

A Fraudulent Case Involving Novel Ink Eradicating Methods

REFERENCE: Abulafia A, Brown S, Abramovich-Bar S. A fraudulent case involving novel ink eradicating methods. *J Forensic Sci* 1997;42(2):300–302.

ABSTRACT: A case involving two stain removers and a paint remover to eradicate inks on checks led to an evaluation of the effect of these and some other traditional ink eradicating products on removing ink. Thirteen products were tested on fourteen inks applied to both regular white paper and to four bank's checks. The effect of the eradicating products on the background print of these checks was also noted.

KEYWORDS: forensic science, questioned documents, ink, chemical erasure, organic solvents, hydrochloric acid, household bleach

A case involving a series of personal checks was investigated in which the original sum in words and numerals had been erased and corrected to significantly larger sums. No signs of mechanical erasure, such as scratching of the paper surface, were visible under microscopic examinations, however, small ink deposits were seen.

Optical examinations with infrared reflection and luminescence revealed that, in some cases, the inks used in writing the check amount in words and numerals were different from the original ink as seen in the signatures which were not erased, and in all cases there was evidence of a chemical erasure (1,2). In most cases, however, it was impossible to determine the original amounts written on the checks.

The first checks to arrive were issued by small shops such as local neighborhood groceries and were made out for relatively small amounts. As time progressed, the checks were written for increasingly larger sums, and belonged to larger businesses such as hotels, travel agents, and supermarkets. Consequently, the checks ended in several bank accounts in various banks, their only common factor being the handwriting of the check amount. All the checks were retained in the check reference collection in the Questioned Documents Laboratory.

Two years after the first checks had been examined, a suspect in the case was arrested as a result of the nationwide broadcasting of the Israel Police's crime investigation television program. The suspect admitted forging the checks along with one partner, and in his testimony given to the police, related and reenacted the consequences leading to his initiation into the business of forgery.

His story began two years earlier when he was unemployed and

heavily in debt. One day, while browsing in a local market, he spotted a solvent for removal of fountain-pen ink stains, "didi seven" manufactured in West Germany. After purchasing the stain remover, the suspect began his operation by selling biscuits to small grocery stores and with the sale gave the store owner a symbolic present—a fountain pen. The store owner would subsequently write out the check for purchase of the goods using his new present, which the suspect would accept, erase and rewrite for a larger amount.

Later on, the suspect found a solvent that would remove ball-point pen ink, the Swiss-made paint remover, "Ricomatic." At this stage, the suspect began to forge checks received from large businesses. Typically, he would make a reservation in a hotel with a cash down-payment and after several days call to cancel the booking. The hotel would refund his deposit with a mailed check. Using the "Ricomatic," he would erase the checks' sum and enter a significantly larger sum instead. The banks' suspicions were never aroused as these checks belonged to clients with large accounts.

The suspect discovered a third solvent for stain removals, "Stain Devils," manufactured in England. According to him, it not only erased certain inks when used alone, but almost all inks could be erased using a mixture of the "Stain Devils" with the "didi seven." The suspect continued forging checks until his remand. He was brought to trial and sentenced to imprisonment.

Purpose of Study

The purpose of this study was to determine the erasability of 14 different types of pens using the three cleaning products used by the suspect, and also using eight organic solvents, hydrochloric acid, and household bleach, and to determine the effect of the above products on the major Israeli banks checks' background printing and security features (3).

Equipment and Supplies

Pens—The pens tested are listed as identified according to their label: 1. Stick 433, 2. Simple ball-point-(manufacturer unknown), 3. kis, 4. Pentel Technica Ball, 5. Uni-ball micro, 6. Montelema—Swiss made, 7. Parker—refill no. DIN 16 554/2 fine, 8. Stick 2000, 9. Stick CP, 10. Zebra Hand-Crystal, 11. Zebra Be-pen 0.5 Be-100, 12. Uni-ball micro, 13. Stick CP, and 14. fountain pen.

Pens numbered 1–8 contained blue ball-point-pen ink; pens numbered 9–12 contained black ball-point-pen ink; pen number 13 contained red ball-point-pen ink; pen number 14 was filled with 'Pelikan Drawing Ink A 17 Black.'

Specimen Paper—'Zohar' photocopy paper with whitener, American—Israel Paper Mills.

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Specimen checks—Four leading Israeli banks' checks were tested; their general descriptions are given below:

Bank A—White background with small grey print of the bank's name in English and Hebrew. Two stripes, one turquoise and one navy-blue, at the head of the cheque. Black writing print.

Bank B—Pale green background of various shades with small white print of the bank's name in Hebrew. Green writing print.

Bank C—White background with pale yellow print of the bank's insignia. Brown writing print.

Bank D—Pale blue background. Navy blue stripe across the head of the check Navy blue writing print.

Test products—The test products with which the checks were tested are listed below:

Solvents—1. Ethanol, 2. Chloroform, 3. Acetone, 4. Dimethylformamide, 5. Methanol, 6. Carbon tetrachloride, 7. Trichloroethylene, 8. Dichloromethane.

Acid—1N Hydrochloric acid.

Bleach—Hypochlorite.

Commercial Eradicating Products—11. "Stain Devils," (liquid), 12. "Ricomatic," (thick solvent-based gelatinous product), 13. "Didi seven," (paste).

Method

Thirteen sheets of photocopy paper were marked with each of the 14 pens listed above and then each of the first ten test products as listed was applied to each ink type by drop pipette, such that each sheet was tested with a different test product. After the liquid had evaporated, their effect on each ink was noted.

A second series of tests was conducted wherein the 13 pens were used to write out checks belonging to Banks A, B and C as listed above. Each check was then treated with one of the three test products, "Ricomatic", "Stain Devils" or "didi seven." The "Ricomatic" and "didi seven" were applied by spreading with a cotton swab stick, and removed approximately 10 min after application; the liquid "Stain Devils" was left to evaporate. The eradicating effects of these three products were then noted.

As a third stage of the experiment, each of the test products listed above were applied to segmented portions of all four banks' checks, either by drop pipette or by spreading with a cotton swab stick. Their visible effects on the checks' respective "security features" were noted.

It should be mentioned here that the test products were applied to blank checks so that any effects on the writing ink would not cloud effects on the 'security features' of the checks themselves. Although this method shows in the clearest way possible the eradicating effect on the background print of the checks, it should be remembered that in a real-life scenario, new entries will have been added to the 'clean' check thus making the interference of the 'security' features less discernible.

Results and Discussion

Of the 13 test products listed above, some were more effective than others in leaching the 14 inks tested. In certain cases, the ink was totally erased, and it is fair to assume that should a new entry be written over this erasure, the existence of the first ink would remain indiscernible to the untrained eye (Fig(s). 1a, 1b, 2a, 2b). Of the products tested, the "Ricomatic" and the "Stain Devils" had the greatest eradicating effect on the largest number of pens as summarized in Table 1.

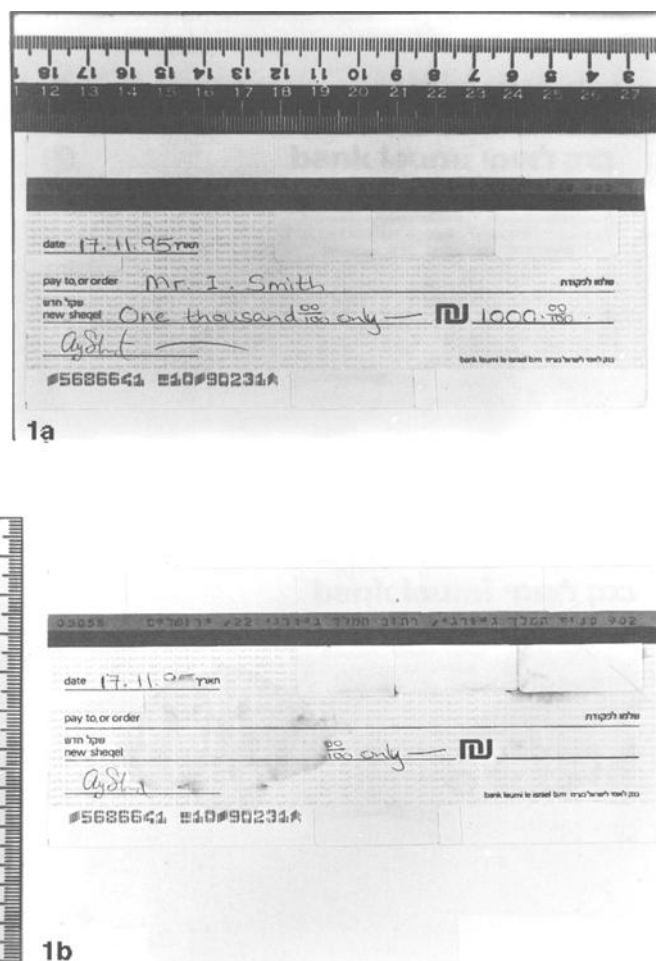


FIG. 1—a) check belonging to bank A with handwritten entries, before erasure. b) Part of the entries on check in Fig. 1a, erased with "Stain Devils."

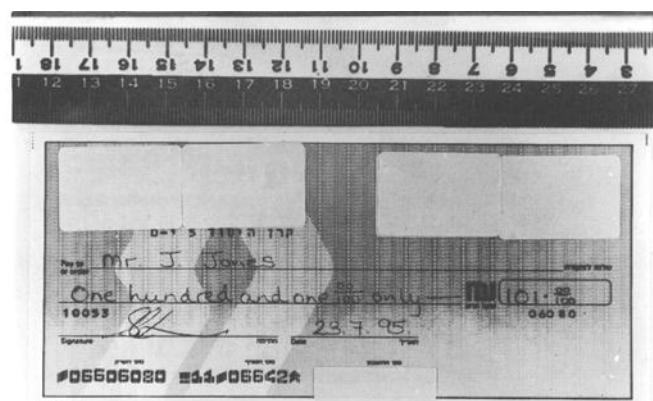
Results pertaining to the effects of the test products on the banks' checks are as follows:

Bank A—a. The bleach caused the background print to yellow, whereas the "Ricomatic," and "Stain Devils" caused fading of the background print. b. Ethanol, dimethylformamide, dichloromethane, methanol, "Ricomatic," and "Stain Devils" partially leached the black writing print. c. Dimethylformamide, dichloromethane, "Ricomatic," and "Stain Devils" erased the navy-blue stripe at the head of the check, revealing the continuation of the turquoise stripe printed above the navy stripe. d. The turquoise stripe at the head of the check was not affected by any of the test products. e. Any test product not mentioned in (a)–(d) above had no obvious effect on the checks tested.

Bank B—a. Trichloroethylene, chloroform, dichloromethane, and dimethylformamide caused discoloration of the background print leaving a yellow halo around the stained area. b. Methanol, ethanol, chloroform, acetone, dichloromethane, "Ricomatic," and "Stain Devils" caused leaching of the black print of the check owner's details. c. Any test product not mentioned in (a)–(b) above had no obvious effect on the cheques tested.

Bank C—a. Bleach caused yellowing of the paper. b. None of the other test products had any effect on this bank's checks.

Bank D—a. Bleach, hydrochloric acid, and "Stain Devils" caused yellowing and fading of the background print. b. Methanol,



2a



2b

FIG. 2—a) check belonging to bank B with handwritten entries, before erasure. b) Part of the entries on check in Fig. 2a, erased with "Ricomatic."

dimethylformamide, and "Ricomatic" caused leaching of the navy blue writing print. "Stain Devils" caused this blue print to fade. c. Any test product not mentioned in (a)–(b) above had no obvious effect on the checks tested.

In general, the test products used did not affect these banks' checks to an extent that would necessarily arouse the suspicions of the receiver of the check. This point is further stressed when taking into account the fact that the potential forger will not just erase the original amount, but will subsequently enter a new amount over the erasure, as mentioned above. This would make the forgery even more difficult to intercept.

Furthermore, the test products that slightly effected the checks, left marks that could be attributed to simple wetting of the checks, and would therefore not arouse suspicion as to their being forged.

TABLE 1—Summary of ink eradicating effects of the test products.

pen \ Solvent	1	2	3	4	5	6	7	8	9	10	11	12	13
1	b†	b	b	b	b	x"	b	b	x	d§	a*	a	c‡
2	b	b	b	b	b	c	b	b	x	d	a	a	c
3	b	b	b	a	b	x	b	b	x	d	a	a	c
4	x	x	x	c	x	x	x	x	x	b	b	x	x
5	b	x	c	b	b	x	x	c	b	a	a	b	x
6	b	b	b	b	b	x	b	b	d	b	b	b	x
7	b	b	b	a	b	x	x	b	x	d	a	b	x
8	b	b	b	b	b	c	b	b	x	d	a	b	x
9	b	b	b	b	b	x	b	b	x	d	b	b	x
10	b	b	b	b	b	x	b	b	x	d	b	b	x
11	b	x	x	b	b	x	x	x	b	a	b	b	x
12	x	x	x	b	b	x	x	x	x	d	b	x	x
13	b	b	b	b	b	x	x	b	x	d	a	b	x
14	x	x	x	c	x	x	x	x	x	x	x	x	x

*a = ink totally erased, (writing no longer visible, and no noticeable staining of the paper).

†b = ink partially erased, (writing still visible with a surrounding stain).

‡c = minimal effect, (very slight leaching of the ink).

§d = ink partially bleached, (no surrounding stain).

"x = no visible effect.

The observations listed in the above table were noted visually in white light.

Conclusion

It would seem that in order to prevent potential forgers from attempting their trade, banks should consider utilizing some form of security paper or printing in their checks that will exhibit a significant change upon applying the above mentioned test products (3). As the situation stands today, several household products as well as commercial cleansers are easily accessible to the potential forger, and have proved to be efficient tools for ink erasure in the forgery of checks.

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