

## TECHNICAL NOTE

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### An Analysis of the Identification Value of Defects in IBM Selectric® Typewriters

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**ABSTRACT:** Twenty-one IBM Selectric® Model 72 typewriters were examined for the presence of identifying defects. The purpose of the study was to determine if Selectric typewriters of a similar age and history of use could be differentiated on the basis of alignment defects. It was found that the typewriters involved in the study could be differentiated using standard typewriter identification techniques.

**KEYWORDS:** questioned documents, typewriters, identification systems

The examiner of questioned documents is often called upon to determine if a disputed document was typed on a particular typewriter. This determination is based upon a comparison of the typing in question with typing known to have been produced on a certain machine. The typing on both the known sample and on the questioned sample should exhibit the same defects with no basic differences. These defects are generally in the form of typeface defects and alignment defects. Typeface defects are the result of the type hitting some hard object or two type bars clashing together during typing. Typeface defects result in printed characters with a broken or deformed outline. Alignment defects may also result from a twisting of the type bars during typing. Alignment defects result in a character not printing in its properly centered horizontal and vertical space on the typed line.

The location of these identifying defects has been made more difficult with the advent of the single element typewriter. In the single element machine, such as the IBM Selectric®, the type bars have been replaced with a single element approximately the size of a golf ball. All of the various characters are located on this element and the defects caused by the type bars clashing together or twisting have been eliminated.

A review of the literature reveals that the identification of IBM Selectric typewriters was first described by Hilton [1]. Hilton has also described some of the difficulties of the identification of the Selectric II typewriter [2], and other single element machines [3]. The characteristics of the IBM Correcting Selectric typewriter are described by Purtell and Casey [4]. Class characteristics of the various single element typewriters are discussed by Levinson [5].

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The identification of the element used in typing a document is explained by Leslie [6]. Caponi [7] has described the typing produced by a defective IBM type element.

The examination of questioned documents that were typed on the IBM Selectric typewriter is a problem which has confronted the modern document examiner. The alignment defects upon which an identification is based are subtle and minute in nature. In addition, there is a lack of information in the literature on just how unique an IBM typewriter alignment defect may be. With this problem in mind, the author designed a study to attempt to determine the frequency of occurrence of defects in a group of IBM Selectric typewriters with a similar history of use.

Typewriter samples were obtained from 21 typewriters located in the typing classroom at Auburn University, Auburn, AL. All of the machines have been subjected to similar use and have been under a service contract. All of the machines were IBM Model 72 with elite spacing. These machines were all purchased at approximately the same time. An examination of the serial numbers revealed that twelve of the typewriters had almost consecutive numbers. The twelve numbers were spread over fifteen consecutive numbers. The other serial numbers contained a group of three machines spread over five consecutive serial numbers. The other serial numbers were not grouped and the serial number on one machine could not be located. All of the machines had fabric ribbons. Ten machines were equipped with IBM Prestige Elite elements, ten were equipped with IBM Prestige Elite 72 elements, and one machine was equipped with an IBM Large Elite 72 element.

The samples used in the study were obtained by taking strike-ups on bond paper. To facilitate the study, the characters were grouped according to the identification scheme used to identify alignment defects in IBM Selectric typewriters. For instance, the plus five (+5) rotation position contains the characters "9bw" and the dash. These characters were typed together. The reference point used to measure the alignment defects was the character "z" which is located in the zero tilt and zero rotation position. The "z" was typed next to each of the groups of characters to allow a precise check of the alignment.

The alignment was checked with a standard typewriter test plate and a fingerprint magnifier. The results were recorded on an IBM Selectric typewriter worksheet designed by David J. Purtell. Only the lowercase letters were considered in this study. It was decided to limit the study to the lowercase characters because of their frequency of occurrence in routine items of correspondence. The results of the study are tabulated in Table 1. The alignment defects are recorded as arrows pointing in the direction of the misalignment. Very slight defects are denoted by an "S" and in those instances where variation was detected, this is indicated by "V." The machines are denoted by the serial numbers and the type style is also indicated. The numbers across the top of the table indicate the tilt and rotation positions. The zero tilt and zero rotation were not included in the tabulation.

### Discussion of Results

It would seem clear that in the group of typewriters studied, it is possible to differentiate between IBM typewriters with the same history of use and maintenance using only lowercase letters. Naturally, adequate standards and sufficient questioned material would have to be provided to make such a determination. As would be expected, the more common alignment defects occur at the extreme tilt and rotation positions. The most common alignment defects occur in the tilt 3 position. The least common and hence most unique alignment defects are the -1, -2, and -3 rotation positions. In the sample studied, fewer of the minus (-) rotation positions exhibited defects in horizontal alignment than the plus (+) rotation positions. This particular study was made somewhat more difficult because all of the machines studied were equipped with fabric ribbons. Only a few examples of each character were studied and hence, variation, as an identifying factor was not considered.

TABLE 1—*Tabulation of results.*

Serial No. (Last Four Digits)	Type Style	Alignment Defects											T1	T2	T3	
		+5	+4	+3	+2	+1	-1	-2	-3	-4	-5					
5628	Prestige Elite	→	...	→	...	...	...	...	←	←	←	↑	...	...		
5630	Prestige Elite 72	...	←	...	...	...	...	...	...	...	...	...	...	...	...	↑
5631	Prestige Elite	←	...	...	...	...	←	...	...	...	...	...	...	...	...	...
5632	Prestige Elite 72	...	←	←	...	...	←	...	...	...	→	↑S	...	↑		
5633	Prestige Elite	→	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5634	Large Elite 72	...	...	←	←	←	...	...	...	...	...	↑	...	↑		
5635	Prestige Elite	...	...	...	...	...	...	...	...	...	...	↑	↑	↑		
5636	Prestige Elite	...	...	...	...	...	...	...	...	...	...	↑	...	...		
5638	Prestige Elite	...	...	←	←	←	...	...	...	...	...	...	...	...	↑	
56	Prestige Elite	...	←	...	...	...	...	...	...	...	...	...	...	...	...	...
5642	Prestige Elite	←	...	←	...	...	...	...	...	...	...	...	...	...	...	↑
5643	Prestige Elite 72	←	←	←	←	←	←	←	←	←	←	↑S	...	...		
4418	Prestige Elite 72	...	...	...	...	...	←	...	...	...	...	...	...	...	...	↑
4421	Prestige Elite	←	←	...	...	...	←	←	←	←	←	...	...	...	...	↑S
4422	Prestige Elite 72	...	→	...	...	...	←	←	←	←	←	...	...	...	...	↑
5563	Prestige Elite	←	←	←	←	←	←	←	←	←	←	↑S	...	...	...	↑
5564	Prestige Elite	←	←	←	←	←	←	←	←	←	←	...	...	...	...	↑
5641	Prestige Elite 72	←	←	←	←	←	←	←	←	←	←	...	...	...	...	...
4750	Prestige Elite 72	←	←	...	...	...	→	→	...	...	...	1V	↑	↑		
0034	Prestige Elite 72	←	...	...	...	←	...	...	...	←	←	...	...	...	...	↑
None	Prestige Elite	...	...	←	←	...	...	...	→	...	...	...	↑	↑		
Total 21	...	11	9	9	6	4	8	2	2	2	4	7	3	14		
Percent	...	52	43	43	29	19	38	1	1	1	19	33	14	66		

**Conclusion**

A group of IBM Selectric Model 72 typewriters with a similar history of use and maintenance were studied to determine if each of the machines exhibited a unique pattern of alignment defects. It was found that the typewriters could be differentiated on the basis of the lowercase letters alone.

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