SILK SCREEN
TECHNIQUE

Technical Problems of the Artist Series

This title is one in a series of such books dealing with techniques and materials of the various art and reproduction methods in use today. Artists and craftsmen and all those interested in the fields of art and reproduction will find this series of great value and interest.

PUBLISHED BY
CREATIVE CRAFTS PRESS
NEW YORK
FOREWORD

This book describes the technique involved in reproducing by the silk screen process. It is intended to present to those interested in the method, data needed to enable them to experiment with it, and to use it professionally.

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I

RECENT GROWTH OF THE PROCESS

In spite of the growth of mass production printing processes such as offset, lithography, gravure, and four color copper plate, the 2,000 year old Chinese stencil process has had a greater proportional growth the last five years than any other modern printing technique. The silk screen process is one of the very few handicraft processes that is not only surviving the machine but even displacing it in many instances. This is because the new technical developments in the process have been successfully applied to new fields and new uses.

The silk screen process was first used in this country about the beginning of the twentieth century. It was first limited to rough and simple "show cards." Today, "show cards" are still being done by silk screen, but the other uses of the process overshadow this one. In the west and in the rural districts almost all the car cards in trolleys, railroad trains, and buses are done by silk screen. The majority of the delicately worked out window displays throughout the coun-
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try are printed by silk screen. Department stores are using it, almost to the exclusion of other methods in their sales promotional material.

Although silk screen cannot approach the chiaroscuro of offset and lithography, it makes up for this by the richness of its pigment layer and the highly valued effect of its "personal touch." Besides this, silk screen process has two distinct advantages. First, its initial cost is much less. For runs under several thousand, it will successfully compete with any other process. The second advantage is that since silk screen is a basic stencil process, it can print on substances that a hard metal plate cannot. It is one method that will successfully print on glass or wood.

In recent years a silk screen machine has been developed to print on bottles, jars, and drinking glasses. The glass is put through a baking process after printing for permanence. In the textile industry silk screen has made batik-type designs available for general consumption, besides developing colorful designs, in its own right, that no other process can duplicate. Designs for neckties, dress materials, scarfs, curtains, wrappers, wall paper, and novelties have been reproduced to some extent by silk screen process.

II

THE PROFILM METHOD

THE CLEANEST AND MOST EFFICIENT OF THE VARIOUS TECHNIQUES in the silk screen process is the method that has been developed only a few years ago. It is called the profilm method.

A piece of silk bolting cloth or specially made "stencil silk" is stretched tightly on a wooden frame. Organdy is a good medium but it will not wear. The silk has a large mesh in proportion to the thread. This permits the paint to flow through the silk as through a strainer.

Magnified, the silk looks like this:

![Fig. 1](image-url)
Silk Screen Technique

Sizing in Angle of Silk & Frame

After the silk is stretched on a wooden frame with tacks, the edges of the silk and wood are sized with glue or shellac. Then strips of two inch gummed tape are pasted snugly on both sides.

When the tape is completely dry, apply several coats of pure orange shellac. The tape and wooden frame can also be waterproofed with white lead or enamel. Be careful that none of the shellac or enamel drips on the main part of the silk since any spot or imperfection will print. Cut a piece of 1 or 3/4 inch five-ply veneer board a few inches larger than the frame on all sides. Be sure it is straight and smooth. Secure the frame onto the “table” or base by means of two removable-pin brass hinges as in Fig. 3.
Arrange hinges in same order as in Fig. 4 so that other frames will fit on the same table.

Wooden dowels or metal pins made from thick nails are forced into the frame on one or both sides opposite the hinged side (Fig. 5). This is to insure accuracy when the frame is lowered. The pin should fit quite snugly into the corresponding holes in the base or table.
III

POSTER BOARD

In most screen shops there are standard sizes of poster board stock. Poster board can be bought in a wide variety of colors. The size from which most sizes are cut is 28 by 44 inches.

Fig. 6

The sizes of the printing frames, therefore, are also standard. Each standard size printing frame is made to print a standard size poster.

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SILK SCREEN TECHNIQUE

There should be at least four inches between the inside edges of the frame and the border of the stock to be printed on the A and B sides and at least 2 inches on the C and D sides.

When the sizes and position of both frame and stock are determined, the paper or poster board must be kept in place by means of "registers" (Fig. 5). If poster board is to be printed, these registers may be cut from the board since it is desirable to have both registers and stock of the same thickness. The registers should be rectangular and not longer than 1½ inch. Using the stock as a guide they should be placed accurately and attached by means of glue and carpet tacks.

If the same registers are to be used repeatedly, they should be treated with shellac to make them withstand fraying and wearing down. If permanent registers are needed, it is advisable to make them from metal, keeping them in place by flathead screws. When paper is to be printed, the registers will naturally have to be thinner. As paper usually curls a bit, much time and trouble will be saved by using the type of gummed tape registers illustrated in Fig. 8.

POSTER BOARD

DO NOT CREASE HERE

CREASE AT THESE POINTS

GUMMED SIDE

GUMMED TAPE REGISTERS
Fig. 8
IV

PREPARING THE STENCIL

The printing table is now ready to receive the stencil. Next comes the cutting and preparation of the stencil. A specially prepared, transparent, amber-colored sheet is placed over the original design or working drawing. This nu-film or profilm, as it is called commercially, is fixed on the drawing and drawing board by means of thumb tacks, rubber cement, or Scotch tape. This film is laminated—composed of several layers. The top, amber-colored layer is made from a nitrocellulose or synthetic lacquer base. This will become the stencil proper. The lacquer film is adhered to a “backing” sheet of heavy glassine paper by means of a very thin layer of soft rubber cement. When the stencil is made, only the top layer is cut with a knife. Various knives are available for cutting film.

It is imperative that the point of the knife be kept at a razor sharpness. It is well to have a sharpening stone handy.

Very little pressure should be used, so that only the top layer is cut. The knife markings on the backing sheet should be barely discernible. The blade direction of the knife

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preparing the stencil

should always be parallel to the curve or direction of the outline of the design. The knife can be used both freehand and with the T square and triangle. When the outlines of the first color to be printed are cut, the film within these outlines must be peeled off. This can be done quite easily with a jeweler’s tweezers or sharpened eyebrow tweezers. Some practice is required to get the “feel” of the medium.

Fig. 9

The stencil of the first color is now ready to be adhered to the screen. If the cardboard of the original drawing is exactly the same size as the printing stock, place the original against the registers. If the size of the original is not the same, fix the original in place under the screen and secure by thumb tacks. In registering succeeding colors, always

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SILK SCREEN TECHNIQUE

place thumb tacks in the same holes in the same position on the printing table. The profilm should now be placed accurately over the original but not secured to it. Lower the screen.

V
ADHERING THE FILM

WE ARE NOW READY TO ADHERE THE FILM TO THE SILK. THIS is done with a specially made adhering liquid. This liquid, which is a basic lacquer solvent (acetates, toluol, etc.) softens the lacquer film and makes it very tacky. A clean soft rag is folded into a pad shape and soaked with the liquid. This is applied on the silk, which is flush against the film. The liquid naturally goes right through the silk and softens the film.

Have ready in the other hand a dry, clean rag. Never permit the wet rag to remain in one spot for more than a moment, otherwise the film might melt completely. The dry rag should immediately follow the wet rag to remove the excess liquid and press the silk firmly against the tacky film. Work from the center outward, if possible. If not, start from one end and work continuously to the other. If the board on which the original is drawn is not smooth or large enough and does not permit a flush contact for complete adhering, remove it and replace with flat smooth cardboard and finish adhering.
ADHERING THE FILM

Let the film dry out from five to ten minutes. The film will be stuck hard and fast to the silk. The backing paper must now be removed. Carefully pick off one corner of the backing paper and peel slowly. All the film should remain stuck to the silk. However, if the film is imperfectly adhered in spots, do not peel further. Replace the backing sheet and adhere these spots again in the original way. Allow time for drying and then resume peeling until backing sheet is removed. You should have no trouble if you are careful in the first place, but experience will teach you your own first-aids.

The stencil is now adhered. At this point you will usually find large open areas of bare silk between the extremities of the film and the frame. These will undoubtedly print. They are called "leaks" and must be sealed. They are sealed by squeegeeing lacquer filler over these open areas. This is usually done from the under side of the frame. Naturally, you will have to remove the frame from its hinges and turn it upside down (Fig. 10).

SILK SCREEN TECHNIQUE

Let the lacquer dry. Hold the frame against a light source to discover pin-holes. If there are any pin-holes, apply another coat of lacquer; let dry, and replace frame in hinges. The printing frame is now ready to print the first color. The succeeding colors are prepared on other frames in exactly the same way. If "hair-line" color registration is not possible by silk screen process, we can at least approach it by very careful workmanship. When colors border each other, a $\frac{1}{8}$ inch overlap is usually allowed. It stands to reason, of course, that the cutter or technician will have to analyze the design, before cutting, for color-sequence and registration.
VI

PREPARING THE PAINT

We are now ready for our paint. This comes ready-made, especially prepared for the silk screen process. It is a thick, light oil paint. It will have to be mixed to match the color required in the original design. The paint usually comes very thick and must be thinned down with additions of thinning varnish. The final consistency of the paint is quite important for clean, sharp printing. It should be light, but not soupy, rather more like a boiled cereal.

A valuable addition to the regular paint is a thick vaseline-like substance called transparent base. This is mixed with the paint to get any degree of transparency or opacity. The combinations possible with transparent “overlays” are practically unlimited. Success with these effects is mainly dependent on the resourcefulness and experience of the designer and technician.

Very often, it is necessary for succeeding colors to be as near to full strength as possible in order to have the greatest covering power. In many designs, however, this may not be necessary. In such instances, the sharpness of detail and

PREPARING THE PAINT

working ease are improved if as much transparent base as possible is used. This addition should not exceed the limitations of color intensity requirements. Even when a transparent or semi-transparent effect is not called for, the addition of transparent base immeasurably improves the texture of the paint. Paint “extenders” are also sold to make the pigment go farther. Such economy should be avoided because the chalk in these extenders lowers the quality and texture of the paint. If you must “extend” the paint, use transparent base.

Paint manufacturers offer a variety of mixing varnishes. The varnishes make the paint flexible, glossy, hard, dull, or soft as required. Some slow down the drying qualities of the paint; others hasten it.

When the paint is finally mixed, it is poured along the edge of the silk within the printing frame. But before we begin printing, let us organize our production and get the other tools together.

The printing frame is hinged to the base. This base is tilted slightly upward on another table or horses (Fig. 14). The height of the screen should be even with the printer’s elbow. On one or both sides of the frames are attached springs. Screen door springs are most commonly used. These springs save labor and improve production. They keep the frame off the base when you are not printing. The printing stock is piled to one side—usually on the printer’s left. Since the paint takes at least an hour to dry, a system of racking the printed stock must be devised.

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THE POSTER RACK

There are several kinds of racks on the market. One of these racks is constructed of two rows of 50 half inch slats of wood arranged like a comb to a center support. The two rows are spaced about 12 inches apart. This rack will hold stock 11 by 14, 14 by 22, 22 by 28 inches. It is fitted with handles and ball-bearing casters.
VIII

PRINTING

The stock is on the left, the rack on the right; the springs are set. The printer stands before the screen and the printer's helper—the "take-off" man—is ready to rack the printed stock. Paint has been poured on the screen. The printer takes a piece of stock from the pile and sets it carefully against the registers. He lowers the screen and holds it down with his left hand against the pull of the springs. With his right hand he takes the squeegee (Fig. 12) and draws the paint over the screen (Fig. 13). Pressure must be firm.

When the squeegee reaches the other side, let it rest against the frame and lift the screen. The "take-off" man removes the printed stock and racks it. Register a fresh piece and print. This time, hold the screen down with your right hand and draw the squeegee across the screen with your left hand—from left to right.

This method of "ambidextrous" printing is the most efficient and will give the greatest production with the greatest
SILK SCREEN TECHNIQUE

ease. Of course, it will take some time to get the knack of it.

When the printed stock is dry, it is removed from the racks and piled again beside the screen for the next color. Be sure that the paint has dried and is not the least bit tacky, otherwise the stock will stick when piled up.

In printing, fine specks of paper lint, or dirt from the stock, will remain on the open areas under the silk. They will show in the print. Remove them with a wet kerosene rag and then wipe with a dry rag. Keep the stock clean.

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PRINTER
IX

CLEANING THE SCREEN—REMOVING FILM

When the printing is finished, insert newspapers under the screen. Pick off paint with cardboard squares, and save in paint can. (In storing the paint, let skin form on the surface. The paint can be used again by carefully removing the skin.) Wet rag generously with kerosene. Soak up paint from screen. Wipe with dry rag. Remove top sheet of newspaper under the screen. Wet another rag with kerosene, wipe and dry off with clean rag. Repeat process until screen is thoroughly clean and dry.

To insure the removal of all traces of kerosene, wipe off with a final rag containing benzine. Clean squeegee in a similar manner. In order to be able to use the screen over and over again for various jobs, make absolutely sure that every last trace of paint is removed from the silk when cleaning. If you do not, the paint will dry into the silk and render it useless.

REMOVING THE FILM

There are some variations as to the method for removing the film from the silk. The one most commonly in use is this: place newspaper or flat sheets of wrapping paper beneath the screen. Soak a rag and the silk with “film remover” or any lacquer solvent. The film will melt and begin to stick to the paper. Remove the top sheet of paper and soak again. Repeat process until film is dissolved. Considerable rubbing is necessary. Finish the cleaning with fresh rags and fresh liquid. Use rubber gloves to protect hands. When all traces of film and lacquer are removed, the screen is ready for the next job.

* * *

The uninitiated in silk screen process will find themselves caught in many technical traps. Organization and planning must be given very careful consideration. A workmanlike attitude will help you avoid many mistakes. One mistake will ruin a job or negate hours of work.

However, the silk screen process, like other creative crafts, will provide pleasure and the satisfaction of accomplishment if approached in the right spirit.
METHODS OTHER THAN PROFILM

This part is concerned with the manner of handling the specific medium and materials used in the creation of a work of art. It is presented as a key, opening the way to a harmonious use of any medium or technique and, more specifically, to the broad possibilities inherent in the silk screen process. For without the proper understanding of its basic characteristics the hazards for insensitive handling are far greater in the silk screen process than in any other reproductive process. This is true both in its fine art and commercial application. On the whole, the commercial use of the silk screen process has not been of the highest quality. For too long a time designers did not permit the characteristics of the medium to influence the idiom of their design sufficiently.

Printing media must be regarded in exactly the same way as the painter esteems his canvas, paints, and brushes. The finished work must convey the feeling that the artist has bestowed a certain amount of love and respect on his printing medium, no matter how mechanical.

In this light, we must understand that silk screen is basically a stencil process; that it leaves a pigment layer of a certain thickness on the print; that the surface texture can be varied from gloss to flat; that the pigment layer can be regulated as to transparency or opacity; that chiaroscuro effects are possible in a very limited way; and that we can use various methods to achieve either sharp or rough outlines. Many of these characteristics are in a sense limitations, but a suitable design must boast of them as advantages.

Since the first part of "Silk Screen Technique" deals with the film method and the organization of printing, we will confine ourselves here to a description of other techniques in silk screen process, which may or may not be used in combination with each other. The chief difficulty in all these methods is the problem of accurate color registration, since glues and certain other "fillers" that are used contract when dry and are hygroscopic. But this disadvantage can be overcome by design that takes loose registration into consideration and by a greater overlapping of colors.

The description of the process in this volume is written with the understanding that the reader is already acquainted with the contents of the first part of "Silk Screen Technique."
XI

TUSCHE-CRAYON—“CUT-IN”

TUSCHE METHOD

Tusche is a black liquid prepared for lithographers. It consists mainly of microscopic wax particles suspended in water. When tusche is brushed on any surface, the wax particles consolidate as soon as the water has dried out. The dry tusche then resists water but is easily removed with turpentine or kerosene. Lithographic crayon has about the same formula as tusche but without the water.

For the tusche method, it is better to use a finer mesh of silk—number 14, 16, or 18—since the pattern of the silk creates the tiny zigzag outlines of the printing areas.

The frame and silk are taped, shellacked and ready for the stencil.

The screen is placed on original drawing and the color to be printed on the silk is outlined with pencil or with India ink.

If ink is used, the screen will have to be raised so that the silk does not touch the drawing; otherwise the ink will blot on the drawing. Dissolve a tablespoon of corn starch in a glass of water and apply to underside of screen with a sponge. Let dry. The starch acts like sizing, makes it easier to apply the tusche and helps prevent pin-holes. But its use is not absolutely necessary.

The tusche is applied with a good brush (preferably sable) to all the areas that are to print. Tooth-brush spatter is quite adaptable to tusche and can be done very successfully. Dry brush is not suitable because it is hard to control. Let the tusche dry. This may take as long as half an hour.

Prepare a mixture of 50% liquid glue (Le Page’s has proved satisfactory), 40% water, 8% vinegar, and 2% glycerine. Prop up the screen at the corners, right side up, so that the silk is a few inches above the table. The screen must be horizontal. Have ready a piece of cardboard about four inches square. It must have one straight edge. Squeeze a little of the glue mixture over the silk—over the tusche drawing and all. Continue in neat parallel strokes until the silk has been completely covered. A little practice will supply the proper knack.

When the glue is dry, look through the screen against a light source and see if there are any pin-holes. If there are pin-holes, it will be necessary to give the silk another coat of glue. When this coat has also dried, turn the screen bottom side up and impregnate the tusche areas with turpentine or kerosene. Place the screen on some newspapers, right side up, apply turpentine or kerosene liberally, spread with rag and rub gently. The tusche will then begin to dissolve. Re-
SILK SCREEN TECHNIQUE

move the top sheet of newspaper. Add more turpentine and continue rubbing. Glue scales off the dissolved tusche, leaving the printing areas open. Repeat the process until the screen is clean. If the outlines are hard to clean, use a small bristle nail brush. The screen is now ready to print. Use paint in exactly the same way as in the film method.

CRAYON METHOD

For this method, it is necessary to use a fine mesh silk, preferably in single thickness. Place stretched silk on the drawing and outline in pencil, on the silk, the general area to be printed. Use a file, sandpaper, engraver's Ben Day plate, Ross board, egg shell board or any definitely textured surface to get the effect desired. Place the textured material under the silk in the area wanted and work on the silk with a No. 2 lithographic crayon. Keep working up the area until it reaches the effect desired.

Squeegee the glue mixture as in the tusche method. When the glue is thoroughly dry, place the screen on large blotting paper. Put a smooth sheet of newspaper inside the screen. Have ready a fairly warm electric iron and iron on the newspaper. The heat will melt the crayon and cause the glue over the tiny grains of crayon to fall away. If the iron is too hot or the screen still damp, the newspaper will stick to the glue. If all the crayon does not finally come off, apply turpentine the same as in tusche method. The screen is now ready to print.

TUSCHE-CRAYON—“CUT-IN”

SIMPLE “CUT-IN” METHOD

The drawings are outlined on the silk in pencil, as in previous methods. This time, however, instead of working “positive,” we work “negative”—that is, we fill in the silk around the printing area and leave the area open. To do this we can use either glue with a little coloring added or lacquer. For permanent screens use shellac or enamel. When all the non-printing areas are covered, the screen is ready.

This method may seem simple, but in reality much difficulty will be encountered in getting over areas free from pinholes, so that much more working time than is usually expected will be consumed. This method is practical only when the design is so simple that most of the “filling-in” can be done with a cardboard squeegee. The outlines, of course, will be quite rough. When the stencil is made of glue, simply wash the screen with water. When it is made of lacquer, remove with thinner, the same as in the film method.
GLUE SHELLAC—SELECTASINE PROCESS

GLUE-SHELLAC METHOD

Prepare the same glue mixture as in the tusche method. Squeegee evenly over the inside of the silk until it is covered. The screen must be lifted off the table a bit so that the silk does not touch anything. When the glue is dry, check for pin-holes against a light source. If there are only a few pin-holes, touch them up carefully with a brush. If there are many pin-holes, the screen must be given another coat of glue—only this time the coat must be considerably thinner. If there are no pin-holes, the screen is ready for the next step.

Place the screen in position flush against the drawing. The screen will be quite transparent and the design will be easy to follow. All the areas not to be printed are to be covered with a waterproof medium. Black shellac or black lacquer are most commonly used. This “cutting-in” must be done quite carefully. Be sure that your medium has enough

GLUE-SHELLAC—SELECTASINE PROCESS

body for a good protective coat. Since the glue acts as a sizing, it brushes on quite easily.

Check against a light for errors, thin spots and pin-holes and correct with further application of shellac or lacquer. When dry, place the screen in a horizontal position, propped up on the ends, off the table. Be sure that the screen is not tilted in any direction. Have ready a clean, soft rag and a pot of water. Dip the rag in water, fold over and apply quickly and gently over the inside of the screen. Wring out the rag and pick up excess water over the screen. The glue over the open area will begin to dissolve. Rinse the rag and apply water again on the screen. This time, however, do not load the rag with too much water. Wring out the rag again and pick up excess moisture. Rinse and continue applications until the glue has been removed from open areas. Finish off with a dry rag.

Always work from above the screen. Check again for any pin-holes that may have come through and correct only with glue. The screen is now ready to print.

This method produces fairly sharp outlines and can withstand the wear of a long run.

SELECTASINE PROCESS

This “process” is not so much a technique of preparing a stencil as simply a system of color registration. However, the simple “cut-in” method is the one best adapted for Selectasine. One screen is used for as many colors as the design requires. The design is analyzed for color sequence. Usually
SILK SCREEN TECHNIQUE

Light colors are printed first. Exception is made when the light colors do not cover much surface.

The first color stencil is made to include all the other color areas. Let us say we have four squares to print: yellow,

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FIRST STAGE
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<tbody>
<tr>
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<td>YELLOW</td>
</tr>
</tbody>
</table>
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SECOND STAGE
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</tr>
</thead>
<tbody>
<tr>
<td>GREY</td>
<td>GREY</td>
</tr>
</tbody>
</table>
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THIRD STAGE
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<th>YELLOW</th>
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</tr>
</thead>
<tbody>
<tr>
<td>GREY</td>
<td>BLUE</td>
</tr>
</tbody>
</table>
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FOURTH STAGE
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</thead>
<tbody>
<tr>
<td>Y</td>
<td>R</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>G</td>
<td>B</td>
</tr>
</tbody>
</table>
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GLUE-SHELLAC—SELECTASINE PROCESS
grey, blue and red, in order. The first stencil—the yellow—prints in all the areas marked out for the other colors (Fig. 15, First Stage). The second stencil—the grey—prints in all the areas except the yellow. The third stencil—blue—prints also in the red area. The fourth stencil—red—prints only in its own area. By the time we reach the red stencil, we have piled up four layers of pigments so that the effect is almost three-dimensional.

One screen prints all four colors. When the first color is printed and the screen cleaned of paint, the area which is to appear yellow is “stopped out” with filling medium (glue or lacquer). The second color is ready to print. The colors that follow are successively eliminated by this stopping-out method. With a bit of resourcefulness and ingenuity it is also possible to use the Selectasine process with film. The difficulty here, however, is in proper adhering, in sealing overlapping film areas, and in not injuring the previous stencils.

As a whole, the application of the Selectasine process is quite limited and it should be used only when the job is suited to it.
IMITATION SHELLAC METHOD

ALTHOUGH THE PRINTING QUALITY OF THIS METHOD IS QUITE poor, it is cheap, quick and easy. It is quite suitable for school work. It is another resist method, similar to the tusche process.

The drawing is traced in pencil on the silk and filled in with colored glue. The glue is used just as the tusche was. The work is “positive.” Let the glue dry. Raise the screen off the bed or table. Keep it horizontal. With a cardboard squeegee some thin imitation shellac over the screen, image and all. You will probably have to apply two coats. When dry, apply some water on the reverse side, so that the glue will melt. Keep setting and rubbing both sides of the screen so that the shellac chips off the glue areas and leaves a clear stencil. Dry the screen off. Now it is ready to print.

This method does not allow the use of the regular screen process paints. They contain oily varnishes which will gradually dissolve the synthetic shellac stencil. Genuine orange shellac is not dissolved by oils but it still cannot be used as a direct screen filler, because when it is dry and oils have passed over it, neither alcohol nor acetone will completely dissolve it out of the screen. The screen, of course, is rendered useless for further work.

Orange shellac can be used, however, when you wish to make a permanent screen. Only in this case can regular screen paint be used. On the other hand, synthetic shellac is quickly washed off the screen with alcohol.

What paint can we use, then, with an imitation shellac stencil? “Show-card” or jar water colors or good quality dry pigment can be used. They must be prepared for the screen. The paint must be light but thick in order to print well. It must not dry too quickly; otherwise the screen mesh will clog. It must also have a lubricating effect between the squeegee and the silk.

To make the paint thicker add boiled flour or corn starch. To lubricate it and prevent quick drying add glucose, corn syrup, or honey. To prevent further quick drying add glycerine. It is necessary to experiment a bit to get correct proportions; otherwise an excess of any one of the ingredients will give trouble.

This prepared paint cannot be used successfully with any other method because the water in the paint causes expansion and contraction of the silk and throws the image out of registration. However, the synthetic shellac method particularly fits the use of water paints, since both stencil and paints are cheap. It must also be remembered that the water paints dry out several shades lighter and have a chalky appearance.
This is another method simple enough to be convenient for class room work. Use almost any kind of thin paper from tracing paper to newspaper stock. Frisket paper is excellent and cellophane is good though a little hard to manage. Whatever stencil material is used should be just large enough to overlap the area of the silk. It should be flat and without wrinkles.

If you use paper which is rather opaque, trace the design on the paper. If tracing paper is used, lay the paper on the original drawing, tack it down (or use Scotch tape) and cut. The stencil can be cut with any sharp instrument. A single-edge razor blade is good. Of course, since you are cutting a simple stencil, the design must not be too complicated. If there are any “centers” or “islands,” cut them out and put them aside for the moment.

Remove the stencil from the drawing and place it in position under the screen. The screen is hinged to the printing bed. Attach the edges of the stencil to the frame at about eight places with bits of Scotch tape. Set the “centers” in place and put a spot of glue in the middle of each one. Lower the screen and press the silk against these glue spots. Let them dry for a few minutes. Pour the regular silk screen paint in the screen and print.

The sweep of the squeegee across the silk and the viscosity or tackiness of the paint will cause the stencil to adhere nicely to the silk. When you are through printing, remove the paint from the screen, rip off the stencil, wash the screen with kerosene in the regular manner, and then remove glue spots from the silk with a little water.

This method is especially adaptable for certain rush sign jobs. The lettering most suitable is a loose, free, simple type: anything from Neuland to Kabel or Futura Black.

In class room work excellent results can be obtained with semi-abstract or conventionalized stencil designs. The design must be simple and colorful. Since good color registration cannot be planned with this method, recognition of and making allowance for this weakness in a loose design will help achieve additional charm.

(See Figure 16)
There are many photographic processes in the field, but as yet they are not fool-proof or stable enough to be practical for the average craftsman. Furthermore, fine detail and half tone effects can be obtained much more easily by photo- engraving and offset process. Photographic silk screen would only be an imitation of those other processes, possessing no distinct qualities of its own. The mechanical effect of photographic screen processes does not harmonize artistically with the craft or "handworked" quality of silk screen process proper.

First of all it is necessary to have a transparent "positive" of the image to be reproduced. The "positive" can be had in a number of ways. It can be made with a photo- engraver's camera by collodion wet-process on glass or on celluloid. Or it can be drawn directly on frosted celluloid by using a special opaque medium.

The screen must be treated with a sensitizing solution. This is usually a gelatine-glue mixture that has been made
PHOTOGRAPHIC STENCIL PROCESSES

sensitive to light by ammonium and potassium bichromate. The screen is then laid in a pressure or vacuum contact frame, with the transparency in place against the treated silk, and is exposed to a strong light, preferably a fan-cooled arc light. After the screen has been exposed a certain length of time (from 10 to 20 minutes, depending on the strength and distance of light) it should be washed first with cold water for a few minutes and then with warm water until the image is clear. Let the screen dry. It is now ready to print.

There are several variations of this method. The carbon tissue method produces a very sharp and delicate print, but the method is quite difficult to use. The carbon tissue is manufactured in England and is used in the making of rotogravure. It is a sepia colored gelatine base film on a backing paper. It is sensitized with bichromates, then exposed in a contact frame with the transparency. It is transferred to a ferrotype plate, washed and adhered to the silk by contact. All in all, the chance for failure in this method is very great unless temperature, quantities and time exposure are just right.