

Common Chemicals for Common Criminals: Check Washing Again

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The removal of several types of pen inks from personal checks is a simple process for the person who is willing to acquire checks that have been legitimately written. Using checks that have been written by the check owner provides the check washer with a model signature for each stolen check that is to be washed and rewritten. This can be confusing to the check owner when the check is finally processed at the home bank, since many bank personnel and customers can't recognize a traced signature as non-genuine. This paper reports the results of experiments utilizing various types of common chemicals to remove inks from check stock.

Introduction

Once again, an old type of crime has become a new fad, and it is paying off for people who profit from washed checks. The crime involves passing bad checks that have been stolen from places such as home mailboxes, United States Postal Service mailboxes, and from the check owners as legitimate payments for goods or services. The checks can be washed to remove the handwriting, then rewritten and cashed. With proper care, the chemical alteration indicators are washed away while leaving the background printing intact. The original authorizing signature can first be traced in pencil, or photocopied, to serve as a model for the rewritten check. This paper will discuss the parameters of washing ink from checks with common chemicals found in paint stores, hardware stores, and automotive parts stores. Some of these parameters are: what inks do and don't wash off without destroying the check; what chemicals may be used; how the signatures are created; and, what a questioned document examiner may find in the finished product. On a positive note, there are some inks that just don't wash without ruining the check.

The removal of several types of pen inks from personal checks is a simple process for the person who is willing to: a) purchase common chemicals, b) practice the methods of washing checks, and c) acquire checks that have been legitimately written. Using checks that have been written by the check owner provides the check washer with

a model signature for each stolen check that is to be washed and rewritten. This can be confusing to the check owner when the check is finally processed at the home bank, since many bank personnel and customers can't recognize a traced signature as non-genuine. The purpose of this paper is to report on the results of laboratory testing of methods either reported to have been used or may reasonably be used in the illegal alterations of checks.

Methods and Materials

These are the materials and methods that were reasonable to be used in this laboratory. It became obvious early on in this research that some methods mentioned by investigators and read on the internet were not feasible. It also became necessary to concentrate on checks that had been produced with chemical alteration security features. These features are the red and blue dots that appear when certain chemicals contact the paper. The pen inks were black and blue in color. The multitude of various combinations of ink, check paper, check background printing processes, and sequences of chemical washings made it necessary to constrain the scope of these tests.

Materials:

- glass petri dishes, 6 inches in diameter
- tongs
- blotting paper

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- a drying line, with clips for hanging checks
- fume hood
- check safety paper
- checks printed on safety paper with chemical security features
- #2 pencil
- rollerball pens
- gel ink rollerball pens
- ballpoint pens
- plastic point pens
- "Sirchie" brand invisible ink in a fountain pen
- common solvents: acetone, ammonia cleaner, bleach, brake fluid, butanol, carburetor cleaner, ethanol, ethyl acetate, ethylene glycol based radiator fluid, furniture refinisher, glycerin, isopropanol, methanol, methyl ethyl ketone, "Microsoap" brand detergent, mineral spirits, petroleum ether, "PhotoFlo," starter fluid, toluene, xylene, "409" brand cleaner.

Methods

All tests were of handwritten information on various papers, mostly blank checks with chemical security features. The test sheets were labeled with pencil and then photocopied. The test items were placed in glass petri dishes and covered with solvent. The time of the ink washing varied from 15 seconds to 90 minutes depending on the speed with which the ink dissolved or the paper deteriorated. The typical wash time was 30 minutes.

No attempt was undertaken to identify ink components from pens used in these tests. The scope of this study was to test observations and claims that some checks can be washed in such a way to remove the maker information ink and rewrite checks that are passable. It was also an objective to test the claim that authorizing signatures or portions of the writing could be left unaffected while other areas on a check could be washed clean enough to yield a check that could be altered and cashed.

Results

For the solvents that were non-destructive, the results were clearly divided along pen class lines. The rollerball pens, including gel ink pens, generally don't wash off the check paper with the chemicals that don't harm the paper. The plastic

point pens may or may not wash off, and may not wash off completely. The ballpoint pens are usually affected to some degree by a series of washes, and many wash off completely.

Several of the test sheets were examined with visual, microscopic, and ultraviolet-visual-infrared examinations. Those inks that were judged visually to be removed completely had indeed left behind only the ballpoint furrows. No luminescent or microscopically visible residues remained. These results varied with paper stock.

The methods that were deemed successful in the removal of the inks were non-destructive to the paper. The addition of abrasion to the process did not facilitate the removal of the inks. The test sheets/checks were placed in the glass dishes and allowed to soak, with only occasional agitation. The techniques were more successful with pure solvents, rather than mixes of chemicals or single chemicals in conjunction with abrasion. The solvents that were deemed to be successful in removing the ballpoint pen inks did not affect the paper or printed background material. Some solvents did leave blue and/or red spots on the paper—the security spots. These spots were quickly removed by a wash in acetone.

The use of solvents that are typically used with water, i.e. radiator fluid, bleach, ammonia cleaner, detergents, "PhotoFlo," etc., were considered to be destructive if they changed either the background of the safety paper or the paper itself. Two ink and stain removers not listed above, "Amodex," and "Kiss-Off," were also tried in tests on safety paper and the paper deteriorated. None of these worked successfully with safety paper and all were deemed to be unreasonable for suspicion as being used by criminal check washers for a useable finished product. It should be noted that this author has had some success with a bleach and ethanol solution and nib pen for altering selected portions of writing without ruining a security background.

The data about the solvents that were destructive to the safety paper background can be useful information for other casework problems. These solvents could still be used by a person to remove ink from a white paper that can withstand the solvent.

Discussion

It is reasonably easy to wash some ballpoint pen inks and some aqueous inks from checks, and therefore from other documents. The importance

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	SOLVENTS																
PENS	Acetone	Alcohols, all	Ammonia	Bleach	Brake Fluid	Carbure- tor Cleaner	Deterg- ents	Ethyl Acetate	Furniture Refinisher	Methyl Ethyl Ketone	Mineral Spirits	Petroleum ether	Radiator fluid	PhotoFlo	Starter Fluid	Toluene	Xylene
Uniball RB & Bic RB	N	N	Pd	Pd Yd	N	N	Nd	N	N	N	N	N	Pd	Nd	N	N	N
Tombo Monocolors, Bl RB	N	N	Yd	Nd	N	N	Pd	N	N	N	N	N	Pd	Nd	N	N	N
PaperMate Rollerball pen, blue	N	P	Yd	Yd	Y	N	Yd	UT	Y	N	N	N	Yd	Yd	N	N	N
Marvy GT-700 Bl gel RB	N	N	Nd	Nd	N	N	Nd	N	N	N	N	N	Nd	Nd	N	N	N
"SWAFDE" ceramic, Blk, RB	N	P	UT	Yd	N	UT	Nd	UT	UT	UT	N	UT	UT	Pd	UT	UT	N
Sharpie, Blk & Bl, pp	Y	Y	Nd	Pd	Y	Y	Pd	P	Y	Y	N	N	Nd	Pd	N	P	P
Pilot Razor Point PP	N	P	Yd	Pd	N	N	Pd	N	P	N	N	N	Yd	Pd	N	N	N
EraseMater2, Bl, EBP	N	N	Nd	Nd	N	N	Nd	N	N	N	N	N	Nd	Nd	Y	N	N
Paper Mate Pens, Blk BPs	P	Y	Nd	Pd	Y	N	Pd	N	PY	P	N	N	Pd	Pd	N	N	N
Bic Stic and Clic Pens, Blk BPs	Y	Y	Nd	Pd	Y	N	Pd	N	Y	Y	N	N	Pd	Yd	N	N	N
Skilcraft Bl BP	P	Y	Nd	Pd	Y	N	Pd	N	Y	P	N	N	Pd	Pd	N	N	N
Skilcraft Blk BP, "US Gov."	N	N	UT	Nd	N	UT	Nd	UT	UT	UT	N	UT	UT	Pd	UT	UT	N
Unknown, "Thanks" Bl BP	P	Y	UT	UT	Y	UT	UT	P	Y	UT	N	UT	UT	Pd	UT	UT	N
Unknown, "Southern Bank" Blk BP	P	Y	Nd	Pd	Y	N	Nd	N	P	P	N	N	Pd	Pd	N	N	N
Unknown, "Marshalltown" Blk BP	N	N	UT	Nd	N	UT	Nd	UT	UT	UT	N	UT	UT	Pd	UT	UT	N
Unknown, Pen/Knife Blk BP	P	P	UT	UT	Y	UT	UT	UT	UT	UT	N	UT	UT	Pd	UT	UT	N
PaperMate Lubriglide, ASQDE, Blk, BP	Y	Y	UT	UT	Y	UT	Pd	UT	UT	UT	N	UT	UT	Yd	UT	UT	N
Shaeffer, "MCU" Blk BP	N	P	UT	UT	Y	UT	UT	UT	UT	UT	N	UT	UT	Yd	UT	UT	N
Shaeffer, "Old Yellow" Bl BP	N	P	UT	Nd	P	UT	Pd	UT	UT	UT	N	UT	UT	Pd	UT	UT	N
Cross, Bl BP	N	Y	UT	Nd	Y	UT	UT	UT	UT	UT	N	UT	UT	Pd	UT	UT	N
Sirchie, invisible ink in fountain pen	N	N	Nd	Nd	N	N	D	N	N	N	N	N	Nd	UT	N	N	N
Pentel pencil lead, and #2 pencil lead	N	N	Nd	Nd	N	N	D	N	N	N	N	N	Nd	Nd	N	N	N

Table 1. Results of washing tests. Y = yes, removed completely or mostly, P = partially removed, N = not removed, d = destructive to paper or background, UT = untested

of this to the document examiner is that it can be an avenue by which a person can alter a check, trace or simulate a source authorizing signature, and cash the check before the owner knows that the check was stolen. Therefore, the checking account would still be open, and the signature on the check would still look acceptable to cashiers and bank personnel.

In casework, some writing impressions are found with faint or occasional ink residues. But, in other cases, the only traces of alterations were the traced signatures and some impressions. Pencil strokes and blank furrows have been found alongside ink traced authorizing signatures. It had been reported by informants that signatures were overwritten (traced) with pencil before washing. Pencil does not wash off with the solvents used in this study. This technique was tried in this laboratory and it worked very well. This result and evidence in casework show that this reported technique can work well for check washers. It appears that the washers traced the signatures before washing the checks, and then traced the penciled image of the signature when creating the new maker information. In a complete wash, there are no visible or luminescent wash lines or halos. In these cases, there is the traced signature, but there may be no absolute proof of washing if a few remaining impressions cannot be ruled out as having come from the writing on the previous check. The carbon copy of a check, or an adequate photocopy of the original check, can prove that washing has been done. It has also been reported that the washers may photocopy the checks before washing, and then trace the source signature from the photocopy after washing. Whatever the case may be, when the finished check is one which only bears impressions with no ink residue, disputed maker information, a traced signature, and no visible or luminescent wash lines, it is up to the law enforcement investigator to find evidence that the check was first written differently. If this check is no longer the same, it can then be unequivocally stated that it is altered.

It has been reported by the press that some check washers "protect" the signature, or, conversely, all of the check except a single word. Therefore, attempts were made to protect some signatures with various methods. These methods were: tape on the front and back of the paper at the signature area, dripping solvent on only part of the check, and, applying water-soluble glue and rubber cement to the front and back of the signa-

ture area. All of these methods failed to produce a useable check when using check paper that has chemical alteration security features. However, when a check is printed without chemical alteration security, it is possible to drip acetone in such a way as to remove large areas of writing without affecting the authorizing signature. This process involves practice, and careful blotting. The finished product is passable, but does show IR luminescent bands. There may be other parameters that allow this signature protection to work by other means. Not all of the possibilities were explored by this examiner, but no FDEs or law enforcement officers that I have communicated with have observed or heard of any indications that this method of preserving the original signature was in use.

The solvents which removed ballpoint pen inks in this study did not affect toner, offset lithography, or letterpress printing associated with the test checks.

It was reported by law enforcement officers that some check washers used a clothes iron to smooth the checks after washing. A pillowcase is reportedly used between the checks and the iron. This examiner found that in some washes, the check paper is smooth and ready for use immediately after the solvent evaporates. The fibers were not raised on the surfaces of the papers until abrasion was used. The use of an iron can smooth out the paper surface and also writing impressions, but may not necessarily be a factor for each check.

The best sequence of action appears to be the use of an acetone wash first, then methanol, if necessary. It is also possible to get excellent results with clear brake fluid, followed by an alcohol or acetone wash. A mix of alcohols and acetone, such as that found in furniture refinisher, did not improve the speed or completeness of washing. The use of ethyl acetate either alone or in a mix with acetone and methanol did not improve the wash effectiveness.

Conclusions

1. Many ballpoint pen inks can be removed easily from checks, even those with chemical alteration security features, without damaging the check.
2. Some ballpoint pen inks are removed completely with organic solvents.

3. Impressions from handwriting done with a ballpoint pen may or may not remain.
4. Chemical alteration indicator spots may be washed away easily.
5. Most rollerball pen inks, including gel pen inks, are not successfully removable from a check without damaging the check.
6. Some rollerball inks feather out when subjected to some of the chemicals tested in washing.
7. A smooth surface on a washed check is possible.
8. If a check has no chemical alteration indicators, it may be possible to avoid the authorizing signature while washing away the remainder of the maker information. The resultant check may be passable. Checks with chemical alteration indicators would show a colored halo or line adjacent to the unwashed area.
9. The use of tapes and adhesives to protect portions of checks which contained chemical alteration security features was unsuccessful in this study.
10. Clear brake fluid works very well for washing some ballpoint inks from checks and other papers.
11. The solvents best used for check washing are not bleaching agents.