

## PLASTIC SHEETS IN MAP REPRODUCTION

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(Extract from *Surveying and Mapping*, Quarterly Journal of the American Congress on Surveying and Mapping, Washington, Vol. X, No. 2, April-June 1950, pages 135-138).

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Plastic Sheets used in map reproduction, known as Vinylite, are a development of modern plastics. Vinylite is a dimensionally stable material manufactured only by the Bakelite Corporation, with some of the material being subsequently processed by other firms and supplied under their own trade names, such as Copyrite, Dyrite, Di-Noc, and Virginia Plak. Plastic sheets have been used with remarkable effectiveness in developing methods for expediting the procedures of chart and map reproduction.

The advantages of Vinylite for compilation and drafting of the base map, are now common knowledge and therefore will be omitted from this talk, with the exception of mentioning that a new Vinylite sheet for these purposes, will soon be marketed. It will be laminated with paper on both surfaces and cost less than the present plastic sheet. It will have an excellent drafting surface for India ink and will of course, retain the stability now inherent in Vinylite.

It is the less known but quite important uses of Vinylite which will be described at this time. The first application to be discussed will be that of the color proof.

### COLOR PROOFS

One interesting use of the plastic sheet is the production of color proofs of maps directly from the negatives. When the edition of a map is due to be printed, it is desirable to have an advance copy for proof-reading of data and registration. On this proof the verifier indicates the changes which should be made before the final printing. Proving maps on plastic is economical, as it eliminates the necessity of preparing lithographic press plates for hand or press proving, which, because of proof changes, often need to be made over. The operation of using colored inks to superimpose the plate images on paper is also avoided.

To process color proofs on plastic sheets directly from the negatives, the plastic is coated in the plate coating machine with a bi-chromated emulsion which incorporates a dye of the desired color. The plastic is then placed in the vacuum printer and, with the separation negative in position, is exposed to the arc lamps. Development is accomplished by washing with water to remove the unexposed areas. This cycle is repeated for each of the colors. Registration is perfect, furnishing the proof-reader with a facsimile of the chart, with true relationship between features, such as drainage in one color, to contours or culture in other colors.

Color proofs may also be made from positives, directly to the plastic, also by coating, exposing, and developing once for each color. However, here, the deep-etch method is used, and in addition, the developed image is each time stained with a dye of the proper color, before the resist is removed.

Proving on plastic is accomplished in less time than is required to process the press plates, and yet provides a proof of superior quality.

### ARTIFICIAL NEGATIVES

Another application is the artificial negative. Colors are often used in the reproduction of maps to emphasize areas, such as blue for water, gray for land, and so on. Each area requires a negative from which the tone is obtained by exposure to the press plate. A film of ruling or halftone may or may not be interposed between negative and plate at time of exposure. Flat tints, solid ruling or halftone, lend themselves admirably to the artificial negative procedure, the actual drawing being converted into the final negative.

This is achieved by placing a chemical blue line image on the plastic and using a water soluble opaque to paint in the areas which are to print on the chart. A non-actinic dye, maroon in color, is applied to the entire surface of the Vinylite; the dye being resisted by the opaque, which is then removed with water. The resulting image is a negative which will withstand abrasion and yet is amenable to corrections.

There is no photographic operation involved, nor any inconvenience of using glass. Here again the plastic sheet serves to expedite production and provide an economy in time and cost.

### DUPLICATE NEGATIVES

A further use of the plastic sheet is the production of duplicate negatives, without the usual intermediate step of first making a positive. Duplicate negatives serve well, for purposes of alterations, where it is desirable not to change the original negative. Duplicate negatives are ideal for convenience in shipping and to avoid breakage of glass.

Large charts, which require two or more glass negatives for lithographic plate making, can be combined into one negative for the entire chart. If desired, several negatives may be exposed to the same area.

In making duplicate negatives on plastic sheets, the method is similar to the deep-etch process using bi-chromated gum, except that after development the plastic is stained with the maroon dye. The duplicate negatives are not mirror images, but read as do the original negatives. This is accomplished by exposing through the back of the plastic, using a single arc lamp, at an increased distance. Negatives made in this manner are clear and sharp, and need no painting or retouching, with the dye impregnating the plastic to form a durable negative not easily marred or scratched.

### GRADIENT TINTS

Colored areas on charts are helpful in distinguishing the various features. In the construction of the aeronautical chart the standard practice is to use tints to indicate such features as water, towns, and gradients of elevations. The preparation of these tints requires a considerable amount of labor. Vinylite has made possible the development of a procedure for drafting these tints at a cost of less than 40 percent of the method which it supplanted. This efficiency is a result of utilizing the artificial and duplicate negative techniques.

Some of the highlights of the methods are: (1) Several gradients are not drafted, being obtained from the adjacent drafted gradients; (2) the ease afforded the draftsman in following the blue lines which are not complicated by composite prints of the base colors; for instance in following the contour lines no other lines are present; (3) glass is not used; (4) the operation of painting the water and town areas for each gradient is avoided; and (5) no photographic work is done.

### BLACKLINE PRINTS

Another development is the blackline print on plastic sheets.

There has always been a desire to produce a print from a negative which would give definition equal to the negative and yet would be on a material which retained size. This is now being done on white opaque and transparent plastic sheets by coating with a bi-chromated gum to which black dye has been added. After exposure and development, there is obtained a dense black print which provides excellent copy for the camera. This procedure has an important application in the periodic revision of a map. By the time an original drawing has been revised once or twice, it usually has become poor reproduction copy. This results in a negative of inferior quality and necessitates considerable retouching. The modern approach to this problem is to paint for deletions on the existing negative and then make a blackline print, to which bluelines may be added if so desired. The new information is added by drawing and stick-up of lettering, and a new negative made.

This method supplies a perfect copy from retouched negatives for each revision, and avoids any necessity for correction of deteriorating original drawings. Each fresh print when revised becomes an original.

Another application is in increasing the limits of a chart. A blackprint is made of the existing negative and the compilation for the extended area is applied. A new negative

is then made, adding a yellow non-actinic coating only to the new portion, and then using the glass negative engraving technique to match the original work.

Still another useful application of the blackprint is in those instances where map copies of the highest quality are needed for possible photographing at some future date.

Recently, a successful test was made of a new blackprint emulsion which because of its increased opacity will be most useful in making a negative from a positive, thereby paving the way for still further uses of plastic sheets.

### MINOR APPLICATIONS

Thus far the major applications of the plastic sheet have been outlined; however, there are uses that have been made for minor purposes which are capable of further expansion or modification to meet the needs of a particular problem. The following are some of these uses:

**Direct plate making.**—Smooth drawings of maps on transparent plastic, 0.005" in thickness, are processed directly to the plate without first making a negative or any other intermediate. This procedure requires a drawing which is unsoiled and on which the data is completely opaque in density.

**Flats.**—The reproduction of maps in booklet form is well accomplished by using plastic sheets for making up the flats. The negative films of the first color are assembled on a clear plastic. A second clear sheet is placed over this assembly and the films of the second color placed in register. The procedure is repeated for each additional color. At the time of plate making, a Vinylite mask is registered with each flat to block out the non-printing areas between the maps.

Golden rod paper is conventionally used for flats, requiring the cutting out of panels, leaving narrow bands of paper to which films are fastened. Registration of colors suffers, as these bands are distorted because of the effect of humidity on the films. This of course does not occur with Vinylite.

**Transfer patterns.**—The use of Vinylite in the drafting of tints, for soil and similar maps, completely obviates the method which has been used for over 50 years; namely, pulling impressions from the pattern plates or stones for transfer to the gummed out plate, or at an earlier date to the lithographic stone. With the new method, the plastic, which is a window negative, is processed to the plate, the desired pattern being obtained by interposing a film between the plastic and the plate at time of exposure. Nine plastics, exposed to three plates, will provide the large variety of designations currently used. Should it be necessary to remake a press plate, this could be quickly done, whereas with the transferred patterns the plate would need to be gummed out again, which would be a lengthy task.

**Engraving.**—Plastic sheets are readily coated, with the same yellow, non-actinic engraving ground used for the glass negative engraving procedure. Grids of large size are easily engraved. This engraved plastic sheet is then used as a negative to produce blackline prints on plastic for a number of charts.

**Wet plate emulsion.**—By applying the proper sub-stratum to Vinylite, it is possible to carry the sheet through the wet plate process and obtain a negative of good quality, to which the emulsion will adhere permanently.

**Specialities.**—There have been produced special graphs and scales on transparent thick plastic, with the image on the face or back of the sheet. The dyed image is etched into the plastic and is therefore practically indestructible.

In conclusion, it should be stated that Vinylite sheets are obtainable from one source or another, in thicknesses of 0.001" and up. Three basic types are produced, the calendered, cast, and planished sheets; a photographic emulsion on planished sheets is also available.

For efficient application of plastic sheets to map reproduction it is highly desirable to have a knowledge of the techniques used in the various procedures and to be informed of the characteristics of the several dozen variations in finish, size, and thickness which are available, in order to select that type which is best suited to the purpose in mind.

