

UNITED STATES  
DEPARTMENT OF THE INTERIOR

CIVILIAN CONSERVATION CORPS  
Project Training

## SIGNS AND MARKERS

Prepared for and with the cooperation of the technical services  
By  
Guy B. Arthur, Supervisor, Project Training



P. T. SERIES NO. 9

UNITED STATES  
DEPARTMENT OF THE INTERIOR

CIVILIAN CONSERVATION CORPS  
PROJECT TRAINING

# SIGNS AND MARKERS



P. T. SERIES NO. 9



TRAIL

DAVE  
SPRING

←  
DARNEL  
SPRING

BUZZARD  
CAVE

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
CIVILIAN CONSERVATION CORPS  
Office of the Supervisor of Project Training  
Washington

SIGNS AND MARKERS

In accord with the purpose of this Project Training Series, this book is not offered as a thorough treatise, nor by any reckoning a statement of policy for the Department. This entire series is restricted to the essentials for a beginning in any one of the occupations covered, and any excursions into theory, design, or policy are included advisedly to give a broader view of the subject than might be had by one who has seen only the handwork or physical labor required.

We wish to acknowledge with much appreciation:

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The help of the British Forest Products Research Laboratory, Department of Scientific and Industrial Research, at Aylesbury, Bucks County, England, in finding the three formulas for artificially weathering wood.

Prepared for, and with the cooperation of, the Technical Services.

January 1938

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## SIGNS AND MARKERS

### Their Purpose

Our signs are, in their best form, invitations. They offer hospitality. They inform, direct, warn, describe, beckon, name, and even prohibit, -- always with an air of welcome. They seem to be animate, rather than inanimate; living and vital, rather than passive and unfeeling; dynamic, rather than inert.

As workers in these reservations, we stand as the Department's hosts to the public. Since we cannot be everywhere at all times, we devise signs and markers to stand in our stead at certain points. That purpose is apparent in every good sign in our areas, -- that it speaks for the Department of the Interior.

The peculiar qualities of our best signs cannot easily be isolated for description, yet it is obvious to even the least aesthetic observer that they possess an amiableness, a free-running good will, a warmth of spirit, which is not approached in signs and markers made for other purposes. That they are eminently in good taste is not an accident -- by any stretch of the imagination, but certainly the result of studied consciousness of the spirit of service in the Department.

### Standards

We see that our signs do not conform to rigid standards in style, form, materials, size or color. Instead of standards we observe certain qualities, and these distinguishing qualities must be understood by anyone who attempts to design and execute signs for our park use.



CORPUS CHRISTI  
STATE PARK,  
Texas.  
A cut-out  
metal sign  
indulging  
in Texac  
atmosphere.

MOHAWK METROPOLI-  
TAN STATE PARK,  
Tulsa, Oklahoma.  
Easy to read be-  
cause of plain  
lettering and the  
information is  
well organized  
on the panel.  
This sign will  
attract attention.



These characteristics cannot be learned from books, or in any school. They must be absorbed from patient study of the signs which we have found good by trial.

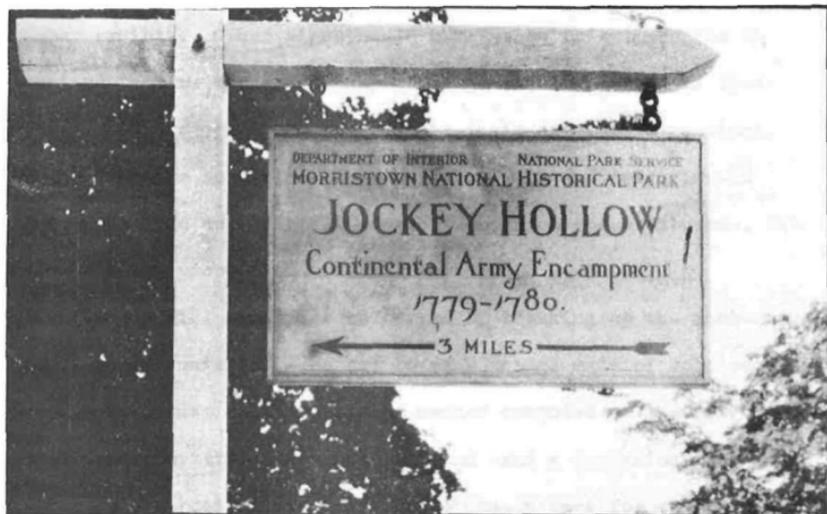
There is a word of caution to be said here. It may seem that the effects obtained in our better signs are achieved by a sort of abandon, or reckless flaunting of principles taught in a school of lettering or sign painting. Only an artist, with skill and sureness gained by arduous application to sound principles, can mask his studied artistry under an appearance of artlessness.

This means that the freedom in which some of our signs seem to revel is not accidental, nor does it fly in the face of convention. It comes after much work with conventional examples and methods, and is a studied technique based upon sound conventional practice. Therefore, we must begin, not with the unusual nor with the most complex of our designs, but with diligent preparation for ordinary sign work.

#### Fitness

If any one word were chosen to characterize our best signs, it would be "fitness." Fitness as to materials and design, for a certain purpose and a certain setting. We do not import bricks for signs, because bricks would be out of place in most of our reservations, just as we do not bring in exotic plants, that is, plants that do not grow naturally in the region. Our work must all be "in character" to be acceptable.

We see signs made of such huge chunks of logs that they overshadow the information panel entirely. The impression is that of a



MORRISTOWN NATIONAL HISTORICAL PARK, New Jersey.  
Excellent taste employed in the style of letter  
proportions of sign and design of mounting for  
this particular area.



STARVED ROCK STATE PARK,  
Illinois. A regulative  
sign of rustic material.  
Good plain lettering.

timber exhibit. Other signs would make us believe timber is so precious that we can spare only saplings for supports. If these willowy members continued to point in their original directions, it would not be so distressing, but they warp and twist in all directions like an old rail fence. In both of these extremes, fitness begs for proportion and balance.

Fitness will sometimes be served by breaking up the monotonous use of native material. We see so many things made of cobblestones, for example, that another sign or marker composed of them might cause some tourist to lose his mind and rend a companion limb from limb. Such a possibility warns us to have a care for the tranquility of the public in making signs and markers.

#### Design

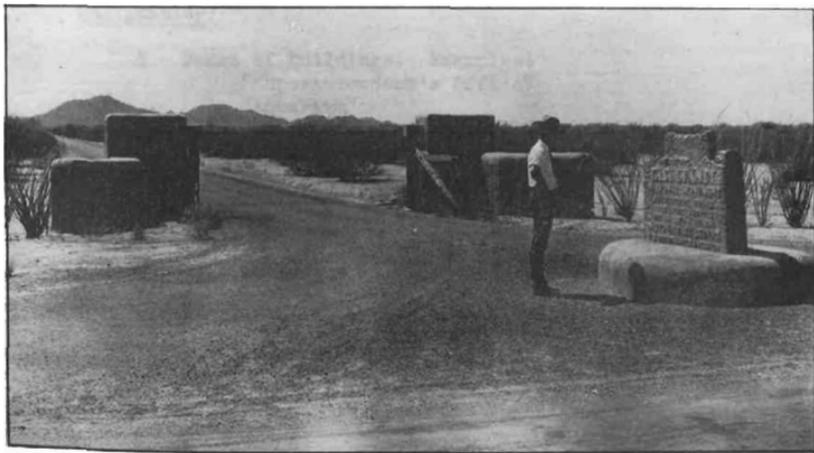
The design of signs and markers, like that of all other structures in the areas administered by this department, is the responsibility of the technicians. In the National Park Service there is a Committee on Signs and Markers "to consider all questions involving the park sign and marker system"; other Bureaus have their own procedure. This official procedure must be recognized in all matters of design.

Rarely is a sign, marker, or other structure designed right on the job. Therefore, the work usually done with signs and markers in camp is concerned with construction. However, the subject offers more than many others for training on-the-job, and also in training off-the-job, ---where design should have some attention. Enrollees



CASA GRANDE NATIONAL MONUMENT,  
Arizona.

The upper picture is a close-up view while the lower picture is added to show how tastefully the sign is placed with reference to the gates and roads.



should learn how to make the mounting, and how to letter, paint carve, and burn. Good training leads into pleasant and profitable employment.

#### Classification of Signs

While there are a great many different kinds of signs, the combinations in design and material make the list seem much longer than it really is. To classify them shows how a sign may be identified according to its purpose, and thus assist in determining its design, materials, treatment, placing, and so on.

#### Regulative:

- A. Traffic Control. Examples:  
"No Parking"  
"Speed Limit 30 Miles Per Hour"
- B. Protection for Property. Examples:  
"Keep Off The Grass"
- C. Cautionary. Examples:  
"Danger -- Explosives"  
"Do Not Feed The Animals"
- D. Schedules. Examples:  
"Gates Close At 5 P.M."  
"Boys' Class Thursday, 11 A. M."

#### Designative:

- A. Names of Buildings. Examples:  
"Superintendent's Office"  
"Aquarium"
- B. Names of Places and Things. Examples:  
"Short Creek"  
"Williams Grove Camp Ground"  
"Round Knob"

#### Directional:

Location of places and things. To be directional, signs must carry some device which points toward the object named. Examples:

"To The Lodge. 3.1 Miles", "Cave Springs"



TUCSON MOUNTAIN  
METROPOLITAN  
STATE PARK,  
Arizona.

Another type of cut-  
out signs.

RANDOLPH  
METROPOLITAN  
STATE PARK,  
Tucson, Arizona



### Entrance Signs:

These are made a separate class arbitrarily, because entrance signs are so important to recreational and other areas visited by the public. They actually fall into other classes, as designative, descriptive, and directional. They are usually more elaborate than other signs, and carry much more text.

### Descriptive or Educational:

These take many forms, but the three following subdivisions indicate the type:

- A. Places and things of present or historical interest.  
"Yaquina Bay Lighthouse. Built 1871. Discontinued 1874"  
"New Salem. In the fall of 1823 James Rutledge, etc.--"
- B. Information.  
"Propagation and distribution of game fish in these pools are under the direction of ---."  
"You are approaching the Surrender Tree."  
"Yakima Reclamation Project. Built by the Federal Government, etc."
- C. Scientific Specimens.  
"Indiana Limestone"  
"White Oak. (Quercus Alba)"  
"North American Buffalo"

### Fictorial or Graphic:

- A. Sheet Maps.
- B. Relief Maps.
- C. Symbols.

The distinctive symbols of departments, such as the Buffalo for the Department of the Interior and the Pine Tree for the Forest Service.

### The Sign Must be Considered as a Whole

The park type of sign consists of the information panel, plus the mounting. This mounting is the stand, posts, hangers, or other



NATIONAL CAPITAL PARKS, Washington, D. C.  
Miscellaneous collection of signs.



support. In almost all other signs the information panel is the only important portion; the mounting is merely incidental. A casual survey of signs for commercial purposes leaves no remembrance of the mounting. The whole impression is of the attention-catching devices and the story. Posts and pedestals which are indispensable are commonly decorated with scrolls and whatnot.

But in our signs the mounting is as important as the information panel. It is expected to create atmosphere, to preface the story on the panel, and give it a frame "in character" with the area. Our signs make definite impressions, favorable or unfavorable, whether we recognize them or not. If we analyze one of these impressions, we may find that the mounting has contributed as much to it as the information panel. That is equally true of any commercial sign in which the mounting forces itself upon our attention. All that is unusual in our practice, then, is to acknowledge this, and make the mounting contribute to the effect we wish to produce.

#### The Mounting

The mounting is important. It must be attractive in itself, yet it must not steal the show. It has<sup>as</sup>/its reason for existence the presentation of certain information on a panel; -- therefore, the mounting must be designed to that end.

It may be framed in place, or it may be framed elsewhere and set up on the site. But in any case the location has a definite influence upon the design and construction. The direction toward which it faces, the distance from some other feature, the nature of the ground, the relation of the sign to exhibits, all have some influence.



WILDCAT HILLS  
GAME RESERVE,  
Nebraska. An  
unusually good  
designative  
sign. Mounting  
well designed  
with good look-  
ing fittings  
forged in camp.  
The style of  
lettering is  
well chosen for  
this design.



RICHMOND NATIONAL  
BATTLEFIELD PARK,  
Richmond, Virginia.  
A neat marker for  
a family cemetery.

As the site is not a chance location, the site and environment may go far to determine the style, materials, size and treatment.

If it is a board sign, the kind of lumber to use is important, and it must be seasoned. The joining must be tight, with sufficient battens and braces to prevent warping and twisting. The priming, painting and varnishing must be done with due regard for the effect of weather.

The selection of lumber for all kinds of signs will be made easier by referring to Chapter III "Selection of Lumber for Farm and Home Building" in Project Training Series No. 8 entitled "Lumber." Here the kinds of uses are compared with the properties of woods and the various headings given indicate conditions to which signs are exposed.

Timbers may be round, hewn square, or smoothed. Tool marks may be desired, or not. The framing may be rustic or finished. Ends may be sawed, roughed off with an axe, broken, or splintered.

Fittings for hanging or otherwise supporting the sign may be conventional nails and bolts, or they may be hand forged.

Posts and supports may be of masonry, using field stones or dressed stones, in mortar or dry, rough or finished. Or they may be of concrete, with floated or rough or hammered surfaces; natural gray or colored.

These construction and design features are mentioned to indicate forms which a design may take, and to show how the several factors which enter into the establishment of a sign influence each other. Like any other man-made feature of a recreational or historic area,

SAGUARO  
NATIONAL  
MONUMENT,

Arizona.  
A tasteful di-  
rectional sign,  
using a cactus  
stem for a post  
and a plain  
board for the  
sign with attrac-  
tive lettering.



GRAN QUIVIRA NATIONAL MONUMENT,  
New Mexico. Two good looking  
signs. Good designs in char-  
acter with their surroundings.



a sign should settle down into place naturally, as if it had only been absent for a little time from its accustomed seat.

It is for the designer, primarily, to achieve this high purpose, but without a sympathetic understanding of the component parts which go to make the whole, we cannot carry out his plans with that sureness which the desired result requires.

#### The Inscription

At this juncture we may assume that the mounting has been designed and constructed, and that we have only to put the inscription in place.

#### Legibility

Whatever else a sign is, it must be legible. Its tone may be precise, humorous, suggestive, chaste, curt, persuasive, coercive or arresting; it may be done in colors, or it may be carved; its design may be highly artistic; but unless it can be read quickly from a reasonable distance, by good eyes and poorer ones, -- it fails. And there is no ground upon which to excuse it, for the inscription has as its business the clear presentation of information. The sign as a whole fails, because its only reason for being is holding up that inscription.

#### Alphabets

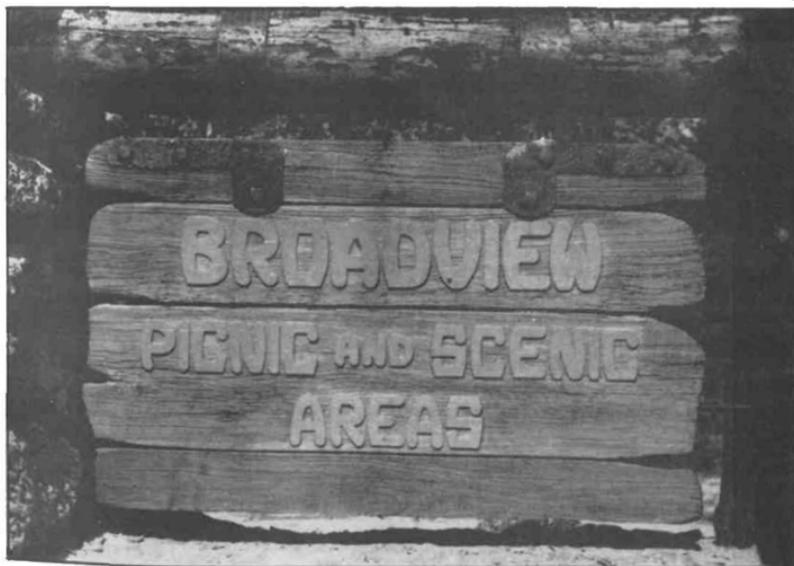
The number of alphabets used in sign work is endless, but most of these are adaptations and modifications of a few basic designs. Hundreds of styles have been considered, from which thirteen alphabets have been chosen which contain the basic characteristics that seem to be most acceptable in our signs and markers. These



BONHAM STATE PARK, Texas.

Two designative signs, both with weathered boards which make an excellent background. The one below has good forged fittings. The styles of lettering chosen are excellent for their purposes.

LAKE WORTH STATE PARK, Texas.



alphabets are shown on pages 34 to 46 at the back of the book.

It has not been thought necessary to include both vertical and slanting styles, since a letterer should be able to handle an alphabet at any required angle.

#### Methods

Letters may be brushed upon a flat surface; they may be engraved -- burned, cut or pressed below the surface; they may be embossed -- left in relief by making the surface lower; they may be metal -- tacked onto a surface; they may be perforated -- cut through the sign; or they may be fastened on, yet separated from, a surface, -- standing out away from it. And there are probably as many more ways. No discussion of methods is in any danger of exhausting the subject.

#### Painting

Most of our signs will probably always be painted, and painting is often combined with other methods. So that this is by far the most important method to learn. The strokes used for filling letters are shown on pages 49 to 51.

#### Paints and Supplies

Many special paints and colors are used in making signs and markers, and each brand has its following of craftsmen. Letterers and sign makers become very ingenious in the use of various preparations to get new effects, often with ordinary materials. We recommend that each superintendent obtain from a local paint and color store the names of manufacturers who make special sign products. These companies will be glad to furnish prices and information on colors, paints, and brushes.

The man-on-the-mule shows you how to go in the GARDEN OF THE GODS PARK, Colorado Springs, Colorado. They are embossed on the post by good carving. The one below is a directional sign along a trail on Lookout Mountain in CHICKAMAUGA AND CHATTANOOGA NATIONAL MILITARY PARK.



GARDEN OF THE GODS PARK, Colorado Springs, Colorado.



### Tools for Painting

The mahl-stick is an indispensable piece of the sign painter's equipment. It can be purchased, but it is just as well to make it.

A palette is the only other tool needed. This is of a different shape, but is used just as a portrait painter uses his. It should be treated liberally with linseed oil before using. As fittings for this palette, two small cups should be made, with clips, so that they can be held on the palette. These are for turpentine for cleaning brushes or for holding a supply of paint mixed for a sign.

On page 52 are illustrations showing how the mahl-stick and palette are made and used.

### How to Begin

A brave start and plenty of perseverance are now in order. Dip the brush into the paint and work it out on the palette, thinning with turpentine when necessary. When the brush is well filled with paint, commence your letter strokes. Make them all with clean, determined motions, moving your left arm in sympathy with the movements of the brush. Experience will show that this movement of the left arm plays a great part in good work.

If you go off the line, or make a poorly shaped letter, don't stop to correct it by faking or wiping; leave it until you can see why it went wrong, and do it over. Practice with curves, straight lines, and other movements, until you get used to the feel of the



CROWLEY'S RIDGE  
STATE PARK,  
Arkansas. The  
lettering has  
been burned in  
and is of such  
proportions as  
to harmonize  
with the mounting.

STEVENS GROVE,  
STATE PARK,  
California.  
An effective  
slab design  
of unusual  
shape and well  
mounted. The  
plain carved  
letters are  
very effective.



mahl-stick, palette, and brushes. You must get full control of the brush, so that it will go where you want it to go, and fill out the outlines of a letter completely. The more completely the stroke can be made to fill the line, the more satisfactory will your work become.

#### Engraved

Letters may be made by carving, which is one of the most finished methods of making signs, and some of our finest examples are done in this way. Engraving may also be done by chemical reagents, but this method is not satisfactory. The quickest and cheapest way is by burning, and some very fine work has been done.

The tools and methods used in burning letters have been devised wherever this method has been adopted, and no one camp is able to monopolize all of the tricks which can be employed. But Camp SP-10-C, at Glenwood Springs, Colorado, has developed tools and technique which are more complete than elsewhere, and the photographs on page 22 show the procedure there. The ingenious tools and shields were all made in camp.

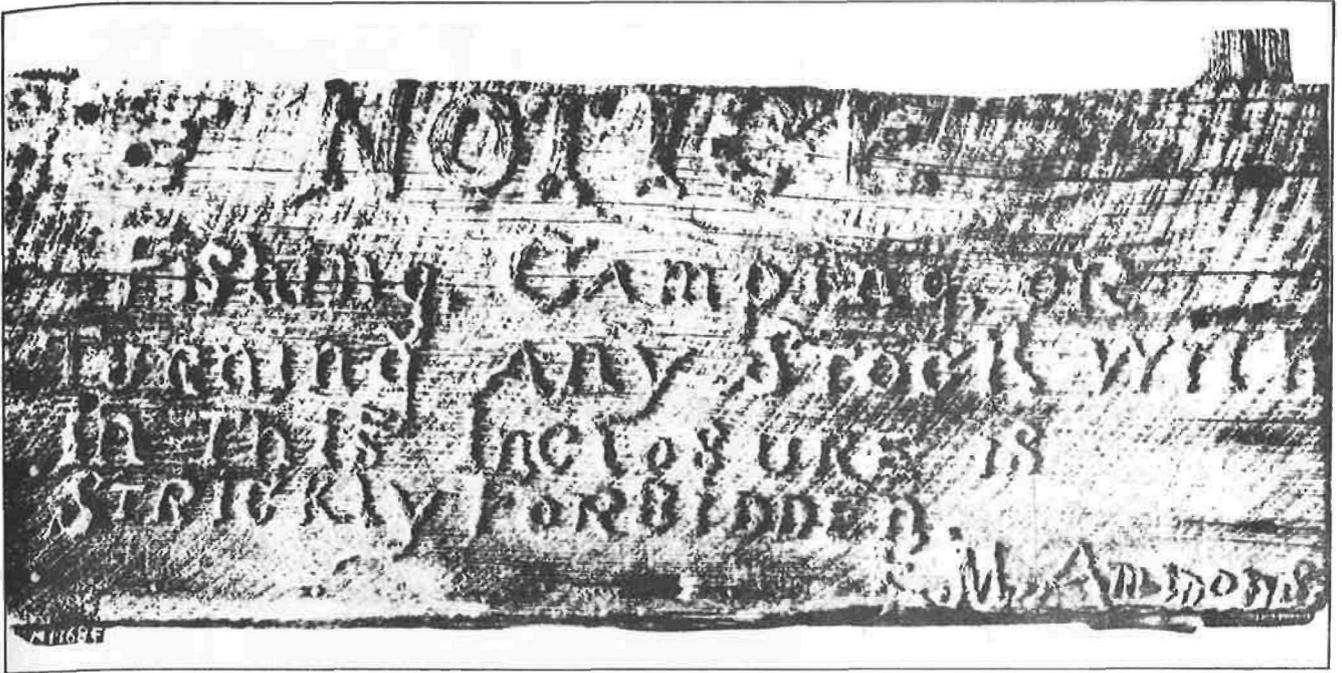
#### Embossed

Letters may be left in relief, and many artistic examples may be found. Wood will even weather away from letters which are protected, as by good paint, so that the surface not so protected is scoured away, leaving the letters in relief.

Sand blasting may be employed to cut away the wood outside of protected letters, and chemical reagents can be used.



BURNING TOOLS. These pictures show the tools made in camp together with shields and the actual burning operation. The tools are heated on a special rack attached to a blow torch.



A SIGN EMBOSSED BY NATURE. Embossing may be accomplished by many devices. So long as the surface of the letter is protected, the remaining surface may be cut away. This sign was merely painted and over a period of years all of the surface except that covered by paint weathered away.

The most popular way to do embossed signs is with a blow torch. Care must be taken to have the heat generate from the torch at all times, in order to keep the burning uniform. If the flame is allowed to kindle on the wood, and throw a flame upward, the burning gets out of control. The letters to stand in relief must be protected by some covering. At first metal letters were tacked in place, but this limited the lettering to such styles as could be purchased, and they became expensive. Another way is to cut letters out of sheet asbestos and tack them in place. This is a gain in freedom of design. Another way is to paint the letters with asbestos paint, going over them several times.



NEBO STATE PARK,  
Dardanelle, Arkansas.  
A 3-board directional  
sign in rustic style.  
This entire sign is  
in good taste. The  
forging, style of  
lettering, the carv-  
ing, shaping the boards,  
and the proportions are  
unusually good.

HUMBUG MOUNTAIN  
STATE PARK,  
Oregon.  
This directional  
sign is notable  
for its simple  
design and pro-  
portions. The  
lettering is  
plain and well  
executed.



### Perforated

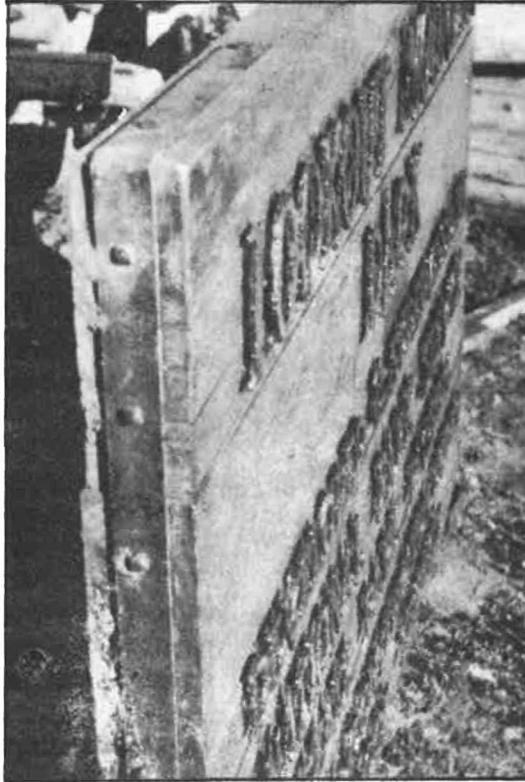
This method is not so successful for ordinary signs in wood as in metal, but some very fine examples of cut-out and perforated signs have been done in wood. Good looking signs are made with metal sheets or plates. The perforating is most commonly done with drills or punches, but cold chisels and other tools can be used with excellent effect. The work does not necessarily need to be smooth. Rough edges also have an appeal.

A variation of this method is the sign cut entirely out to present an idea by its form. A simple form is the cut-out of a pointing hand. Two signs of this kind are shown on page 8.

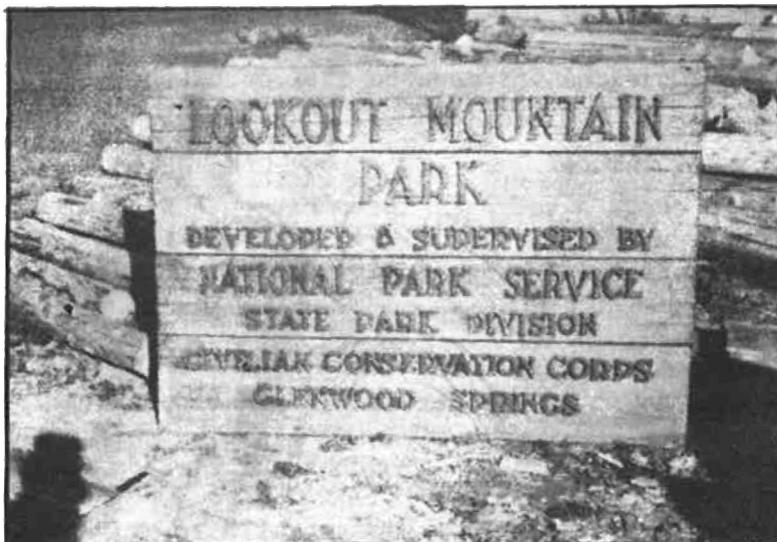
### Stand-Off Letters

There is only one place where this type has been developed, at Lookout Mountain Park, Glenwood Springs, Colorado, in the same Camp SP-10-C where the burning method is so well developed. In this type, each letter is burnt out of heavy steel plate. Then on the back of it two or more cap bolts are welded, their heads in contact with the letter, and their shanks extending away from it at right angles. For mounting, holes are drilled through the wooden panel, and the bolts are passed through to be fastened with nuts and washers. The letters stand away from the panel by the thickness of the bolt heads. Illustrations appear on page 26.

There is a certain freedom about the fused edges of these letters which makes the sign very attractive, and after burning the metal needs no painting to prevent corrosion, so that such letters are as near permanent as any can be. The effect of raising the letters off the surface of the panel is chiefly in the longer shadows, which add a great deal to the sign's appearance.



**METAL LETTERS.** Letters cut from steel plate with welding outfit and mounted on a wooden panel with cap screws. The heads of the cap screws are welded to the back of the letters.



## Spacing Letters

No matter what is done with letters, they must be spaced, and spacing is not accidental.

Uniformity of effect is gained, not by spacing the letters equal distances apart, but so that areas of white spaces between the letters are approximately equal.

The following few rules for spacing will enable the letterer to do satisfactory work, until such time when he is able to judge the spacing for himself. If these rules are followed, uniformity of spacing will be obtained.

1. Space letters that have a rectangular shape one unit apart--  
B, E, H, I, K, M, N, R, S, U, Z,
2. Space letters that have both sides curved  $\frac{1}{2}$  unit apart--  
C, G, O, Q,

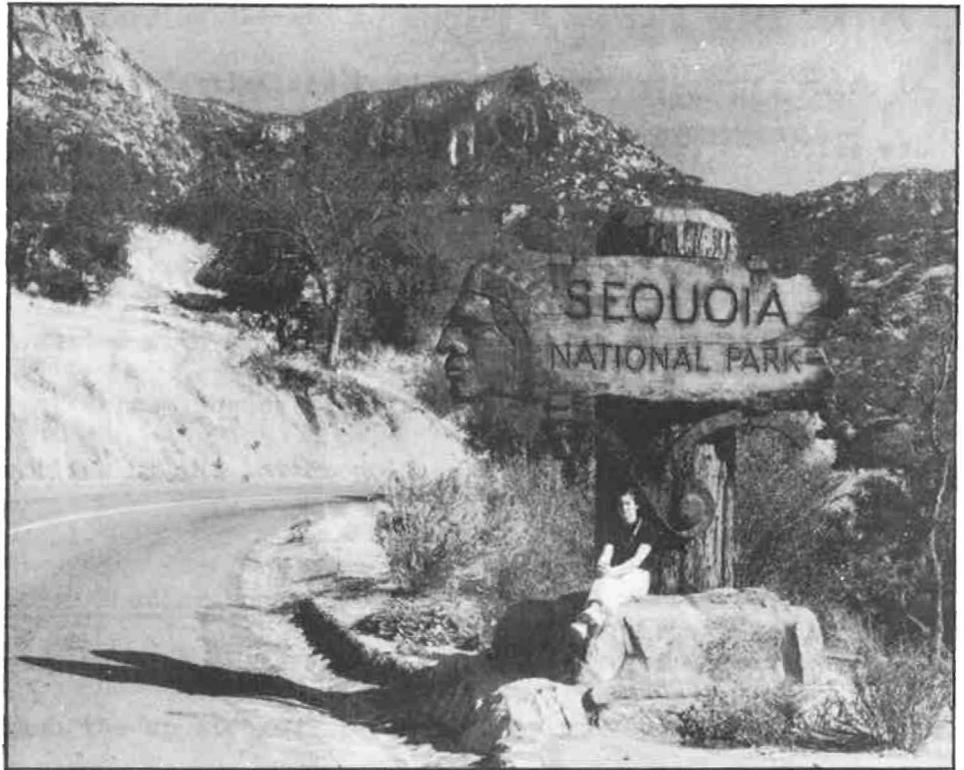
Also combinations such as: HC, ON, PN, etc. That is, when a letter with a straight side is adjacent to one with a curved side.

Also combinations such as: TH, FH, LE, MJ, etc.

3. No space should be left between the letters W/V/Y and combination TA.

When the letters AV or AW occur together a space of one unit should be left between the inclined sides AW--1 space between, AV--1 space between.

The beginner should pencil in the letters first and then judge as to the correctness of the spacing. No rigid rule can be laid down to cover the spacing of all possible combinations of letters. Correct spacing is explained in the copy on page 47 .



SEQUOIA NATIONAL PARK, California. Designative sign in heroic proportions. The one below is a directional sign in unusually good taste.



LAKE GUERNSEY  
PARK, Wyoming.  
Bureau of  
Reclamation  
Camp, BR-9.

For transferring letters to a sign, there is a trick used at Richmond National Battlefield Park at Richmond, Virginia, which is worth mention. The alphabet is made on heavy paper, and holes are punched around the outline of the letter with a needle or tracing wheel. When a letter is to be used, it is placed in position on the sign, and dusted with a "pounce bag", which is any bag of coarse cloth half full of talcum powder. The powder passes through the holes to form an outline of the letter on the sign, and this is then traced in with a pencil.

#### Rule for Shading Roman Letters

Shading came about because the down stroke of a pen or brush was heavier than the up stroke. The ink or paint would run down, but would drain back into the pen or brush on the up stroke. From that we have a simple way of determining which strokes should be shaded. Merely decide which are natural down strokes, and make them heavy. Be governed by the natural flow of ink in a pen, or paint in a brush.

Some exceptions to this rule have developed in conventional styles, and these may be noted as they come to attention.

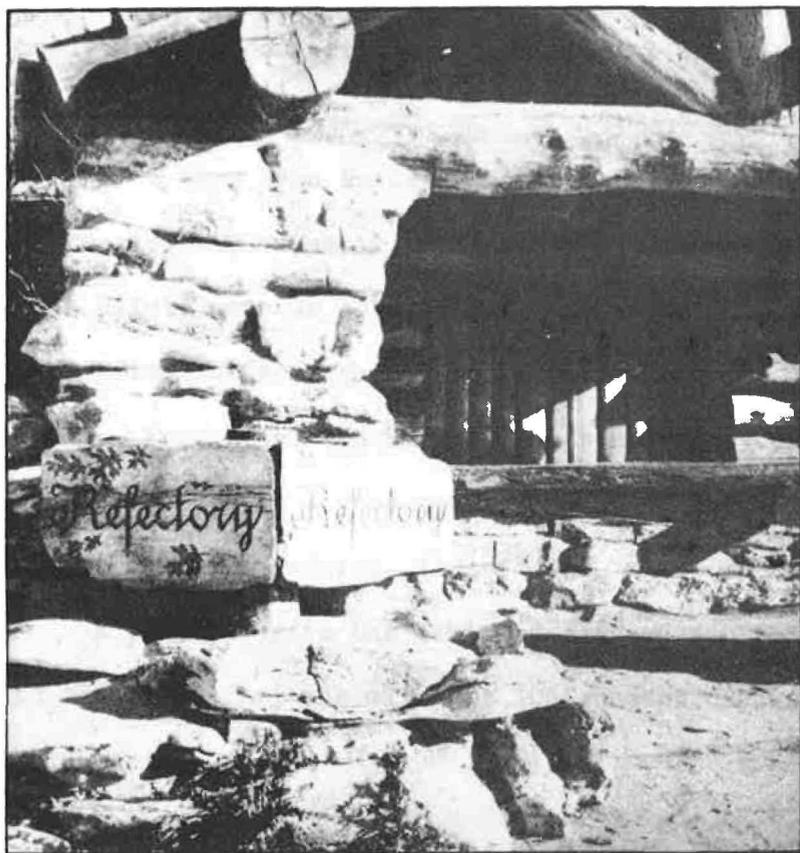
#### Artificial Weathering of Wood

Many signs and markers would settle more gracefully into their surroundings if the wooden parts were aged or weathered, but there has been no simple and effective method of doing this artificially.

It is not sufficient to merely cut away the soft fibres of the wood. The remaining hard portions must have the appearance of natural wasting. For this reason harsh mechanical methods, such as sand blasting and burning, are not acceptable. The corrosive action of



LINCOLN LOG CABIN STATE PARK,  
Charleston, Illinois.  
A distinctive type.



MOHAWK METROPOLITAN STATE PARK,  
Tulsa, Oklahoma.  
An effective sign with excellent choice of lettering for the purpose. The leaf decoration is a tasteful addition. The rough slab is in keeping with the rustic architecture.

chemicals more nearly simulates the slow advance of outdoor weathering.

An extensive search has yielded three methods from the British Forest Products Research Laboratory, in the Department of Scientific and Industrial Research at Aylesbury, Bucks County, England. Their letter follows:

Weathered or Aged Appearance on Wood.

We have no section in this Laboratory which deals exclusively with wood finishing problems, and are therefore not in a position to vouch for the accuracy of the following information which we have obtained for you. We trust, however, that one or the other of the processes will meet your requirements.

We would point out that equally successful results cannot be expected with all woods. Oak appears to be the wood which is most commonly used in connection with artificial aging processes.

1. Limed Oak

If a warm tone is desired, the surface of the wood should first be treated with ammonia, preferably by fuming, but brush application of a dilute aqueous solution of the reagent might be satisfactory. Thereafter the wood should be brushed along the grain with a wire brush. Freshly slaked lime of the consistency of soft putty should then be rubbed in across the grain. When dry, wipe off excess lime and finish with varnish, linseed oil, wax polish or button polish.

A paler tone in the finished surface can be obtained by bleaching in the first instance with hot 10% aqueous oxalic acid or other bleaching agent.



JEWEL  
CAVE  
NATIONAL  
MONUMENT,  
South  
Dakota.

Two directional signs of particularly good design. Both are nicely balanced and both are in tasteful lettering. The one of Jewel Cave might be termed an entrance sign. The one below reverses the usual design of this type. Usually the open side of the design is toward the object.



CRATER  
LAKE  
NATIONAL  
PARK,  
Oregon.

## 2. Silver-grey Oak

(a) Dissolve 1 lb. of caustic soda in 1 gallon of boiling water. Apply the hot solution to the wood. When the surface of the latter begins to dry, wash off excess reagent with boiling water and brush along the grain with a wire brush. Now allow the surface of the wood to dry.

(b) Slake one handful of quicklime in 1 gallon of water. Apply to the wood which has previously been treated with caustic soda. One or more treatments with lime may be necessary to obtain the desired tone, but allow to dry after each application. When the wood is finally dry it can be finished by any of the methods mentioned under 1.

## 3. Weathered Oak Finish

The following is taken from "The Decorator" 1936, Vol. 135, No. 414, (October), p. 88.

"....Bleach the wood with oxalic acid or other bleaching agent to remove the brownish tinge of the oak. A thin wash coat of lead colour is next applied, and this is made up from white lead or zinc oxide paste, bound with gold size and thinned down to water-like consistency with pure turpentine; drop black is added to produce the grey shade. and if desired this can be warmed up by adding yellow ochre. More than one application may be necessary to obtain the shade desired, and it is better to have this wash coat on the weak side and to apply several coats than to have it too dark and muddy. Allow overnight for the wash coat to dry then apply one or two thin coats of shellac and finish with a flat varnish or wax polish."

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 & \$ 1 2 3 4 5 6 7 8 9 0

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 ff fi fl ffi ffl ct

ſ . & . , - ' : ; ! ?

A A B C D E F G  
 H I J K L M N  
 N N O P Q R R S T  
 U V W X Y Z QU  
 Qu Th U \$

1 2 3 4 5 6 7 8 9 0

a b c d e e f g g h i  
 j k k l m m n n o  
 p q r s t t u v v  
 w w x x y z ff fi fl  
 qu ct st fs . , - ' ' : ; ! ?

A B B C C D D E E F G

G H I J J K L M M N N

O P P Q R R S T T U V U

W X Y Y Z

£ \$ 1 2 3 4 5 6 7 8 9 0

a b c d e f g h i j k k l m n o p

q r s t u v v w w x y z f f f i f l f f i f f l

Q u & s t ( ) [ ]

**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 & \$**

**1 2 3 4 5 6 7 8 9 0**

**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 . , - ' : ; ! ?**

**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 &**

**1 2 3 4 5 6 7**

**8 9 0 \$ . ,**

**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**

A B C D E F G

H I J K L M N O

P Q R R S T U V

W X Y Z & \$ ¢

1 2 3 4 5 6 7 8 9 0

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

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 & \$

1 2 3 4 5 6 7 8 9 0

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 . , - ' ' ∴ \$

“ ” : ; ! ? .

**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**

**1 2 3 4 5 6**

**7 8 9 0 & \$**

**· , - ' ' = = ! ?**

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J K L M N O P Q R S

T U V W X Y Z & \$

1 2 3 4 5 6 7 8 9 0

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m n o p q r s t u v w

x y z . , - ' : ; ! ?

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 &

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l m n o p q r s t u v

w x y z . , - ' : ; ! ?

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 &

\$ 1 2 3 4 5 6 7 8 9 0 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 t t e r e s i s o r o s

Th th . , - " ' : ; ! ?

ABCDEFGHIJKLMNOPQRSTUVWXYZ

RSTUVWXYZ&

*ABCDEFGHIJKLMNOPQRSTUVWXYZ*

*RSTUVWXYZ&*

1 2 3 4 5 6 7 8 9 0

ABCDEFGHIJKLMNOPQRSTUVWXYZ

RSTUVWXYZ&

*ABCDEFGHIJKLMNOPQRSTUVWXYZ*

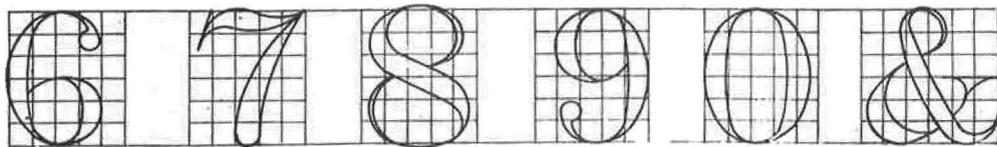
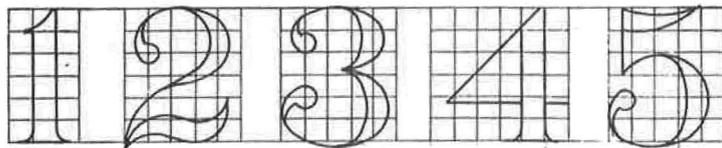
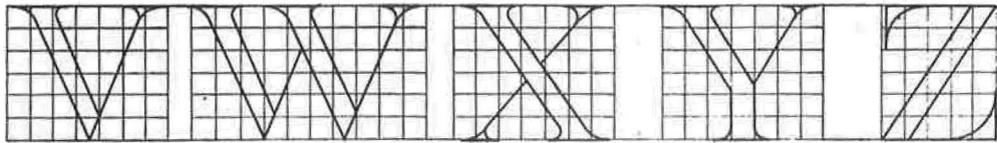
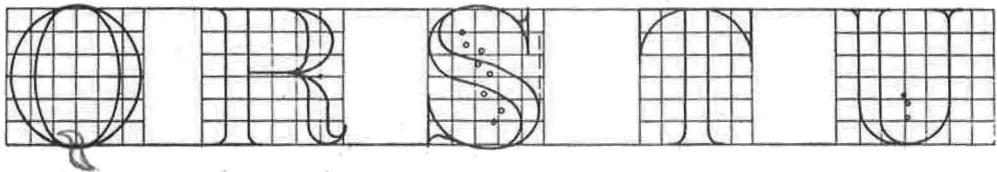
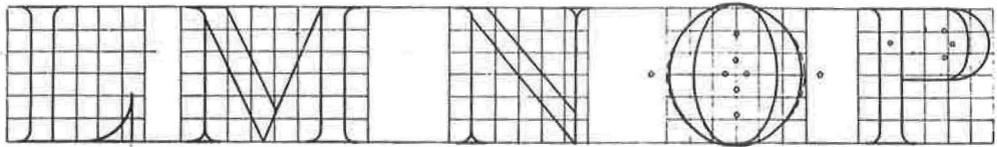
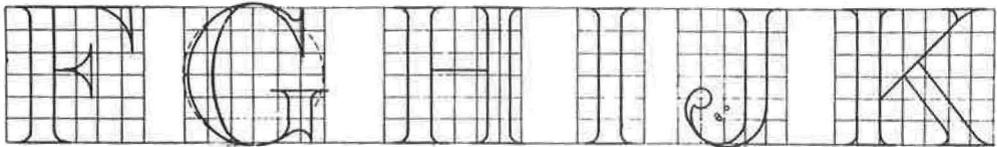
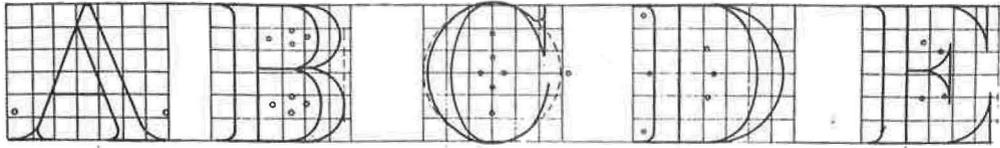
*RSTUVWXYZ&*

1 2 3 4 5 6 7 8 9 0

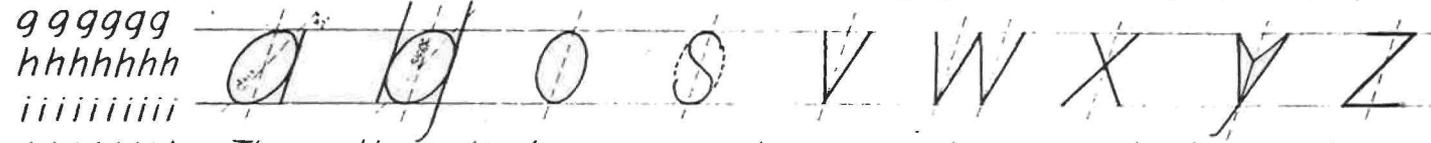
abcdefghijklmnopqrstvwxyz

*abcdefghijklmnopqrstvwxyz*

Roman Letters Mechanically Formed.



Instructions for freehand lettering, Michigan College of Mines C.&M.E. Dept  
 Freehand lettering should be either vertical or sloping 70°. It is  
 advisable to use pencil guide lines for alignment and slope. One of  
 the most important rules to be observed is that a, b, c, d, e, g, h, p, and q  
 are formed with an ellipse whose major axis slopes 45° while the  
 stem slope is 70°. o, i, a, l, o b, c, o, l, d, e, o, j, g, h, m, n, p, o, j, q.



The mathematical signs are always made perpendicular as shown  
 + - x ÷ || ⊥ = ∞ ∞ The average width of  
 letters is  $\frac{3}{4}$  their height. The small letters are  $\frac{2}{3}$  the size of  
 the capitals. The Roman and Arabic numbers are  $\frac{5}{6}$  as high.  
 The spacings between the letters are only approximate, but  
 there should be a constant relation between the line and space  
 which is best determined by eye, giving the appearance of  
 equal areas between them. The unit space is  $\frac{1}{6}$  the height of  
 the letter. When || lines are adjacent, the space between the  
 letters is 2 units e.g. "MINIMUM". When the curved lines are ad-  
 jacent the space between the letters is 1 unit e.g. ACCOQSTV  
 Leave the space of one letter between words and two letters  
 between sentences. The Greek letters are, Aαα, Bββ,

Γγγ, Δδδ, Εεε, Ζζζ, Ηηη, Θθθ, Ιιι, Κκκ, Λλλ,  
 Μμμ, Ννν, Ξξξ, Οοο, Πππ, Ρρρ, Σσσ, Τττ,  
 Υυυ, Φφφ, Χχχ, Ψψψ, Ωωω.

Gamma Delta Epsilon Zeta Eta Theta Iota Kappa Lambda Mu Nu Xi Omicron Pi Rho Sigma Tau Upsilon Phi Chi Psi Omega

Erase guide and slope lines

AAAA  
 BBBB  
 CCCC  
 DDDD  
 EEEE  
 FFFF  
 GGGG  
 HHHH  
 JJJJ  
 KKKK  
 LLLL  
 MMM  
 NNN  
 OOOO  
 PPPP  
 QQQQ  
 RRR  
 SSSS  
 TTTT  
 UUUU

**HOMESTEAD MINE**  
 Bangor, Colorado  
 Plan of Underground Workings  
 Scale: \_\_\_\_\_ Date: \_\_\_\_\_  
 Index No \_\_\_\_\_ File No \_\_\_\_\_  
 Name: \_\_\_\_\_

Title Building.

Map of  
 The Grand Pacific Mine  
 Clinton, Colo.  
 Showing  
 Surface and Underground workings  
 Scale 1" = 100' ~ F. C. Davis, Eng.  
 Jan. 1, 1912

MAP OF  
 THE GRAND PACIFIC MINE  
 CLINTON, COLO.  
 SHOWING  
 SURFACE AND UNDERGROUND WORKINGS  
 SCALE 1" = 100' ~ F. C. DAVIS, ENG.  
 JAN. 1, 1912

(Sketch freehand with pencil.)

(Title complete)

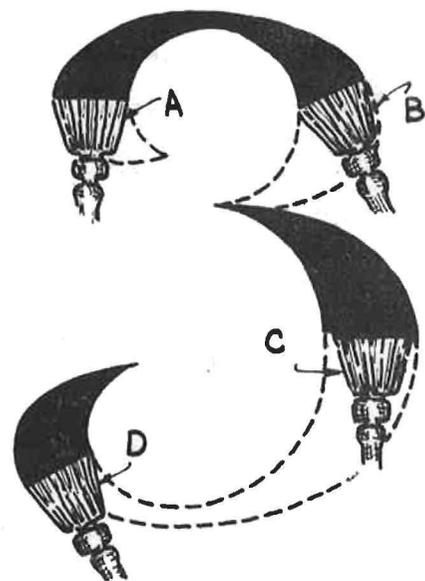
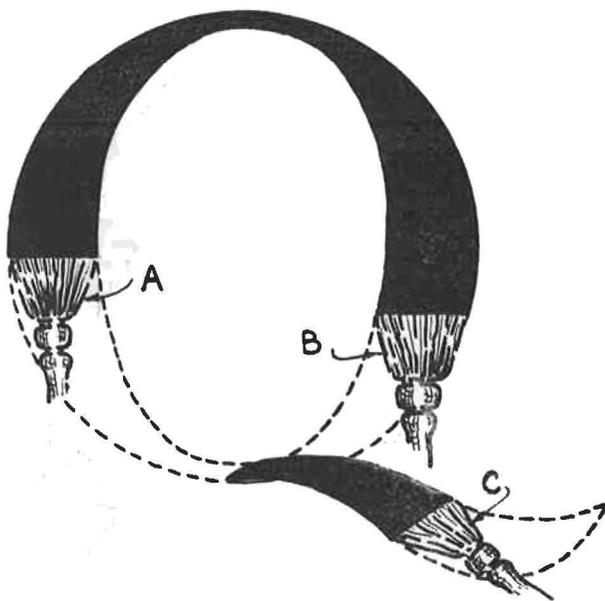
Plate No

MAP OF  
**THE GRAND PACIFIC MINE**  
**CLINTON, COLO.**  
 SHOWING  
**SURFACE AND UNDERGROUND WORKINGS**  
 SCALE 1" = 100' ~ F. C. DAVIS, ENG.  
 JAN. 1, 1912

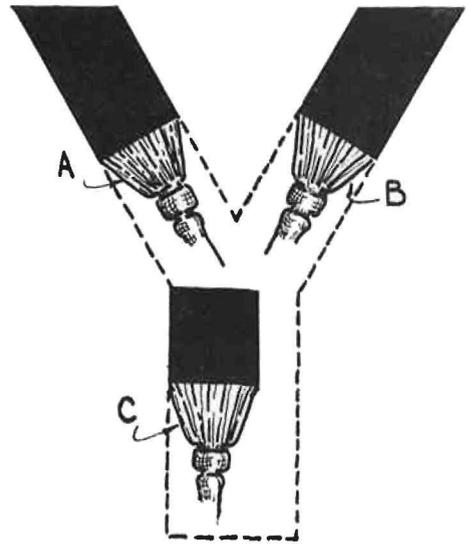
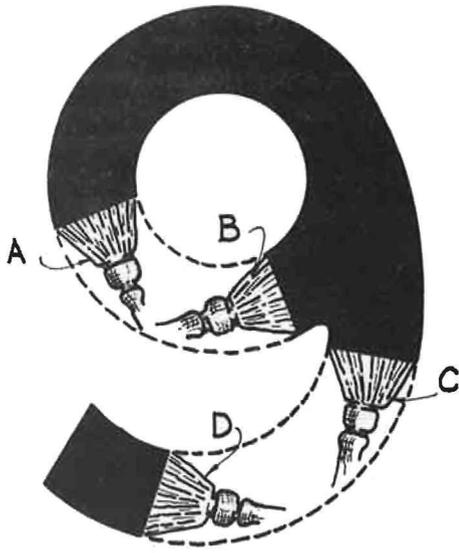
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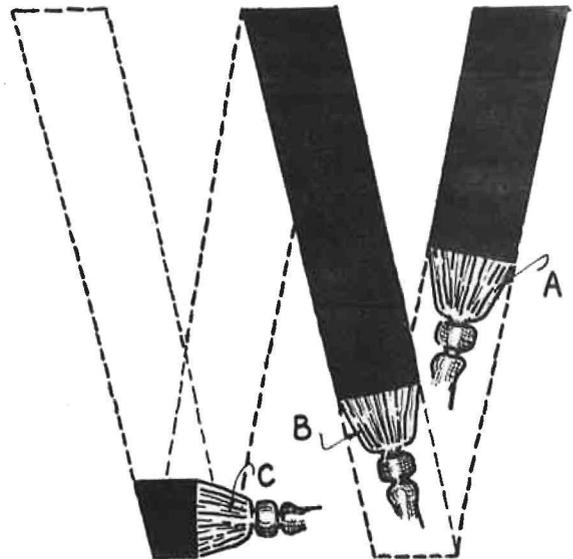
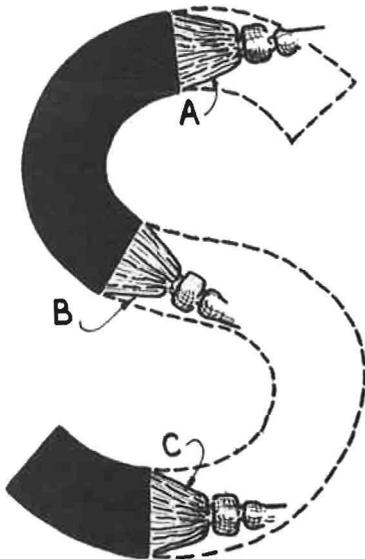
NOTE:—  
 THE CHISEL EDGE OF THE  
 BRUSH MUST BE KEPT HOR-  
 IZONTAL. DO NOT TWIST  
 THE BRUSH IN FINGERS.  
 TURN CHISEL EDGE OF  
 BRUSH TO VERTICAL POSI-  
 TION ON THIN VERTICAL  
 STEMS IN A-E-F-H-K-L-M-N-  
 T-V-W-X-Y-Z.



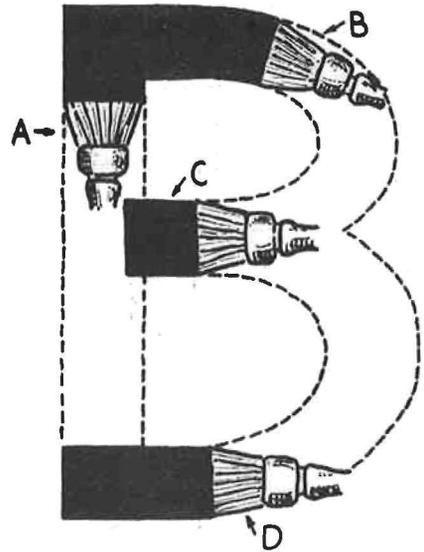
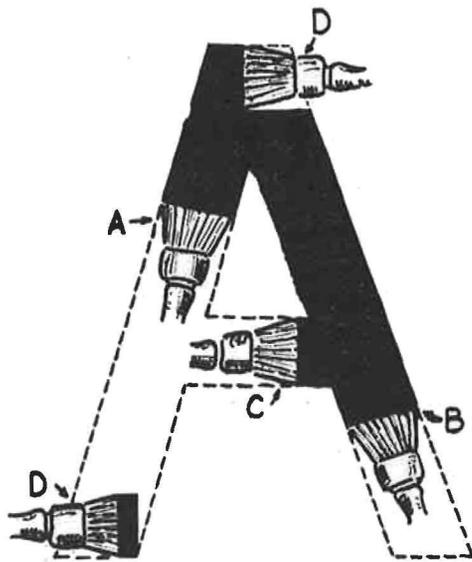
THICK - THIN METHOD  
 MAKE ALL STROKES IN ORDER OF THE LETTERS



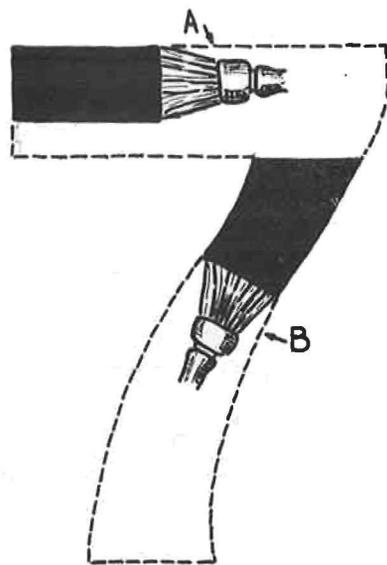
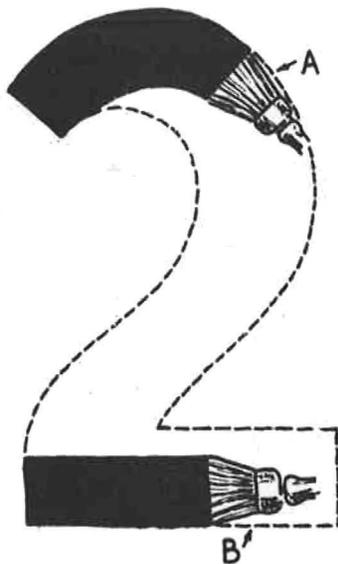
MAKE ALL STROKES IN ORDER OF THE LETTERS



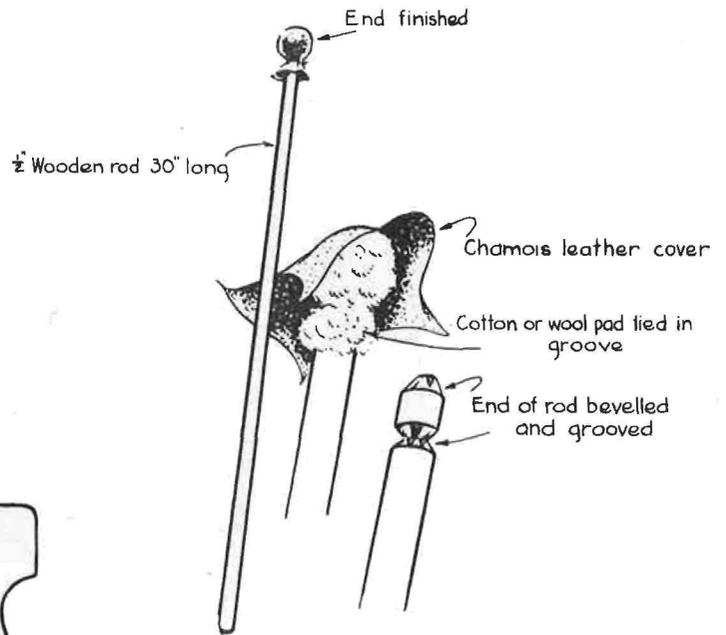
MAKE ALL STROKES IN ORDER OF THE LETTERS



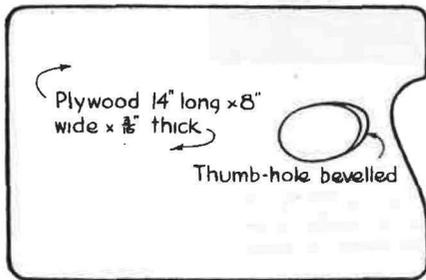
MAKE ALL STROKES IN ORDER OF THE LETTERS.



USING TWO STROKES  
MAKE ALL STROKES IN ORDER OF THE LETTERS.



THE MAHL-STICK



THE PALETTE



USE OF THE MAHL-STICK AND PALETTE



GOOD CARVING. Always looks neat and durable. It provides excellent training, leading into many kinds of employment. Below, a close-up view of carving or burning, showing the texture of work.





DEPARTMENT OF THE INTERIOR, Washington. Showing the placing and size of the inscription with reference to doors and windows. Below is an enlargement for a study of the style.

DEPARTMENT OF THE INTERIOR



THE ERICSSON MONUMENT, Washington. A peculiar and fitting style of letter. This inscription goes around the four sides of the pedestal. Below is enlargement.

