THE TECHNICAL FEASIBILITY OF ECONOMICAL METHODS OF PHOTO-MECHANICAL REPRODUCTION IN HIGH SCHOOL PRINTMAKING PROGRAMS

A Thesis

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by

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CHAPTER I

THE PROBLEM

In the recent history of printmaking the technique of photo-mechanical reproduction combined with intaglio printing has been employed and has grown in use and interest in recent years. The prints of Georges Rouault for Miserere du Guerre and in the smaller plates for Les Reincarnations du Peres Uba are examples of combining the mechanical with the manual method of printing. Immediately after the Miserere prints were shown in New York, there appeared many attempts of heliogravure to out-Rouault Rouault.[1] A commercial firm photo-engraved Rouault's plates and they were used by him as a working base. Through plate development this "base" disappears almost entirely. Almost nothing appears to remain of the photo-engraving; however, on close inspection the photo-mechanical method and manual method appear blended, leaving the photo-image wherever he could not achieve the same success by hand.[2]

Heliogravure is described in Hayter's book as coating

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[1]Stanley William Hayter, About Prints (London: Oxford University Press, 1962), pp. 46-47.

[2]James Thrall Soby, Georges Rouault (New York: The Museum of Modern Art, 1947), pp. 29-30.

a copper plate with a solution of gelatine and potassium bichromate which become light sensitive when dry. When a negative is placed between the coated plate and a light source, the image is transferred to the coating. By washing away the coating that was exposed to light (the part of the coating that was hidden by the black of the negative remains insoluble in water), the plate is bared and ready to be etched in acid.[3]

Contemporary examples of combining photo-mechanical reproduction with manual methods are seen in the prints of Peter W. Milton. In the print Julia Passing, Milton uses the photo-mechanical methods with manual techniques to create a superimposition effecting a spatial organization of subject matter. Other people involved in photo-mechanical reproductions are Naomi Savage, Thomas Coleman, and Robert A. Nelson. Nelson and Coleman are more concerned with the combining of the mechanical with the manual methods of intaglio printing whereas Savage uses photo-engraving frequently as an end in itself.

In consideration of the popularity of these techniques, it is desirable that the student of printmaking be able to employ them; however, the mounting cost of commercially pre-

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[3]Hayter, op. cit., p. 45.

pared plates and the expensive equipment needed to produce them has made this nearly impossible at the high school level. For this reason it is important to find substitute methods for these students to explore; however, little has been done in this regard.

I. THE PROJECT

Purpose of the project. It is the purpose of this thesis to (1) determine the technical suitability of four economically feasible means of using photo-mechanical reproduction in the high school printmaking program and (2) to produce a series of prints, which are works of art in themselves and which illustrate these photo-mechanical methods.

Importance of the project. It is desirable for the students to have experience in this photo-mechanical technique so that they may broaden their scope of visual awareness. The development of the student as a creative being is the responsibility of the high school art program. The combining of the photo-mechanical with the manual techniques offers more background for the serious art student who will enter art in college. A challenge is offered the student through photo-mechanical reproduction in organizing space and to discipline himself in learning processes in visual

awareness. If the opportunities for experience in photo-mechanical techniques are available to the high school student, he will be able to enlarge his visual and creative awareness.

CHAPTER II

REVIEW OF RELATED LITERATURE

The review discusses the historical and contemporary usage of photo-mechanical reproduction and other transfer and etching techniques which benefited this writer.

Soby discusses in his book, Georges Rouault, the relationship of Rouault's prints to his paintings due to his use of photo-gravure.[4] Rouault used the photo-mechanical process to establish his working base which, through extensive etching, almost appears invisible.[5]

In The Book of Fine Prints, Zigrosser describes the impact of photo-mechanical reproduction on the world of printmaking and art. He states that the effect of photography on printmaking is definite and tangible as well as making it less of a business and more of an art.[6]

Hayter describes Heliogravure in his book, About Prints, and the steps to be followed in applying the light sensitive emulsion to the plate.[7] The steps in transferring

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[4]Soby, op. cit., p. 22.

[5]Ibid., pp. 29-30.

[6]Carl Zigrosser, The Book of Fine Prints (New York: Crown Publishers, Inc., 1956), p. 163-165.

[7]Hayter, loc. cit.

the halftone negative in preparation for etching are also described.

Lindquist describes three methods of transferring letters to a metal plate in his Master of Fine Arts thesis "Transfer Method for Intaglio Printing, With a Consideration of William Blake's Relief Method." The three methods are an impervious ground, a lift ground, and counter proof. He describes an impervious ground as an acid-resisting ground not requiring a lift ground. The lift ground Lindquist describes is the combination of an impervious ground with a lift ground to achieve the transfer. The use of the counter proof is to transfer an image from one sheet of paper to another to achieve a reversal.[8]

The Handbook of Modern Halftone Photography, by Noemer, describes the concepts and practices of achieving a halftone negative for photo-mechanical reproduction. It discusses the technical processes involved in making a screen negative and what line ratio is most suitable for the making of the screen negative as well as other concepts and practices.[9]

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[8]Evan Leroy Lindquist, "Transfer Method for Intaglio Printing, With a Consideration of William Blake's Relief Method" (unpublished Master of Fine Arts thesis, State University of Iowa, Iowa City, 1963), pp. 17-25.

[9]Ewald Fred Noemer, The Handbook of Modern Halftone Photography (Demarest: Perfect-Graphic-Arts, 1965), p. 44.

Cahoon's book, Commercial Art, describes the process of sensitizing a metal plate and the preparations involved in the etching of the plate to achieve the photo-engraving.[10]

In New Ways of Gravure Hayter describes the use of soft ground and lift ground methods which were helpful in some of the preliminary phases of the experiments conducted in this study.[11]

Peterdi, in Printmaking, describes the methods of transferring a drawing to a grounded plate which were helpful in the development of the plates to achieve the prints that are works of art in themselves.[12]

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[10]Guy F. Cahoon, Commercial Art (Dallas: The Southwest Press, 1930), pp. 119-136.

[11]Stanley William Hayter, New Ways of Gravure (London: Routledge & Kegan Paul Limited, 1949), pp. 68-96.

[12]Gabor Peterdi, Printmaking, Methods Old and New (New York: The Macmillan Company, 1959), pp. 91-92.

CHAPTER III

DEFINITIONS OF TERMS AND SCOPE AND LIMITATIONS

I. DEFINITIONS OF TERMS

It is necessary at this point of writing to offer brief definitions of terms which this writer uses in the rest of this study.

Polaroid jelly. This is a term that is used in describing the emulsion for developing pictures of a Polaroid Land Camera.

Wipe-on-emulsion. This is a photo-sensitive liquid that is applied to the surface of an aluminum plate in preparation for the transfer of a halftone negative.

Desired results. This term is used in reference to duplicating, in an intaglio print, an image that is as clear and precise as the original photographic image.

II. SCOPE AND LIMITATIONS

Every thesis must start and end somewhere; therefore it is necessary to set some form of limitation to this study, otherwise it could continue and become so broad that one would wonder about the validity of such a study.

It is the intention of this writer to set a limit on range of exploration and experimentation of this study. study shall be limited to the exploration of only four sible means of combining the photo-image with other in- lio techniques. These possibilities are to use: (1) paper photo-engraved plates to achieve a negative or a tive image, (2) an exposed Polaroid negative with its ly, (3) the photo-sensitive emulsion for silkscreen, and a wipe-on-emulsion.

The experiments are further limited in that zinc es are used because of their availability and economy. ough other acid may be usable in some methods, nitric is used because of its availability as well as its be- the recommended acid to use with zinc.

After the photographic images are transferred to the plates, these plates will be further developed as fin- works of art. In this development no limits are im- on the techniques used only insofar as the plates are loped to be printed intaglio.

CHAPTER IV

METHODS AND PROCEDURES

In consideration of the popularity of photo-mechanical chniques, the mounting cost of commercially prepared plates, d the expensive equipment needed to produce them, it is portant to find substitute methods for high school students explore.

It is the purpose of this study to determine the tech-cal suitability of four economical methods of photo-chanical reproduction. The methods used are described parately with any variation used to achieve the desired sults.

I. NEWSPAPER PHOTO-ENGRAVED PLATES

Negative image. The zinc plate was prepared with a yer of soft ground using a roller as the method of appli-tion. By placing the newspaper photo-engraved plate face own in the ground and running the two plates through the ntaglio press, the image was transferred to the zinc plate. he zinc was further protected by using stop out varnish here the plate was not to be etched at this time. The ransferred image was etched, for the desired length of ime, into the zinc plate. Length of time the plate stayed

n the acid depended on the strength of the acid and whether r not there was a thin layer of soft ground still covering he zinc.

Positive image. Five variations of this experiment ere employed to achieve a positive image. The first vari- tion was preparing the newspaper photo-engraved plate for he lift ground process by rolling on a solution of syrup ith black pigment added to aid in viewing the image after t was transferred to the zinc plate. Transferral of the age was accomplished by placing the newspaper photo- graved plate on top of the zinc plate and allowing the yrup to set up briefly. The two plates were then separated, eaving the syrup solution on the zinc plate. This solution s then allowed to dry so that the application of the thin rd ground would not disturb the lift ground. The plate was hen immersed in hot water to dissolve the syrup and allow he image to lift.

The next variation in attaining a positive image was sing syrup by itself as the mode of lift. This was done ecause, in the first variation, the water suspending the lack pigment tended to bead up allowing gaps to appear. he remaining steps were executed in a similar manner as hat of the first variation.

The next variation used Lindquist's lift ground as

cribed in his Master of Fine Art's thesis.[13] This lift und was composed of gum acacia with liquid detergent ed to provide surface tension. The lift ground was then lied to the newspaper photo-engraved plate by the use of rayer. Instead of direct transferral to a zinc plate the ution was transferred to a sheet of acetate covered with d ground. When the solution was dry, a zinc plate was ted to just above the melting temperature of hard ground. y were run through the press with the heated plate in tact with the solution and hard ground on the acetate. diately thereafter the acetate was stripped off leaving hard ground and lifting solution on the zinc plate. The aining steps were executed in a similar manner as the ceding variation.

The fourth variation was begun by inking the newspaper to-engraved plate with intaglio ink and printing it as would an intaglio plate. Immediately upon pulling the of, it was placed face down on a zinc plate and run rough the press to transfer the negative image to the zinc. ink became the acid resist ground allowing the positive ge to be etched.

The last variation was done exactly as the above with

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[13]Lindquist, loc. cit.

exception that lithography ink was substituted for the aglio ink. Litho ink was used in this variation because greater content of varnish could be expected to act as ore acid-resistant ground.

II. POLAROID JELLY

The first step in this experiment was to take a pic-e with a Polaroid Land Camera. After the required time developing, the picture was separated from the negative the negative was immediately placed face down on the plate and rubbed with a spoon. The rubbing was done dd pressure so that the jelly would adhere to the zinc. was done rather than running the plate and negative ough the press because the press would create too much sure and would cause the jelly of the negative to spread slide. The plate was stopped out with varnish where it not to be etched, and by using the jelly as the ground, plate was then etched.

III. PHOTO-SENSITIVE EMULSION FOR SILKSCREEN

The writer first attempted to attain the desired re-ts for this experiment by mixing one part sensitizer to n parts emulsion and brushing it on the plate. The neg-e used was a "home made" one. The negative was made by ing a newspaper photo-engraved plate in relief and trans-

rring the image to acetate. This negative was then placed ce down on the prepared plate and exposed to light, there- transferring the image to the zinc plate. By rinsing the te in warm water, the black areas, the areas hidden by black of the negative, washed off. The plate was then ersed in acid and etched using the remaining emulsion as acid resist ground.

The next attempt in this experiment was by application the emulsion to the plate with a roller. This time a tographic halftone negative was used. The negative was ced on the plate with a clear sheet of glass over it to p it in close contact with the prepared plate. This com- ation was then exposed to light for the desired length of e thereby transferring the image to the emulsion from the ative. This time, instead of washing the black areas off, plate was coated with a thin layer of liquid hard ground. s necessitated the plate being soaked in hot water for a iod of time so that the emulsion would lift exposing the nc. The plate was etched in a conventional manner.

IV. WIPE-ON-EMULSION

This experiment was done by applying the wipe-on- lsion to the zinc plate by a brush. After placing the ftone under a clear sheet of glass on top of the prepared

, this combination was then ready for exposure to light ffect the transferral of the photographic image. After ng out the unexposed areas of the coating, the plate was and ready to be etched.

V. OTHER TECHNIQUES

After the images were transferred and etched, the were further developed through the use of typical lio manual methods. These methods were used to develop rints as works of art in themselves. Some methods em- d were (1) aquatints to create areas of value and ine etch in hard ground to accent and reinforce the s.

CHAPTER V

RESULTS OF THE EXPERIMENTS

The lack of photo-mechanical reproduction at the high school level deprives students of opportunities for experience in this growing method of intaglio printmaking. The purchase of commercially prepared plates is not only economically impractical for these high school departments, but the production of such plates, by employing typical commercial methods in the high school studio, is also impractical. It is the purpose of this thesis to determine the technical suitability of four economically feasible means of using photo-mechanical reproduction in the high school printmaking program. The four methods explored are: (1) The transfer of an image from a newspaper photo-engraved plate to a zinc plate using soft ground to achieve a negative image. Five variations are explored in this first experiment. Three are using different solutions of lift ground for the attainment of a positive image and the last two are using intaglio and lithographic ink respectively to achieve a positive image; (2) the transfer of an image using Polaroid jelly as the acid resist ground; (3) the transfer of an image using a photo-sensitive emulsion for silkscreen as the acid resist ground; and (4) the use of wipe-on-emulsion to transfer an image to a zinc plate. The following material outlines

results of the exploration of these four methods.

I. NEWSPAPER PHOTO-ENGRAVED PLATES

Negative image. This experiment was accomplished as ned because the image transferred to the zinc plate rly and precisely and was etched to the desired depth hout any problem occurring. The method of transfer using soft ground left a thin layer covering the zinc. Because his layer, the length of time the plate etched was one a half hours. This time limit was also affected by the state of the acid. Plate I illustrates this method of to-mechanical reproduction combined with manual techniques intaglio printmaking.

Positive image. In the many attempts to achieve a itive image, many problems arose that could not be resolv- In the first attempt to apply the lift ground solution syrup and pigment, the solution tended to pull away creat- gaps in the image. Because of the gaps created in the ge, this plate was not etched.

In the next variation using the syrup alone as the e of lift, there appeared to be a transfer of the image the zinc. However, the syrup appeared not to have enough ting power to lift cleanly. This resulted in a very otty image and therefore was not etched.

indquist's thesis described a lift ground that suc-
for him in the transfer of lettering.[14] This process
ribed, was dissolving six parts gum acacia powder in
parts water with three parts liquid detergent added
ide surface tension. This technique did not achieve
ired results, in this third variation, because the
und would not adhere to the halftone dots. This
in gaps appearing throughout the image. Even
few fine lines of Lindquist's lettering did transfer,
ic difference is that the lines were continuous whereas
ftone was composed of small dots.

he last two variations using the intaglio and litho
the means of transferral and as the acid resist
to achieve a positive image did not, in fact, produce
ired results. The larger image on plate II was etched
ntaglio ink as the ground whereas the smaller image
tho ink. An examination of this plate will show the
image as a negative, whereas the smaller image resulted
g partially negative. The inks did not serve as ade-
rounds and broke down very shortly after immersion in
id.

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[14] Lindquist, loc. cit.

II. POLAROID JELLY

This second experiment, using the Polaroid jelly as ans of transfer, failed also. The ground, which was lly, broke down almost immediately on contact with the The longest length of time this plate was in the acid nty seconds. An examination of plate III will show he image is very light which was due to the lack of ne dots in the negative and jelly. The halftone dots ave held the ink better because in etching they would eated pits rather than an open bite.

III. PHOTO-SENSITIVE EMULSION FOR SILKSCREEN

he negatives transferred in both attempts without any oblem arising. On the second attempt, a sheet of as added to keep the negative in close contact with pared plate during the time of exposure to light. The that arose on the first attempt was in the etching of te. The emulsion reacted much like the Polaroid exper- that it broke down, in the acid, much too soon to be ful. The emulsion floated off the plate when exposed to ric acid. The second attempt, using a thin layer of liq- ground over the emulsion to achieve a lift when soaked water, did not lift without rubbing the plate harshly. bing tended to take more than the desired areas of

image off the plate. The emulsion had little lifting , resulting in a very poor lift. An examination of IV will show that the emulsion had little lifting even though the plate soaked in water four days. The the thin layer of liquid hard ground did not retard ction of the acid on the emulsion. The emulsion still down.

IV. WIPE-ON-EMULSION

This experiment failed because the emulsion and zinc ot compatible. Without an insulated layer, the emulsion not adhere to the surface of the zinc plate. Immediate ng of the emulsion will result, and due to the imperfec- of zinc, the emulsion will be absorbed by the metal and break down the metal. The process of treatment to make mulsion and zinc compatible is described as follows. irst step is to dissolve 36 grams of gelatine clear in ters of water and heat to 105 degrees to 115 degrees nheit. After the gelatine is thoroughly dissolved, grams of chrome alum and apply to the surface of the . Then dry the solution with hot air and it may be de- le to apply a second layer. There is also an acid short that should be applied to the emulsion after the emul- has been sensitized to light. This acid short stop de up of one and a half ounces acetic acid mixed

32 ounces of water. The above solutions should be stor-
in a refrigerated container to achieve the best results.
above treatments are too technically involved for use
the high school printmaking program based on the scope
limitations of this thesis.

CHAPTER VI

SUMMARY AND CONCLUSIONS

A brief statement summarizing the main points of this and any conclusions and recommendations will be offer- this chapter.

I. SUMMARY

Due to the growing interest in photo-mechanical repro- combined with intaglio printing, it is desirable for gh school printmaking students to have an opportunity perience in this growing method of intaglio printmaking. This study was undertaken to explore the technical bility of four economical means of photo-mechanical re- tion on zinc plates. The four methods of combining mechanical images with other intaglio methods are the (1) newspaper photo-engraved plates, (2) Polaroid (3) photo-sensitive emulsion for silkscreen, and ipe-on-emulsion.

The first method was to transfer an image from the news- plate to a soft-grounded zinc plate to print a negative This variation of the newspaper photo-engraved plate achieved the desired results and so was developed her, with the manual methods of intaglio printmak- into a work of art in itself. The next three vari-

ions using different solutions of lift ground and differ- t means of application did not result in a clear transfer; erefore, the plates were not etched. The last two varia- ons using the intaglio and litho ink as the means of trans- rral and as the acid resist ground to achieve a positive age did not, in fact, produce the desired results. The ks did not serve as adequate grounds and broke down very ortly after immersion in the acid.

The next experiment was to transfer an image from a laroid negative by using its jelly. This method failed ause the jelly, being used as the ground, broke down much rapidly. Immediately upon immersion in the acid the ound started lifting and peeling off.

The next experiment was to transfer a halftone neg- ive to the zinc plate by using a photo-sensitive emulsion silkscreen. After the emulsion was exposed to light to ansfer the negative, the plate was etched using the emul- on as an acid resist ground. This method also failed be- use the ground broke down immediately upon contact with acid. A new problem arose when a thin layer of liquid rd ground was applied on top of the emulsion in the attempt achieve a lift. The emulsion did not lift to open the ired areas of the plate.

The last experiment was to transfer a halftone neg- ive by using a wipe-on-emulsion. This was done in a sim-

ar manner as the photo-sensitive emulsion for silkscreen. is method did not prove workable because the wipe-on-emulsion oved to be not compatible with zinc.

II. CONCLUSIONS

Although three of the experiments failed, a partial ccess was achieved. The image from the newspaper photo- graved plate was achieved in negative form in the intaglio int with great fidelity. It was technically acceptable cause it was easily achieved with simple materials and ocedures. This technique is recommended for use in the gh school printmaking program.

An examination of plate I shows the utilization of e combination of photo-mechanical reproduction with the nual processes. The shallow depth used in the manual pro- ss set up a play of space which was contrasted with the oto-image creating a focal point. This focal point, the oto-image, was further reinforced by the values moving viewer to this area. The linear qualities of this print d to define and tie together the tonal areas creating a ual expression of subjective space.

The use of the counter proof method to attain a posi- e image with the newspaper photo-plates did not yield desired results. However, this method did produce a

sual effect not likely to be achieved by other means and ich was useful in further development. With this in mind, e method is also recommended for use in the high school intmaking program.

An examination of plate V shows the utilization of combination of photo-mechanical reproduction with the ual processes. The photo-image created a break up of ce that counteracted the planes set up by the picture mat. The combination of the photo-image planes and the ual process planes resulted in keeping the viewers eye ing to the focal point. The linear elements tend to ine and tie together the tonal areas creating a visual ression of subjective space.

Even though the transferred image from the Polaroid y did etch slightly, this technique appeared impractical use the ground broke down too rapidly for proper etching. is doubtful if this technique would seriously achieve any ptance in the high school printmaking studio and is efore not recommended. Since the results of this tech- were nil, the plate was not developed further.

A halftone negative did transfer to the light sensitive ion for silkscreen successfully, but when etched the ing lifted off very quickly which makes this technique ttle use in the high school printmaking program. This , also, was not developed further.

The results of the study did answer questions raised re-
g to photo-mechanical techniques. This study appeared
iminate three techniques described in the methods chap-
The three apparently eliminated techniques were;
oid jelly, photo-sensitive emulsion for silkscreen, and
ipe-on-emulsion.

The worth of this study was validated by the elimination
e above techniques and by the satisfactory results of
ewspaper photo-engraved plates showing possible uses
e high school printmaking program. The worth of this
was further validated by the production of a series
ints, which are works of art in themselves and which
trate the photo-mechanical methods in combination with
nual methods.

APPENDIX

PLATE I

NEWSPAPER PHOTO-ENGRAVED PLATE

NEGATIVE IMAGE

"SUBTERRANEAN LEVEL"

PLATE II

NEWSPAPER PHOTO-ENGRAVED PLATE

POSITIVE IMAGE

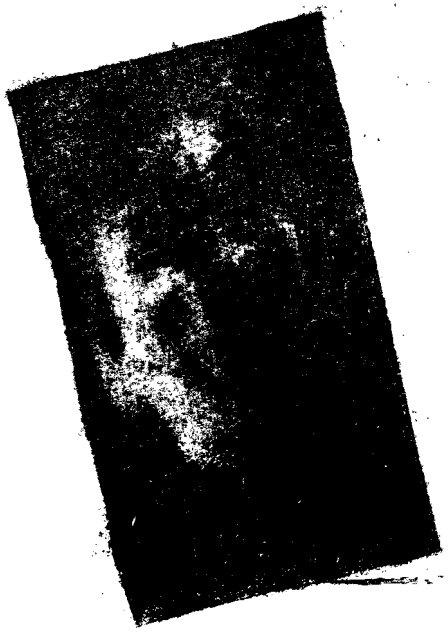

PLATE III

POLAROID JELLY

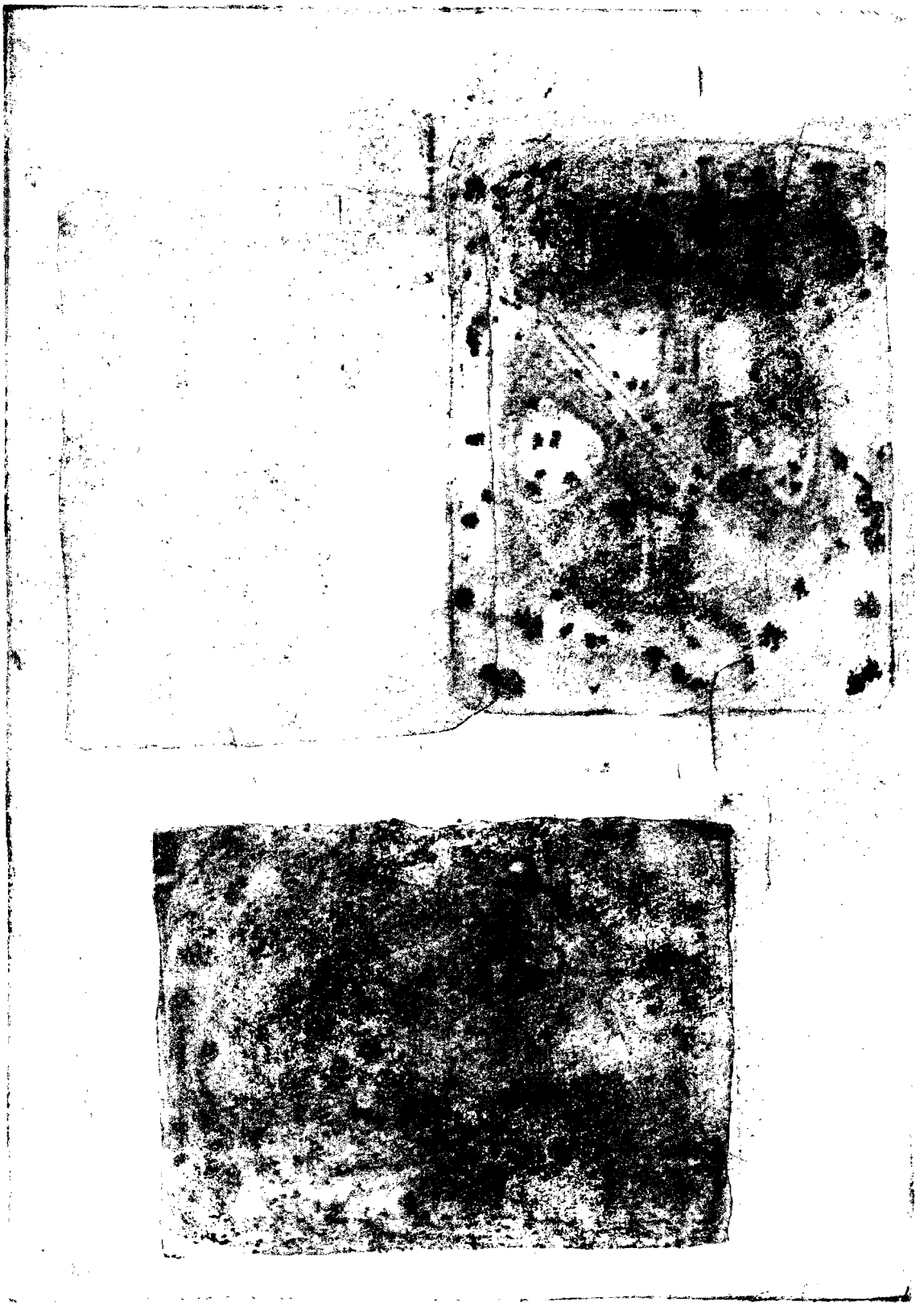

PLATE IV

PHOTO-SENSITIVE EMULSION FOR SILKSCREEN

PLATE V

NEWSPAPER PHOTO-ENGRAVED PLATE

POSITIVE IMAGE

"GHOSTLY APPARITIONS"

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