# A STUDY OF THE TYPOGRAPHIC AND PRODUCTION DEVELOPMENTS IN THE GRAPHIC ARTS AS THEY ARE APPLICABLE TO STUDENTS IN A BEGINNING COURSE FOR A MAGAZINE AND NEWSPAPER CURRICULUM

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# PREFACE

The Department of Technical Journalism at Oklahoma Agricultural and Mechanical College has grown from a small segment of the Department of English to a separate department. In reputation it has grown from a department teaching journalism for weekly and small daily newspapers to one of the few departments giving intensive instruction in industrial editing. The two phases of journalism are similar in many principles, yet the approach to basic courses must be adjusted to fit the needs of students in both fields of study.

The course in basic typography in the Department of Technical Journalism is one of the dual curriculums courses which must fill the needs of both newspaper journalism and industrial communications. Textbooks for this subject tend to specialize in one phase of journalism and touch lightly on the others.

Machinery and methods of mass reproduction of the written word are ever changing. During the past decade successful photo-composing machines have given photo-lithography the necessary tools to successfully compete with letterpress printing. Letterpress has in turn advanced to new plastic materials for duplicate printing plates as well as to automatic type-composing machines. Typographers have modernized their approach to basic type design through introduction of faces based on scientific legibility studies of readability of different patterns.

This study is not a complete reorganization of the basic typography course but is an expansion of the course to include the latest advancements in machinery and tools as well as to tie the course more to the needs of students in the industrial communications curriculum.

The author is indebted to Professor Clement E. Trout for his counsel, criticism and assistance in preparation of this thesis and in all matters pertaining to my college work. My thanks are also due Lemuel D. Groom, Professor of Typography and my immediate adviser, for assistance with this study and for encouragement throughout my college years.

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## Chapter I

## HISTORY OF PRINTING

The printing industry is like any other industry today in that research is being carried on daily to find new and better methods and tools to produce a better product at a lower price. But the printing industry differs from other industries in that it has been the forerunner of our civilization and standard of living.

It is impossible to set an exact date or year for the birth of printing since this industry is dependent upon the merging of five major inventions. These inventions are an alphabet, paper, ink, type, and a press. As we shall see, each of these was discovered in a different part of the world and in a different era of history.

### Words and the Alphabet

Man made himself superior to other animals the moment he attempted to communicate to his fellow men his mistakes and experiences. First communication was probably oral with grunts and groans, but later man began working on a better and more nearly permanent method of communicating his experiences.[1]

Development of the writing system is generally credited to the Egyptians. Hieroglyphic characters have been found that date back as far as 4777 B.C. which show the Egyptians' efforts to permanently record the deeds of one of their earliest kings.[2]

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[1] The Encyclopedia Americana, 1956 Edition.

[2] Oscar Ogg, The 26 Letters, (New York, 1948), p. 50.

Early hieroglyphic writings are called picturegraphs and the era in which they were used is termed the pictorial era. These names were selected since a complete incident was described in one picture. This form of writing passed through four stages before it became a true alphabet.[3]

The second stage, called the ideograph era, used more than one picture to describe an incident. Each picture represented an idea and it took more than one picture to describe an incident.[4]

As centuries passed and man wanted better records, ideographs were revised into picture words. In this third stage, hieroglyphics were written so that each picture was a word and it took more and clearer symbols to convey the message.[5]

For still better records, the Egyptians expanded their hieroglyphics into syllables and picture sounds. At this stage the pictures became less like pictures and more like symbols to meet the requirements of a true alphabet.[6]

The Phoenicians, who were traders in the Mediterranean Sea, took the Egyptian alphabet and simplified it to meet their need, which was chiefly keeping records of their trading activities. These traders carried their system along with their merchandise throughout the Mediterranean area.[7]

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[3] Ibid., p. 58.

[4] Ibid., p. 58.

[5] Ibid., p. 58.

[6] By definition, an alphabet is a series of letters, symbols, or signs which form the elements of a written language; a collection of the signs or symbols representing different sounds of a language. The same symbol elements can be rearranged to represent other sounds.

[7] Ogg, p. 73.

It is believed that the Phoenicians supplied the Greeks with 19 alphabet characters. All of these characters were consonants which would form words similar to our present abbreviations, such as, bldg. for building and bbls. for barrels. The Greeks developed their own system by changing various unused Phoenician consonants to vowels and by adding some of their own. Their alphabet became standardized with 24 characters and was officially adopted in 403 B.C.[8]

Even with a standardized system, the alphabet was slow to spread throughout the nation. The lack of spacing between words, lack of punctuation, and use of only capital letters made the written words very difficult to read. However, little by little it spread through Greece and then into Rome.[9]

The Romans formed a basic alphabet retaining 13 letters of the Greek system which were almost unchanged. These letters were A, B, E, Z, H, I, K, M, N, O, T, X, and Y. Remodeling of other Greek letters produced C (and G), L, S, P, R, D, and V. Letters F and Q were taken from two old characters abandoned by the Greeks. This formed a Roman alphabet of 23 characters.[10]

The Romans once dropped the letter Z which held the sixth place in the Greek system, but later found that letter necessary so they revived it and placed it at the end of their order.[11]

The three letters of our present alphabet, J, U, and W, were not used by the Romans at all. The U and W were developed from the V

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[8] Ibid., p. 87.

[9] Ibid., p. 96.

[10] Ibid., p. 106.

[11] Ibid., p. 106.

about a thousand years ago, and the letter J was developed from the I about five hundred years ago.[12]

In addition to establishing the order and content of the alphabet, the Romans also greatly increased the beauty of the letter forms themselves. The square corners and sharp angles of the Greek alphabet were transformed into gradual curves and graceful shapes. This was caused by the Romans "writing" the letters as compared with the Greeks "drawing" them.[13]

While this development of our alphabet was taking place in Europe, a completely different alphabet was being developed in the Orient. In the Orient, the change from actual picture words to picture syllables and letters was much slower. This is the reason that printing with movable type was not credited to the Koreans. This will be explained later in this chapter. Even today much of the Oriental writings are still in the picture stage.[14]

## Paper

The invention of a written language in Egypt brought about the need for a writing material. The first writings were placed on stone, cave walls and later on clay tablets. Each of these was either immobile or bulky. About 3,000 B.C. a crude paper was developed in Egypt made from the papyrus plant, a water reed growing along the Nile.[15]

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[12] Ibid., p. 106.

[13] Ibid., p. 106.

[14] Thomas Francis Carter and L. Carrington Goodrich, The Invention of Printing in China, (New York, 1955), p. 213.

[15] Normon E. Binns, An Introduction to Historical Bibliography, (London, 1953), p. 9.

Papyrus was made by weaving the reed into a matte which was soaked in water and pressed flat. Later the product was improved by rewetting the matte and rubbing it with a stone until it was smooth. By 244 A.D. papyrus was being manufactured in Alexandria as a staple product and exported to other countries.[16]

The last known document on papyrus from Egypt was dated 936 A.D. Paper, the manufacture of which reached Egypt a century and a half previous, then largely displaced papyrus as a writing material.[17]

Discovery of papyrus led to the discovery of other materials suitable for writing. Among such are parchment and vellum. Parchment was made from the skins of sheep and goats and vellum was made from the skins of young calves. The skins were soaked in a solution of lime, then stretched on frames, and scraped thin and smooth with sharp stones.[18]

Paper, as we know it, was invented in the Orient and brought to Europe. The Chinese used bamboo and wood as a writing material long before the Egyptians made papyrus. They were much slower in finding a lighter weight material like papyrus though. It was almost 200 B.C. when rolls of silk began replacing the bamboo and wood material. By 105 A.D. the invention of paper in China was announced to the Emperor. This paper was made from tree bark, hemp, old rags and fish nets.[19]

Oriental traders carried the art of paper making to Europe and in 793 A.D. a paper making factory was started at Bagdad. Workmen for

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[16] Ibid., p. 9-10.

[17] Carter, p. 106.

[18] Ralph W. Polk, The Practice of Printing, (Peoria, Ill., 1945), p. 3.

[19] Carter, p. 3-4.

the factory were brought from China. In 825 A.D. another paper factory was established at Damascus which became the main source of supply for Europe for several centuries.[20]

## Ink

The historical background of ink used for printing is still somewhat a mystery. Early inkmakers kept their formulas a secret and passed them on to their apprentices after they had taken a vow of secrecy.

The first inks were stains and colored fluids which originated in China. These inks spread to Europe with Chinese paper. Before the invention of printing with movable type, German painters found that linseed oil mixed with carbon black made a good paint. This was soon adopted by printers and served as a basic ink for centuries.[21]

Frank Wiborg in his book Printing Ink--A History describes early inkmaking: "When ready to manufacture a new batch of ink for the season, the master printer, with his assistants and apprentices, their families and friends, would take a holiday. The merry-makers would gather around. A fire would be built, over which would be hung a huge iron pot for the boiling of linseed oil. The banquet or picnic dinner included bread that had been roasted or fried in hot linseed oil. Later on, by means of muller and slab, pigment was ground with boiled oil and good ink produced."[22]

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[20] Ibid., p. 134.

[21] Ibid., p. 33.

[22] Charles R. Conquergood, "Dramatic Moments in the Romance of Ink," The Inland Printer, 125 (August, 1950), p. 67.

One of the earliest references to commercial inkmaking is found in Moxon's Mechanics Exercises, dated 1683. While this may not have been very complimentary to the quality of the ink, it was reported that quality of the ink depended on the conscience of the inkmaker. It was not until 1755, when William Blackwell, in England, founded his inkmaking business, that the new industry can be declared as being successfully sprouted.[23]

## Type

Type, as we know it today, did not exist in the art of printing until the fifteenth century. The first printing was done on tablets and carved stones which contained a complete page. Letters and illustrations were hand carved on these tablets and stones.

It was not until the sixth century A.D. that wood blocks replaced the stones and clay tablets. Earliest traces of the use of wood were found in China, but its spread through Asia Minor into Europe was very rapid.[24]

With all their search and research none of the historians of type admits that the many-centuries-earlier wood block printing of the Orientals led to the origination of type as we know it. A Korean book in the British Museum, said to have been printed from movable type in 1338, was not known in Europe until the nineteenth century. This method of printing was not continued in the Orient because languages were still in a picture-word stage, making this method economically impractical. The invention of wood block printing there was forgotten.[25]

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[23] Ibid., p. 67.

[24] Carter, p. 37.

[25] Richard N. McArthur, "Dramatic Moments in the Romance of Type," The Inland Printer, 125 (August, 1950), p. 74.

The idea of individual letters on each block sprang up again in 1430. This time a man named Laurens Coster in Haarlem, carved individual letters on blocks of wood. He printed from them merely to amuse his children; therefore, his idea was not acclaimed as the successful invention of movable type.[26]

Ten years later, about 1440, the idea sprang up again. This time it was Johann Gutenberg, a Mainz, Germany, goldsmith. Gutenberg began his experiments in 1440 using borrowed money. Ten years later he produced his first book, The Constance Missal. This book was printed with type of which each letter was an individual piece of metal.[27]

The Gutenberg invention was far superior to his two predecessors' in that his letters were first carved in brass matrices which were placed in a mold to be filled with molten lead alloy. This process allowed Gutenberg to produce an unlimited number of letters that were durable and of even height.[28]

His letters were very rough and were cut to duplicate the German book hand. The pointed Gothic black-letter (not at all like the type called Gothic in America) was similar to such modern faces as Cloister black or Goudy text. In his first book, all the text was set with movable type, but the initial letters and decorations were hand drawn.[29]

The famous Gutenberg Bible, which followed the Missal by about six years, was composed of more nearly perfected letters with the

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[26]John Clyde Oswald, A History of Printing, (New York, 1928), p. 4.

[27]Ray Lajoie, "Missal Edging Out Bible as Oldest Book," Daily Oklahoman, (June 5, 1955) Magazine Section, p. 14.

[28]D. B. Updike, Printing Types Their History, Forms, and Use, (Cambridge, Massachusetts, 1951), p. 5.

[29]Ibid., p. 6.

initial letters and much of the decorative material cast in the same manner as the type.[30]

In 1456, the same year the Bible was printed, Gutenberg's creditors foreclosed on him and Johannes Fust and Peter Schoffer acquired his type and equipment. Employees of the enterprise began leaving and carrying the type-making secrets to other parts of Europe.[31]

German script was the only type face design in use until 1465 when a rough Roman was produced and printed by Conrad Swenydheym and Arnold Pannartz at Subiaco, a Benedictine monastery near Rome. Their type is usually called half-Roman, as it shows considerable weight and angularity characteristic of the German text, though intended to follow the humanistic Roman hand of that era.[32]

Four years later the first true Roman was developed by Johann and Wendelin de Spira in Venice. Other top designers which followed him include Nicholaus Jenson (1470), Claude Garamond (1530), and John Fell (1585).[33]

A successor to Jenson, Aldus Manutius, cut the first known italic types in 1501. His italic Minuscules were adapted from the cursive writing of that time, and used with small Roman capitals. Slanted italic capitals, first made at Lyons, were not adopted in Aldine typography until 1560.[34]

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[30]McArthur, p. 74.

[31]S. H. Steinberg, Five Hundred Years of Printing, (Harmondsworth, Middlesex, England, 1955), p. 22.

[32]McArthur, p. 74.

[33]Ibid., p. 74.

[34]Ibid., p. 74.

Other dramatic years in type history are 1757, when John Baskerville introduced what we now call a transitional face, and 1788, when Giambattista (John the Baptist) Bodoni introduced his type assortment of 150 Roman and 28 Greek types. Baskerville's face is supposed to have influenced Bodoni in producing a "modern" face.

Today the number of different type faces and their designers will number into the thousands. Many of these faces are disappearing while each year more and more are appearing to give printers and publishers a variety to fit any type of publication.

## Press

In his book, The Origin of Printing in Europe, Pierce Butler describes two methods used by early printers to produce impressions of their blocks. The first and simplest method was that of friction and the other method was to use a press.[35]

The friction method involved laying a sheet of paper or vellum on the inked block and rubbing until close contact had been established at every point and the whole pattern of wet pigment clearly transferred.

Butler explains two disadvantages of this method. First, it would not work well with oily ink as the ink is displaced by rubbing before it can be absorbed by the paper. Second, and a more serious disadvantage, it is almost impossible to take an impression from another block on the reverse side when one side of a sheet has been printed. The rubbing necessary to establish a close contact is almost certain to smear the impression printed on the first side.

Using a press for producing impressions was a faster process, and it produced better work. The heavy pressure necessary to work vellum

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[35](Chicago, 1940), p. 35.

was easily attained, oil ink would be accurately transferred, and the second side of the paper could be printed as neatly as the first.

Screw presses were in common use in the fifteenth century. At that time domestic linens were not smoothed with hot irons but were carefully folded while still damp and set under pressure to dry. Every prosperous householder seemed to have at least one screw press for this purpose. Any of these presses might have been used as it stood by a printer for producing impressions. Modifications of this type press were soon made to make it more suitable for printing.

When Gutenberg put his movable type to practical use in 1450 he adopted the screw press as his method of printing. Instead of a press used for linens, as mentioned above, he adapted the wine press for his invention.

Whether or not Gutenberg knew about the Italian cylinder press which was used by copper-plate engravers in 1452, we will probably never know. At any rate he had to choose between the platen and the cylinder types of machine before designing his press.

There are several reasons why he chose the platen type. First, he lived before the age of machine tools such as grinders, planers, and lathes so that an iron press was not possible. In fact, the first iron-framed press was not known until three and a half centuries later. Also, since wood-turning was done by hand, Gutenberg probably thought the plane surface of a platen would be easier to obtain and to maintain than a wooden cylinder. The third reason was that this invention was being carried out on borrowed money and a platen press would cost less than a cylinder machine. Finally, there was a rough model of such a press in common use, the familiar wine press.[36]

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[36]Eugene St. John, "Dramatic Moments in the Romance of the Printing Press," The Inland Printer, 125 (September, 1950), p. 41.

This style of press, with slight modifications, continued to be used by many small weekly newspapers as late as the early 1900's. Improvements included movable type-bed which would permit better inking, ease of changing forms and better sheet positioning; a faster screw which decreased the time required to print each sheet; and rollers to ink the type, instead of leather balls.

The first successful major deviation from the Gutenberg press did not come until 1811 when Friedrich Konig put his cylinder press into use. This press carried the sheet of paper across the type form by means of a cloth covered cylinder, which increased production to 1100 sheets per hour as compared to 300 on the hand press. "On the twenty-eighth of November, 1814, the reader of the London Times was informed that he held in his hand a paper printed by machinery moved by the power of steam and which had been produced at the rate of 1,100 impressions per hour, thus heralding the advent of what was to become the high-speed press of the next century."[37]

This press was Konig's machine which at once lowered printing costs by 25 percent and thus made cheaper and larger editions possible.[38]

The announcement of the successful cylinder press seemed to open the door for other inventors. Men began immediately to improve and revise Konig's press so that their new models would do better printing at faster speeds. Only 37 years after the first cylinder press, a rotary press was introduced capable of printing 22,000 to 24,000 impressions per hour.

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[37]Steinberg, p. 192-193.

[38]Ibid., p. 193.

Around 1890 the printing industry clearly divided into two fields, speed and quality printing.

Newspapers and magazines with large circulations required faster presses which are supplied by Babcock, Cottrell, Goss, Harris, Hoe, Scott and Wood.[39]

Commercial printers preferred quality printing rather than speed. Such presses as the roll-fed bed, platen presses and rotary presses were the first automatic units devised for such printers by Kidder, Meisel and New Era. Famous names in the early stages of sheet-feeders are Fuller, Harris, Dexter, Miller, Autopress, American Type Founders, Miele, Chandler & Price and Brandtjen & Kluge.[40]

Today, it is possible to obtain a press with speeds up to 100,000 impressions per hour, which will print multiple colors on both sides of the sheets with almost unlimited number of pages. Such presses will print, fold, bind, count and package such publications automatically.

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[39] St. John, p. 39.

[40] Ibid., p. 40.

## Chapter II

## PRINTER'S SYSTEM OF MEASUREMENT

Most printing uses text which is less than an inch in size. Lacking a standard scale, different scales of measurement were adopted by early printers and typecasters. In 1886 the first attempt to standardize sizes was made by the American Typefounders Association.[41]

Up to that time the only standard agreed upon was the division of the inch into six parts. This was called the pica and equalled .166 2/3 inch. The Association dropped the fraction and called the pica .166 of an inch.[42]

Today printers use the rule of thumb measurement when discussing measurements of 1/6 of an inch for a pica. The .00067 inch difference is so minute that it will show only in long lengths.

### Point

A unit smaller than the pica was needed to eliminate the use of fractions in expressing sizes. Early printers gave each size of type a name and learned how each was related to the others in size. Among such names were:

| | | | |
|---|---|---|---|
| Excelsior | 3 points | Brevier | 8 points |
| Brilliant | 4 points | Bourgeois | 9 points |
| Diamond | 4½ points | Long Primer | 10 points |
| Pearl | 5 points | Small Pica | 11 points |
| Agate | 5½ points | Pica | 12 points |
| Nonpareil | 6 points | English | 14 points |
| Minion | 7 points | | |

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[41] _____, Linotype Keyboard Operation, (Brooklyn, New York, 1940), p. 174.

[42] Ibid., p. 174.

A unit called the point, which divided the pica into 12 equal parts, was devised to replace the individual names for each size of type. Rule of thumb calls the point 1/72 of an inch, but the point is actually .01383 inch.

## Agate

Agate is one of the few name sizes of measurement now in use. Prior to use of the point, the agate was approximately $5\frac{1}{2}$ points. Today, its size has been changed to 5 1/7 points and it is used to measure depth of columns in charging for space. Many newspapers and magazines charge for their space by the agate line, of which there are 14 to the inch.

Larger publications may explain their advertising rate in terms of mil-lines. The mil-line is a method to compare the cost of advertising in different publications and means the cost of one agate line in one million copies.

## Ems and Ens

A different system of measurement used to measure the length of lines of type is also used by printers. This is commonly known as the em system.

The em is the square of the size of type to which it belongs. For instance, if you were using 12 point type, the em would be 12 points wide, or with 10 point type the em would be 10 points wide. An en is one-half an em.

This system was introduced to designate the sizes of spacing material when type was set by hand. Today it is used to determine the cost of type setting.

Students should be cautious of usage of the em as a measurement. Many people use the measurement synonymously with pica. Whenever the word em is used, one should determine whether the pica em or the true em is meant.

## Type High

Along with the standardization of printer's measurements was the necessity of a common height of type. Besides the wide variation of type sizes by different type foundries, there were different heights of type. This prevented printers from using types of different manufacturers.

The American Type Founder's Association selected a standard type high of .918 inch. This not only aided the small printers but also permitted the printing press manufacturers to build standard presses.

Other standardized printing measures include the use of plates 11 points thick for shell sterotype and electrotype plates, use of 16 gauge or .065 inch zinc and copper plates for photoengravings and .021 inch for plastic engravings. These plates are then mounted on wood blocks to make them type high.

The standardized measurements mentioned in this chapter are those used in the United States. There are two other systems of measurements used in other countries.

## Chapter III

# PRINTING TYPES

Type is the letters which a printer arranges into words and sentences to create a master from which to mass produce copies. Such type may have one or more of many different physical characteristics. It may be a letter cast on a square block or metal which when inked and pressed on a sheet of paper transfers the letter to the paper; or it may be the letter that is drawn and photographed on film that can be re-photographed onto a sheet of metal and then reproduced from the metal, or it may be drawn or typed onto a sheet of paper or metal and reproduced from such masters.

## Anatomy of Foundry Type

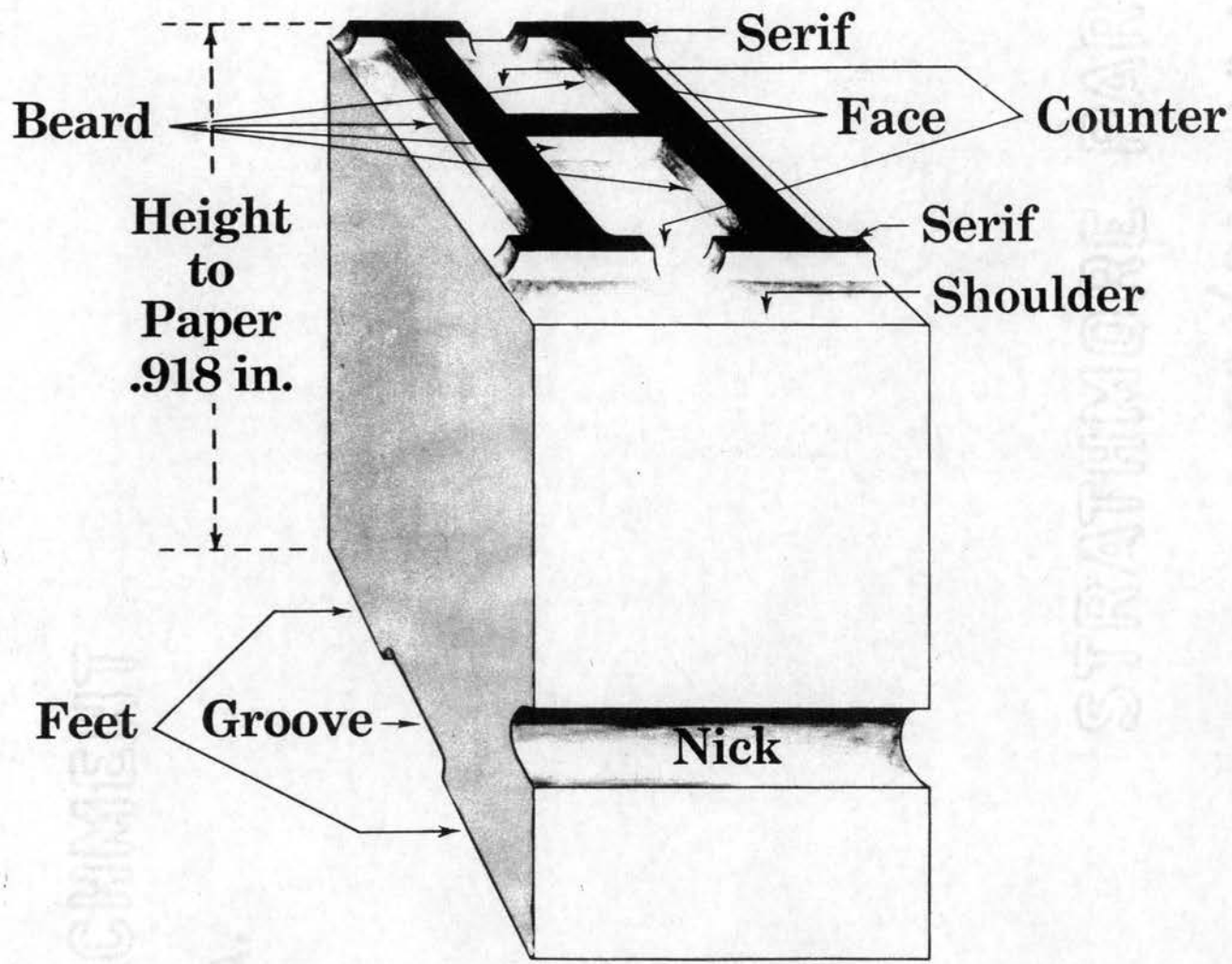
Foundry type is used to describe the characteristics of type in general since there is such a wide difference in the physical appearance of materials produced by different machines. Also, foundry type is the first printing type which was mass produced and is the basic piece from which other manufacturers deviated.

Figure 1 is an illustration showing the anatomy of type.

## Classification

Since the invention of movable type over 500 years ago, there have been thousands of different faces, each differing some more or less important characteristic. So great is the number of type faces which have been cut during the past five centuries that students of typography have been forced to attempt to consolidate them into classifications.

Figure 1. The anatomy of type



Many methods of classification have been developed so that it is impossible to group type faces in a manner which will find agreement by all authorities.

For practical purposes of typography students, the following breakdown of type faces is presented:

Blackletter
Roman Oldstyle
Modern Roman
Transitional Roman
San Serif
Serif Gothic
Script
Cursive

Each of these, except blackletter, script and cursive, is complemented with an italic face.

Among other variations of the above classification are the addition of a ribbon category and the division of the Roman oldstyle into classic oldstyle, French oldstyle and Dutch-English oldstyle.

Samples of these type styles are illustrated in Figure 2.

Blackletter

Blackletter, also known as text, old English, German script and in England as Gothic, is a continuation of the German hand which scribes used to copy manuscripts before the invention of printing. This is the style of type first used by Gutenberg and is commonly used in ecclesiastical printing.

Roman Oldstyle

Roman oldstyle originated as geometric constructed letters for use as Roman stone inscriptions. Each letter was drawn by use of squares and circles. The heavy arcs on the serifs were necessary in the stone cutting to eliminate rough edges in the chiseling.

Classic oldstyle, typified by Goudy, was derived from classic types whose designers centered around Venice in the latter fifteenth

century. These faces were imitations of early Italian manuscripts, having free-flowing lines marked with pen-drawn characteristics. There is little difference between the thick and thin elements as they follow the natural outline of the pen stub as it is drawn over the paper.

French oldstyle, typified by Garamond, is not so imitative in design of the manuscript hand. Garamond is freer than Goudy and there is more difference between the thick and thin strokes. The "A" has a high crossbar, the "T" has unequal angles and directions in the serifs. The lobe of the "a" is tight and small and letters like "r", "t", "n" and "p" have small, dipped serifs.

Caslon, an example of Dutch-English oldstyle, was influenced to a large extent by the Dutch models of the early eighteenth century which were getting further and further away from the style of hand-lettered manuscripts. This face shows some contrast between thick and thin elements of the letters. It is a delicate and interesting face, fairly round and open.

The crossbar of the Caslon "T" dips from each end to the center. The ears of the lower case letters are smooth and oval. The top serifs of letters like "r" and "t" are clear-cut triangles. The "A" is notched as though a paring knife had been used to take a small slice out of it. The loop of the "a" has a clean, open swing which is neither circular nor angular.

Modern Roman

Modern Roman type faces were originated by an Italian designer Giambattista Bodoni with a type design bearing his name. He designed the face to break away from the traditional faces of the sixteenth century as well as to maintain his reputation of beauty in his publications. Bodoni concentrated his efforts on producing editions of

relatively small numbers of magnificent copies. The modern face is characterized by contrasts between light and heavy lines and by flattened serifs. It has a geometric appearance of straight lines and round circles.

Transitional Roman

Transitional Roman type faces are just what the name implies. They are those which have the appearance of being between oldstyle and modern Roman design. Cheltenham is a good example of such a face. It has the geometric appearance and flat serifs of modern Roman, but there is little contrast between the thick and thin strokes as in oldstyle Romans. Most of the serifs have only a slight rounding at the corners; exception is the "t" which has no serif on the crossbar.

San Serif

San serif, also called Gothic in the United States, is just what the name implies. It is type without serifs. The design, typified by Spartan, originated through early Greek writings on clay tablets with a stylus. The letters have no thick and thin strokes, all are the same size.

This block-letter pattern is probably the oldest in existence.

Serif Gothic

Serif Gothic is an adaptation of san serif faces. The letters have the same block appearance as the san serif with no contrast of thick and thin elements. The serifs on this design are square and the same weight as the letter.

Scripts and Cursives

Scripts and cursives originated with French designers. Both styles were based on hand writing with a quill pen. The pen effect is emphasized through the thick and thin elements throughout the styles.

Script designs are those in which the letters are joined together and the cursives have unjoined individual letters.

Italic

Italic faces are slanted letters which correspond with the Roman letters which also have the same name. This style was first used by Aldus Manutius in 1501 as a close-fitting letter which would permit more words to a given page. Today such faces are used sparingly as display lines in headlines or advertisements or for emphasis as words or groups of words in the text of articles.

The slanted complements to san serif and square serif type faces are called obliques instead of italics.

Ribbon and Miscellaneous

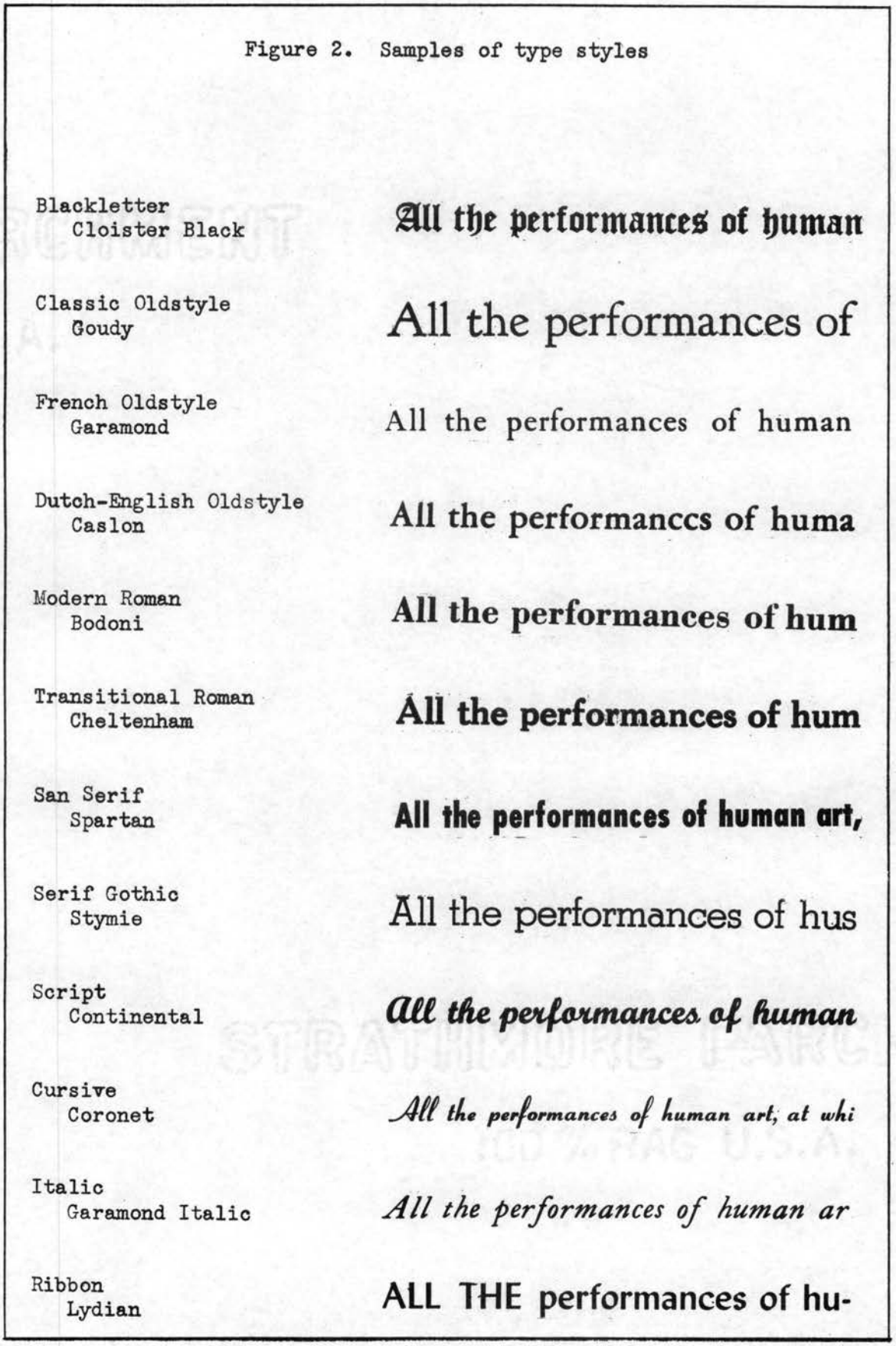
It is almost impossible to group each of the thousands of type faces within the above concise classifications. An example of an unclassifiable face is Lydian. This face has thick and thin elements, but it has no serifs. The over-all appearance of the letters is that of a folded ribbon, which led many typographers to add such a classification.

Other faces which could be placed within such a class include Valiant and Studio.

Miscellaneous categories could be expanded to classify the now popular hand-lettered appearance faces as well as the many brush designs.

More than 14 major type foundries are adding new type designs every year to give buyers of printing a face to meet any situation in a wide selection of sizes and weights.

Figure 2. Samples of type styles



## Type Fonts

Type foundries sell their faces in assortments called fonts. A font contains a complete assortment of letters of one size and style of type, the quantity of each individual character varying in accordance with the frequency of its use in ordinary printing. Fonts are usually sold separately in capital letters, small letters and figures and are based on the number of "A's" desired. Punctuation marks are included in both capital and small letter fonts.

Table 1 shows the breakdown by number of 3-A, 4-a, 3-1; 5-A, 9-a, 4-1; and 18-A, 32-a, 10-1 fonts as sold by American Type Founders.

## Series

Type is produced in different sizes to meet the demand of different forms of design and display. An array of different sizes of the same face of type is known as a series. A complete series of a popular design, such as Bodoni Bold, would include the following point sizes: 6, 8, 10, 12, 14, 18, 24, 30, 36, 48, 60, and 72.

## Family

In addition to type fonts and series, a particular type design has many variations in weights and widths of the letters which, when grouped together, are called a family.

Members of Intertype's Futura family include the following variations of the basic design: Futura Light, Futura Book, Futura Medium, Futura Demibold, Futura Bold, Futura Extra Bold, Futura Medium Condensed, Futura Bold Condensed, and Futura Obliques for each size.

Other variations which could be added to Futura are: Extra Condensed, Extended, Wide, Black and Ultra. In the case of transitional Roman faces, additional variations could be a modern and oldstyle variation.

Table 1. Breakdown of quantity of each letter, according to "A" schemes, in American Type Foundry job fonts.

| Capitals | 3-A | 5-A | 18-A |
|---|---|---|---|
| A I N O R S T . , | 3 | 5 | 18 |
| B W Y | 2 | 2 | 8 |
| C L | 2 | 4 | 12 |
| D H M P U | 2 | 3 | 10 |
| E | 4 | 6 | 22 |
| F G ' | 2 | 3 | 9 |
| J K V - | 2 | 2 | 6 |
| Q X Z & : ; ! ? ( ) | 1 | 1 | 4 |
| **Lower Case** | **4-a** | **9-a** | **32-a** |
| a i n o r s t | 4 | 9 | 32 |
| b g p w y | 2 | 4 | 13 |
| c f m u | 2 | 5 | 17 |
| d | 3 | 6 | 19 |
| e | 5 | 12 | 43 |
| h l | 3 | 6 | 21 |
| j k v | 2 | 3 | 9 |
| q x z | 1 | 2 | 6 |
| . , | 2 | 5 | 17 |
| - | 1 | 2 | 5 |
| : ; ! ? ( ) | 1 | 1 | 3 |
| ' | 1 | 2 | 6 |
| **Figures** | **3-1** | **4-1** | **10-1** |
| 1 | 3 | 4 | 10 |
| 2 3 4 5 6 7 8 9 $ , | 2 | 3 | 8 |
| 0 . | 3 | 5 | 12 |
| - | 2 | 2 | 4 |

## Chapter IV

## COMPOSING AND TYPE MACHINES

The preceeding chapter has discussed type in the form of individual letters. This type is cast by machinery at type foundries and purchased in fonts by printers, both large and small. Most large and medium size printing plants have one or more machines which produce their own type from molds and matrices for faster and more economical assembling of text matter.

Type for reproduction by printing can take two different forms. It can be made of metal with the letter raised on a base or it can consist of letters on photographic film or a transparent material. The form of the type depends on the method of printing to be used, which will be discussed in Chapter VI.

For ease of classification, many of the composing and type machines are called by their trade-mark names.

### Linotype and Intertype Machines

Linotype and Intertype machines are commonly called line composing machines since they produce type in the form of a solid line. Letters on these machines are composed through manipulation of a keyboard which releases punched matrices from a storage magazine and arranges them in a line. The matrices are then transferred to become the top of a form, which is the length and thickness of the line desired. This form is filled with molten metal to cast the line of type. The matrices are then returned to the storage magazine and the cast line is transferred to a tray with previously set lines.

These machines are the most popular type of composing machines in the printing industry and can be found in most any printing plant. Invention of the Linotype of Ottmar Mergenthaler in 1886 was the first successful break from type composed by individual letters as invented by Gutenberg.

Normal operating speed for these machines is six lines per minute, although Linotype has a high-speed model designed to double such speed with Teletypesetter tape operation. The teletypesetter tape is a perforated tape which is coded by the position of the holes in it to automatically operate the keyboard of line-composing machines.

Such line composing machines have a normal type size range of 4 points to 45 points, but some condensed 48-point faces can be cast on a 45-point base. Line length can be made from 4 picas to 30 picas. Lines up to 42 picas can be attained on one slug with a special machine or longer lines can be produced through using two or more slugs.

## Monotype

The Monotype is a type-casting machine which produces individual types, set up in lines and justified to any width. It consists of two separate units--a keyboard and a caster.

The keyboard unit punches a series of coded holes in a paper tape to determine the order of the letters. This tape is similar to the Teletypesetter tape used for automatic operation of line-composing machines.

The punched tape is put on the casting unit to activate a large matrix which has the complete alphabet, capital letters, small letters and numerals. The mold passes over a pot of molten metal which casts the letters selected by the tape. The letters are assembled one by

one into a tray until the code on the tape determines the end of the line; then the line is pushed forward to make room for the next line.

Advantages of such a machine are that corrections do not involve resetting the complete line, but the error can be removed and the correct letter inserted in its place.

The Monotype Company also produces a machine which casts only individual letters to be placed in type cases. This machine is similar to ones used by major type foundries and can be found in many large newspaper and typesetting companies.

## Ludlow and All-Purpose Linotype

The Ludlow and All-Purpose Linotype are casting machines which produce type slugs from lines of assembled matrices. These machines are used primarily to supplement line-composing machines with larger sizes of types.

Matrices for these machines are assembled from a case by hand and are returned to the case by hand after casting the line. Range of type faces on these machines is from six point to 120 point condensed.

Today the Ludlow Typograph is the only machine of this type in production. The All-Purpose Linotype is no longer in production, but many of these machines are still in use.

## Fotosetter

The Fotosetter is a photographic, line-composing machine similar in construction to the Intertype slug machine except that it has a camera in place of a metal pot. The machine is manufactured by Intertype Corporation and is the first successful, photographic-composing machine in mass production.

The master letters for Fotosetter matrices are pieces of film in the sides of the matrices. The matrices are assembled in complete lines, like line-composing machines, and transferred to the camera. In the camera unit, each mat is photographed individually with the film moving the width of the mat after it is photographed to allow space for the next letter. The mats are then returned to the storage magazine for re-use.

The finished type, on film, can range from 4 to 36 points in lines from one letter to 42 picas wide. Larger sizes can be obtained through enlarging the film photographically.

Advantages of this machine are: first, the production of sharp letters from four to 36 points with only one set of matrices; second, make-up of pages can be done with scissors and celephane tape; and third, justification of lines is equally between each letter instead of between the words as in a line-composing machine.

## Photon

The first successful experimental photographic composing machine and second to the Fotosetter in entering the commercial field is the Photon.

Photon has no physical resemblance to other type-composing machines. It is operated by a standard typewriter keyboard which has additional keys for special characters. The keyboard is mounted on the machine, which has a desk appearance. On the desk are controls to determine type size, line length, line spacing and type faces.

A glass matrix disc, containing 16 different type faces, supplies the master letters to be photographically enlarged or reduced on film to compose the type.

The operator sets a complete line, which is electronically put into coded storage. A proof is then reproduced in typewriter script so that corrections can be made before photographing the line. After corrections, the operator presses another key to actuate the machine in photographing the line. Spacing is automatically determined between the words to give a flush left and right line.

## Linofilm

The third major photographic composing machine to reach the commercial market is produced by Mergenthaler Linotype Company. The Linofilm, introduced in 1954, is a two-unit machine--keyboard and photographic center. The keyboard unit utilizes a standard typewriter keyboard, a small auxiliary selector and control panel for selector and control keys, a justifying unit and a paper tape perforator.

The photographic unit contains a reader unit, an optical system and a film magazine. Photographing of the letters is done through the use of a video tube and electronic waves, instead of a moving disc or circulating matrices as employed by the two previous machines.

## Filmotype

Filmotype might be referred to as the Ludlow of photographic composition. It is a small table-top machine on which the desired letters are positioned in front of the copying film by hand. This machine will set only one size of type from each master film, but different sizes can be attained through enlarging and reducing photographically with an enlarger. Filmotype Corporation has over 1,000 different type faces available which are inexpensive film strips that can be acquired by printers on purchase or loan basis.

## Typewriters

The standard office typewriter is another type-composing machine which can be applied to printing. Good clean typewriter copy can be photographed and processed into a printing plate which will reproduce copies as good as the original.

Modern typewriters have available new faces which have differences between thick and thin to class them as true Roman faces. San serif faces are also available as well as larger sizes of the standard face.

In addition to the standard typewriter, variable spacing typewriters have been introduced to provide even left and right margins with a variety of type faces that will compare with printing types. Immediately after World War II, International Typographical Union strikes throughout the United States created a demand for such typewriters to set type for strike-bound newspapers. This would enable the newspapers to use regular typists to set the material for their publications. Their copy would be photographed and plates made from it.

Three companies--International Business Machines, Coxhead Corporation and Vari-Typer, Inc.--produced such machines. Since then most of the regular typewriter companies have begun their models of such machines.

Many of these typewriters can have the type face and size changed at will. Sizes range from six point regular and expanded to 18 point condensed.

Typewritten printing copy can also be composed through IBM and Remington-Rand punch cards. The desired text and tables can be punched into the cards, arranged and printed with their printers to

produce a master copy to be photographed for a printing plate. This is becoming popular in name and directory listing and tabulated tables.

## Artype

Artype is type printed on pressure sensitive paper designed to be cut out individually and pasted up as a headline for master copy which is to be photographed. Such type is available in a wide variety of sizes and faces to meet the need of small printers who use typewriters as composing machines. Fonts of such type can be obtained for as little as $1 each.

## Chapter V

## REPRODUCTION OF ILLUSTRATIONS

Since the gradations of a photograph, oil painting or other type of original are in continuous tone form, i.e., represented by a varying silver deposit (as in a photograph), or by smooth and continuous application of pigment, and since it is impossible to transform more than the deepest shadows or the highest lights into a printing surface by mere photoprinting on sensitized metal, some means must be employed to transform the more delicate gradations into a form capable of accurately reproducing these gradations in the inked impression on paper.[43]

The method adopted to reproduce middle tones of illustrations is the half-tone screen. This screen breaks the entire photo-negative into fine dots. Where deep shadow is on the negative, the dots blend together to make the plate smooth and solid. In the lightest areas of the negative such dots are very fine and almost unnoticed by the naked eye. Middle tones are produced through medium-sized dots.

To produce the printing plate of the illustration, the screened negative of the illustration is printed directly on a sheet of photo-sensitized metal. Where the light passes through the negative onto the metal, it hardens the metal.

After the photo exposure, the metal plate is placed in a solution of acid which eats away the areas not hardened by the light. Such

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[43] J. S. Mertle, Photolithography & Offset Printing (Chicago, 1937), p. 68.

etching of the plate creates a relief plate similar to type in that the printing areas are even and the non-printing areas are below the surface.

Screens for photo-reproduction can vary according to the type of printing press and paper to be used. For newspapers and rough papers the screen should have either 50, 65 or 85 dots to the inch. Finer and smoother papers would use 100, 120 or 133 line screens which mean that there would be that many dots to an inch of the plate. Other screens are made with lines from 150 to 300 but are rarely used due to paper surfaces and press limitations.

## Techniques

There are three major techniques available to the editor to reproduce illustrations. These are half-tones, line plates and combination plates.

### Half-tones

A half-tone is a printing plate made with the use of a screen as previously described. These plates are so named because they are made to pick up the middle tones of grey.

### Line Plates

Line plates are those produced without the use of a half-tone screen. They reproduce illustrations in only the two extremes, black and white. These plates are commonly found in cartoons and comic strips.

### Combination Plates

Combination plates are as the name implies, a combination of line and half-tone plate. Such plates are generally produced through placing the dot tone pattern in selected areas by hand with patented screen

patterns called Ben Day. These screen patterns are printed on clear pressure sensitive material which can be cut to fit the desired area. The illustration is then photographed and etched as a line plate, but the Ben Day produces the half-tone qualities in the desired areas.

Combination tones can be placed in drawings by hand or through the use of special, rough-finish, artist papers if desired.

## Color Separation

Printing is done one color at each impression of the type. In order to obtain more than one color, a separate arrangement of type and illustrations is necessary for each additional color. This task is reasonably simple except in the case of natural color illustrations in three or four colors.

Natural color illustrations are commonly referred to as process plates and can be reproduced in either the three primary colors or these three plus black. When black is omitted, it is replaced by a dark blue for shadow tones.

Copy for process plates can be anything from an oil painting to a color transparency or even a black and white photograph. In any case a separate screened negative is made for each desired color. Where black and white copy is used, three or four negatives are made with grey tones lighter than ordinary negatives so that they may be re-touched by hand to obtain the desired color tones.

In screening process negatives, the screen is turned for each plate so that the color dots will not print over one another. In three-color printing the blue screen is set at $45^{\circ}$, the yellow at $75^{\circ}$ and the red at $105^{\circ}$. This pattern will cause the dots to print in a circular appearance with the dominant color in each area being a

heavier dot. Four-color plates have a dot pattern of black at 45°, yellow 60°, red 75° and blue 105°.

Through using the three primary colors and the shade black on white paper, any of the secondary colors and tones can be obtained through dot variations. Where the red and blue dots dominate an area, the resulting color will be violet; yellow and blue will produce green; and red and yellow will produce orange. Black will give a heavier tone and absence of it results in light tones.

## Methods of Producing Plates

Photoengravings are the most common method of making plates. Such plates are made as explained at the beginning of this chapter. Materials for them include zinc, copper, aluminum and magnesium.

Zinc plates are the most popular. Zinc is the least expensive, but is limited by the strength of the metal. Such plates will wear down during large numbers of impressions. Copper is expensive, but has the strength qualities which zinc lacks. Aluminum and magnesium are compromises between the two for quality printing, but cannot be stored for reprinting due to their corrosive qualities.

A comparatively new plate in the field is plastic. Machines are designed by Consolidated Equipment Company and Fairchild Corporation to pick up grey tones through an electric eye and transmit electric impulses to a hot needle which burns the dot pattern into a plastic plate.

The Fairchild Scan-O-Graver will produce plates only the size of the original print, but will make either standard or reverse plates. Screen size is limited to that originally on the machine.

Consolidated's Engrav-A-Plate, newest in the field, will enlarge or reduce the size from that of the original copy, produce reverse plates, permit screen sizes of 60, 65, 80, 100 and 120, and can be adapted for process plates.

## Duplicate Printing Plates

Three methods are used to produce duplicate printing plates as needed. They are electrotype, sterotype and plastic.

Electrotype plates are produced by making a deep impression of the plate in a thin sheet of copper. The face of the sheet is coated with wax and placed in a vat of acid. A bar of lead is placed in a second vat of acid. Through electrolysis the lead is transferred to the back side of the copper sheet to form a base. The plate is trimmed and shaved and ready for shipment.

Sterotype involves the making of a paper matrix of the desired plate through applying approximately 10 tons pressure to the type and sheet of heavy paper. The matrix is shipped to the printer who places it in a form and makes a lead cast from it.

Plastic plates are made in a manner similar to that in which sterotypes are made except that the plastic is shipped to the printer in place of the mat.

Today electrotype plates are generally limited to duplicate fine-line illustrations and color plates. Both the materials and labor are too expensive for general use. Sterotype mats do not reproduce fine-line illustrations and are hampered by shrinkage of the matrix, but they are least expensive and light weight for shipping. Plastics produce a better plate than sterotype since the plastic can be forced into the

mold under pressure. It also has some shrinkage but is gaining in popularity by many advertising agencies.

## Chapter VI

## METHODS OF REPRODUCTION

There are many methods of mass reproducing written material which can begin with the use of multiple carbon copies, mimeographing and ditto. These methods are considered office machines and will not be discussed in this paper.

Instead, this chapter will discuss mass reproducing methods which will be found in quality printing plants and will include letterpress, offset-lithography, gravure and silk screen printing.

### Letterpress Printing

Letterpress printing is the reproduction of written material from type which the printed parts are on a raised plane from the non printing base. This method is the earliest method of printing which began with rubbing stones.

Presses to do this type of printing can be divided into two major categories, platen and cylinder.

The platen press, which is most common in most all printing plants, involves the principle where two flat surfaces close together. On one surface is the type to be printed, which is inked with round rollers passing over the type leaving a layer of ink. On the other surface are guides which hold each sheet of paper as it is pressed against the type by closing the two surfaces.

The second method of letterpress printing is through the use of a cylinder to press the paper against the type. Cylinder presses can use either type which is placed on a flat bed or type which is cast in

a solid plate on a curve to make another cylinder. Also, such presses are designed to print by individual sheets or from a continuous roll of paper.

A flat-bed cylinder uses common type (.918 inch high) placed on a flat surface under the cylinder which carries the paper over the type. On most sheet-fed presses the type-bed moves back and forth underneath the inking rollers and cylinder. Webb presses, where paper comes from a continuous roll, usually have the bed of type stationary and the cylinder and inking rollers pass over it.

Rotary presses, presses using two cylinders, utilize continuous paper from a roll. On one cylinder is a curved sterotype plate of type which rotates at the same speed as the impression cylinder which presses the paper against the type. Such presses are generally used in magazine and newspaper printing where speed of printing on both sides of the sheet in great quantities is necessary.

All of the above sheet-fed presses can be obtained with automatic feeding or they can be operated manually. Platen presses are less expensive and generally slower than cylinder presses. In turn, cylinder presses produce a better quality of printing since only a small part of the cylinder is pressed against the type at one time and only a light impression is necessary to attain the desired printing.

## Offset and Lithography

Lithography is taken from the Greek language--its literal meaning is "writing on stone." This printing process began with images traced on stones with a greasy compound. Water was put on the stone before each re-inking to repell the oil base ink in areas where the greasy substance was not placed on the stone. After inking the areas of the

original image, paper was impressed against the stone to produce the printed copy.

Modern lithography has replaced the stone with porous metal plates which will easily bend into the shape of a cylinder to enable faster and better reproductions. Offset was added to such printing when an intermediate cylinder was added to lithographic presses to decrease the amount of water transferred to the paper with the ink.

Today's offset-lithographic presses are sheet and roll fed, using zinc or aluminum plates printing on a rubber blanket which in turn transfers the image to paper with a steel, impression cylinder. Water is applied to the plates with cloth-covered, composition rollers. Ink is applied immediately after the water through another set of rollers to give the press an even, continuous motion.

Offset press sizes begin with Multilith and Davidson 10 x 13 inch size. Other sizes include $17\frac{1}{2}$ x $22\frac{1}{2}$ inches, 19 x 35 inches, and up to 72 inches.

## Rotogravure

Rotagravure is a process by which the printed image is etched into a cylinder. On the press the cylinder rotates through a reservoir of ink, then the surface ink is scraped off with a blade the length of the cylinder. Ink remaining in the etched depressions of the cylinder is that which will print directly on paper.

This method of printing produces excellent photograph reproductions, but the expense of the cylinders and etching them has made it prohibitive for most printing.

## Silk Screen Printing

Silk screen printing is a process used for printing a small quantity of large sheets of paper or cloth. An example of such is paper for large billboards along the highways.

This method involves the drawing of the image on large sheets of fine woven cloth. Non-printing areas are filled with a laquer to prevent ink from penetrating through the cloth. The cloth is mounted in a frame and placed over the paper so that ink can be spread across the screen and penetrate to the paper. Using a fine woven cloth will eliminate most all the cloth weave on the printed sheet since the ink will smear under the threads a short distance.

## Chapter VII

# PAPER

Physical appearance of the printed message is dependent on three tangible things: type, ink and paper. Excluding content, the reception given to the printed page by intended readers depends on selection of these three items and how well the printer uses his skills.

Paper, one of these elements, is made in a wide array of finishes ranging from rough-surfaced mimeograph paper to slick, coated enamels. Sheets are available in a wide range of thicknesses varying from thin onionskins to heavy cardboards.

## Kinds of Paper

Paper manufacturing can be divided into three basic processes. These are the making of rag papers, sulphites and sulphates.

Rag paper was the first to be mass produced. It is made from a pulp of cotton and flax fibres and old rags. The pulp is poured into the paper machine where it passes through calendering rollers which dry the pulp and form it into a continuous sheet.

In the calendering process, different finishes can be attained through interchanging the rollers. For example, the last calendering roller can be embossed with a linen weave surface which will transfer such surface to the paper.

Rag content papers are best adapted to pen and ink writing and fine letterhead stationery. It is a strong paper which will permit erasures and rough handling without tearing easily.

Sulphite papers are chemically processed from wood pulp, usually pine and spruce. These papers are also processed through calendering rollers.

Papers from this process can be more easily adapted to the type of printing surface desired and the raw material is much less expensive than rag papers. Manufacturers combine rag and wood pulp in some papers to attain the strength qualities of rag papers with the inexpensiveness and adaptability of sulphites.

Sulphites include newsprint paper which is made from poor quality pulp, book papers which have been pressed into a hard sheet through calendering rollers, and enamels which have a chalk substance added to give a smooth, glossy surface.

Sulphate papers, commonly called kraft paper, are waterproof and wrapping papers. The sulphate process is similar to the sulphite process except that different chemicals are used to break the wood fibres into pulp to produce a stronger paper at the expense of poorer printing qualities.

This process permits the use of wood which would be rejected for sulphite papers and re-use of waste papers. Natural color of this paper is brown, but it can be bleached and dyed to any desired color.

## Uses of Paper

Mimeograph paper.--This course fibre, rough-surfaced sulphite is designed to absorb ink by penetration. It is not well adapted to half-tone pictures.

Newsprint.--An inexpensive, rough-surfaced paper, newsprint is designed to absorb ink by penetration. It is adapted to print half-tone screens of 65 to 85 lines.

Poster.--Poster is colored material of the same grade and specifications as newsprint.

Book and offset papers.--There is very little ink penetration to better grades of this medium-smooth, soft, dull-finished paper. It will utilize half-tone screens up to 100 lines. Book papers are stronger and more durable than newsprint and mimeograph papers.

Coated book.--This smooth, hard-surfaced, semi-gloss, finished paper is designed to print half-tones up to 120 lines. Coated papers are stronger and more durable than common book paper.

S&SC book.--Sized and super calendered book papers are a glossy, hard-surfaced paper designed to print even finer half-tones.

Egg shell book.--This is a soft, rough-surfaced paper which has little calendering. It is commonly used for programs and folders.

Enamels.--These slick-surfaced, hard papers are designed to print the best with 150 line half-tones. They are available in either a glossy or dull finish.

Flat writing.--This is a more refined grade of newsprint designed for pen, pencil and typewriter work. It is not suited to half-tone printing.

Bonds.--Bonds can be either sulphite, rag or a combination which is designed as a strong, hard, stationery paper. It is not particularly suited to printing and half-tone reproduction.

Ledger.--Ledger is a hard, durable, smooth-surfaced paper for record forms. It is usually a rag content paper adapted to pen-and-ink writing more than to printing.

Text.--This is a plate or antique finished book paper designed particularly for brochures and announcements. It is usually watermarked.

India.--India is better known as bible paper. It is a thin, hard-surfaced, durable paper used primarily for bibles. Methods of manufacture of this paper have been kept secret within each paper mill.

Onionskin.--This is a thin, strong, hard-surfaced, durable writing paper designed for carbon copies of typewritten material. Such papers can be stored in a minimum of space for years without becoming brittle.

Cover.--These extra-heavy, soft papers are designed for covers of paper-bound booklets. They are not particularly adapted to half-tone printing but are available in a wide assortment of finishes.

Bristol, tag and index.--These cardboards are available in a wide range of thicknesses and surfaces to fit most any need.

Kraft.--Kraft is the name given the sulphate paper used for wrapping papers and heavy, durable envelopes.

## Paper Sizes and Weights

Paper is packaged at the mill in standard sizes and sold to customers by the pound. Each package contains a ream--500 sheets--except cardboards which are wrapped in packages of 100 sheets.

Standard sizes and weights of papers are shown in Table 2.

Cardboards and kraft papers have many different sizes, each having its own basis for weight.

Sizes of paper shown in Table 2 are only the basic sizes for determining the weight of each kind. Paper wholesalers carry a wide selection of sizes to fit most any need, but when ordering printing the basic size of the desired paper should be considered to eliminate waste.

## Figuring and Cutting Paper

Paper is purchased in large sizes and cut in printing plants to the desired size. To determine the number of sheets of large paper

Table 2. Standard sizes and weights of paper

| Paper | Basic Size (in.) | Weights Available[1] (pounds) |
|---|---|---|
| Bonds | 17 x 22 | 13, 16, 20 and 24 |
| Book and Offset | 25 x 38 | 50, 60, 70, 80 and 100 |
| Coated Book and S&SC Book | 25 x 38 | 70, 80 and 100 |
| Cover | 20 x 26 | 50, 60, 65, 90, 100, 110, 125 and 130 |
| Egg Shell | 25 x 38 | 50 and 60 |
| Enamels | 25 x 38 | 60, 70, 80 and 100 |
| Flat Writing | 17 x 22 | 14 and 16 |
| Ledgers | 17 x 22 | 24, 28, 32 and 36 |
| Mimeograph | 17 x 22 | 16, 20 and 24 |
| Newsprint | 24 x 36 | 32 and 35 |
| Onionskin | 17 x 22 | 9 |
| Poster | 24 x 36 | 32 |
| Text | 25 x 38 | 70 and 80 |

[1]The weight of paper is quoted as the weight of a ream of the basic size of each type of paper.

needed to attain the desired printed sheets, divide the measurements of the smaller sheet into the measurements of the larger sheet.

The following problem will serve as an example in figuring cost of paper as well as in determining the number of sheets needed for a particular job.

PROBLEM: A job of 750 copies of a four-page, 6 x 9 inch folder is to be printed on 60-pound Wedgewood offset. The paper costs $27.10 per hundred pounds and comes from the mill in a 25 x 38 inch size.

The four pages will be printed two at a time on a sheet of paper 9 x 12 inches. Then the paper will be turned over and the remaining two pages printed on the reverse side before being folded.

The 750 sheets of 9 x 12 inch paper are to be cut from 25 x 38 inch stock. Divide the 9-inch width into the 38-inch side of the stock and you get 4 with 2 inches trim. Divide the 12-inch measurement into the 25-inch side of the stock and you get 2 with 1 inch trim. Now multiply the 4 (from the 9 into 38) times the 2 (from the 12 into 25) to get the number of smaller sheets that can be attained from the larger. The answer, of course, is 8.

Now divide the 8 into the number of sheets needed for the finished job, or into the 750. The result is 93 3/4 or 94.

We know that the cost of 25 x 38 inch paper is $27.10 per hundred pounds. The weight of one ream, or 500 sheets, is 60 pounds; so, to find the cost of 500 sheets, multiply $27.10 by .60. You will get $16.26 for the cost of 500 sheets. One thousand sheets will cost twice as much as 500 or $32.52. The cost of the 94 sheets needed can be determined by multiplying the cost of 1,000 sheets by .094 (the fraction of 1,000 sheets needed) to get the answer of $3.06.

To cut the paper for such a job, the paper cutter would be set at 9 inches. Four stacks of paper 9 x 25 inches would be cut from the 25 x 38 inch stock. Then the cutter would be set at 12 inches to trim them to 9 x 12 inches.

## Chapter VIII

## INK

Ink, another major tool in good printing, was an obstacle which hampered the invention of printing over 500 years ago. Today it can be the difference between a good printing job and a poor one.

Ink is purchased by the printer in barrels, pails, cans and tubes. It is a paste substance which contains a base, pigment dye and dryer. Every basic element must be suited to both the paper to be printed and the press used in printing.

In printing, the speed of the press determines how thin the paste substance should be. A high-speed metropolitan newspaper press will use ink that is almost like water.

Newspaper ink penetrates into the paper and never dries. This permits the press to be used day after day without washing the ink off the press. Since the ink penetrates into the paper, it must have a heavy pigment in the ink to keep the printed areas black after penetration.

In contrast, a job printing press which prints only 1,500 sheets per hour would use a thick, paste ink. If it were printing on enamel paper, a quick-setting, medium-black ink would be necessary to prevent the ink from smearing when the next sheet is stacked upon it. Inks for enamel paper should be a non-scratch base to give it a permanent set since very little of the ink penetrates into the paper.

Ink manufacturers have been successful in keeping their components a secret, but will produce inks suited to any press in any color or

shade to fit the following needs:

News and poster inks

Half-tone inks

Book inks

Combination inks

Dull half-tone inks

Gloss inks

Bond inks

Mimeograph inks

Snap dry inks

Non-scratch inks

Washable inks

Opaque inks

Transparent inks

Special inks for cellophane

Metalic inks

Glo inks

Process color inks

In addition to color inks purchased from inkmakers, many printers desire to mix their own shades and tones to fit a particular job. Table 3 is a sample ink-mixing schedule used by printers.

Figure 3 illustrates a breakdown of colors from primary colors to secondary and intermediate colors.

Table 3. Ready reference color mixing chart[1]

BROWN, CHOCOLATE--White, Red, Black
BROWN, SIENNA--Orange Lake, Black
BROWN, SNUFF--Yellow, Bismark Brown
BROWN, UMBER--White, Red, Yellow, Black
GREEN, DARK--Lemon Yellow, Milori Blue
GREEN, GRASS--Lemon Yellow, Peacock Blue
GREEN, OLIVE--Orange Lake, Process Blue
MAGENTA--Process Red, Purple
MAHOGANY--Yellow, Orange, Black
MAROON--Deep Red, Blue
ORANGE--Yellow, Red
PURPLE--Process Red, Blue
VIOLET--White, Red, Blue

Tints

BLUE, LIGHT--White, Milori Blue
BLUE, DARK--White, Bronze Blue
BLUE, SKY--White, Cerulean or Peacock Blue
BUFF--White, Yellow, Orange
CREAM--White, Vermillion, Blue
FLESH COLOR--White, Orange Lake
GREEN, LIGHT--White, Green Lake, Lemon Yellow
GREEN, DARK--White, Green Lake, Blue
GREY, BLUE--White, Half-Tone Black
GREY, DRAB--White, Yellow, Black
GREY, PEARL--White, Black, Yellow
LILAC--White, Red, Blue
OLD GOLD--White, Persian Orange
PINK, LIGHT--White, Vermillion
PINK, ROSE--White, Process Red
SALMON--White, Persian Orange

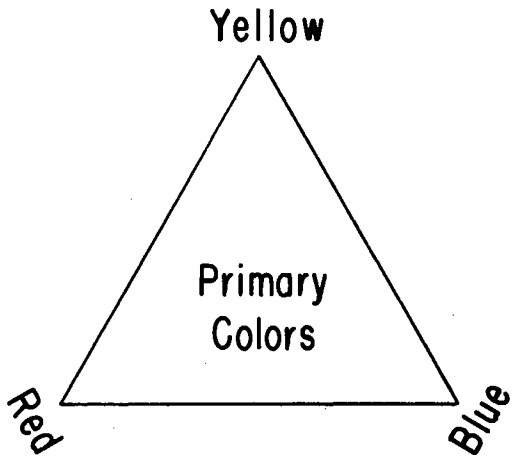
[1]Colors to be mixed are given first in capitals. The ingredient inks from which they are mixed, follow. The first mixing color predominates, the others in proportion.

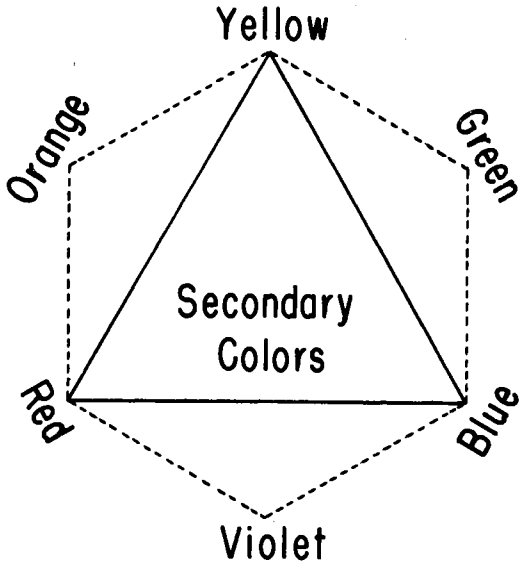
Figure 3. The color wheel

One of the simple systems for making a color wheel is based on the three colors, yellow, blue and red. These colors cannot be obtained by mixing other colors. They are called primary colors.

**PRIMARY COLORS:**

Yellow
Blue
Red




The next colors are made by mixing together two adjoining primary colors. These new colors are called secondary colors.

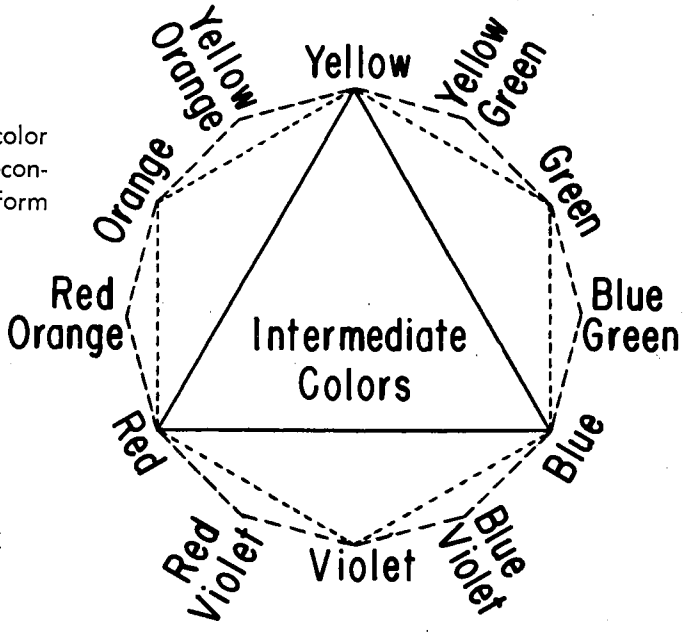
**SECONDARY COLORS:**

Yellow + blue = green
Blue + red = violet
Red + yellow = orange

To round out this very simple color wheel the adjoining primary and secondary colors are mixed together to form the intermediate colors.

**INTERMEDIATE COLORS:**

Yellow + green = yellow-green
Green + blue = blue-green
Blue + violet = blue-violet
Violet + red = red-violet
Red + orange = red-orange
Orange + yellow = yellow-orange



# Chapter IX

# BINDERY

Methods of binding sheets of printed paper into books and booklets are almost unlimited today. The method of binding will determine the position of the pages on the printed sheets and the way each folded sheet of multiple pages is placed together for binding.

## Types of Bindings

A case-bound book consists of a hardboard cover which is covered with cloth or plastic material. The pages are printed in sections of eight or 16 pages with each of the pages falling in numerical order within the section. Bindery operations for this type of book consist of stacking the sections on top of one another. The complete book is sewed together by a special machine before the back is glued to give added strength. The assembled pages are then placed within the cover and the end sheets are glued to the cover. After being pressed until the glue is dry, the book is ready for distribution.

A side-stitched binding, a much cheaper method, uses printed sections similar to the case binding. In place of sewing the sections together in the back, the pages are placed in the cover and secured with wire staples on the side. Ends of the staples may be covered with binder's tape to improve appearance.

Variations of the side-stitched book include two styles of hinged covers. For the first style, the assembled pages are side-stitched without the cover. Then the cover is glued to the book. The second style is bound as the regular side-stitched book except that the covers

are cut approximately one-half inch short. A half-inch filler is taped to the bound side of the cover to form the hinge.

Most popular binding for small booklets is saddle stitching. Pages for this type of binding are printed so that each section can be placed inside the other. The first eight-page signature would include the first four pages and the last four pages of the book. The signatures and cover are placed inside one another and then the booklet is stitched with two or more wire staples placed along the back fold.

Spiral bindings of wire or plastic inserted through holes punched in the pages and covers are used for unfolded, paged books. Such bindings permit use of mimeograph and small presses that can print only one page at a time.

## Folding and Trimming

Printed sheets for books are folded so that the open ends of the sheets are on the bottom and outside of the book. Such standardization permits the binder to use the top and binding edge of the book as guides to keep the pages even while assembling and binding.

Except for the spiral and case-bound books, the folded pages remain together throughout the entire binding operation. After binding, one-eighth inch is cut off the top and bottom and one-quarter inch is cut off the outside to cut the pages apart and finish the book with all sides smooth and even.

Case-bound books are trimmed after sewing and gluing, and spiral books are trimmed before binding.

# Chapter X

## COPYFITTING

Fitting typewritten into printed type areas is done on a basis of averages. There are three popular methods in use to do this job. These methods are commonly called the character count method, the word count method and the square inch method.

### Character Count Method

To fit copy by the character count method it is necessary to know three of the following factors: average number of typewritten characters to the line of copy, the number of typewritten lines of copy, the average number of characters to each line of type, or the number of lines of type.

To find the number of lines of type a certain sheet of copy would make, multiply the number of characters of typewritten copy by the number of typewritten lines and divide by the number of characters in a line of printed type. The result is the number of lines of type. Count any fractions of lines as another line.

In order to find how much copy is necessary to fill a specific area of type, multiply the number of characters in each line of type by the number of lines of type and divide by the desired number of characters in each typewritten line.

This method of copyfitting is not perfect but is accurate and simple enough that it can be applied to most any job of printing.

## Word Count Method

The word count method of copyfitting is identical to the character count system except that words are the units employed instead of characters. The results of this method are not as accurate as the character count method because of the variations in the length of the different words.

To determine the number of words of copy needed when the number of characters is known, divide the total number of characters by six. Six is a predetermined average of number of letters and space for each word.

## Square Inch Method

In order to fit copy with the square inch method it is necessary to determine the number of characters or words to the square inch of type. This can be determined either by using a table or by manually counting the words in a sample of the desired type.

To fit copy with this method, measure the number of square inches in the type space to be filled and multiply it by the number of words or characters per square inch.

## Copyfitting Display Lines

The above copyfitting methods are based on averages, and accuracy of fitting is increased with larger amounts of copy. The amount of copy in most display lines is so small that these copyfitting methods would be too inaccurate, so a different character counting system is employed to fit such lines.

Character units are assigned letters of different width for display fitting. All lower case letters except i, l, m and w are assigned a value of one unit. The i and l are given a value of one-half

and the m and w a value of one and one-half. All capital letters except I, M and W are one and one-half unit widths. The capital I is one-half the the capitals M and W are two units wide.

Punctuation, except the question mark, is assigned a value of one-half unit, and the question mark and all figures are given one unit count.

The above units are for headlines which contain both capital and small letters. For display lines which are all capital letters a slightly different unit system is employed. One unit letters include all letters except I, M and W, all figures and the question mark. One-half unit characters are the I and the remaining punctuation. One and one-half units are assigned the M and W.

## Copyfitting Tools

There are many different copyfitting tools available to simplify mathematical mechanics of the job. Among such tools are pre-calculated tables, slide rules and electronic computers. Most of these tools use the length of the lower case alphabet, measured in points, as a basis for determining average type character width. (Tables showing length of the lower case alphabet are available from most type manufacturers.)

## Fitting Pictures

Illustrations can be enlarged or reduced photographically before making the printing plate. Such enlarging and reducing is done proportionally to its original dimensions, but the editor can change such dimensions through cropping. Cropping is done by marking on the face of the picture the area of the illustration to be reproduced.

Cropping marks are placed on the face of the photograph. They are small marks on the edge of the picture made with a red or black

grease pencil. The grease pencil will not mar the photograph as will a hard-lead pencil and can be rubbed off in event of error.

Proportional scales for predetermining enlarging and reducing sizes are available to the editor. They will enable the editor to size his illustrations and dummy them into his publication while the prints are being processed by the photoengraver.

# Chapter XI

## LAYOUT

Successful printing is based on a few general principles which govern the details of its construction and arrangement. Through use of such principles, the publication will have typographic unity and organization of display, text and illustrative material.

The six principles of display are fitness, balance, proportion, harmony, contrast and rhythm.

### Fitness

Fitness implies that the general plan and details of the job shall be logically arranged. The layout should be kept simple unless the nature of the copy implies otherwise. Fitness also implies that the type shall create the proper atmosphere for the message to attract the intended reader.

Fitness of copy means that copy blocks should be broken into lines of logical units which may be read and understood at a glance. The layman's definition of fitness might be use of good, common sense to create a clear and pleasing job with maximum appeal to readers.

### Balance

In order to produce good printing, the typographical units must balance about the optical center of the page. The optical center is not the same as the mathematical center of a sheet. The optical center is midway horizontally and approximately three-fifths of the way up from the bottom of the sheet.

Balance is divided into two subdivisions: formal and informal.

Formal balance is the arrangement in which equal units of typographical material are placed on each side of the center of the page as well as balanced about the optical center.

Informal balance permits the use of unequal weights of typographical units arranged so that they optically balance about the focal point. In order to use informal balance the editor must have a sense of weighing the area and density of each unit of material to determine its appropriate place in relation to the other units.

## Proportion

Proportion is the principle involving the margins and shape of the typographic page. Margins should be the smallest on the left and increase in size clockwise on the page. A second part of this principle involves keeping the margins within a border less than the margins from the border to the edge of the sheet.

It is generally accepted that the most pleasingly shaped page is one in which the length is one and one-half times the width. Modern usage has tended to break away from this rule, but a majority of publications hold to a two to three proportion which may open either vertically or horizontally.

Proportion of white space to text, by rule of thumb, should be fifty-fifty. When margins occupy a greater area than the text, the text loses its prominence. The opposite creates the effect of an overcrowded page.

## Harmony

Harmony is the unity of all parts included. Over-all harmony includes shape harmony, type harmony, type and border harmony, tone harmony and subject harmony.

Shape harmony implies a harmony of shapes of the elements of the page. The general shape of the letters should harmonize with the shape of the page. For example, condensed type faces may be used more effectively on narrow pages and extended types may be used on wide pages with a more pleasing effect.

When types of one series are used, harmony in letter forms is certain. If more than one type form is used on one piece of printing, there must be something in common in their general shape characteristics. Type has gender that must be considered in selecting the face to be used. For example, Garamond light italic might be thought of as a feminine type and Caslon bold might be used as a masculine type. Types such as Tempo medium may be used as a neutral type.

Harmony of type to borders is also important to good typography. A plain type must have a plain border and a more elaborate type should have a border with similar characteristics.

Type, border and margins must have tone harmony. Tone harmony is simply the use of typographic units of similar weights so that one unit will not be stronger and destroy the appeal of the remaining units.

## Contrast

Although harmony is vital to typographic layout, complete harmony in size and weight would become monotonous and dull. To prevent such monotony, it is necessary to use contrast in type size to distinguish display from text. Contrast with white space within the text and page areas, use of initial letters, shape contrast of line drawings and halftones will break any monotony. Caution should be given not to use too many gimmicks and thus to break harmony. Gimmicks will tend to fight one another and destroy the effectiveness over all.

## Rhythm

Rhythm is the quality which leads the reader from one element to another until the entire page is covered. Rhythm is attained through positioning each unit, display line, illustration and text in such a manner that the eye will cover the entire page without abrupt distractions and movements.

This technique includes not only eyeflow over the page but also movement from one page to another throughout the publication.

Effective use of these principles should give a bright harmonious page with life and movement to attract the interest of any or all sexes. It is now up to the author to employ the rules of good writing to hold the attention of the readers throughout the publication.

## Chapter XII

## PREPARATION OF COPY

Failure to properly inform the printer of special instructions can be costly to the editor's budget. Misunderstandings through improperly marked copy are charged to the consumer by printing establishments. The best way to prevent such mistakes is to use standard, written copy instructions.

### Marking Copy

The manuscript should be typed, double spaced, on one side only of an $8\frac{1}{2}$ x 11 white sheet of paper. Generally, a six-inch line is recommended for typewritten copy. Corrections and alterations of the manuscript should be kept to a minimum and be neatly made. Printers charge extra for dirty copy or for manuscripts which must be retyped.

The manuscript should be started about one-third of the way down on the first page to provide space for printing instructions. Such instructions will include kind of type, size of type, width of type line, a guide line to tie the copy with the headline and any special instructions which may be necessary.

Additional pages of the manuscript should have the slug line, identifying the article, and the page number. The bottom of each page should have the notation "more" until the end of the article, which should be designated by one of the following symbols: END, ###, or (30).

Display lines and copy within the article which is to be set in different type should be typed on separate sheets with instructions designating where they fit into the article.

Mark your copy with standard copyreading marks, devising your own symbols only creates confusion for the printer.

## Marking Pictures

Illustrations for reproduction should be marked with a grease pencil along the outer edge of the copy. On the reverse side of the picture or on a sheet of paper pasted to the edge of the copy, the editor should write the desired dimensions, name of publication, and an alphabetical letter identifying that picture from other illustrations within the same publication.

## Marking Dummies

A printer's dummy is a graphical layout of the entire publication designating where each article, headline and illustration is to appear. The dummy may be penciled on sheets of paper which are proportional to the page size or it may be actual size and be made by pasting up galley proofs.

The dummy must have clear instructions so that the printer can assemble the publication without the editor being present.

## Proof Reading and Marking

During the early days of printing, the proof reader was just as important to a publication as the author. The job was an art and proof readers strived for perfection with each publication. Mass production has changed the proof-reading task in our society from a real art to a simple mechanical operation.

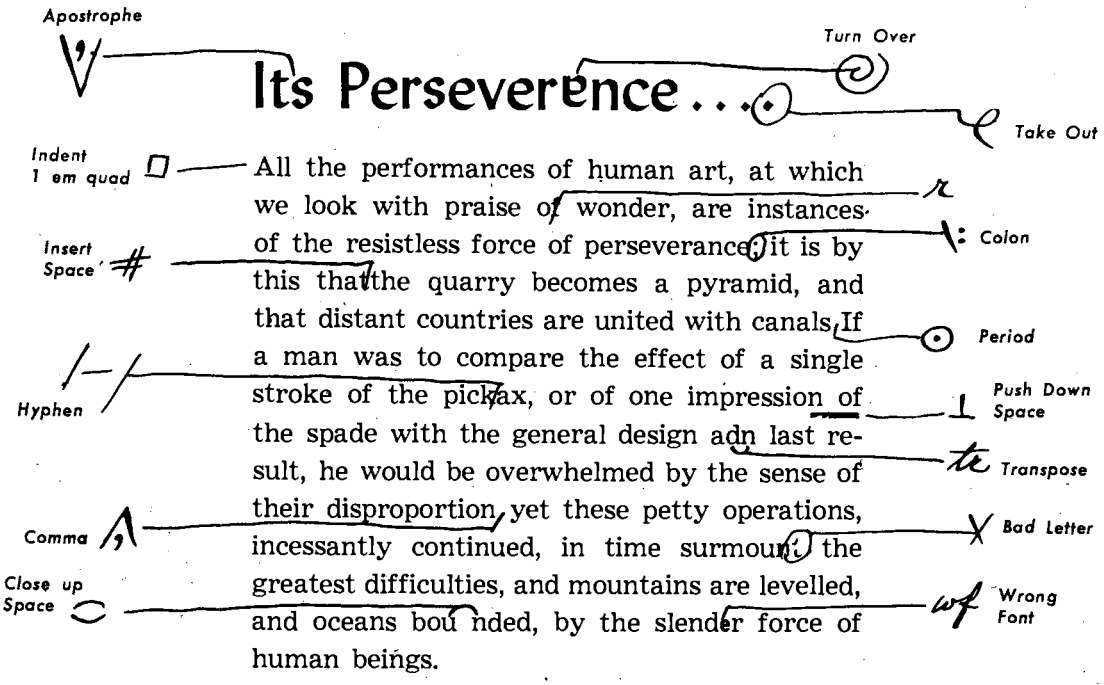
Today proof reading is done by two people. One reads and marks the proofs of type while the second holds and reads the original copy. One will read aloud to the other through the entire manuscript.

There are two schools of thought on the marking of proof errors. One involves a series of marginal notations with small carrots denoting the position of the error. The other uses a line leading from the actual error to the marginal notation.

The method using the line is preferred by most printers, since many marginal notations could accidently be overlooked and thus be printed uncorrected.

Figure 4 is an example of proper proof marking.

Figure 4. Proof Marks



## SUMMARY AND CONCLUSIONS

The field of graphic arts has expanded into a large industry to include letterpress, lithography, gravure and silk screen. It has become so vast and technical that the journalism student can only spend the time to attain a general understanding of the process and techniques of it. The journalist specializes in newspaper, industrial communications, or radio and television. The printer specializes in only a phase of the graphic arts field.

This thesis is designed to give the student a general understanding of the tools which transform his written message into large quantities of permanent volumes for mass dissemination. This is not a guide explaining one method of reproducing written material but an explanation of principles and description of tools and methods available to writers and editors in reproducing their manuscripts.

Material for this thesis was gathered from notes taken during the present course of basic typography, articles of typographers published in trade journals, books written by outstanding typographers, pamphlets and data from typesetting and machinery manufacturing companies and personal interviews with representatives of printing manufacturing companies.

Manufacturers are continuing research and testing of new processes and methods. Type designers are continually creating new patterns, particularly informal script letters. Printing plants are expanding into combination letterpress and offset production.

The graphic arts have advanced rapidly over the past decade and will continue to expand into new materials, processes and techniques.

The author has attempted to include every advancement in the field as they are announced by the manufacturers. Some have not been released for commercial use yet.

A study of a growing enterprise cannot end at any specific date or year but must be continual. Improvements can be included in classroom lectures to a limited extent, but soon it will be necessary to again look at the industry to delete the obsolete and to elaborate on the advancements.

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# APPENDIX

## LINE SPECIMENS

## OF MOST COMMONLY USED TYPE FACES

Baskerville

ABCDEFGHIJKLMNOPQabcdefghijklmnopqrstuvwxy

Beton

**ABCDEFGHIJKLMNOPQRSTabcdefghijklmnopqrstuvwx**

Bernhard Roman

ABCDEFGHIJKLMNOPQRSabcdefghijklmnopqrstuvwxyzabi

Bodoni

**ABCDEFGHIJKLMNOPQRabcdefghijklmnopqrstuvwx**

Bodoni Campanille

**ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFabcdefghijklmnopqrstuvwxyzabcdefghijklm**

Bookman

**ABCDEFGHIJKLMNOPabcdefghijklmnopqrstuvwx**

Brush

***ABCDEFGHIJKLMNOPabcdefghijklmnopqrstuvwxyzab***

Caslon

ABCDEFGHIJKLMNOabcdefghijklmnopqrstu

Century

**ABCDEFGHIJKLMNO abcdefghijklmnopqrstuv**

Cheltenham

**ABCDEFGHIJKLMNOPQRabcdefghijklmnopqrstuvwi**

Cloister

ABCDEFGHIJKLMNOPQRSTUV abcdefghijklmnopqrstu

Cooper

**ABCDEFGHIJKLMNOabcdefghijklmnopqr**

Corona

ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz abcdefghijklmnopqrstu

Coronet

*ABCDEFGHIJKLMNOPQRabcdefghijklmnopqrstuvwxyzabcdefghijklmni*

Corvinis

**ABCDEFGHIJKLMNOPQRSNUV abcdefghijklmnopqrstuvwxyz**

Eden

ABCDEFGHIJKLMNOPQRSTUVWabcdefghijklmnopqrstuvwxyzabcde

Egmont

ABCDEFGHIJKLMNOPQRST abcdefghijklmnopqrstuv

Franklin Gothic

**ABCDEFGHIJKLMNOPabcdefghijklmnopqrstu**

Futura

ABCDEFGHIJKLMNOPQRSTU abcdefghijklmnopqrstuvwxyz

Garamond

ABCDEFGHIJKLMNOPQRSabcdefghijklmnopqrstuvwxyzab

Goudy

ABCDEFGHIJKLMNOPQRabcdefghijklmnopqrstuvwxyzl

Grayda

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyznoq

Kabel

ABCDEFGHIJKLMNOPQRSTUabcdefghijklmnopqrstuvwxyzabcdefg

Kaufman

ABCDEFGHIJKLMNOP2RSabcdefghijklmnopqrstuvwxyzabc

Legend

ABCDEFGHIJKLMNOPQabcdefghijklmnopqrstuvwxyzabcdefghijklm

Lydian

ABCDEFGHIJKLMNOPQRSTUabcdefghijklmnopqrstuvwxyi

Mandate

ABCDEFGHIJKLMNOPQRSabcdefghijklmnopqrstuvwxyzal

Metro

ABCDEFGHIJKLMNOPQabcdefghijklmnopqrstuvw

Onyx

ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIabcdefghijklmnopqrstuvwxyzabcdefghijklmnopq

Radiant

ABCDEFGHIJKLMNOPQRabcdefghijklmnopqrsuv

Railroad Gothic

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzabcl

Raleigh Cursive

ABCDEFGHIJKLMNOPabcdefghijklmnopqrstuvwxyzabcdefghijkll

Scotch

ABCDEFGHIJKLMOPQRSTUV abcdefghijklmnopqrstu

Spartin

ABCDEFGHIJKLMNOPQRSTUabcdefghijklmnopqrstuvwxyz

Stymie

ABCDEFGHIJKLMNOPQRabcdefghijklmnopqrstuvw

Tempo

ABCDEFGHIJKLMNOPQRabcdefghijklmnopqrstuvx

Trafton Script

ABCDEFGHIJKLMNOPQabcdefghijklmnopqrstuvwxyzabcdefghijklmnopqrstuvwxyzab

Weiss

ABCDEFGHIJKLMNOPQRSTU abcdefghijklmnopqrstuvwxyz

# VITA

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candidate for the degree of
Master of Science

Thesis: A STUDY OF THE TYPOGRAPHIC AND PRODUCTION DEVELOPMENTS IN THE GRAPHIC ARTS AS THEY ARE APPLICABLE TO STUDENTS IN A BEGINNING COURSE FOR A MAGAZINE AND NEWSPAPER CURRICULUM

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Date of Final Examination: May, 1957