

The American Board of Forensic Document Examiners

**CLASSIFICATION
AND
IDENTIFICATION
OF
CHECKWRITERS**



**Authored by:
THOMAS W. VASTRICK**

The American Board of Forensic Document Examiners, Inc.

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of Forensic Document Examiners, Inc.**

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PREFACE

This monograph is intended to be a comprehensive source of information regarding the checkwriter industry and how it can affect examinations involving checkwriter impressions. Provided is an index for make and model classification, as well as a guide to the identifications of a specific source machine.

Checkwriter impressions contain distinctive features that provide classification information. In addition, a comprehensive examination of checkwriter impressions often provides sufficient basis for an identification or elimination of a suspect machine. This author has been involved in researching, verifying, and updating this information over the past ten years.

The author also wishes to acknowledge the kindness and assistance received from the following individuals who helped make this monograph possible:

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The Author

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This monograph is the culmination of over 10 years of research into the mechanics, classification, and identification of checkwriters. Mr. Vastrick has periodically disseminated some of this information at professional meetings.

CHAPTER 1

INTRODUCTION

History

Since 1830, some form of check protection has been used to discourage tampering. For nearly sixty years, check protection was exclusively in the form of intricate designs printed on the check itself. This form of protection evolved into the modern safety paper industry.

Checkwriters have played a major role in check security for the past century. These mechanical devices designed for the purpose of check protection were first marketed in the 1870s. These simple devices were developed to emboss a written area thus rendering it impervious to surreptitious erasure. Some banks utilized their bank seal for the same purpose. Another form of mechanical check protection of that era were machines that cut out numerals on the check similar to a stencil.

In 1899, the Todd Company manufactured their first protectograph, a mechanical device that sequentially printed and embossed the amount. Todd protectographs dominated the market in the early twentieth century. Today, checkwriters from various manufacturers can be found in almost every bank, as well as in many large and small companies.

The Industry

A checkwriter, or check protector, is a device that is designed to ink, emboss, print, perforate, or shred a monetary value onto a document. Numerous makes and models have come and gone since the inception of checkwriters. There are currently five checkwriter manufacturers in the United States, as well as major manufacturers in Japan and Denmark, who market their products around the world. Even with the advent of computers and their ability to write checks, there is still widespread demand for checkwriters as evidenced by their daily use in many large corporations and banks, along with smaller companies and shops.

Examination of the numeric typeface design, printing element, payee perforator, and prefix impressions provides the readily apparent parameters necessary to classify a questioned checkwriter impression into its proper make and possible models. It is even possible to glean this information from any one part of the impression. A checkwriter impression also provides numerous possible avenues for the isolation of individual characteristics.

This monograph is prepared to provide information about recent (post-1960) domestic checkwriters along with a summarization of foreign typeface designs capable of denoting commonly recognizable United States currency formats (Appendix I) and pre-1960 makes and models (Appendix II) for general differentiation purposes.

Definition of Terms

blemish	A small extraneous spot found near inked regions of checkwriter impressions that is characteristic of machines that use ribbons as their ink source.
check protector	A term synonymous with checkwriter.
checkwriter	A device, manually or electrically powered, designed to ink, emboss, print, perforate, or shred a monetary value onto a document.
dialing	A class of checkwriter requiring the operator to sequentially dial a wheel to a desired symbol and activate that portion of the impression.
FRNDS	Flush Right No Dollar Sign. A form of prefix used by Burroughs and Standard Register with the words right justified and no dollar sign to eliminate the possibility of certain forms of impression alteration.
groove	See ridge and groove.
heavy duty	A class of checkwriter design to imprint on numerous layers of documents such as an original and carbon copies. By nature, these machines have no payee perforator.
impression	An image formed by pressure on the document.

individual prefix	A prefix specially designed for a specific customer.
inking model	A class of checkwriter that utilizes liquid ink as the typeface inking source.
keyboard	A class of checkwriter utilizing a series of keys to establish the desired number of a given segment.
level	A class of checkwriter utilizing a series of levers to adjust the numeral of a given segment.
multicurrency	A class of checkwriter that can specifically designate, by recognizable symbol, more than one national currency.
numeric typeface design	The form of each numeral that, when combined, is unique to one manufacturer. Most domestic manufacturers of checkwriters have more than one design.
oscillating prefix	A prefix that slides on a track flush with the left most digit used on a given checkwriter impression thereby eliminating any excessive space next to the numeric value.
payee perforator	An optional device of a checkwriter that perforates or shreds a pattern above the impression area for the purpose of protecting any payee entry from erasure or alteration.
perforation	Penetration through the document.
perforation pattern	A term used by this writer to describe the pattern of complete perforations versus those parts of the impression that are designed to, but do not, perforate the paper.
perforation format	A type of impression format resulting in a pattern of pinholes.
platen	A bar-shaped object that pushes the paper stock against the typeface and provides the pressure necessary to obtain an impression.

prefix	The impression, or the part of the checkwriter responsible for the impression, located immediately to the left of the last imprinted numeral segment.
printing element	The impressions or the parts of the checkwriter responsible for the impressions located between or to the immediate right of the numerals designating or separating dollars and cents (other than the dollar sign) along with commas or decimal points.
ribbon model	A class of checkwriter utilizing an inked ribbon as the typeface inking source.
ridge and groove	A type of impression format resulting in a series of parallel impressions.
segment	A part of the checkwriter on which are forged one of numerals or symbols that can be set by the operator in establishing an impression value. Usually a different segment is used for each digit.
typeface	The portion of the prefix, printing element, or segment directly responsible for the appearance of the impression.

CHAPTER 2

CHECKWRITERS AND THEIR IMPRESSION

Introduction

The first step in the classification and identification of checkwriters is an understanding of the machine and its impressions. While an impression may appear to be the most basic of products, there are many facets to be considered.

A checkwriter impression is actually a group of separate impressions comprised of the prefix, printing element, payee perforator, and the numerical typeface or segment (Figure 1).

The Impression

Prefix

The prefix is that part of the impression that precedes the amount of the check. Major manufacturers have a standard prefix. Some manufacturers, in addition, also offer individualized prefixes in the form of business names, pictures, numbers, or a combination. Some companies will use a number as a prefix, as opposed to the company name, sometimes called a registered number. The checkwriter manufacturer can provide the name of the company that corresponds to the number. As a note of reservation, prefixes can be removed and are interchangeable. An invention of the past forty years is the oscillating prefix. Mechanically, the oscillating prefix is similar to staples in a stapler. The prefix sits in a track. When the machine is operated, spring action pushes the prefix along the track until it is flush against the left-most number.

Non-oscillating prefixes print in the same location each time. Unused prefixes print in the same location each time. Unused columns of numbers between the amount and the prefix are usually filled in by zeros, stars, asterisks, or other symbols.

The prefix is used on each impression and, as such, will be more susceptible to wear or chip defects than numerals. When a dollar sign precedes the amount, it is usually a part of the prefix.

Printing Element

The printing element includes commas, decimal points, and words, symbols, or abbreviations for the words "and," "cents," or "dollars" (except the dollar sign). Each manufacturer has standardized symbols for these terms which usually can be differentiated from all others. As with the prefix, much of the printing element is part of each impression making it more susceptible to wear and chip defects.

Payee Perforator

The payee perforator is a built-in perforator or shredder used on the portion of a check where the payee name is normally located. Its purpose is to protect the entry from erasure and alteration. This feature is present only on certain models making it an excellent class distinction when present. The absence of a payee perforator impression does not necessarily indicate that the checkwriter used has no payee perforator. The operator can choose to disengage this part of the impression with a simple flip of a lever.

Numerical Typeface/Segment

The numerical typeface is the piece of metal or plastic block molded to conform to the shape of a numeral and from which an impression is made. One set of numerals, 0 through 9, are forged onto a plate in an arc. This plate is called a segment. Checkwriter models are made with from five to eleven segments. Each segment of a machine is independent of the others with regard to individual characteristics. While many individual characteristics are associated to a specific numeral, letter, or word, defects such as misalignment or tilt will likely be the result of a defective or loose segment.

Platen

The platen is a bar-shaped object that pushes the paper stock against the typeface and provides the pressure necessary to obtain the proper impression. The platen face has a complimentary design to the typeface to achieve its ridge and groove, pinhole, or embossment format. It is not generally possible to isolate impression characteristics as platen defects without the examination of the actual checkwriter. Defects in the prefix, printing element, and numerals will create similar impression defects.

The Machine

Checkwriters have a variety of power sources, design formats, impression formats, and inking sources, along with specialized models. An understanding of these features is necessary background knowledge for conducting impression examinations.

Power Source

Modern checkwriters can be divided into two groups according to the power source - electric and manual machines. An electric model (Figure 2) utilizes an operating bar similar to the bar used to activate a cash register. A manual model (Figure 2) has an operating arm similar in appearance to that of a slot machine. Only extreme variation in pressure of application on a manual model will create impression differences on a single machine that would indicate the use of a manual model. Of course, this variation is removed when an electric model is used. Examination and comparison of many impressions suggests that differentiation, based on an examination of an impression, is extremely rare.

Inking Source

The two general inking sources of current domestic checkwriters are ribbon and liquid ink. The ribbon is used in much the same way as a typewriter ribbon.

An impression by a ribbon machine is not difficult to identify as such. Ribbon impressions leave a number of spots or blemishes in the surrounding areas (Figure 3). In addition, checkwriters utilizing ribbons do not provide for distinct or sharp definition. Evidence of the weave of the ribbon can also be seen through the microscope. Each of these characteristics become more pronounced as the ribbon gets worn and older. Burroughs and Standard Register checkwriters have a once through ribbon. These ribbons do not leave evidence of impression amounts as do Mylar typewriting ribbons.

Checkwriters utilizing ribbons normally produce impressions containing two or more colors in the numerical and printing element area. By design, the color borders, which are sharp and well defined, should be located between a numeral and part of the printing element.

The liquid inking process is more complex. A pre-inked pad comes in contact with the typeface, inking it just prior to contact. Checkwriters using this process produce an impression with distinct, sharp edge definition (Figure 4).

It should not be difficult to differentiate between the two inking sources. In addition, the inking is a source of numerous individual characteristics as discussed later.

Design Format

Most current domestic checkwriters are either of the keyboard or lever design (Figure 5). There is no way to differentiate between a keyboard or lever model based on an examination of the impression.

The keyboard resembles and works like a pre-LED cash register. It is activated only once to produce the entire impression. Keyboard machines can be either electronically or manually powered.

The lever machine likewise is activated only once in order to place the entire impression onto the paper. The amount for each segment is set by moving a lever to the desired numeral. Lever machines are manually powered.

Many Japanese checkwriters utilize a dialing format (Figure 5). The prefix, each numeral, and each part of the printing element are individually impressed onto the paper. The machine automatically spaces. The typeface is located on a wheel which is rotated to the proper position for the desired impression. Dialing machines, in general, have an inherent, non-reproducible alignment problem characteristic of this design format. The machines will not possess a payee perforator.

Impression Format

Separate from the design format of the machine or the typeface is the manner in which the paper is shredded or embossed. Figure 6 contains examples of each.

The ridge and groove format is the most common. It is comprised of a series of parallel peaks and valleys of various lengths. The ridges and grooves, depending on the manufacturer, can be vertical, horizontal, or of various degrees of diagonal. All, however, should be straight and parallel. While the ridge and groove format is usually designed to perforate the paper, this does not necessarily always occur. This phenomenon is a particularly useful means of individual machine identifications.

The pinhole format is, at present, domestically unique to F & E Hedman. Each numeral or character is comprised of a combination of liquid ink and small holes patterned in and around the inked area.

The third impression format is the embossing format. This is a general category of impressions that, by design, do not completely perforate the paper. There exists, however, ridge and groove and pinhole format machines that contain options to prevent perforation but these machines maintain their characteristic design and should be recognizable as such.

Specialized Models

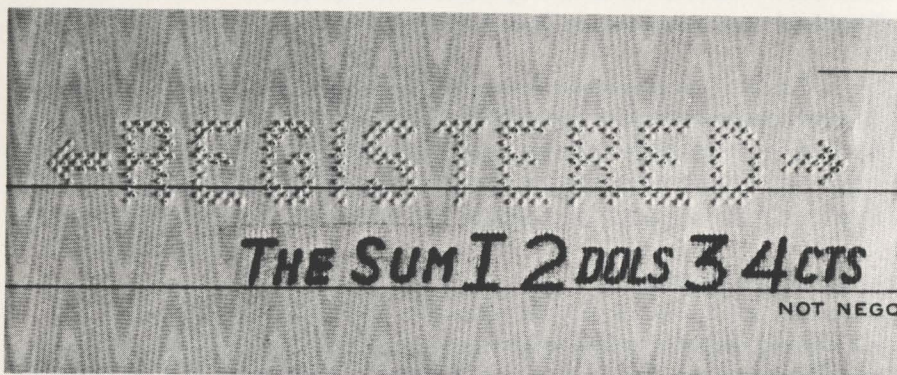
Specialized models are those machines designed for a specific use. The two most common specialized models are multicurrency models and heavy duty models.

The multicurrency models are checkwriters that can imprint symbols for various currencies. American multicurrency models usually offer 10-12 different currencies on one checkwriter. Sometimes these models will possess a slightly different numeral design but all will possess a different prefix and printing element. In these machines, the dollar sign is not part of the prefix. It is usually a separate segment.

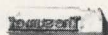
Japanese dialing machines are usually multicurrency providing up to three different currency designations. Systema and Checker Co. of Denmark manufactures a multicurrency checkwriter similar to the American design.

Heavy duty models are made to imprint an amount onto an original check and carbon copies. Domestic manufacturers either provide a heavy duty model or a machine with an adjustable platen that can provide extra pressure. While carbon traces on the reverse side of a check may suggest the possibility that a heavy duty model checkwriter was used, no definite distinction can be made.

Domestic manufacturers have provided ridge and groove and pinhole format machines that do not perforate the paper stock. This is normally accomplished by the use of a hard rubber platen.



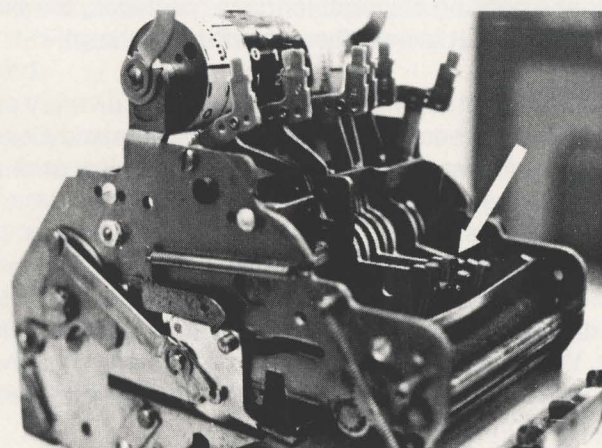
PLATEN



PREFIX



PAYEE PERFORATOR



SEGMENT

FIGURE 1 A checkwriter impression comprised of the payee perforator (REGISTERED), prefix (THE SUM), printing element (DOLS, CTS) and numbers along with some of the component parts of the machine that create the impression.

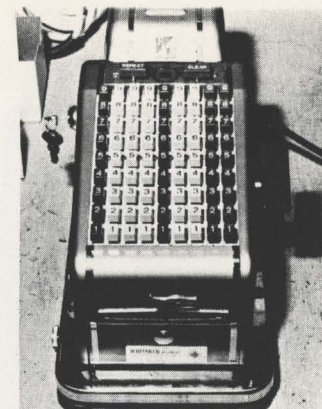
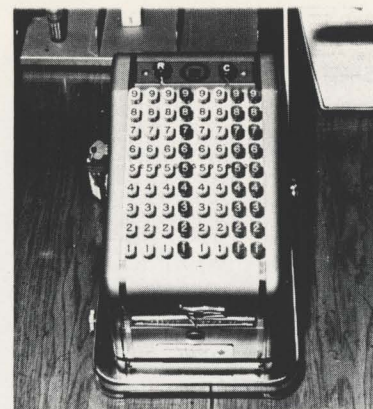


FIGURE 2 An electric model (right) and a manual model (left).



FIGURE 3 Under magnification a checkwriter impression from a machine utilizing a ribbon as its inking source will have poorly defined edge definitions and small spots of ink called blemishes in areas that should be void of ink. Compare this illustration to that of Figure 4.

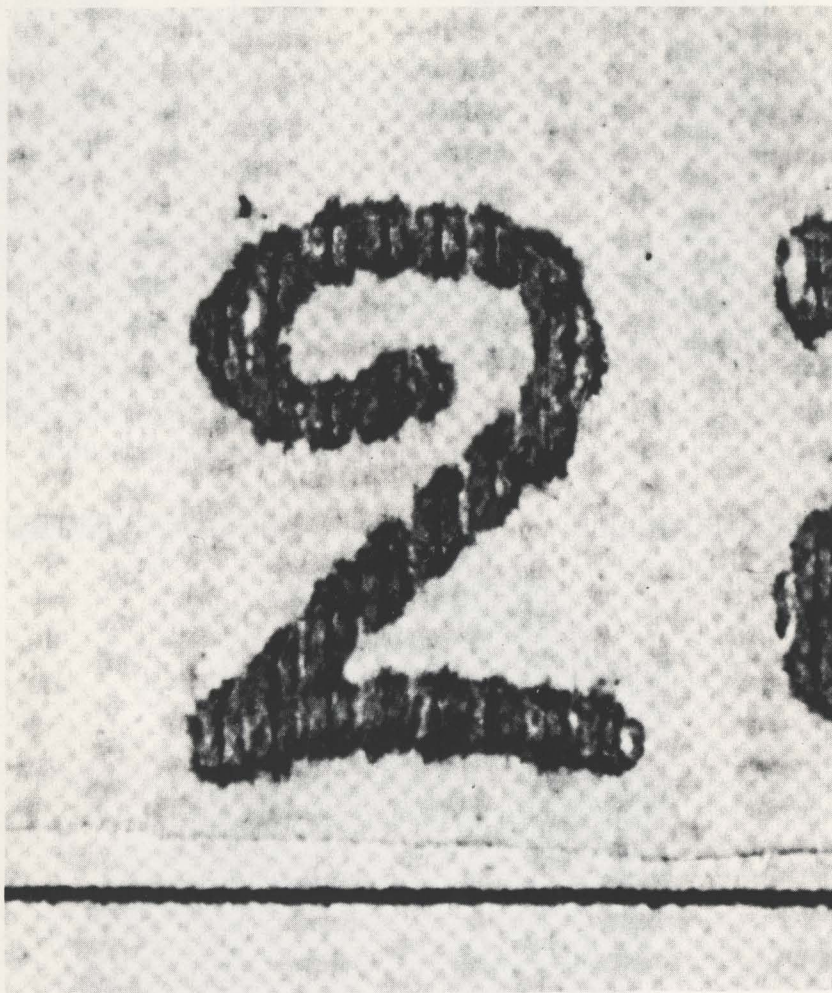


FIGURE 4 Under magnification a checkwriter impression from a machine utilizing liquid ink as its inking source will have sharp, clean edge definitions. Compare this illustration to that of Figure 3.

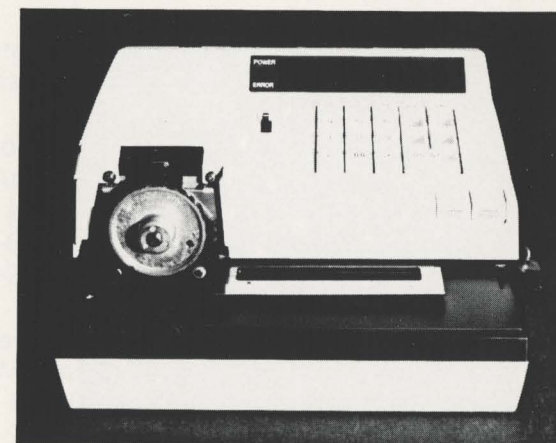
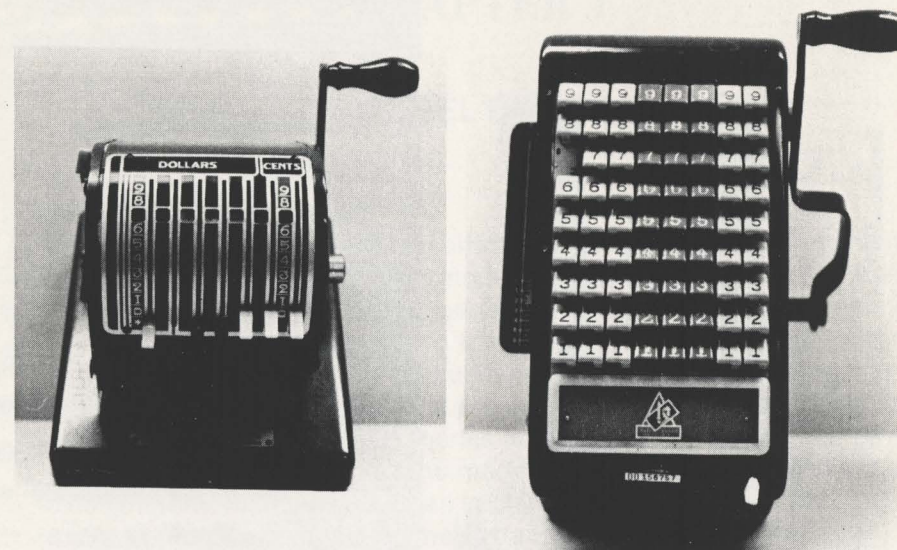


FIGURE 5 The three different design formats are (from left to right) keyboard, lever and dialing.

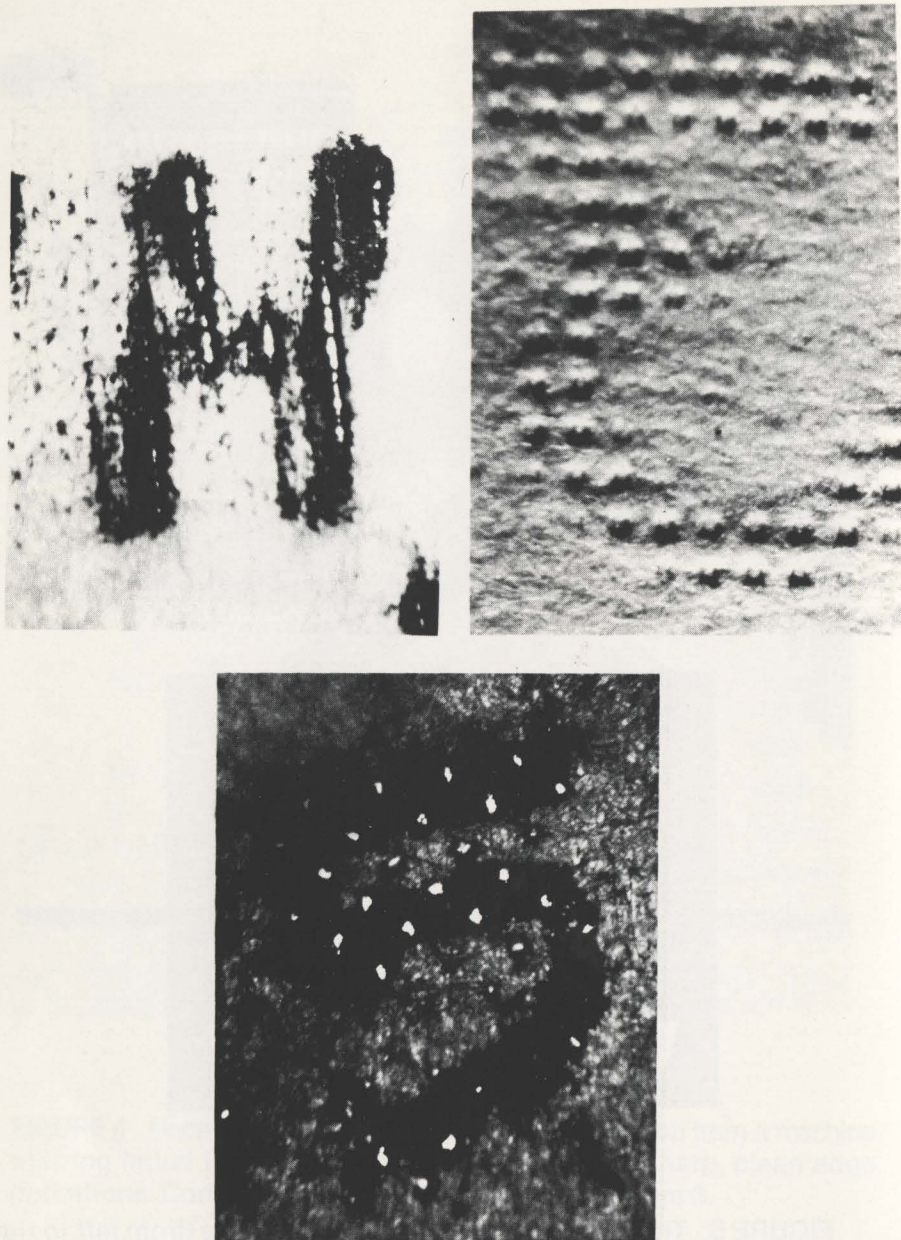


FIGURE 6 The three different impression formats are (from left to right) ridge and groove with its characteristic appearance of parallel lines, pinhole with its characteristic appearance of tiny holes through the paper stock and embossing, shown here with oblique lighting from the reverse side of the document to show its characteristic dimple appearance.

CHAPTER 3

MAKE AND MODEL DIFFERENTIATION

Introduction

The next phase of the classification and identification of checkwriter impressions is make and model differentiation. Since 1870 many manufacturers have come and gone, some existing only a short time. As such, information regarding the various companies ranges from comprehensive to sketchy. Measurements of numeral height and width in the next sections are accurate to better than 0.01 inches based on comparisons of a series of numerals from the same machine and other machines of the same make and model. When measurement fell on an 0.005 increment, it was listed as such rather than rounded off. These measurements are based on the outermost edges of the ink.

Make identification

There are, at present, five manufacturers of checkwriters in the United States. They are as follows:

F & E Hedman
1158 W. Armitage
Chicago, IL 60614-4196
(312) 871-6500 or
(800) 872-2788

Hall Welter Co., Inc.
46 Mount Hope Avenue
Rochester, NY 14620-1015
(716) 235-8240

Paymaster Corporation
1811 W. Winnemac Avenue
Chicago, IL 60640-2693
(312) 878-9200

Standard Register
600 Albany Street
P.O. Box 1167
Dayton, OH 45401-1167
(513) 443-1000

Certex
3705 S. Jason Street
Englewood, CO 80110
(303) 761-8680

In addition, Standard Register, Certex, and Entronics produce a similar product called a money order dispenser. This product is described in detail under the name of each manufacturer. Entronics' headquarters address is as follows:

Entronics Corporation
10509 Markison Road
Dallas, TX 75238
(214) 341-1396

The checkwriter industry has not followed the trend of typestyle copying as the typewriter industry has done. Each manufacturer produces machines with impressions that differ substantially from the competition.

Table 1 summarizes impressions from current and recent (post 1960) checkwriter manufacturers and is designed for a quick comparison with a questioned impression in order to determine the manufacturer. A more thorough set of standards can be found in the model differentiation section. It is possible that some minor variations may exist when using this table to determine the manufacturer of a questioned impression. Should this occur, examine the section dealing with model differentiation to determine whether the variant is a model characteristic. If it is not found to be such, turn to Appendix II which contains impressions from pre-1960 machines. It is possible that the questioned impression was produced by an old model. As additional information, Appendix I contains impressions from some foreign checkwriters that can, in some way, print in an American currency format.

Model Differentiation

Once the manufacturer has been established, examinations can be conducted to determine the extent of model differentiation possible. Some of this information can also be used for date bracketing. Listing is by alphabetical order according to the manufacturer's name.

BURROUGHS

In 1899, The Todd Company manufactured the first protectograph. Throughout the early 1900s, Todd continued to pioneer and dominate the checkwriter industry. (Appendix II includes an impression of a Todd Protectograph from the 1920s taken at the Smithsonian Institute.) In 1954, Todd became part of Burroughs Corporation. The transition was in name only as the checkwriter impressions did not change during that time.

Burroughs checkwriters are difficult machines in which to make significant model differentiation for a number of reasons. First, the corporate headquarters was, in general, uncooperative in supplying information. Second, Burroughs has routinely carried a relatively large

number of models with no impression differences. Finally, Burroughs changes model numbers frequently for reasons other than those that distinguish themselves on the impression such as a change of casing color. In general, if a Burroughs machine has a two digit model number beginning with a seven or eight, it was manufactured prior to 1968. If the machine has a four digit model number beginning with an eight, it was manufactured between 1968 and 1975. If the machine has a four digit model number beginning with a nine, it was manufactured between 1976 and 1982. If the machine has a four digit model number beginning with a two, it was manufactured between 1983 and June of 1986. These date/model number relationships have exceptions.

In June 1986, the Business Forms Division of Burroughs Corporation was sold to Standard Register. Information regarding checkwriters manufactured under the new name is listed under Standard Register.

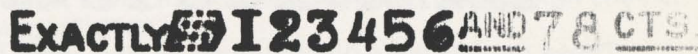
The payee perforator utilizes a ridge and groove design unique to Burroughs machines. Payee perforators, however, are rarely found on their machines. If an impression from a Burroughs checkwriter contains a payee perforator, it could be considered an individualizing feature.

All recent Burroughs machines have an adjustable platen allowing for variation in pressure thus giving each machine the capability to perform as a heavy duty machine.

Standard prefixes read either "PAY \$" or "EXACTLY \$" or can be a "FRNDS" (Flush Right No Dollar Sign), a two-line prefix that reads "PAY EXACTLY" in all equal-sized capital letters. The letters P, A, and Y are directly above the letters T, L, and Y so that the two words are flush right. There is no dollar sign. This was designed to eliminate the practice of altering the dollar sign into another digit.

Burroughs has made two major changes in the printing element that can aid in date bracketing and model differentiation of a checkwriter impression. Figure 7 contains examples of each with corresponding dates of use. Some models such as the T60, T63, and Series T200 have different printing elements altogether.

Model T60

EXACTLY 

The 8 segment T60 can be differentiated from other Burroughs models by the underscore on the printing element. In addition, machines made prior to the mid-1970s contained shorter numerals (0.22 inches)

than other models. A special option available only on the T60 was the "flat face type" which created an impression that did not perforate or shred the paper. This was designed for use on computer cards. Differentiation also exists in the prefix with its unique letter height ratios. This model was manufactured up to the time of sale to Standard Register. (See Standard Register Model TJ510.) The T60 has, in the past, been available as a 10 segment machine.

Model T63

EXACTLY I 2 3 AND 7 8 CTS.

The 5 segment Model T63 was discontinued in 1968 and resembles the T60 produced prior to the mid-1970s. The only impression differences possible would be due to the different number of segments.

Series T200

EXACTLY I 2 3 4 5 6 7 AND 8 9 CTS

The Series T200, first manufactured in 1960, is a pinholing machine with a minimal amount of embossing. The unique numeric typeface design is the most outstanding differentiation feature.

Models T72, T820, and T220-10

EXACTLY \$ I 2 3 4 5 6 7 8 9

Although these models cannot be differentiated from each other based on the impression, they can easily be differentiated from all other Burroughs models. A small square separates the prefix and the currency denotation. The dollar sign design differs from that found on domestic models. The numeric typeface design and height is similar to that of the T60. Another bar can be found that either separates dollars and cents or is used as a suffix. The payee perforators on these models utilize a pinhole as opposed to a ridge and groove format.

Models 70, 74, 75, and 79

EXACTLY I 2 3 4 5 AND 6 7 CTS

These models were discontinued around 1968. Therefore, their printing element will only be of the "AND"/"CTS" format.

Models T78, T73, and T88

EXACTLY I 2 3 4 5 6 7 AND 8 9 CTS

These models were also discontinued around 1968. They also are designed to sign checks. Also refer to the Model T-2900.

Model or Series T800, T840, T890, T802, T842, T8959, T892, and T9859

EXACTLY I 2 3 4 5 6 7 AND 8 9 CTS

These models can have either of the first two printing elements found in Figure 7. These models were generally produced between 1968 and 1975.

Model or Series T8305, T8805, T8859, T8878, T8875, T8876, and T8889

PAYEE I 2 3 4 5 6 AND 8 9 CTS

These models were also generally manufactured between 1968 and 1975. They differ from the previous models in that these models are designed to also sign checks. Also refer to Model T-2900.

Models T9009, T9408, T9409, T9908, T9909, T9929, T2009, T2909, and T2929

PAYEE I 2 3 4 5 6 7 8 CTS

Production of these models began after 1976. Therefore, their printing element should be consistent with the sample impression above. Production of the T9 ____ models began in 1976 while the T2 ____ models began production in 1983.

Models T9309, T9809, T9879, T9889, T2309, and T2879

PAYEE I 2 3 4 5 6 7 8 CTS

The only difference between these models and those listed directly above is that these models are designed to also sign checks. Also refer to Model T-2900.

Model T-2900, T8142, and T142

EXACTLY \$1,234.567 AND 89 CTS

The models T8142 and T142 appear to be different versions of the same machines manufactured until 1983. At that time, the model number of both changed to T-2900 due to minor changes that did not affect the impression.

This model is called the "Control Center Unit." It features a number of options and sits on its own stand. This model has been in production since 1960. Therefore, it could contain any one of the three printing element formats found in Figure 7. Since this model is also designed to sign checks, it cannot be differentiated from other such machines listed previously. This model is currently being manufactured by Standard Register.

CERTEX

Certex has been manufacturing checkwriters since 1981. The company has been in business since about 1955. The company began operations rebuilding Paymaster checkwriters. During the 1980's, Certex was best known for their coin counting machines. Certex checkwriters utilize dot matrix printers.

Series 100

THE \$123,456.00

The unique numeral design, printing element, and prefix provide substantial evidence for make identification of this checkwriter. The Models 100 and 101 do not sign checks. The Models 110 and 111 have the check signing function which can be easily deactivated.

Series 6000

PAY EXACTLY \$2,478dols39cts

The Series 6000 currently consists of the Model 6200 Check and Money Order Dispenser and the Model 6300 Money Order Dispenser. When the Model 6200 is set for money orders, the Model 6200 and Model 6300 cannot be differentiated. Both will imprint the words "MONEY ORDER" at the top center portion of the document. As with the Series 100, these models utilize a unique impression for make identification purposes.

ENTRONICS

CIRCLE-K **\$158.00** CTS**
 LOCAL #2345

ONE HUNDRED FIFTY-EIGHT AND 00/100 DOLLARS

MAR 28, 1990

LOCATION #2345

\$46.13 CTS

FORTY-SIX AND 13/100 DOLLARS

Though not a manufacturer of checkwriters, Entronics of Dallas, TX, has been producing money order dispensers since 1983. These machines utilize a non-embossing dot matrix printer. The dollar sign, numerals, and "DOLS" and "CTS" design make Entronics' products readily discernible from others. Further differentiation is possible through the other impression entries such as date, written amount, money order number, store name, and location number. Entronics designs the format of their money order dispenser as to the needs of each individual customer. Therefore, the placement of these entries will vary from one customer's machine to another's. The location number specifies which of the customer's stores issued the money order. Since each store normally has only one money order dispenser, it is possible to locate the specific machine used to imprint a particular money order. Currently Entronics, Certex, and Standard Register are the only companies producing money order dispensers (see Standard Register Models T4300, T4500). All money orders currently purchased from 7-11 and Circle K convenience stores are printed by an Entronics money order dispenser.

F & E HEDMAN

F & E Hedman has been producing checkwriters since 1914. Hedman machines have always had a distinctive typeface style. All models are perforating machines using liquid ink. The numerals, along with the various terms and symbols, are vertical. All models use similar numeric typeface design. Three different sizes, varying in width, can be found as shown in Figure 8.

Since 1975, the payee perforator has spelled the word "Warranted." Prior to 1975, the payee perforator spelled the word "Insured."

Prior to October 1978, some models contained a printing element using the terms "and" and "cts" along with a dollar sign on the prefix. After that date, the standard printing element for all domestic models was "dol's" and "cts" (which had been standard on other models for many years).

It is possible to order the standard prefix without underscoring. The underscoring became standard in 1969, but has been found on Hedman impressions as far back as 1929. The maximum length of an individual prefix is 1 5/16 inches for their lever machines and 1 7/16 inches for their keyboard machines.

An F & E Hedman Checkwriter can be dated through either the casing color or serial number. The casing color will allow for a six to seven year time bracket. The serial number provides much greater precision.

Current Models

Series 950, Model 1210

The sum of 1.2345.678 dol's 90 cts

The Model 1210 is a 10 segment machine. The characteristics of the 10 segment numerals are the outstanding differentiation features as this model has been the only Hedman domestic 10 segment machine for many years.

Series 950 Multi-Currency

The sum of 1.234.567 ◀ \$ ▶ 89 ★

This 10 segment multicurrency model can be differentiated from the Model 1210 by the dollar denotation and the star suffix. This model has no payee perforator.

Series 950, Model 1190 and Keyboard Models 2130 and 2330

The sum of 1.234.567 dol's 89 cts

The Model 1190 is a post-1981, 8 segment model, hence using the same numeric typeface design as the 9 segment models 2130 (manual) and 2330 (electric). The only way to differentiate between the lever model and the keyboard models would be if all 9 segments of the keyboard models were in use on an impression. The keyboard models sometimes are referred to by the model name Premier.

Series 950, Model 1191 and Keyboard Models 2135, 2335, and 2435.

The sum of 1.234.567 dol's 89 cts

These models differ from the previous models in their impression only by the lack of a payee perforator as these four models are heavy duty machines. The Model 1191 is a post-1981 8 segment machine and the keyboard models are 9 segment machines. The keyboard models sometimes are referred to by the model name Premier.

Discontinued Models

Series 950, Model 1186 (Computer Card Model)

The sum of 1.234.567 dol's 89 cts

The 8 segment Model 1186 was also called the "Tab Card Protector" or TCP. It is specifically designed to emboss the paper without perforations. This was accomplished through the use of a hard rubber platen. This feature differentiates the Model 1186 from all other models. Production of this machine ceased in September 1981.

Series 950, Model 1180

The sum of \$ 1.2.3.4.5 and 6 7 cts

The Model 1180 is the only 7 segment machine with a payee perforator produced in at least the past 15 years. Prior to 1978, the printing elements used the terms "and" and "cts" again being the only 7 segment machine to do so.

Series 950, Models 1181 and 1182

The sum of \$ 1.2.3.4.5 and 6 7 cts

The only difference between these two models is that the Model 1181 has a clock on it. These models are 7 segment machines without payee perforators. The printing elements have always read "dols" and "cts." As such, these models could not be differentiated from the Model 1180 made after October 1978 with an inactivated payee perforator.

Keyboard Multi-Currency

The sum of 123.456=US\$78★

The KB multi-currency model was discontinued in the mid-1980s. It is a 9 segment machine with a printing element that differentiates it from all other domestic models. The KB multi-currency can be differentiated from the Series 950 multi-currency by the numeric typestyle design and the dollar denotation.

Keyboard Model F-2125

The sum of \$ 1 2 3 4 5 and 6 7 cts

The Model F2125 is a pre-1981-type 8 segment machine. It utilizes printing elements of "and" and "cts." This model has no payee perforator nor does it use commas between the numerals. Production of this model was discontinued sometime prior to 1977.

Keyboard Model 2235

The sum of 1.234.567 dol's 89 cts

The model 2235 was a manual version of the Model 2435. The specific date of discontinuance is not known. This model cannot be differentiated from the Model 2435, 2335, 2135, or 1191 based on their impressions.

GOLDEN AGE INDUSTRIES (Protect-a-Check)

CHECK PROTECTOR 0 1 2 3 DOLS 4 5 CTS

The one "checkwriter" produced by this company is an inexpensive, plastic, toy-like device that operates, and resembles, a hand stamp. Non-reproducible misalignment is a distinctive characteristic of this machine. Because it is plastic, wear and chipping defects may be more prominent. The characters are flat and vertical. The numerals are 0.20 inches in height. An outline of the outer extremities of the machine left inked lines above and below the impression. The pattern was reproducible

and was the result of inadvertent inking of the edges of the device while inking the characters to be printed. There is no payee perforator with this device.

HALL-WELTER CO., INC. (Speedrite)

SUM OF \$ 2134.56 cts
SUM OF \$ 987654.32 c
THE SUM OF 987654 DOLS 32 cts

The models 900 and 914 have been manufactured without change since the early 1950s. The difference between these two models is the metal casing (900) versus the plastic casing (914). Both models are lever machines using liquid ink and a ridge and groove format. The numerals and the ridges and grooves are vertical while the prefix and the printing element characters slant at 10° to the right of vertical. The most outstanding differentiation features of Speedrite machine are the payee perforator and the numerical typeface design especially the "0" and "1." The height of the numerals is 0.225 inches.

Model B-L

FIDAIN BANK US\$ 3479-25-000

The multicurrency Model B-L maintains the characteristic payee perforator and numerical typeface design of the Models 900 and 914. It can be differentiated by the presence of the small horizontal bars and by the dollar denotation. The "US" portion of the dollar denotation can be omitted.

MONTGOMERY WARD

PAY TO THE ORDER OF \$ 22 DOL 41 CTS

Little is known of the Montgomery Ward machine as neither a machine or a genuine impression could be secured. Some information was gleaned from a picture of both. The machine looks conspicuously like an Ultra 2000, but the impression does not. The ridges and grooves are vertical as are the numerals. The machine has six segments and probably has a non-oscillating prefix. The prefix and printing element are the most outstanding differentiation features. Non-reproducible misalignment is likely a characteristic of this machine.

PAYMASTER

Paymaster Corporation has been manufacturing checkwriters since 1922 and currently sells more checkwriters than any other domestic manufacturer. Most checkwriter impressions of questioned origin encountered by this author have been Paymaster impressions.

Paymaster produces one keyboard model with the remainder being lever models. Both ribbon and liquid inking systems are produced. The ribbon machines use black and red as standard colors. Their standard machines have vertical ridges and grooves. Special order horizontal ridges and grooves are available.

As a dating note, Paymaster changed the numeric typeface design of all models except the Model 7000 in October 1976 (Figure 9). The Models 8000, 8000B, and 8000-10 returned to the pre-1976 design as of 1983. Other numeric typeface design changes can be seen in Appendix II, impressions of older machines. Relatively specific dating information based on the casing color and serial number can be found in Appendix III.

Ribbon Models

Model 8000, 8000B

COLONIAL
NATIONAL BANK I 2 3 4 5 6 DOLS 7 8 CTS

The Model 8000 utilizes the standard printing elements (DOLS, CTS) and numeric typeface designs (Figure 9) common to most Paymaster machines. The height of the numerals is 0.23 inches. Paymaster's heavy duty (8000 B) and computer card machines are Model 8000 derivatives that retain the class characteristics of their variety.

Model 8000-10

THE SUM 65354444

The Model 8000-10 resembles the impression of the Model 875 with respect to the prefix and the cents configuration. This model can be differentiated from the Model 875 by the lack of a payee perforator and check signing capabilities. It should be noted, however, that both a payee perforator and a check signor can easily be deactivated for an impression. This model was introduced in 1983.

Model 800

BERKSHIRE LIFE
INSURANCE CO. I 2 3 4 5 6 DOLS 7 8 CTS

The Model 800 was the predecessor to the Model 8000 and was discontinued in 1962 when production of the Model 8000 began. The 1960-1962 version of the Model 800 cannot be differentiated from the 1962-1976 version of the Model 8000. After October 1976, the new numeric typeface design used by the Model 8000 allows for differentiation.

Model 7000

NATIONAL BANK
-OF COMMERCE- I 2 3 4 5 6 DOLS 7 8 CTS

The Model 7000 is a keyboard model with a numeric typeface design similar to the pre-1976 design used on other Paymaster models but with a height of 0.27 inches. The design did not change in 1976.

Model 850

THE SUM 3 4 5 6 DOLS 7 8 CTS

The Model 850, discontinued in June 1972, also signs checks. Without the check signing portion activated, the Model 850 cannot be differentiated from the pre-1976 Model 8000 or the 1960-1962 Model 800.

Model 875

T^{HE} SUM 65 I 2 3 4 5 6 7 8

The Model 875 is a lever machine that also signs checks. The prefix and the different designation for cents in the numerals and printing element are unique to this model and the Model 8000-10. The Model 875 can be differentiated from the Model 8000-10 by the presence of either a payee perforator or a check signor impression.

Ink Models

The payee perforator is the key differentiating feature of most liquid ink Paymaster models.

Model S-1000 and X-2000

THE SUM I 2345 DOLS 67 CTS

The payee perforator of these models reads "Registered" (standard from 1975 to present), "Insured," or "Bonded" (both used prior to 1975).

Models X-550 and X-900

THE SUM I 2345 DOLS 67 CTS

These models have a payee perforator in a rectangular form 4 perforations high by 53 perforations wide.

Model S-550

SHAKY'S I 2345 DOLS 60 CTS

The S-550 uses the same payee perforator as the X-550 and X-900. The S-550 has been out of production since 1975, so this model could not have the numeric typeface design in use after October 1976. To this extent, the S-550 can be eliminated as a candidate if the questioned impression is of such design.

Model 700

NOVEL WASHINGTON I 23456 DOLS 78 CTS

The Model 700 was a liquid ink version of the Model 7000. The numeric typeface design of the two models are identical (0.27 in height which is noticeably taller than other Paymaster models' numerals). This model was manufactured from 1957 to 1975. The payee perforator read either "Insured" or "Bonded."

REXCO PRODUCTS (Ultra)

Ultra 2000

198765 and 324

The Ultra 2000 was formerly a product of Ultra Industries, Inc., of Van Nuys, CA. It was taken over by Rexco Products in 1977 and sold through Sears catalogs as of late 1977. There have been no known changes in the impression. Unsuccessful attempts to contact the company in 1988 suggest that this machine is out of production.

The Ultra 2000 is a 7 segment ribbon machine. Characteristically, the amount is set in a similar fashion to a lever machine though a wheel is used rather than a lever. The height of the numerals is 0.22 inches. Although at first glance the Ultra 2000 may appear to be a ridge and groove machine, it actually uses a pinhole format. Along with the format, the prefix and the printing element are the most outstanding differentiation features resulting in an easily classifiable impression.

SAFEGUARD

As of late 1977, production of Safeguard checkwriters was terminated. As a result, sources of information were limited. All Safeguard models encountered utilize a ridge and groove format using liquid ink. Safeguard checkwriters use non-oscillating prefixes.

TOWER (Sears)

THE SUM 9876 DLS 54 CTS

The Tower Model sold through the Sears catalog until late 1977. This model is unique from all other Safeguard models upon the most cursory examination, most notably the style of prefix and the "DLS" dollar insignia of the printing element. The ridges and grooves slant 40° to the right of vertical.

Mark II (Multicurrency)

\$ ★ I 2 3 4 5 6 7 8 9

The Mark II International Model utilizes the numeral typeface design generally associated with domestic Safeguard models. The ridges and grooves of the dollar sign slant 40° to the right of vertical. The ridges and grooves of the numerals are vertical. The height of the numerals is 0.265 inches. Differentiation of this model can be made by the dollar sign prefix.

Sears Deluxe

THE SUM OF I 2 3 4 5 6 DOL'S 8 9 CTS

The Sears Deluxe Model contains the common Safeguard numerical design, height of numerals (0.265 inches) and ridge and groove slant of 40° in the prefix. Differentiation can be made by the wording of the prefix "THE SUM OF." In addition, the payee perforator is rectangular-6 perforations high by 78 perforations long. The printing element format has been found on Safeguard models dating back to 1940.

Model K

REGISTERED _{K 9731} D ★ ★ ★ 4 5 2 DOL'S 4 8 CTS

The Safeguard Model K is a keyboard model. This model can be differentiated by the payee perforator which is a series of 7 perforations high by 3 perforations wide (16 sets), the numeric typeface design similar to a Speedrite design, and the numeral height of 0.24 inches.

Mark I

THE SUM ★ ★ I 5 7 9 DOL'S 3 0 ¢

The 40° slant of the prefix, the use of "THE SUM" in the prefix, the numeric typeface design, the numeral height of 0.265 inches, and the underscored "DOL'S" dollar insignia are all standard Safeguard features used for decades. The one differentiating feature of this impression is the cent sign. As caution, this impression is from a 1961 model. No information regarding dates of manufacture or design changes were available.

Sears

Sears has sold checkwriters through their catalog. Two manufacturers have been identified as suppliers of this product, namely Safeguard and Rexco Products. Specific machine information can be found under the manufacturer's name.

SPEED-O-PRINT

Models 5000 and 5200

THE SUM I 2 3 DOL'S 4 5 CTS

The typeface of these Speed-O-Print models has not changed from their inception in the early 1960s until 1984 when Speed-O-Print ceased manufacturing checkwriters. The difference between these two models is that the Model 5000 is a manual machine and the Model 5200 is an electric machine.

The numeric typeface design pictorially resembles the Paymaster design. However, Speed-O-Print uses a dimple-like embossing print format that does not perforate the paper. A special flat typeface was also available that left no embossing pattern. The models are each 7 segments with a numeral height of 0.23 inches. A payee perforator, standard on both models, is rectangular-5 perforations high by 45 perforations wide.

STANDARD REGISTER

In 1986, Standard Register of Dayton, Ohio, bought the Business Forms Division of Burroughs Corporation. Two former Burroughs models were continued as Standard Register checkwriters while one new checkwriter series (Series T3000), one money order dispenser, and one money order/cashier check dispenser were added. All other Burroughs models were discontinued. In 1989, the Series T3000 was discontinued and was replaced by the T4100 and T4200 which, as with the dispenser models, utilizes a dot matrix printer. The TJ510 (currently the only Standard Register embossing checkwriter) can be specially ordered with a hard rubber platen to prevent total perforation of the paper. One other carry-over feature from Burroughs is the use of FRNDS (Flush Right No Dollar Sign) prefix as standard on the TJ510. Use of a dollar sign is discouraged.

The signature capabilities of some Standard Register models differ from other checkwriter manufacturers. Standard Register models contain a computer chip with the signature programmed into the machine as opposed to a die stamp. In addition, deactivating the signature feature would require entering the protected computer software.

Embossing Models

Model TJ510

PAY TO THE ORDER OF 1234567890 CTS

This model was formerly the Burroughs T-60. Standard Register has made some changes and also made it a 10 segment machine again. The prefix and the printing element, when combined with the standard numeric typeface design of Burroughs/Standard Register, make this model distinguishable from all others. The TJ510 can be specially ordered as a multicurrency machine.

Model T2900

EXACTLY 1234567 AND 89 CTS

This model is also called the Control Center Unit. It is a former Burroughs machine (same model number) that did not change while becoming a Standard Register product. Standard Register discontinued this model in 1990. It can be differentiated from other Standard Register models by the underscored cent digits and the printing element. However, this impression has only limited differentiation capabilities from certain Burroughs models (see Burroughs).

Model T3001, T3000

PAY TO THE ORDER OF 123 AND 00 CTS

These related models are electronic, ten segment checkwriters utilizing a different design format consistent with a dialing machine. The typeface is on a device similar to, and also called, a daisywheel. As such there is only one set of numerals as opposed to machines with segments. The standard prefix requires strikes from two different fingers of the daisywheel. The split is located between the A and Y of PAY and the A and C of EXACT. The printing element is the outstanding

feature allowing for differentiation from all other models. The T3000 differs from the T3001 by its lack of accumulating and calculating functions which are not visible on the impression. Its appearance is similar to an electronic adding machine. This machine was manufactured from 1986 to 1989.

Dot Matrix Printed Models

Model T4100, T4200

PAY TO THE ORDER OF 12345678 CTS

PAY TO THE ORDER OF 12345678 CTS

The Models T4100 and T4200 utilize an Epson dot matrix impact printer capable of two different sized fonts as shown above. Subtle differences exist between these fonts and those found on the T4300, T4400, and T4500 which utilize an Okidata dot matrix impact printer. Currently the differences can be seen in the comparative widths of each letter and by the design difference of the numeral 2. However, it is anticipated that the numeral design of the 2 on the T4300, T4400, and T4500 will soon be changed to that used by the T4100 and T4200.

The Model T4200 can also sign checks and, as such, can be differentiated from the Model T4100. These models were first marketed in 1989.

Model T4300

PAY TO THE ORDER OF 12345678 CTS

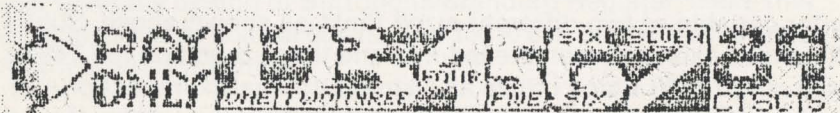
The Model T4300 is a money order dispenser. As such, the document on which it is used should differentiate the Model T4300 from the other Standard Register dot matrix-printed products except the Model T4500. The Models T4300 and T4500 can be differentiated in two ways. Only the Model T4500 has signing capabilities. In addition, the Model T4500 will imprint the words CASHIER'S CHECK or MONEY ORDER in the lower left portion of the document. The Model T4300 does not offer a second font size.

Model T4400



The Model T4400 is the only model utilizing the Okidata printer that is designed for checks. It also has check signing capabilities. Therefore, the Model T4400 can be differentiated from the Model T4100 by the presence of the signature, the printed amount entries in words, and the numeral design and width differences resulting from the different printers. The last two reasons provide the basis for differentiating the Model T4400 from the T4200.

Model T4500



While the Model T4500 does have the second font size, this option is not widely available and should not be considered common. The Model T4500 can be differentiated from all the other Standard Register dot matrix printed models by the presence of the words CASHIER'S CHECK or MONEY ORDER in the lower left corner of the document. The Model T4500 is the only model that will print these entries.

ULTRA

In 1973, Ultra Industries introduced the Ultra 2000. In late 1977, Rexco Products took over the production. Details and specifications of the Ultra 2000 can be found under Rexco Products.

EXACTLY 10 AND 89 CTS

EXACTLY 224 DOL'S 00 CTS

PAY TO THE ORDER OF 12345678 CTS

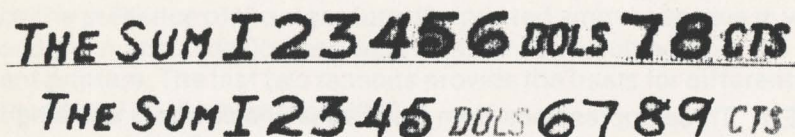
FIGURE 7 Three impressions from Burroughs checkwriters showing changes in the printing element that can aid in dating. The top impression shows the printing element (AND, CTS) used prior to March, 1974. The middle impression shows the printing element (DOL'S, CTS) used between March, 1974 and 1977. The bottom impression shows the printing element (CTS) used after 1977.

The sum of 12345678 dol's 90 cts

The sum of 1.234 dol's 50 cts

STATE NAT'L BANK 123456 dol's 78 cts

FIGURE 8 The three versions of the F&E Hedman numeric typeface design. The numerals of the top version, used on ten-segment models, measure 1.1 inches wide on average. The numerals of the middle version, used on nine-segment models and eight-segment models manufactured after 1981, measure 1.55 inches wide on average. The numerals of the bottom version, used on seven-segment models and pre-1982 eight-segment models, measure 1.65 inches wide on average. Note the distinct differences of the top portion of the numeral 1.



THE SUM I 23456 DOLS 78 CTS
THE SUM I 2345 DOLS 6789 CTS

FIGURE 9 Paymaster changed the numeric typeface design on most models in October, 1976. The top impression is the design used before the change and the bottom impression is the design used after the change.

CHAPTER 4

MACHINE IDENTIFICATION

Introduction

The final stage of the identification process is the identification of the specific checkwriter that prepared the impressions. A mechanical checkwriter impression is actually a set of impressions. Defects found in one part of an impression should not be expected to carry over to another portion. It is also important that the document examiner scrutinize both sides of the document. Many times defects will be more pronounced on the back side.

The individual characteristics of the dot matrix printer-produced Standard Register models are consistent with dot matrix printers and the document examiner should refer to any of several worthy papers on the subject for information.

Wearing and Chipping

Whenever two metal parts come in contact under pressure, these areas become susceptible to wear and chip defects. Paper clips and staples attached to a check can also cause similar results. These defects are usually among the most dramatic features for identification and demonstrative purposes. Wear and chip defects can be found on the impression in the form of a ridge and groove hiatus, missing pinholes, abrupt changes in embossment, or a missing portion of a character. Caution is advised in isolating wear or chipping as the cause of identifying features as foreign objects or inking problems can cause similar impression idiosyncrasies.

Perforation Pattern

A perforating pattern is a term used by this writer to describe the pattern of complete perforations versus those parts of the impression that by design should but do not entirely perforate the paper (Figure 10). This feature can be observed in the payee perforator also. It is best to examine for this pattern from the back side of the document and with transmitted light. Machines using the ridge and groove format tend to show some variation in the perforation pattern. Paying careful attention to using similar paper stock for the known impressions can lessen this variation. Tests by this author found a majority of pinhole impressions tested contained a reproducible perforation fingerprint. This

phenomenon can be caused by misalignment, wear, chipping, or platen defects.

Misalignment

Three types of misalignment provide the document examiner with individual characteristics helpful in the identification of a specific machine, namely horizontal, vertical, and depth.

The most common individual defect of ridge and groove machines found by this author has been depth misalignment. The misalignment shows itself on the impression as a visible change in embossment depth and ink intensity within a character or characters (Figure 11). Misalignment of the platen should result in a variance throughout the impression (excluding the payee perforator). Misalignment of the prefix, each segment, or parts of the printing element, would be isolated only to the corresponding part on the impression. The phenomenon can be viewed from either side of the document.

Vertical and horizontal misalignment (Figure 12) is a defect feature of the prefix, segment, or printing element. If the culprit part is a segment, the misalignment should be present in that column regardless of which numeral of the segment is being printed. Some variation can occur if the cause of the misalignment is a loose part. Most Japanese models are dialing machines which impress each character one at a time. Non-reproducible misalignment is a class feature of this type of checkwriter. This problem generally does not apply to domestic mechanical checkwriters.

Blemishes

Ribbon machines by their nature will create impressions with small dots around the characters. These dots or blemishes are found between and around the characters. Examination of numerous sets of impressions revealed that while most blemishes are of random nature, most of the checkwriters produced some blemishes that were consistently located in the same place (Figure 13). An extremely worn ribbon often results in blemishing on such a scale as to render the impression illegible (Figure 14).

Impression Voids

Though predominant in inking machines during tests, small regions of ink voids could be found in every class of checkwriter. The mechanical causes of these voids are numerous, but the consistently reproducible nature of this phenomenon establishes the voids as individual characteristics of a machine (Figure 15).

Ribbon Shift

Current domestic checkwriter manufacturers producing ribbon-type machines normally offer multicolored ribbons, usually in two colors. By design, the color border of many models is located between a numeral and part of the printing element so as to not to be visible on the impression. Often the ribbon will shift in one direction making the color border distinctly visible, usually bisecting a character. The specific location of the color border then becomes a further identifying feature of the machine.

Special Impression Features

An individual prefix is a custom made prefix which can contain a name, image, number, or a combination (Figure 16). These prefixes are not an uncommon feature. Many moderate size companies, chains, and banks purchase numerous individual prefixes for their checkwriters so this feature does not insure a possible population of one. Another note of reservation is that these prefixes are interchangeable with any prefix manufactured by the same company.

Some companies choose to use a number for their individual prefix. Some of these will also include the word "Registered" indicating that the number can be traced to its owner. Checkwriter manufacturers do indeed maintain records of these numbers and their *original* owners.

Occasionally an individual prefix will have two different sets of numbers. One number is the company number while the other number (usually the smaller of the two) designates the specific checkwriter thereby suggesting, in these instances, a possible population of one.

Burroughs Corporation, and subsequently Standard Register, strongly recommended, as policy, that purchasers of their checkwriters not order the optional payee perforator. None of the many Burroughs and Standard Register checkwriter impressions viewed by this author have contained a payee perforator impression. Discussions with company officials indicate that payee perforators on Burroughs and Standard Register models are extremely rare.

Improper Inking

Tests revealed that several liquid inking machines have subtle and not-so-subtle variations in hue within particular typeface characters. Some inking was so poor as to cause ink smearing. Examination from the reverse side often provides the best perspective of this feature (Figure 17).

Extraneous Inking

Document examiners should peruse the area around the impression for extraneous inking. This phenomenon could be the result of a defect and repetitive in corresponding known specimens.

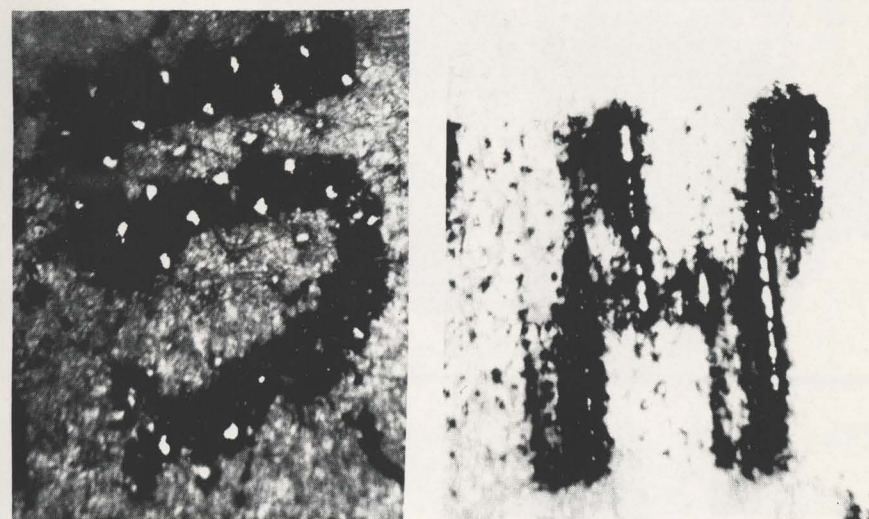


FIGURE 10 The perforation patterns of the pinhole and ridge and groove format checkwriters. The pattern of complete and incomplete perforations has been found to be reproduceable and unique in individual machines.

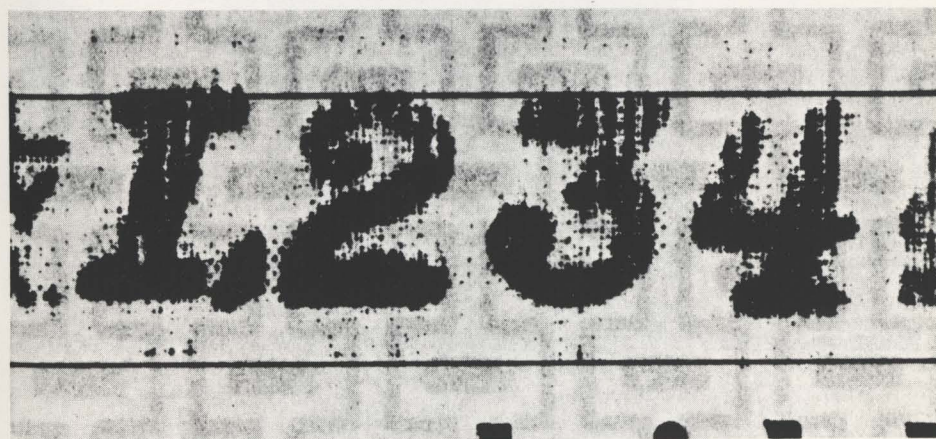


FIGURE 11 A variance in ink intensity caused by depth misalignment.

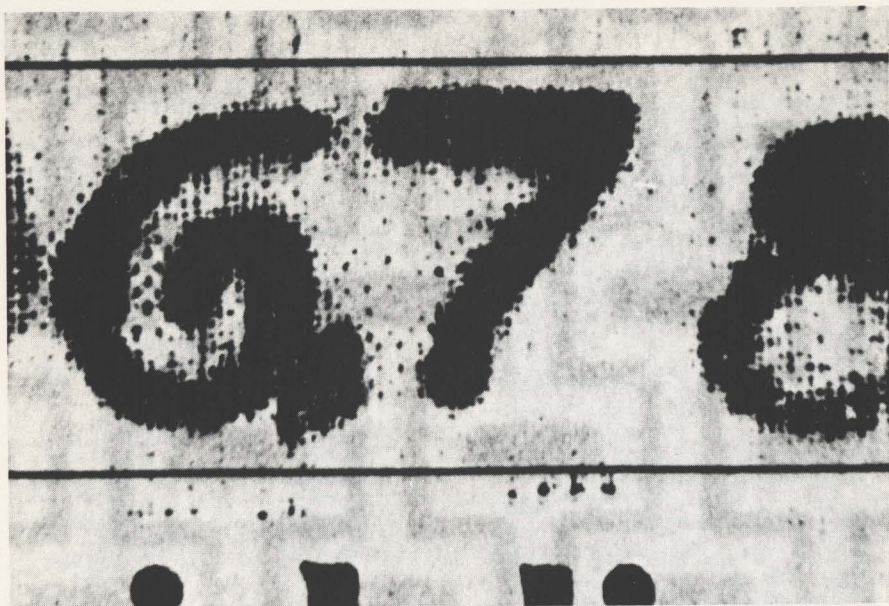


FIGURE 12 An example of vertical and horizontal misalignment.

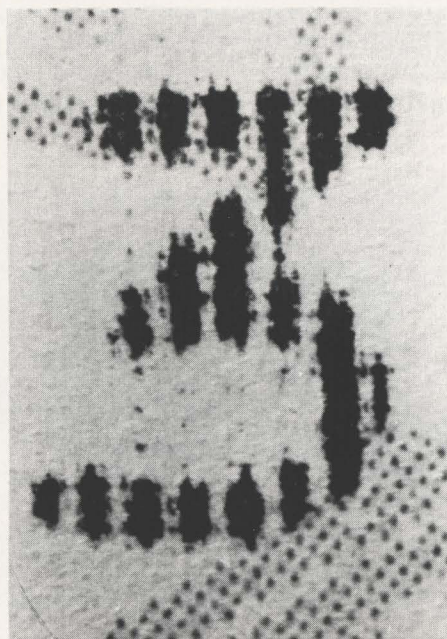


FIGURE 13 The series of blemishes running vertically on the left side of the numeral 3 were found to be repeatedly present in numerous sample impressions from a machine.

PAY TO THE
ORDER OF

EXACTLY \$100.00



Central Fidelity

FIGURE 14 The results of a worn ribbon.



FIGURE 15 An ink void is located at the center of the numeral 4.



06-08-42

44

KNOWN SPECIMENS

1. The samples should be taken on the same or similar paper stock. Characteristics can vary greatly when paper stock weight differs.
2. The samples should be taken immediately therefore limiting the time frame between the questioned impression and the known standards. In the event that the date of the questioned impression is known, contemporaneous, course-of-business impressions would be a beneficial addition to the standards.
3. The first specimen should be for the amount set on the machine when first encountered. Occasionally the questioned impression will be that amount.
4. Verbatim specimens should be principal among the standards.
5. A full strike-up requires each numeral from each segment.

CHAPTER 6

CHECKWRITERS AND ALTERATIONS

Additions

Additions to pre-existing impressions by altering the dollar sign or the left-most numeral have been the most common form of alteration found by this author. Careful examination of the region will reveal differences with the remainder of the impression, especially in the embossment as seen through a microscope and with basic non-destructive ink comparisons (Figure 18).

Impression Eradication

One common method of altering a check for fraudulent purposes is to completely change the amount. To accomplish this feat on checkwriter impressions would require the removal of the impression ink, the embossment, and perforations.

Pressure tests were conducted for the purpose of determining whether the embossments and perforations were reversible. The tests were conducted on damp paper pressed at 20,000 PSI. Perforation holes were recovered and ridges and grooves were flattened at cursory glance. Microscopic examination, however, showed significant remnants of the original design.

Manufacturers refer to their checkwriter inks as indelible. Tests showed that not all of the dyes were immune to bleaching. F & E Hedman blue ink, for example, bleached to a light brown in 50% bleach within one hour. On a yellow check with careful overwriting, microscopic examination of the amount was necessary to reveal the tampering.

Erasure Masking

A checkwriter impression can also be used to effectively mask a genuine amount or erased area by impressing over it. Nothing has been found, however, that a thorough microscopic examination of a document would not reveal.

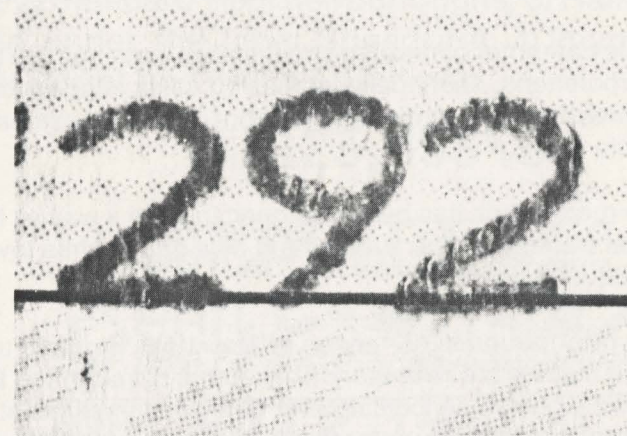


FIGURE 18 The numeral 2 representing two hundred was added by hand and the subsequent 9 and 2 were overwritten to give the impression of a uniform appearance as shown in the illustration. Examination of the ridge and groove format from both the front and reverse side of the document, however, revealed ample evidence of addition.

CHAPTER 7

SUMMARY

Checkwriting classification and identification is not a major part of the case load of document examiners. However, comprehensive and current information must be available when such problems arise.

While computer generated checks have lessened the market for larger corporations, continually increasing sales suggest that checkwriter impressions will continue to confront document examiners in the foreseeable future.

This monograph has been designed in such a way as to be used for general training on the subject and as a guide while involved in a checkwriter examination.

This information is current as of May 1990. Periodic updates of makes and models are necessary. This author, through the Board, will provide such updates periodically and welcomes inquiries at any time. Since changes in industry do not wait for such papers, it is important to verify any information as current when being applied to case work.

TABLE 1

A quick reference guide for general make differentiation. Minor differences may be found that are characteristic of a particular model. The above samples are from 1) Certex, 2) Standard Register/Burroughs, 3) Hall-Welter (marketed under the label Speedrite), 4) Paymaster, 5) Speed-O-Print and 6) F & E Hedman.

1 THE SUM **\$123,456^A.00** DATE

PAY **754282554** FOUR TWO EIGHT EIGHT CTS CTS
ONLY

2 **PAY 12345678** SIX CTS CTS
ONLY ONE TWO THREE FOUR FIVE SIX CTS CTS

NATIONAL SAVINGS TRUST CO. **\$1,234 AND 50 CTS**

3 SUM OF **\$213450cts**

SUM OF **\$987654.32¢**

THE SUM OF **987654 DOLS 32 CTS**

4 THE SUM **I234 DOLS 50 CTS**

5 THE SUM **I23 DOLS 45 CTS**

6 The sum of **1.234.567 dol's 89 cts**

APPENDIX I

Foreign Checkwriters

LION OFFICE MACHINE CO., LTD.

THE SUM I 23,456 DOLS 79 CTS
I 234567890 \$ CTS NTUS &.,*
¥ 123456,7890 1*★¥,0

MAKKUSU CO.

¥ 1 2 3 4 5 6 7 8 9 0 ★, - , 15 £

MARUZEN CO., LTD.

1234567890, RLS / .

MAX BUSINESS MACHINES CORP.

\$32,659,874.12¢

OKUMURA GIREN CO.

¥ 1 2 3 4 5 0 6 7 8 9 0, 00 * \$
¥ 1 2 3 4 5 0 6 7 8 9 0, 00 * \$

PLUS CO.

¥ 1 2 3 4 5 6 7 8 9 0 £ \$ 0. - , ★
 ¥ £ \$ 1 2 3 4 5 6 7 8 9 0 ★ , - . 00
 ¥ 1 2 3 4 5 6 7 8 9 0 , - . ★ 也 金 ¥

50

SUN CO., LTD.

1 2 3 4 5 6 7 8 9 0 ¥ £ \$ % ' , * .

SYSTEMA & CHECKER

④ CHECKER USD I 2345678-90

TACHIKAWA CO. (SELMA)

0956081

TECHNOL SEVEN CO., LTD. (NIPPO)

1234567890,\$\$£¥
¥12345,0¥6789,0.*-

1234567890 THE SUM OF 1234567890 IS 45

TOHO SEIKI CO., LTD. (UCHIDA)

1234567890★¥HK\$US-.,
¥123450,.※¥67890,※

51

Checkwriter impressions from models manufactured before 1960

EXACTLY NINETEEN DOLLARS SEVENTY FIVE CENTS

The sum of 12, 13, 14, 15 and 16 is 67 cts

HALL-WELTER CO.

THE SUM OF \$12345 DOLLARS 67 CTS

THE SUM 1 2 3 4 5 DOLS 6 7 CTS

SEVENTY SIXTY FIFTY FORTY THIRTY TWENTY NINETEEN
ONE AND TWO AND THREE AND FOUR FIVE SIX SEVEN EIGHT NINE
TEN DOLLARS TWENTY THIRTY FORTY FIFTY SIXTY SEVENTY EIGHTY NINETY CENTS

CUMMINS "CHICAGO"

01234567890*

93-07090

ABBOTT

01234567890*

MARCY RODERICK CO. "THE EXECUTIVE"

U.S. SAFETY PUNCH

\$12345 67890*

ARNOLD

1234567890

NEW SAFETY




















CUMMINS "CHICAGO" (enlarged)

AGE (enlarged)

AUTOMATIC BANK PUNCH

\$1687

PAGE

WESLEY

LIGHTNING CHECK PUNCH

\$-10-\$

APPLIED RESEARCH CORP. "PERMA PRINT"

SEARCH CORP. PERMA PRINT
THE SUM OF * * 10 DOL'S 23 CTS

THE SUM OF 4567 DOL'S 89 CTS

PEARL ENGRAVING CORP. "SUMMIT"

THE SUM OF * 0 1 2 3 DOLL'S 4 5 CTS

THE SUM OF *** 9 8 DOL'S 7 6 CTS

HUMPHREY "DEFENDER 50"

TOLEDO "SERIES R-1000"

INTERNATIONAL "W"

CHECKOMETER
(became Paymaster)

STEWART

SENTINAL

PEERLESS JR.

DEFIANCE

NATIONAL

MONROE (DH8, D8w, D10w, D10ww)
(DRM-wb, DR, DRM, DRA)

\$156.98

RITEALL

(one machine makes both impressions)

0602557E 12457900

JUN 07 1964
 ELEVEN
 NEW YORK
 OR
 FOR THE
 NEW YORK
 EXCH
 NEW YORK
 GOLD

APPENDIX III

A table of casing colors and serial numbers that can be used for dating purposes with Paymaster checkwriters. This information is not relevant for reconditioned machines.

SERIES	COLOR	MANUFACTURED APPROX.)	STARTING SERIAL NO.
5550	Charcoal	Apr. 1964 - Apr. 1966	7F26500, 67F21800, 35F10000,
5550	Sea Shell White	Apr. 1966 - Aug. 1968	65F21800, 7F30800
5550	Aquamarine	Aug. 1968 - Dec. 1970	7F35500
5550	Bronze Mist	Dec. 1970 - June 1972	7F38180, 67F33700
X-550	Charcoal	Apr. 1964 - Apr. 1966	7C97500, 77C31019, 37C40500
X-550	Sea Shell White	Apr. 1966 - Aug. 1968	87C46000, 98C10000
X-550	Aquamarine	Aug. 1968 - Dec. 1970	87C83615, 37C48000, 77C36000,
X-550	Bronze Mist	Dec. 1970 - June 1972	98C13464, 7C102500, 77C40700, 37C58000,
X-550	Holly Green	June 1972 - Mar. 1974	87C135500, 7C103600, 98C16709, 77C45700
X-550	Sun-Glo	Mar. 1974 - Apr. 1976	37C71200, 87C191500
X-550	Pearl Shell	Apr. 1976 - Apr. 1978	87C240990, 77C49500, 37C81200
X-550	Horizon Blue	Apr. 1978 - Apr. 1979	87C308500, 77C55000, 37C90000,
X-550	Golden Mint	Apr. 1979 - May 1981	87C377601, 77C59600, 37C101396
X-550	Oyster White	May 1981 - May 1983	87C430100, 77C62660, 37C111400
X-550	Pastel Green	May 1983 - Apr. 1985	87C458200, 77C64400, 37C116000
X-550	Light Beige	Apr. 1985 - Oct. 1987	87C494300, 37C119800, 57C12000
X-550	Light Gray	Oct. 1987 - (Current)	87C519600, 37C121650, 57C13800
S-1000	Charcoal	Apr. 1964 - Apr. 1966	87C540600, 37C123200, 57C15100
S-1000	Sea Shell White	Apr. 1966 - Aug. 1968	87C560650, 37C124250, 57C16650
S-1000	Aquamarine	Aug. 1968 - Dec. 1970	7L30000, 8L20500, 8L20550,
S-1000	Bronze Mist	Dec. 1970 - June 1972	38L22451, 38L10000
S-1000	Holly Green	June 1972 - Mar. 1974	8L32800, 7L48500, 98L33340,
S-1000	Sun-Glo	Mar. 1974 - Apr. 1976	7L66100, 8L41602, 38L10300
S-1000	Pearl Shell	Apr. 1976 - Apr. 1978	7L86400, 8L55300, 38L10635
S-1000	Horizon Blue	Apr. 1978 - Apr. 1979	7L102500, 8L64000, 77L11000,
S-1000	Golden Mint	Apr. 1979 - May 1981	78L12200
S-1000	Oyster White	May 1981 - May 1983	7L124300, 8L77000, 78L18500
S-1000	Pastel Green	May 1983 - Apr. 1985	7L157791, 8L87940, 78L23530
S-1000	Light Beige	Apr. 1985 - Oct. 1987	7L183655, 8L95800, 78L27530
S-1000	Light Gray	Oct. 1987 - (Current)	7L199700, 8L100200, 78L30030
8000	Charcoal	May 1964 - Apr. 1966	7L216800, 8L107200
8000	Sea Shell White	Apr. 1966 - Aug. 1968	7L226550, 8L112850
8000	Aquamarine	Aug. 1968 - Dec. 1970	7L234100, 8L116900
8000	Bronze Mist	Dec. 1970 - June 1972	7L240900, 8L119300
8000	Holly Green	June 1972 - Mar. 1974	8N22000, 68N11000, 78N13000,
8000	Sun-Glo	Mar. 1974 - Apr. 1976	38N10000, 8N36800, 38N10100, 78N17504
			68N11701, 165N14091, 8N37440
			8N65900, 38N11630, 68N12200,
			78N22900
			8N98400, 78N30000, 38N14175
			65N11206, 68N12700
			8N120800, 78N35500, 38N16900,
			68N13200
			8N152600, 78N42500, 38N23100,
			68N13600

SERIES	COLOR	MANUFACTURED APPROX.)	STARTING SERIAL NO.
8000	Pearl Shell	Apr. 1976 - Apr. 1978	8N190340, 78N48900, 38N31836,
8000	Horizon Blue	Apr. 1978 - Apr. 1979	68N14104, 8N229765, 78N54400, 38N43740,
8000	Golden Mint	Apr. 1979 - May 1981	68N14510, 8N260000, 78N59000, 38N55550
8000	Oyster White	May 1981 - May 1983	68N15000, 8N307200, 38N68600, 58N13400,
8000	Pastel Green	May 1983 - Apr. 1985	68N15500, 8N354600, 38N79200, 58N17450,
8000	Light Beige	Apr. 1985 - Oct. 1987	68N16200, 8N398300, 38N88300, 58N20300
8000	Light Gray	Oct. 1987 - (Current)	68N16400, 8N453900, 38N96800, 58N23850,
8000-B	Bronze Mist	Dec. 1970 - June 1972	68N17050
8000-B	Holly Green	June 1972 - Mar. 1974	8W10000, 38W10000
8000-B	Sun-Glo	Mar. 1974 - Apr. 1976	8W13400, 38W10550
8000-B	Pearl Shell	Apr. 1976 - Apr. 1978	8W20100, 38W12500
8000-B	Horizon Blue	Apr. 1978 - Apr. 1979	8W29305, 38W17600
8000-B	Golden Mint	Apr. 1979 - May 1981	8W39815, 38W26800
8000-B	Oyster White	May 1981 - May 1983	8W46450, 38W31800
8000-B	Pastel Green	May 1983 - Apr. 1985	8W55900, 38W36000, 58W11100
8000-B	Light Beige	Apr. 1985 - Oct. 1987	8W64100, 38W37550, 58W11850
8000-B	Light Gray	Oct. 1987 - (Current)	8W72300, 38W38600, 58W12100
8000-10X	Pastel Green	Sept. 1983 - Apr. 1985	8W79050, 38W39400,
8000-10X	Light Beige	Apr. 1985 - Oct. 1987	1N10006, 31N10000
8000-10X	Light Gray	Oct. 1987 - (Current)	1N10800, 31N11300
X-900	Charcoal	Apr. 1964 - Apr. 1966	1N12000, 31N14300
X-900	Sea Shell White	Apr. 1966 - Aug. 1968	7K154000, 37K22000, 77K14500
X-900	Aquamarine	Aug. 1968 - Dec. 1970	7K180000, 37K25841
X-900	Bronze Mist	Dec. 1970 - June 1972	7K203500, 37K29600, 77K21850
X-900	Holly Green	June 1972 - Mar. 1974	7K219700, 37K32400, 77K24700
X-900	Sun-Glo	Mar. 1974 - Apr. 1976	7K227000, 37K34630, 77K26000
X-900	Pearl Shell	Apr. 1976 - Apr. 1978	7K234600, 37K38300, 77K27500
X-900	Horizon Blue	Apr. 1978 - Apr. 1979	7K245211, 37K42292, 77K28950
X-900	Golden Mint	Apr. 1979 - May 1981	7K254220, 37K46200, 77K30950
X-900	Oyster White	May 1981 - May 1983	7K259100, 37K47200, 77K33000
X-900	Pastel Green	May 1983 - Apr. 1985	7K267200, 37K47900, 57K10200
X-900	Light Beige	Apr. 1985 - Oct. 1987	7K270420, 37K48300, 57K10325
X-900	Light Gray	Oct. 1987 - (Current)	7K273000, 37K48900, 57K10450
X-2000	Green	Oct. 1961 - Apr. 1964	7K276600
X-2000	Charcoal	Apr. 1964 - Apr. 1966	8M10103
X-2000	Sea Shell White	Apr. 1966 - Aug. 1968	8M41000, 38M10000
X-2000	Aquamarine	Aug. 1968 - Dec. 1970	8M64500, 38M10300
X-2000	Bronze Mist	Dec. 1970 - June 1972	8M84900, 38M12900
X-2000	Holly Green	June 1972 - Mar. 1974	8M100000, 38M14500
X-2000	Sun-Glo	Mar. 1974 - Apr. 1976	8M109005, 38M14800
X-2000	Pearl Shell	Apr. 1976 - Apr. 1978	8M117000
X-2000	Horizon Blue	Apr. 1978 - Apr. 1979	8M124036, 8M130560

SERIES	COLOR	MANUFACTURED APPROX.)	STARTING SERIAL NO.
X-2000	Golden Mint	Apr. 1979 - May 1981	8M138600
X-2000	Oyster White	May 1981 - May 1983	8M150300
X-2000	Pastel Green	May 1983 - Apr. 1985	8M159150
X-2000	Light Beige	Apr. 1985 - Oct. 1987	8M164700
X-2000	Light Gray	Oct. 1987 - (Current)	8M167600
850	Charcoal	May 1964 - Apr. 1966	8S12525, 38S10500
850	Sea Shell White	Apr. 1966 - Aug. 1968	8S14500
850	Aquamarine	Aug. 1968 - Dec. 1970	8S15700
850	Bronze Mist	Dec. 1970 - June 1972	8S16502
875	Charcoal	May 1965 - Apr. 1966	8U10000
875	Sea Shell White	Apr. 1966 - Aug. 1968	8U11100
875	Aquamarine	Aug. 1968 - Dec. 1970	8U13700, 38U10525
875	Bronze Mist	Dec. 1970 - June 1972	8U16500, 38U10975
875	Holly Green	June 1972 - Mar. 1974	8U19100, 38U11375
875	Sun-Glo	Mar. 1974 - Apr. 1976	8U23200, 38U12200
875	Pearl Shell	Apr. 1976 - Apr. 1978	8U28020, 38U13300
875	Horizon Blue	Apr. 1978 - Apr. 1979	8U32645, 38U14000
875	Golden Mint	Apr. 1979 - May 1981	8U35800, 38U15360
875	Oyster White	May 1981 - May 1983	8U40600, 38U15900, 58U10300
875	Pastel Green	May 1983 - Apr. 1985	8U45000, 38U16100, 58U10525
875	Light Beige	Apr. 1985 - Oct. 1987	8U48700, 38U16300, 58U10700
875	Light Gray	Oct. 1987 - (Current)	8U53100, 38U16650, 58U10900
700	Charcoal	Apr. 1964 - Apr. 1966	8D39500, 68D12500, 78D12000
700	Sea Shell White	Apr. 1966 - Aug. 1968	98D10000, 38D10000
700	Aquamarine	Aug. 1968 - Dec. 1970	8D45496, 78D12886, 38D10041
			8D51900, 68D12775, 78D13750
			38D10750
700	Bronze Mist	Dec. 1970 - June 1972	8D59300, 68D13000, 78D15000,
			38D11400
700	Holly Green	June 1972 - Mar. 1974	8D63950, 68D13200, 78D15655,
			38D12000
700	Sun-Glo	Mar. 1974 - May 1975	8D70000, 68D13400, 78D16400,
			38D12300
7000	Charcoal	Apr. 1964 - Apr. 1966	8P14500, 38P11000
7000	Sea Shell White	Apr. 1966 - Aug. 1968	8P22313, 8P23255
7000	Aquamarine	Aug. 1968 - Dec. 1970	8P32500, 38P10630
7000	Bronze Mist	Dec. 1970 - June 1972	8P41900, 38P11400
7000	Holly Green	June 1972 - Mar. 1974	8P47900, 38P11900, 78P10600
7000	Sun-Glo	Mar. 1974 - Apr. 1976	8P56200, 38P12700, 78P11700
7000	Pearl Shell	Apr. 1976 - Apr. 1978	8P68683, 38P14000, 78P12650
7000	Horizon Blue	Apr. 1978 - Apr. 1979	8P82786, 38P15000, 78P13850
			48P10105, 34P10105
7000	Golden Mint	Apr. 1979 - May 1981	8P91700, 38P15600, 78P14850
			48P10405, 34P10450
7000	Oyster White	May 1981 - May 1983	8P104800, 38P16000, 58P10150
7000	Pastel Green	May 1983 - Apr. 1985	8P115550, 38P16225, 58P10300
			48P11200, 34P11000, 54P10125
7000	Light Beige	Apr. 1985 - Oct. 1987	8P125100, 38P16400, 58P10400
			48P11700, 34P11150
7000	Light Gray	Oct. 1987 - (Current)	8P133750, 38P16525, 58P10500,
			48P12300, 34P12250