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## A New Development in Graphic Transfer Material and an Illustration of Its Illegal Use

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Many document examiners are familiar with the graphic arts process commonly referred to as dry transfer lettering. In this system letters or other symbols are removed from a carrier sheet and pressed onto another medium, such as paper, through the use of a blunt burnishing tool or stylus.

A variation of this has been introduced recently wherein the user can produce, or have produced for him, sheets of dry transfer material tailored to his specific needs. Through the use of an intermediate negative, ultraviolet light, and one-step chemical or water developing, the user can reproduce any letters, symbols, or designs that are desired. Only a flat original design that can be reproduced photographically is required to make the image.

One system was developed by 3M Co. and became nationally available in March 1976. 3M refers to their process as "image 'n transfer" or "INT."

INT material is referred to by 3M as "unique, photomechanically imageable graphic transfer material for line art, symbols and typography." Knowledge about these processes is valuable to document examiners because signatures and other writings can be reproduced by this method, and while this reproduction could be determined through an examination of an original document it would be difficult to ascertain from a photocopy. An illustration of an illegal use of this process is given later in this paper.

The creation of an INT image begins with an original document that contains the material to be reproduced, such as signatures, symbols, computer optical character reader (OCR) letters, and so on.

The user, or a graphic arts firm, photographs this material with conventional black and white film or uses other available processes to produce an intermediate negative. 3M suggests the use of an orange color key, manufactured by them, as one type of nonphotographic intermediate material. The color key does not need a camera or darkroom facility and can be processed quickly in room light.

The intermediate is bonded to an INT sheet and exposed to an ultraviolet light source such as xenon light, a carbon arc lamp, black light, or any similar device. Once exposed, the sheet is developed with one chemical in room light. 3M refers to their chemical as INT Developer and regards its composition as proprietary information. The developed INT sheet is rinsed in running water, squeegeed to remove water droplets, and then air-dried, placed in blotter paper, or dried with forced air. It is then ready for use. To store the material for subsequent use a silicone protective sheet is applied to the adhesive side.

Application of INT material is similar to that used in any dry transfer lettering system. A protective sheet, if previously applied, is removed, and the design is pressed against the receptor material. A blunt instrument is used to transfer the image to the receptor and the carrier sheet is slowly peeled away. If maximum adhesion is desired, 3M suggests that the

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protective sheet be placed over the image and that it be reburnished. It is possible to place one image over another and images can be removed through the use of a film eraser or tape.

The image is said not to chip, flake, crack, or peel under most conditions. The documents described in the following case were stored in plastic check protectors, and when they were removed after several months' storage portions of the INT adhered to the plastic.

Once the intermediate negative is made any number of INT sheets can be produced. 3M indicates that INT sheets are resistant to heat and therefore can be used in thermal copiers or transparency makers. INT is said to reproduce 110-line halftones. My own experiments indicated that reproduction of any design over 85 lines usually resulted in a poor copy.

It is important that the unexposed and exposed sheets be protected from any ultraviolet light. Even room light will cause a deterioration in the image that results in a lack of adhesive capability and difficulty in carrying out a good image transfer.

INT will produce a sheet of one color. The colors currently marketed by 3M are black, red, green, yellow, and blue. Should a user desire an image incorporating several of these colors it would be necessary to apply each image color separately.

INT will reproduce continuous-tone originals, and the result usually appears to be of higher contrast than the original.

The price of a starter kit is within reach of most individuals. Specialized items such as an ultraviolet light source or vacuum board (to insure flat original and image sheets) will add to the start-up costs, but they are not absolutely necessary. Obviously, such items are usually available in a graphic arts department. A starter kit can consist of ten black 215- by 280-mm (8½- by 11-in.) sheets at \$34.50 and 0.9 litres (one quart) of developer at \$4.00.

A second system is marketed by Norfilm Corporation under the trade name "Autotype Systems." It is similar to 3M's process except that it uses plain water as the developing agent and, through the addition of dyes, an unlimited number of colors can be produced. Their starter kit can consist of only five black 290- by 355-mm (11 by 14-in.) sheets for \$26.00.

Examination of a case involving the suspected use of INT is similar to that used for any dry transfer lettering process. If an original document is available, a visual examination will reveal a shiny image or design with the material sitting on the paper rather than indented into it. Magnification may show that minute breaks appear in the line, that portions of the design may have broken off or been accidentally removed through rough use, or that the lines may be erose.

The effort made by the person applying the design will be evident in the resulting image. The individuals discussed in the following illustration began their endeavor by taking much time to produce their transfers. As the scheme progressed, and they lost interest in a quality product, their efforts were rushed, and a deteriorated image resulted. The deterioration was produced by a carrier sheet that was removed before all of the image had been transferred. This resulted in broken lines or the absence of portions of letters.

Examination of the various names on the checks with measuring grids allowed the examiner to determine that INT or a similar product was used. As would be expected, groups of names were of the same length and size. Apparently several masters were used to produce transfer sheets because there were different lengths for groups of the same name.

I asked a local sales outlet for INT to reproduce a 100- by 125-mm (4- by 5-in.) negative, supplied by me, that bore my handwriting and hand printing. The film was Contrast Process Pan developed in HC-110. Figure 1 is a photograph of the INT sheet reproducing quickly written signatures and more slowly produced hand printing. The top signature

was written in blue ink with a Pentel®, the second signature was done in black fluid ink, the first hand-printed name was done with black fluid ink, and the second hand-printed name was done with a black grease pencil. 3M suggests that the gray scale on the left of Fig. 1 be included on the INT sheet to show the user the degree of exposure. Figure 2 is a photographic print made from my negative. Figure 3 is a photograph of the second signa-

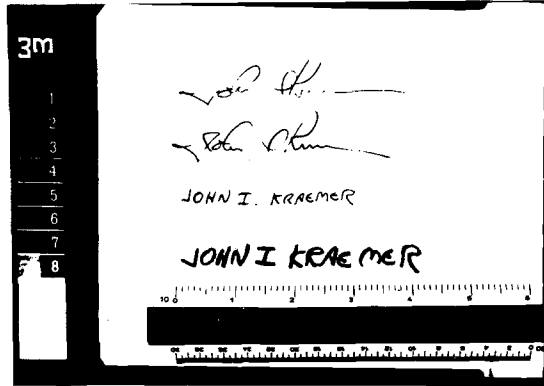


FIG. 1—Photograph of INT sheet reproducing both handwriting and hand printing.

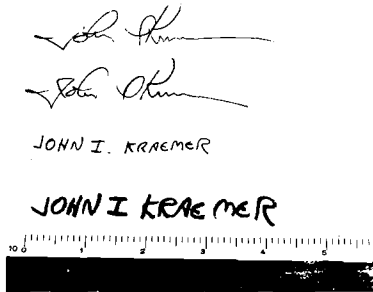


FIG. 2—Photographic print made from the negative used in the INT process.

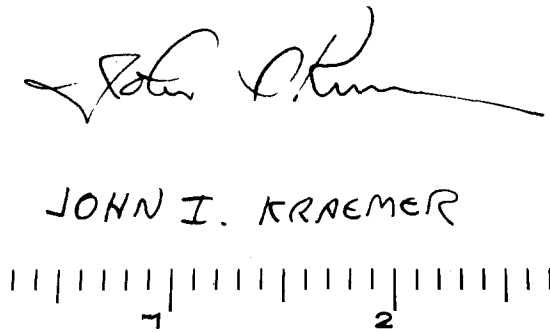


FIG. 3—Photograph of second and third lines of Fig. 1 after they were transferred to white bond paper.

ture and first hand-printed name after they were transferred to a sheet of white bond paper.

The reader may assess the effectiveness of this method of reproduction through the use of INT by examining Fig. 3. Little imagination is required to see its potential for criminal use.

**Case Illustration**

INT was used in Washington, D.C., within the past two years by a group of check forgers. Their use was both original and unusual in that it defeated the establishment's protective systems in a new way.

It is the policy of most major department stores, check-guaranteeing services, and other merchants in this city to require certain standards to be met before a check is accepted. All checks must have at least the individual's name printed on the face (our transient population precludes the requirement for an address) and they must contain an account number imprinted in magnetic ink. The check-passing ring, consisting of at least four females who worked in various federal facilities, overcame these safeguards through the use of INT and their agency's graphic arts departments.

The ring used two types of checks. The first type was a counter check or starter check that was obtained in a pad when a new account was opened. The second type of check contained the conventional printed name and address; it was obtained by purse snatches, armed robberies, and other methods.

In the case of the counter check it was necessary to personalize it through the addition of only the account holder's name, usually in the upper left corner (see Figs. 4 and 5). INT was used for this: fictitious names were produced and photographed, INT sheets were made, and these names were then individually transferred to the counter checks. Once personalized, the counter checks met the requirements of the merchants and other agencies. These checks were proffered along with phony identification, usually a Polaroid®-type government identification card (produced by an accomplice in one of the federal agencies). Having met all of the requirements of the merchant, the transaction was completed and the check was accepted.

A second addition was made to both the counter checks and the stolen checks to defeat another protective mechanism. Many merchants and other check-cashing services use printed lists, computer links, or telephone calls to verify account numbers and determine whether any frauds or forgeries have been committed on those accounts.

To overcome this problem the ring would alter one or more of the OCR symbols in the magnetic ink account number area at the bottom of the check. Figure 6 is a close-up photograph showing the alteration of the second account number. INT was again used to

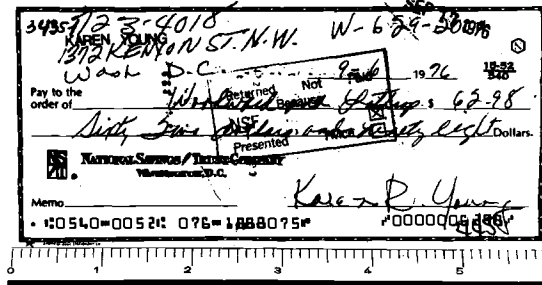


FIG. 4—An example of a personalized counter check.

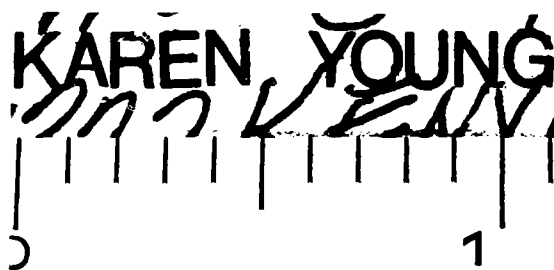


FIG. 5—Enlargement of the transferred letters shown in Fig. 4.

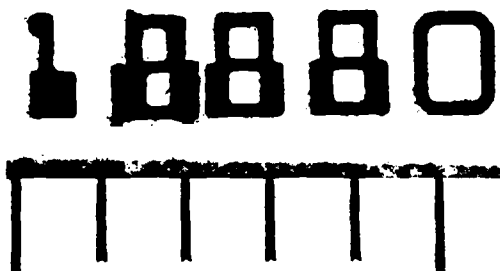


FIG. 6—Close-up photograph of altered account number.

produce images of OCR symbols, or portions of symbols, that were then applied to one numeral in the account number. Usually a 5 or a 2 would be changed to an 8.

The second addition allowed counter checks bearing one INT-produced name to be used for several accounts and it allowed the stolen personal checks to be accepted after the victim had notified the bank and closed the original account.

The group was successful in their efforts and passed checks over approximately six months totaling nearly \$60 000.000.

### Summary

A new graphic arts process has been described that should cause a document examiner to pause before issuing a finding that relies on photocopies. A recent case illustrates the possibility of dry transfer lettering being applied to any document.

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