straight when changing from one circle to the other. Each end should break away slightly from the circle and follow a graceful line that allows the lower section to be slightly larger than the upper one.

Roman Lettering

1

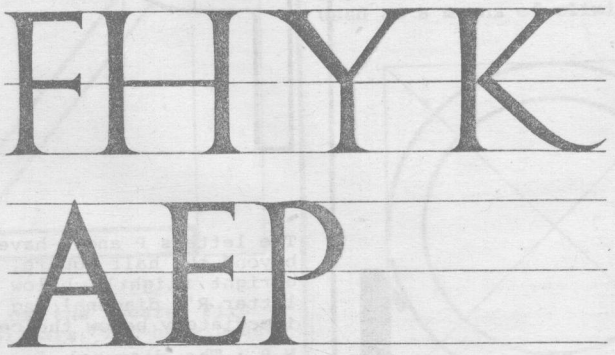
Roman lettering provides a most beautiful alphabet whose formation comprises optically adjusted and elegant forms. The following pages explain the construction of the individual letters, their proportion being based on L.C. Evett's classic 1938 interpretation of the Trajan Column. They are presented in order of ease of construction, in four groups: the uprights, the obliques, the curves, and the loops.

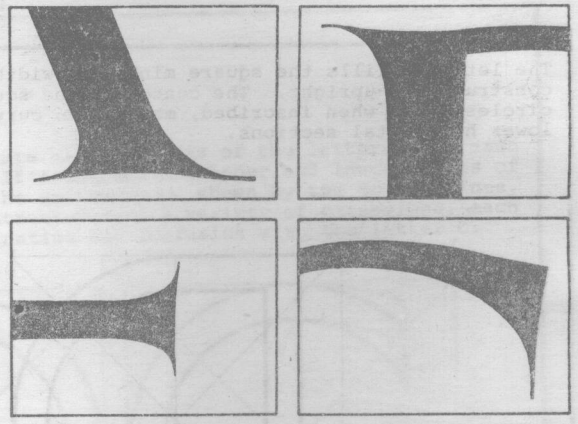
The drawing instruments required are a T-square, an adjustable set square, and a set of compasses. Guidelines should be drawn lightly with hard graphite, with a softer graphite used for drawing curves. Once constructed, the letters can be brush-painted solid with India ink after outlining them with a technical or ruling pen.

N.B.: Inking mistakes can be retouched with white paint or typewriter correction fluid.

2

Apart from an upper guideline and a baseline, a halfway guideline should be used in the construction of such letters as F, H, Y, and K. However, an optical adjustment is made to the crossbar of the letter A and the middle arm of the letter E. Also, depth-of-loop lines for the letters R, P, and B deviate from the halfway line.

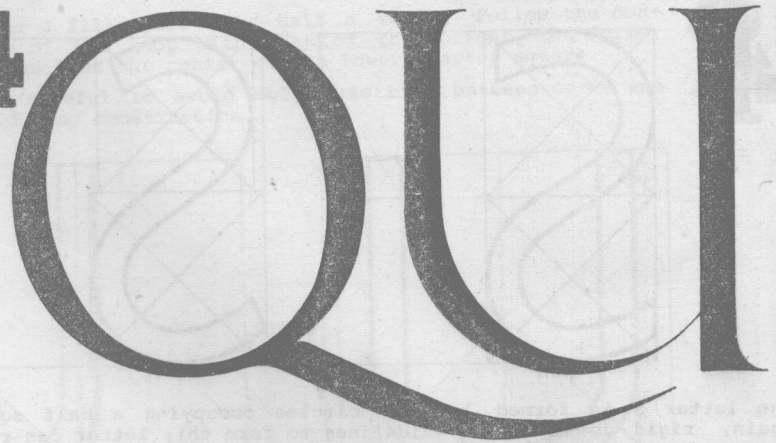




3

Serifs act to finish each stroke and also to help the eye pass along the line. There are several variations, but each should always extend the letter form, that is, appear to grow from the letter so that no hint of junction is evident.

4



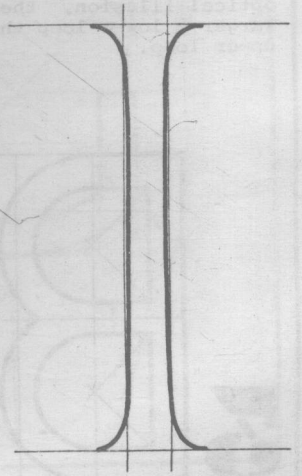
Extended flourishes, or tails, occur on the letters Q, R, J, and K. Apart from that on the letter K, these swing below the baseline, with the extra-long version on the Q acting as a visual connection between it and U, its following letter.

5

The letter I is the easiest Roman letter form to construct. It is represented by a full-width upright stroke, its thickness being one-tenth of the chosen height of the letter size.

N.B.: All other stroke thicknesses are multiples of this width.

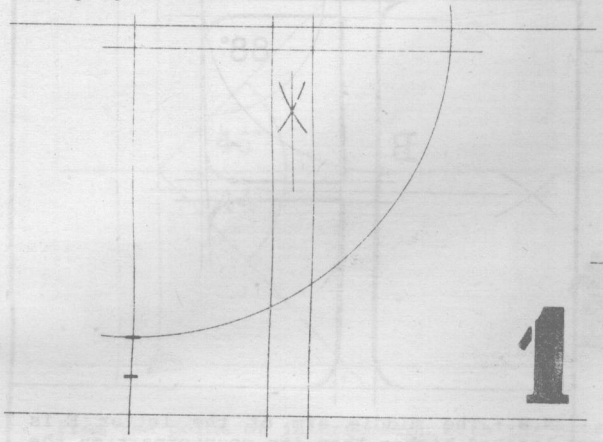
Two important optical effects that modify the appearance of the I and, indeed, all other full-stroke uprights in this alphabet, should be introduced. The first is the entasis, or slight concavity, of its sides, achieved by changing the drawing angle of the pencil against the raised edge of the ruler during construction. The second effect is a slight concavity of the face of each serif as it touches the upper and lower guidelines.



The Uprights: T, H

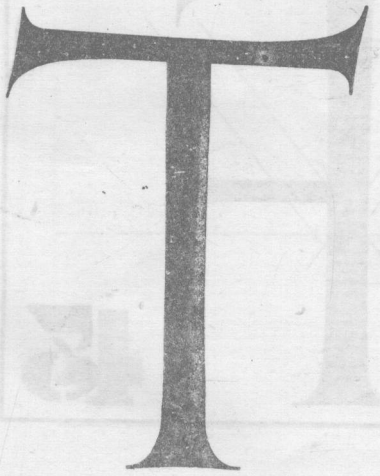
The length of the upper crossbar on the letter T is determined by the letter's height less two upright stroke thicknesses. The thickness of the crossbar is just over half that of the upright.

Bisect the crossbar to center the position of the upright.



1

The result is an elegant and dynamic form, and one more easily spaced when forming words, by first locating the crossbar.



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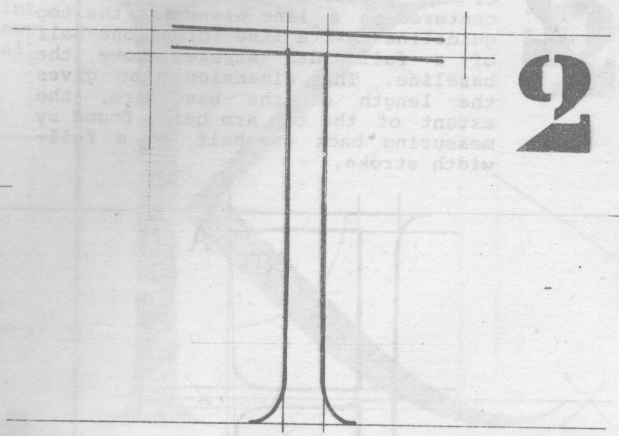
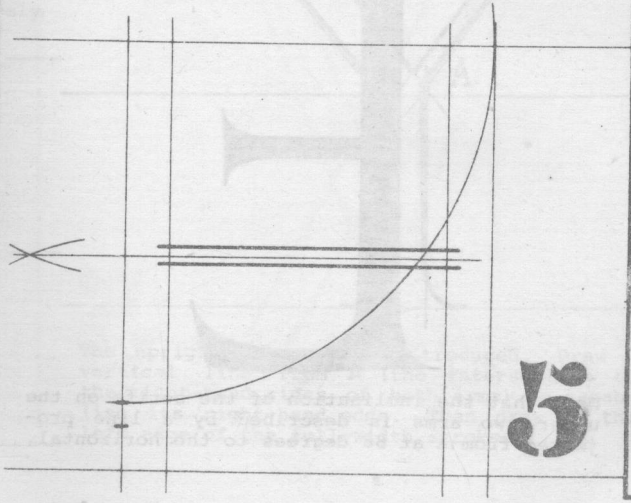


2

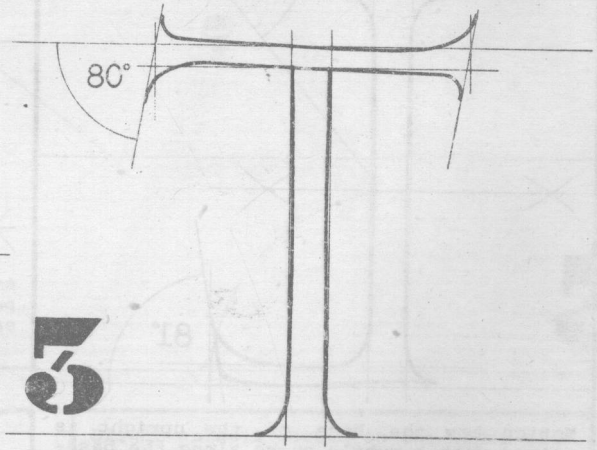
Notice that the crossbar is slanted slightly from left to right. This brings movement to the form and helps the eye read this letter in context with others. Having both a shortened and a slanted crossbar also avoids a potential top-heaviness commonly associated with this letter form.

The width of the letter H is determined by the letter's height less the thickness of one and a half upright strokes.

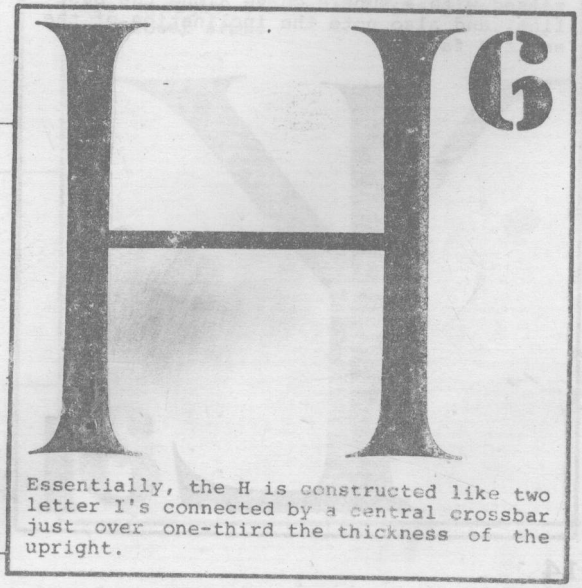


5

Although some designers prefer to draw the crossbar serifs so that they are symmetrical with the upright, a further refinement is to angle them along an eighty-degree slope to vertical. Yet another refinement is the subtle elongation of the lower, left-arm serif and the upper, right-arm serif.



3

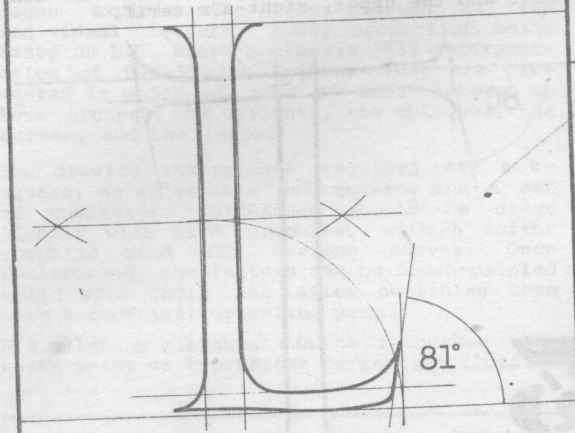


6

Essentially, the H is constructed like two letter I's connected by a central crossbar just over one-third the thickness of the upright.

The Uprights: L, E, F

To construct the letter L, first establish its full-width upright. One-half its height gives the extent of its arm, the thickness being roughly half that of the upright. This thickness is maintained for all the arms in the letters E and F.

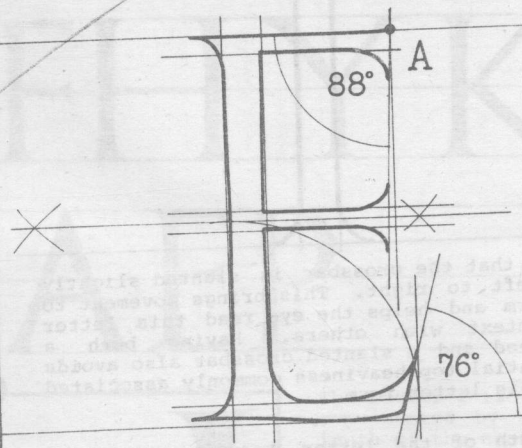


Notice how the base of the upright is raised with a subtle curve along the baseline, and also note the inclination of the serif's face.

L 1

2

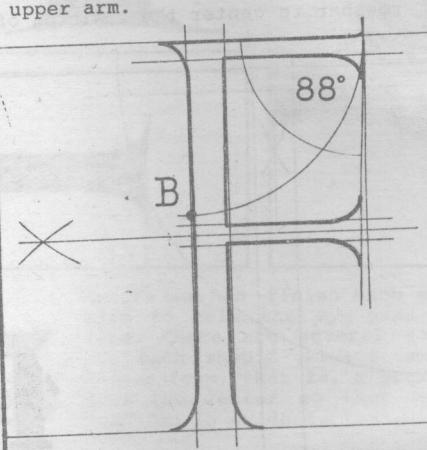
The letter E extends the construction of the letter L. Its middle arm is centered on a line bisecting the top guideline and a line formed one-half of a full-width stroke above the baseline. This dimension also gives the length of the base arm, the extent of the top arm being found by measuring back one-half of a full-width stroke.



E

Note that the inclination of the serifs on the upper two arms is described by a line projected from A at 88 degrees to the horizontal.

The height of the letter F is bisected to give the center line for its lower arm. Point **B** is found by measuring one-half of a full-stroke's width up from the halfway line. The dimension from this point to the top guideline finds the extent of the upper arm.

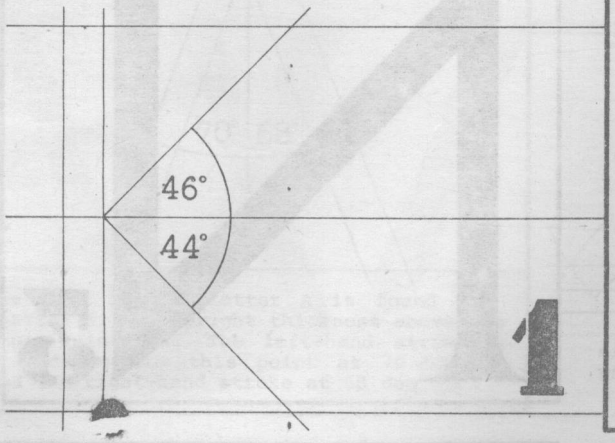


N.B.: The middle arm of the letter E is located higher than its counterpart on the letter F. However, in each case, their extent and the angle of their serifs is found by a line angled at 88 degrees.

F 3

The Obliques: K, Y

After establishing the full-width upright of the letter K, project its arms from a point on the halfway line. The upper arm is drawn at an angle of 46 degrees to the horizontal, the lower arm at an angle of 44 degrees.

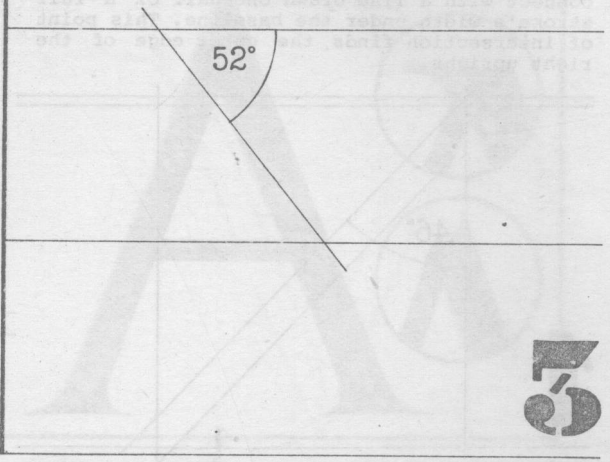


1

2

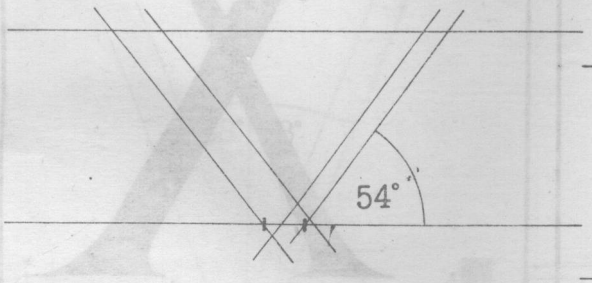
The upper arm is one-half the width of the full-stroke lower arm, the latter ending with a flourish similar to that in the letter R.

To construct the letter Y, first establish the outer edge of its left arm. This is described by a line drawn at 52 degrees from a point on the top guideline down to the halfway line.



3

From the point of intersection with the halfway line, measure one full stroke's width to the right. From this point the outside edge of the right arm is projected at an angle of 54 degrees. Add lines to describe the inside edges of the left and right arms. The arms are full- and half-stroke width, respectively.



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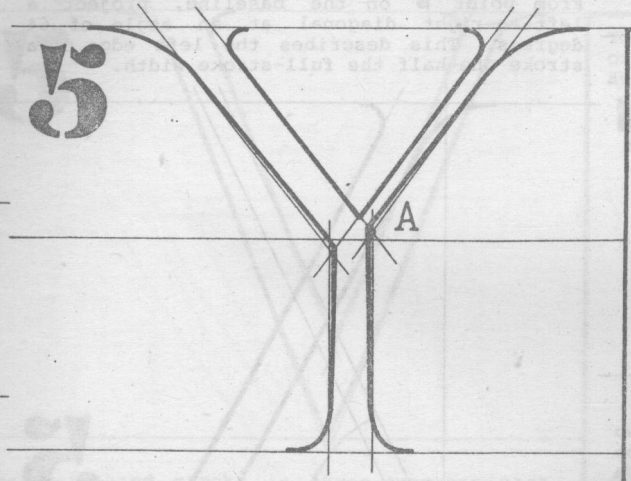
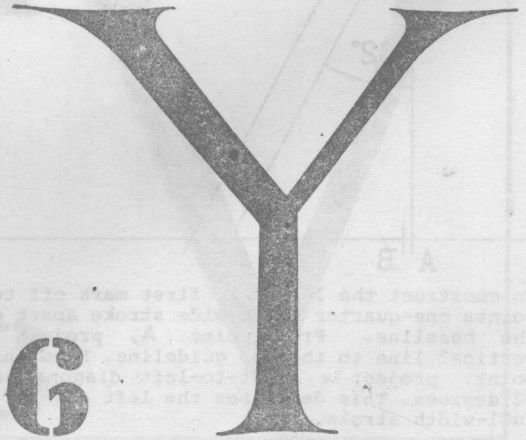


5

The upright can now be introduced. Draw a vertical line from **A** (the intersection of the right-hand sides of both arms) to establish its right-hand edge. Then draw in the left edge of the full-width stroke.

Slight entasis occurs on the upper stem of the upright stroke and the outer side of the lower arms.

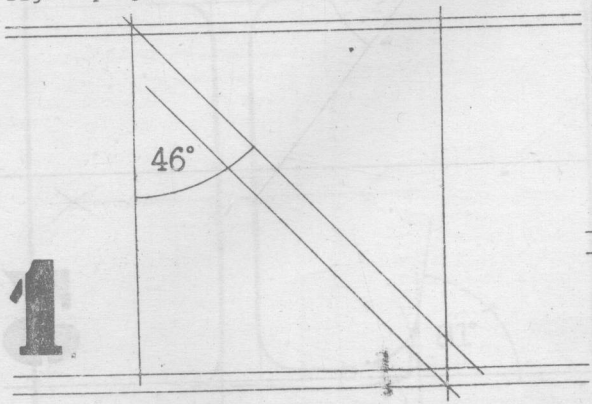


6

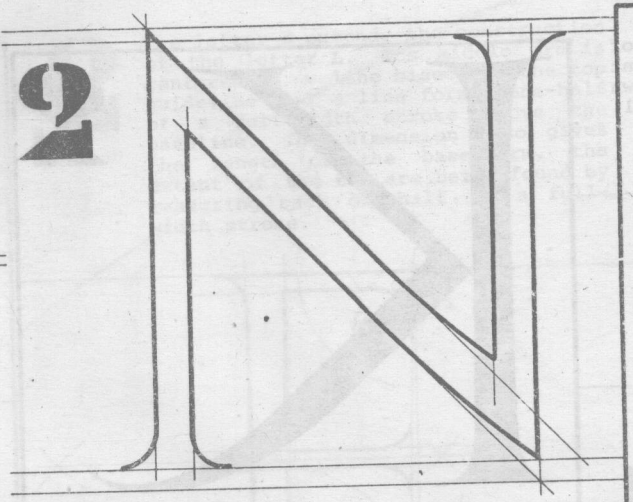
The Obliques: N, X

The apex of the letter N occurs at a point on a line drawn one-quarter of a wide stroke's width above the upper guideline.

From this point, a diagonal is then drawn at an angle of 46 degrees. One full-stroke width below this, a second diagonal is drawn to connect with a line drawn one-half of a full stroke's width under the baseline. This point of intersection finds the outer edge of the right upright.



1

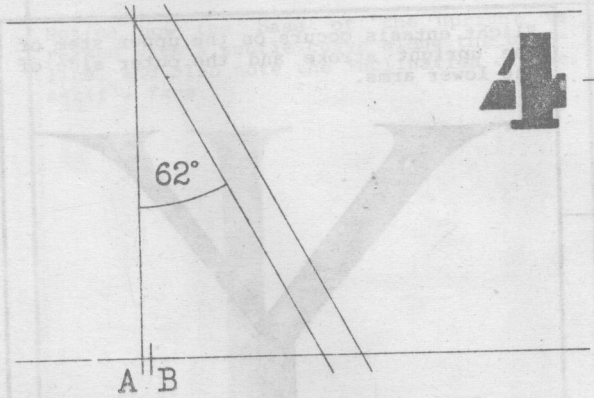


2

When the diagonal stroke is drawn, a subtle curve is introduced along its length to bring its lower point onto the baseline.

Both the upright strokes are seven-eighths of a wide stroke in thickness.

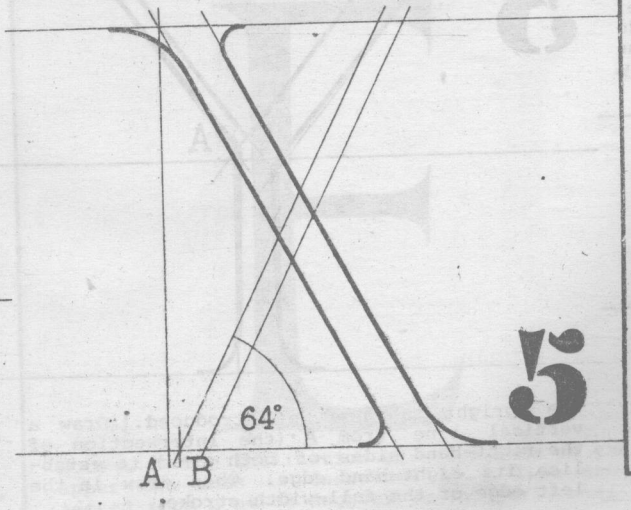
3



4

To construct the letter X, first mark off two points one-quarter of a wide stroke apart on the baseline. From point **A**, project a vertical line to the top guideline. From this point, project a right-to-left diagonal at 62 degrees. This describes the left edge of a full-width stroke.

From point **B** on the baseline, project a left-to-right diagonal at an angle of 64 degrees. This describes the left edge of a stroke one-half the full-stroke width.



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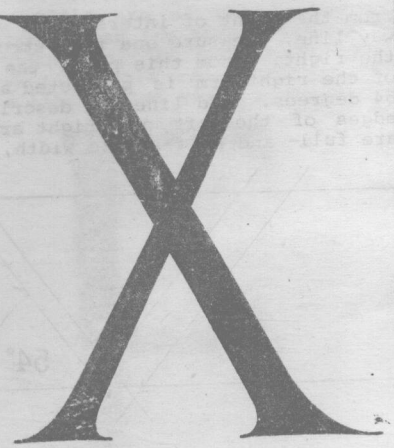

As with other oblique serifs in the Roman alphabet, the outer versions are slightly larger and extended.