6.1 Typewriter Examinations

Examinations of typewritten documents can involve many facets. Limitations can be placed upon these examinations by influences such as the copy process, the advent of computer-generated fonts similar to typestyles, etc. Information provided in this procedure gives an overview of the process, considerations and instrumentation used. Analysis schemes for each case will be implemented depending upon the type of evidence presented.

6.2 Classification Methods References

6.2.1

A PC Based Typewriter Typestyle Classification System for Courier Typestyle Specimens - From *The Haas Typewriter Atlas - Philip Bouffard (1993)*

6.2.2

The Differentiation of Pica Monotone Typewriting - *Crown*

6.3 Terminology

Also see: *Type Face Nomenclature* - *MAFS Newsletter - Jeff Luber (1989)*

6.3.1 Typing Terminology:

Character – In connection with typewriting identification, it refers to all letters, symbols, numerals, and points of punctuation.
Defect – Any abnormality or maladjustment in a typewriter that is reflected in its work and leads to its individualization and/or identification.
Escapement or pitch – The spacing along the horizontal line of typewriting, i.e., the basic letter spacing.

Pica - 10 letters per inch (broad measurement classification)
Elite - 12 letters per inch (broad measurement classification)
Proportional spacing - letters occupy units of space according to their relative size.
Dual spacing.
Foreign.

Spacing measurements – typewriter test plate letter spacing = the number (i.e. 2.12) indicates the amount of space in cm that one character would occupy.
Typeface – The printing surface of the typeblock or element.
Type bar – An arm or lever, to the end of which is attached a type block that is swung against the document.
Type element – The type ball or wheel of a single element typewriter.

Ribbon – Cloth or fabric ribbon or carbon film tape used as a medium to leave a visible image of the character of the paper.

6.3.2 Types of Machines:

Single element typewriter – Typewriters using either a type ball or type wheel printing device.
Type bar machine – Typewriters using a series of type bars.
Manual typewriter – A machine whose operation depends solely upon the mechanical action set in motion by the physical act of striking a letter or character key.
Electric typewriter – A typewriter equipped with an electric motor that assists in operating and activating the mechanical linkages, type bars and carriage movements.
Electronic typewriter – A typewriter in which most mechanical parts have been replaced by electronic controls and circuits.
Word processing unit – Any typewriter or other printing unit that is combined with a memory system and thus capable of automatic or repetitive typewriting.
Proportional spacing typewriter – A typewriter which types with each character occupying units of space horizontally along the line of type, based on the relative width of each character.

6.3.3 Pica (typography)

A pica (pronounced /ˈpaɪkə/) is a typographic unit of measure corresponding to 1/72 of its respective foot, and therefore to 1/6 of an inch. The pica contains 12 point units of measure.

The pica originated around 1785, when François-Ambrose "L'éclat" Didot (1730–1804) refined the typographic measures system created by Pierre Simon Fournier le Jeune (1712–1768). He replaced the traditional measures of cicéro, Petit-Roman, and Gros-Text with “ten-point”, “twelve-point”, et cetera.

To date, in printing these three pica measures are used:

- The French pica of 12 Didot points (also called cicéro) generally is: 12 × 0.376 = 4.512mm (0.177in).
- The American pica measure of 0.013837 ft. (1/72.27 ft.). Thus, a pica is 0.166044in. (4.2175mm)
- The contemporary computer pica is 1/72 of the Anglo-Saxon compromise foot of 1959, i.e. 4.233mm or 0.166in. Notably, Adobe PostScript promoted the pica unit of measure that is the standard in contemporary printing, as in-home computers and printers.

Usually, pica measurements are represented with an upper-case "P" with an upper-right-to-lower-left virgule (slash) starting in the upper right portion of the "P" and ending at the lower left of the upright portion of the "P"; essentially drawing a virgule (/) through a "P". (Ꝑ)[citation needed] Likewise, points are represented with number of points before a lower-case "p", for example, 5p represents “5 points”, and 6P2p represents “6 picas and 2 points”, and 1P1 represents “13 points”, which is converted to a mixed fraction of 1 pica and 1 point

Publishing applications such as Adobe InDesign and QuarkXPress represent pica measurements with whole-number picas left of a lower-case "p", followed by the points-number, for example: 5p6, represents 5 picas and 6 points, or 5½ picas.

Cascading Style Sheets defined by the World Wide Web Consortium use "pc" as the abbreviation for pica (1/6 of an inch), and "pt" for point (1/72 of an inch).

Note that these definitions are different from a typewriter's pica setting, which denotes a type size of ten characters per horizontal inch.

- Bringhurst, Robert (1999). The Elements of Typographic Style, second edition. H&M Publishers., pp. 294–295
- Pasko, W W (1894). American Dictionary of Printing and Bookmaking. H. Lockwood., p. 436

(source: http://en.wikipedia.org/wiki/Pica_(typography))

6.3.4 Typographic Unit

Typographic units are the units of measurement used in typography or typesetting. The traditional units are different from common metric units, as they were established earlier. Even though these units are all very small, across a line of print they add up quickly. Confusions such as resetting text originally in type of one unit in type of another will result in words moving from one line to the next, resulting in all sorts of typesetting errors (viz. rivers of white, widows and orphans, disrupted tables, and misplaced captions).

Development:
In Europe, the Didot point system was created by François-Ambroise Didot (1730–1804) in c. 1783. Didot's system was based on Pierre Simon Fournier's (1712–1768), but Didot modified Fournier's by adjusting the base unit precisely to a French Royal inch (pouce), as Fournier's unit was based on a less common foot.

However, the basic idea of the point system – to generate different type sizes by multiplying a single minimum unit calculated by dividing a base measurement unit such as one French Royal inch – was not Didot's invention, but Fournier's.[note 1] In Fournier's system, an approximate French Royal inch (pouce) is divided by 12 to calculate 1 ligne, which is then divided by 6 to get 1 point. Didot just made the base unit (one French Royal inch) identical to the standard value defined by the government.

In Didot's point system:

- 1 point = 1⁄6 ligne = 1⁄72 French Royal inch = 15 625⁄41 559 mm ≤ 0.375 971 510 4 mm, however in practice mostly: 0.376 000 mm, i.e. + 0.0076 %.

Both in Didot's and Fournier's systems, some point sizes have traditional names such as Cicero (before introduction of point systems, type sizes were called by names such as Cicero, Pica, Ruby, Long Primer, etc.).

- 1 cicero = 12 Didot points = 1⁄6 French Royal inch = 62 500⁄13 853 mm ≤ 4.511 658 124 6 mm, also in practice mostly: 4.512 000 mm, item: + 0.0076 %.

The Didot point system has been widely used in European countries. An abbreviation for it that these countries use is "dd", employing an old method for indicating plurals. Hence "12dd" means twelve didot points.

In Britain and the U.S.A., many proposals for type size standardization had been made by the end of 19th century (such as Bruce Typefoundry's mathematical system that was based on a precise geometric progression). However, no nation- wide standard was created until the American Point System was decided in 1886.

The American Point System was proposed by Nelson C. Hawks of Marder Luse & Company in Chicago in the 1870s, and his point system used the same method of size division as Fournier's; viz. dividing 1 inch by 6 to get 1 pica, and dividing it again by 12 to get 1 point. However, the American Point System standardized finally in 1886 is different from Hawks' original idea in that 1 pica is not precisely equal to 1⁄6 inch (neither the Imperial inch nor the U.S. inch), as the United States Type Founders' Association defined the standard pica to be the Johnson Pica which had been adopted and used by Mackellar, Smiths and Jordan type foundry (MS&J), Philadelphia. As MS&J was very influential in those days, many other type foundries were using the Johnson Pica. [note 2] Also, MS&J defined that 83 Picas are equal to 35 centimeters. The choice of the metric unit for the prototype was because at the time the Imperial and US inches differed in size slightly, and neither country could legally specify a unit of the other.

The Johnson Pica was named after Lawrence Johnson who had succeeded Binny & Ronaldson in 1833. Binny & Ronaldson was one of the oldest type foundries in the United States, established in Philadelphia in 1796. Binny & Ronaldson had bought the type founding equipment of Benjamin Franklin's (1706–1790) type foundry established in 1786 and run by his grandson Benjamin Franklin Bache (1769–1798). The equipment is thought to be that which Benjamin Franklin purchased from Pierre Simon Fournier when he visited France for diplomatic purposes (1776–1785).

The official standard approved by the Fifteenth Meeting of the Type Founders Association of the United States in 1886 was this Johnson pica: It equals 0.166 inch exactly one. Therefore, the two other – very close – definitions: 1200 / 7227 inch and 350/83 mm are both unofficial.

In the American point system:

- 1 pica = exactly 0.1660 inch (versus 0.1666 = 1/ 6 inch for the DTP-pica) = 4.216 400 mm.
- 1 point = 1/ 12 traditional pica = exactly 0.013 83 inch = 0.351 36 mm.

The American point system has been used in the USA, Britain and many other countries including Japan.

Today, digital printing and display devices and page layout software use a unit that is different from these traditional typographic units. On many digital printing systems (desk-top publishing systems in particular), the following equations are applicable (with exceptions).

- 1 pica = 1/ 6 inch (British/American inch of today) = 4.233 mm.
- 1 point = 1/ 12 pica = 1⁄72 inch = 127⁄360 mm = 0.3527 mm.

Fournier's original method of division is restored in today's digital typography.
Comparing a piece of type in didots for Continental European countries – 12 dd, say – to a piece of type for an English-speaking country – 12 pt – shows that the main body of a character is actually about the same size. The difference is that the languages of the former often need extra space going atop the capital letters for accent marks (e.g. Ñ, Â, Ö, É), but English doesn't need this.

Metric units: The traditional typographic units are based either on non-metric units, or on odd multiples (such as 35⁄83) of a metric unit. There are no specifically metric units for this particular purpose, although there is a DIN standard sometimes used in German publishing, which measures type sizes in multiples of 0.25 mm, and proponents of the metrication of typography generally recommend the use of the millimetre for typographical measurements, rather than the development of new specifically typographical metric units. The Japanese already do this for their own characters (using the kyu, which is q in romanized Japanese and is also 0.25 mm) and have metric-sized type for European languages as well. One advantage of the q is that it reintroduces the proportional integer division of 3mm (12q) by 6 & 4.

During the age of the French Revolution or Napoleonic Empire, the French established a typographic unit of 0.4 mm, but except for the government's print shops, this did not catch on.

In 1973, the didot was restandardized in the EU as 0.375 (= 3⁄8) mm. Care must be taken because the name of the unit is often left unmodified. The Germans, however, use the terms Fournier-Punkt and Didot-Punkt for the earlier ones, and Typografischer Punkt for this metric one.

6.3.5 Notes

1. Actually, Sebastien Truchet (1657–1729) had invented a similar type sizing system before Fournier implemented his point system. Truchet's system was applied to the types of the Imprimerie Royale, the romains du roi. It is thought that Fournier knew about Truchet's scheme that was based on the standard French Royal inch and a very fine unit of 1⁄204 ligne. For further information on Truchet's system, refer to James Mosley's "The New Type Bodies of the Imprimerie Royale", pp. 400–408, Vol. 3, The Manuel Typographique of Pierre- Simon Fournier le jeune, Darmstadt 1995. and Jacques André's "Truchet & Types".

2. Regarding the background of the adoption of the Johnson Pica, Mr. Richard L. Hopkins, author of Origin of The American Point System says: "The major issue then was the expense involved in re-tooling literally hundreds of molds in each foundry to make them all conform to the new system. If they could avoid just a few sizes being altered, it would save hundreds of thousands of dollars. That is why the MS&J (Johnson) pica was adopted."

6.3.6 Select Bibliography

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(source: http://en.wikipedia.org/wiki/Typographic_unit)

6.4 Theory of Typewriter Identification

a. Use of any mechanical instrument causes wear and damage to its various working parts, leading to the appearance of individual defects in the work of each machine.

b. The particular combination of defects and properly printed characteristics serves to individualize the typewriter.

c. Identity is established by agreement of four basic conditions common to both the questioned and known typewritings:

1) The same size type.
2) Identical typeface design.
3) The same unique combination of defective and non-defective letters and characteristics.
4) The same misalignment defects found in both the questioned and the known typewriting.

6.5 Types of Typewriting Characteristics

6.5.1 Class Characteristics (design, type and size)

1) Overall size of letters and characters.
   a) Vertical height.
   b) Escapement or pitch.
   c) Vertical spacing.

2) Serifs:
   a) Presence or absence.
   b) Length and style.
   c) Locations.

3) Construction of some "key" characters.
   a) Short or long center "M", "W", or "w".
   b) Separate number "1".
   c) Separate exclamation mark.
   d) Lower case "t":
      (1) Length and location of crossbar.
      (2) Ratio of lengths *of* divided crossbar and vertical staff.
      (3) Curvature at lower extremity.
   e) Lower case "f":
      (1) Curvature of the top.
      (2) Length and location of crossbar.
      (3) Ratio of lengths of divided crossbar and vertical staff.
   f) Lower case "i":
      (1) Height and position of dot.
      (2) Length of serifs.
   g) Lower case "g":
      (1) Proportion of upper oval to that of the lower oval.
      (2) Relative shapes and positions of both ovals.
      (3) Shape and position of the connecting line.
      (4) Shape of serif or ending on upper right.
   h) Lower case "y".
      (1) Relative lengths of parts.
      (2) Angle found in center.
      (3) Length and shape of tail.
   i) Lower case "a".
      (1) Shape and size of bowl.
      (2) Shape of top and ending strokes.
   j) Numerals
      (1) Shape and style of each.
      (2) Relative shapes and sizes of parts.
      (3) Relations to baseline.

6.5.2 Individual characteristics (defects):

1) Printing defects:
   a) Typeface defects.
      (1) Breaks in the impression caused by chips or bumps in the type metal.
      (2) Dented, bent, or irregular outlines of characters caused by damage to the typeface itself.
   b) Alignment defects:
      (1) Vertical malalignment - the character prints above or below the baseline.
      (2) Horizontal malalignment - the character prints to the right or left of its proper position.
      (3) Slant malalignment - the character does not print perpendicular to the baseline.
      (4) "Off its feet" - the type face does not strike (print) with equal pressure over its entire surface.
         (a) Characters print heavier on one side than the other (left or right, top or bottom).
         (b) Most often observed in broader small letters and in capitals.
2) Machine defects:
   a) Variation in the designed spacing between letters or lines.
   b) Slippage of the paper so that successive lines are not parallel.
   c) Skipping of a space after certain characters.
   d) Improper ribbon operation affecting the printed impression.
   e) Defective operation of the margin stops.
      (1) Irregular left margins.
      (2) Stacking of characters on the right margin.
   f) Characters consistently off their feet on the top or bottom edges due to improper platen adjustment.
   g) Rebound - in which certain characters strike twice, printing two impressions not quite superimposed.

3) Transitory defects:
   a) Dirty typefaces.
   b) Worn fabric ribbon.
   c) Often useful in dating a typewritten document.

6.6 The Process of Comparison - Method

Typewriter examinations are performed per ASTM E2494-08 *Standard Guide for Examination of Typewritten Items*

6.7 Overview and Considerations of Specialized Typewriter Problems

6.7.1 Type bar

Type bar machines:

a) Commonly characterized by malalignment defects.
b) Malalignment of the same character in both the upper and lower case should generally be considered as one defect, not two.
c) Common characteristics of portable type bar typewriters:
(1) Typewriting may be much more erratic due to the lighter frame and construction commonly utilized in portables.
(2) Many characters may appear to be consistently "off their feet" high or low due to vertical malalignment of the small diameter platen with the type font.
d) Electric type bar typewriters are often characterized by uniform pressure of the typewriting.
e) The final identification of a type bar machine rests on the application of the principles and techniques described previously herein.

6.7.2 Single Element

Single element machines
a) Identification is influenced by the combination of the particular element used and by the particular machine it is used on.
(1) One machine can use several different elements.
(2) One element can be used on several different machines.
(3) The report must specify whether the identification is of the element, or the machine, or both.
b) First step is to determine if the questioned typewriting was produced on a single element machine.
(1) Type ball machines usually have a distinctive type style (different from typebar machines).
(2) Type ball units do not usually emboss the paper as do typebar or type wheel units.

6.7.3 Proportional Spacing

Proportional spacing machines:

a) Necessary to use an alignment test plate or grid ruled with lines spaced equal to the basic unit escapement of the machine involved.
b) The final identification rests on the application of the same principles and techniques described for the examination of both typebar and single element machines.

6.7.4 Alterations or Insertions into a Typed Document

1) Determine if the suspected insertion or alteration was made by the same machine as used to type the rest of the document.
a) Utilize conventional typewriter comparison techniques.
b) Utilize conventional typewriter ribbon comparison techniques.

2) If suspected insertions or alterations were made by the same machine, or if unable to make that

determination, attempt to ascertain if the suspected portions were produced at a different time than the rest of the typewritten text.

a) Check for improper placement of the suspect.typewriting.
    (1) Examine suspected lines to see if they are parallel to the other lines of typing.
    (2) Measure the vertical distance between the lines of typing
        (a) Usually should not vary more than 1 1/60 of an inch.
        (b) Be aware of the amount of natural variation or "slop" in the legitimate typing.
    (3) Check vertical alignment of the suspect typing using the appropriate typewriter grids.
    (4) Look for unnaturally cramped letters or words.

b) Check for other indications that the suspected typing was entered at a later time.

    (1) Dirtier or filled in characters.
    (2) Different ribbon density.
    (3) Different impression depths.
    (4) New defects in the characters.
    (5) Erasures and/or strike overs, particularly where a very small word or single character may have been changed or added.

6.7.5 Typist

Considerations and/or cautions:

a) Identification of a suspect typist is simpler when the typist is known to be one of a small group.
    (1) When the machine utilized has been identified and is known to be available to only a small group of people
    (2) It is often easier to eliminate persons not involved.

b) An opinion or conclusion must be based on extensive disputed and known specimens of typing.
    (1) Personal habits or typewriting characteristics should be repeated with sufficient regularity to ensure a correct identification.
    (2) Opinions expressed must usually be qualified.

c) Many of the " individual" characteristics or habits utilized for identification are susceptible to imitation.

Typist characteristics:

a) Test or language habits:

General subject matter.

- Sentence construction.
- Observance of grammatical rules.
- Choice of words and use of slang.
- Spelling.
- Division of words into syllables (when they cannot be completed on - the line).
- Method of paragraph divisions.
- Balanced or unbalanced placing of typed material on the page.
- Lengths of lines.
- Arrangement of heading and conclusion.

- Margins - width and adherence to (especially the right margin).
- Abbreviations.
- Punctuation, use of hyphens, etc.
- Capitalization.

b) Machine habits:

- Faulty use of the shift key.
- Careless carriage return.
- Use of the tab key.
- Erroneous striking, stacking or repetition of particular characters
- Transposition of commonly occurring letter pairs.
- Method of correcting.
- Method of typing numbers, amounts, fractions, etc.
- Choice and use of symbols:

  L or I for the number "1".
  Capital "0" instead of the zero symbol.
  & instead of the word "and".
  Apostrophe. backspace, and period for an exclamation point. Overall rhythm.

Depth of impressions.

(a) Overall, of entire text.
(b) Of particular characters.
(c) Of certain words (especially short words, such as: "the", "it" etc.).

6.7.6 Electronic

Electronic typewriters:

a) Capable of using pica, elite, and proportional spacing escapement interchangeably.
b) Typing elements (wheels or balls) are interchangeable.
c) There are very few mechanical actions:

(1) Character selection, letter spacing, line spacing, basic alignment, and ribbon action are all controlled with the basic electronic unit (typewriter) itself.
(2) Only a slight chance of machine defects occurring.

d) The type wheel is the portion of the unit most apt to develop individuality or defects.

(1) The typefaces can become worn and the spokes of the wheel twisted or bent to provide very slight alignment and/or printing defects.
(2) No relationship between defects in a particular spoke and its character and any other character.
(3) Defects are apt to be temporary or transient because they are easily repaired under most of today's warranty service/maintenance programs.

6.7.7 Computer Fonts

a) Technology advancements have resulted in computer fonts and imaging programs with a wide capability of making documents appear to have been generated on a typewriter.
b) Extreme care must be taken during the examination process to ensure that the document being examined was produced by a typewriter before such examinations can be made.
c) Reproduction processes (copier, scanner, facsimile) may preclude the possibility of determining whether a typewriter was used to produce the document in question.
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6.8 References

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