

## Cold Type

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New mechanisms, new accessories, new shop methods for the composition of typematter, stimulated by the growth of the photomechanical arts and sciences, become a new division of Linotype functions and demand new sales techniques

**The Purpose** of this Sales Manual unit is to summarize the developments in graphic arts equipment and methods which have rapidly become a new and highly important phase of our sales activities. After seventy years of selling type-on-slugs as the end product of our machines and matrices, we are today equally concerned with *type-on-film* and *type-on-paper*. This new division of our Linotype service to the graphic arts industries brings the need for broader knowledge of process requirements—the familiar routines of the letterpress operations must become our approach to the optics and the chemistry of the various photomechanical processes.

Linotype Salesmen have encountered for many years the lively participation of their customers in “the battle of the processes.” Continuing debates in trade gatherings and in trade publications argue the comparative merits of Offset *vs* Gravure *vs* Letterpress and the most frequent conclusion is that all three processes will be used under present craft conditions, each finding its own field but with constant keen competition in the overlapping fringes of these fields.

With the growing uses of the photomechanical processes Linotype Salesmen have for some years heard complaints that process reproduction of typematter, using proofs from metal-composed forms, was both inefficient and an unavoidable source of imperfections in the printed product. And successive generations of Linotype Management, aware of these process limitations and demands, have closely followed the efforts of inventors in Europe and America to adapt a camera mechanism to typesetting.

**Experiments with Phototypesetting** have now been continuing for several decades. As early as 1898 a patent was issued to an American inventor, covering a camera designed to assemble images of type characters by exposing type-printed patterns. But, in the forepart of this century, more direct progress was made in Europe, though without commercial success.

Within recent years developments in this field have been more rapid, with such diverse ideas about phototypesetting as have inspired Intertype's Fotosetter and the French-American Photon. Meantime, our Company's careful studies of the needs and possibilities for photographic composition and our deliberate period of the development and perfection of mechanisms have been approved by most printers and publishers as the essentially careful approach to a new method.

During this experimental era in photomechanisms we have also followed the developments of other substitutes for the traditional uses of metal-cast slugs and types. The adaptations of typewriter mechanisms to provide more typographic facility, the uses of tape-controlled typing devices, and the accessory devices and materials to assemble typography with hand-arranged paper letters—all these innovations have been worked into new trade procedures. With these changes in the traditional composing room practices has come a new pattern in the industrial economy which involves controversial labor relationships as well as new practices in production controls.

**The Definition of Cold Type** now embraces “any kind of typematter which has been composed or arranged without the use of slugs or types cast in hot metal.” Thus all composition today is either in “cold type” or in “hot type.” (Earlier distinctions were made between photo-composed matter and the product of typewriter devices or hand-set paper letters—today they are all just “cold type.”) But the uses of either method to produce well-designed, attractive and readable printed matter are controlled by the definition of *Typography*—“the art of printing with type; also, the style, arrangement, or appearance of matter printed from type.” While the average reader may rarely know how the page was printed, we know he remains subconsciously impressed with its niceties of *Typography*, in its readability and in its style. Linotype's approach to cold type has consistently recog-



nized the need to make every provision for typographic standards—this aspect of our sales approach is just as vital in trade contacts as are the economic and technical factors of cold type production.

**Cold Type Innovations and Uses** have been discussed in several previously issued units of this Manual—it is assumed that the reader of this summary is familiar with them. Those units have emphasized various phases and impacts of cold type. We may group these factors as:

*Technical*—involving the principles of photography and the photomechanical processes, the precision of ink-printed images as affected by process limitations, the effects of duplicating methods such as electrotyping and stereotyping as compared with photographic methods, and the comparison of machines and accessories for hot type versus cold type production.

*Industrial*—the impact of changing production methods on a plant and its personnel when cold type replaces or supplements hot type. The uses of “art department” pasteup techniques and commercial art personnel for the assembling of typematter and illustrations have brought the determined effort of the ITU to maintain control of those functions by the special training of their members. Similar controversial conditions have come with the substitution of typists to supplant the operators of Linotypes and Monotypes.

*Economic*—the fundamental factors of relative costs of installation and operation of cold type equipment as compared with hot type equipment to produce the same general amount and variety of product.

Seven units or inserts in this Manual cover the foregoing aspects of cold type and its uses. They are:

*The Nature of Phototypesetting*—details the photographic routines and the nature of photographic images. Lists a few books most immediately useful for the non-technical reader.

*Printing Processes and Their Relation to Type*—defines the processes and compares their printing limitations as related both to process and to kinds of paper. Includes a full glossary of the technical terms which we encounter in talking to customers and should employ in writing letters and reports.

*Flow Charts of Printing Processes*—six charts diagram the progress of a printing project from

copy to press product, showing the three processes with variations in procedures needed for cold or hot type.

*Relative Costs of Near-Print Processes*—a comparison of cost figures for book production with Linotype composition printed letterpress against various methods of typewriting using offset.

*Photocomposing Machines and the Brewer Keyboard*—book issued by ITU to its members and supplied to MLCo for this Manual; illustrates and describes the Linofilm, Fotosetter, Monophoto, Photon and Hadego. Features the Brewer Keyboard, ITU’s defense mechanism against the typewriter keyboard arrangement on TTS. Describes “new skills and techniques” needed by ITU members who handle cold type materials in makeup, etc.

*New Printing Processes—with Special Emphasis on Photocomposition, Ruling and Paste Makeup*—ITU pamphlet featuring their training course for compositors and operators; shows successive steps of phototype production of typical display ad.

*The Present and Future of the Printing Processes*—propaganda booklet by the Electrotypers’ Industry to promote letterpress.

Following the distribution of the latest of the foregoing items for this Manual, our Executive Offices provided description material on Linofilm and ProType for a *Cold Type Handbook*, issued in 1957 by PRINTING INDUSTRY OF AMERICA. The first purpose of that compendium on cold type equipment was to enlighten employing printers on the procedures and craft responsibilities with respect to union jurisdictions. The PIA editors compiled basic data on the several machines in three tables which are reproduced here with currently amended data—but we have added the *ATF Typesetter* which was announced after the PIA publication had been distributed, and we have omitted the ATF Hadego and the Rutherford machines which have very little use in the industry.

**Equipment for Cold Type Production** as compiled for the industry in the *PIA Handbook* is a collection of manufacturers’ printed matter. All this advertising has stimulated trade interest to a degree which demands corresponding familiarity by the Linotype Salesman if he is to adapt his sales proposals to plant conditions as he finds them in his territory. The PIA roundup of cold type equipment includes, as most significant, the phototypesetting machines which employ a keyboard, either directly (as in the Fotosetter) or as a separate unit (Linofilm). The machines that concern us today are:



*Linofilm*  
*Fotosetter*  
*Photon*  
*Monophoto*  
*ATF Typesetter*

(We omit here the PIA listing of *Rotophoto*, now appraised by Linotype as not commercially significant at this time.)

Much more simple, mechanically, are the photolettering machines. They photograph pattern letters one-at-a-time, with various provisions for fitting and spacing, to form display lines, heads, or small blocks of bodymatter. In this classification we are interested in:

*ProType*  
*Filmo-Type*  
*Coxhead Liner*

The various adaptations of typewriter mechanisms, now well-established for cold type bodymatter composition are:

*IBM Electric Executive*  
*Vari-Typer (and its DSJ version)*  
*Friden Justowriter*

The foregoing may be classified as composing machines, with varied uses in book composition, commercial printing, statistical listings and the like. Further comment later on the typewriter approach to cold type.

The incidental accessories of cold type provide alphabets of wide variety in design and size, symbols, rule and decorative borders. These are assembled with individual units from sheets of paper or film, or from a container of separate letters corresponding to a case of type. Self-adhering, pressure-sensitive film is the more popular and Craftint Manufacturing Company offers in that form a large assortment of alphabets, shading media and the many symbols used by draftsmen and map makers. Better known among these accessories are:

*Artype (on film)*  
*Craftint (on film)*  
*Fototype (on paper units)*

**Sales Comparisons of the Phototypesetting Machines** are summarized in Tables I to III, covering relative speed, capacity, type size limits and the like. Since the basic principles and construction of these machines differ so decidedly, these comparisons cover those factors of operation and product which immediately affect the typographic requirements of the typesetting plant. Naturally they are of prime importance to the Linotype Salesman for his presentation of Linofilm and ProType as against competition.

Mechanical descriptions of Fotosetter, Photon, and Monophoto, sufficient for our general sales needs are provided in the ITU book *Photocomposing Machines and the Brewer Keyboard*. More detailed information about Linofilm and ProType has been provided for Linotype Salesmen. We add here a summary of data on the ATF Typesetter, recently launched after some years of development. It is a two-unit mechanism which comprises a keyboard and a photographic unit. Quoting their announcement:

"The keyboard unit, basically an electric typewriter with modifications and additional code keys, perforates a 'common language' tape and at the same time produces a typewritten proof of the copy. Line justification, quadding and centering of copy are handled by proper codes punched in the tape. These operations are not shown in the typewritten proof, but are automatically incorporated in the finished product. Justification is normally done with word spacing, although it is possible to insert letter spacing. Entire lines or individual letters may be deleted during the original typing, if corrections are necessary.

"The photographic unit operates automatically. The punched tape is fed into the 'reader' unit on the photographic unit, and all the operations called for by the tape are completed automatically.

"Heart of the ATF Typesetter is the vinyl plastic disc on the photographic unit. This disc carries two complete fonts of type—such as roman and italic, light and bold, etc.—of the same point size. An optical system produces a transparent positive film from the negative characters on the disc.

"A manual keyboard on the photographic unit permits direct composition of unjustified composition—or insertion of heads, captions, or production messages."

When the ATF Typesetter was demonstrated at a trade meeting, a Linotype executive made a detailed report from which we quote:

"Fonts are on small plastic discs which accommodate only one font. On each disc the same font is duplicated three times to reduce by two-thirds the travel time of the disc from character to character. Since the photographic unit will hold only one disc at a time, *no mixing of faces is possible*.

"They use but five different unit widths for some 85 different characters in a font, so good letter fitting cannot be accomplished. Cost of one disc is \$120.

"The keyboard perforates a seven-hole tape—actually it is a Justowriter keyboard. While punching a line, individual character errors can be cor-



rected by backing up and retyping, or the whole line can be erased and retyped.

"Quadding functions are claimed, but these must be accomplished by using unit spacing to fill out the lines, and would be little better than flushing or centering lines on a Teletypesetter tape that was to be used on a Linotype without a quadder.

"Leading of one-half up to 16 points is available in increments of one-half point.

"The photographic unit is very slow. I timed it at approximately 120 characters per minute. This is no faster than the speed of a competent Linotype operator. However, they claim composition costs of 20 to 30% below hot metal.

"The ATF sales executive pointed out that, in producing this system (his words) they had not attempted to compete with Fotosetter, Photon, Monophoto or Linofilm. Their objective was a low-cost, straight matter machine hitting the market on price, low overhead, low maintenance and simple operation, with reasonable quality."

**Sales Comparisons of the Typewriter Composing Machines**, as against normal Linotype composition with letterpress production, may be based on the experience of Princeton University Press as detailed in our Manual unit *Relative Costs of Near-Print Processes*. For the cost limitations of complicated textbook composition and for other special conditions in book production, the typewriter composing machines have become increasingly popular. In various fields of commercial printing as well as in the production of weekly newspapers and similar periodicals, these machines have made it possible to use typists in place of printers. Usually the printing process with such material is offset but, with the aid of photoengraving, letterpress can be used. These process considerations (as shown in our *Flow Charts of Printing Processes*) are important factors in our sales approach for cold type equipment.

Competitively, the installation of Linofilm (plus ProType) equipment has these technical advantages over the use of any of the typewriter composing machines:

- 1) Linofilm's product on film (positive or negative as desired) need not be further photographed as must type-on-paper.
- 2) Linofilm's ample variety of character set-widths assures correct typeface design, whereas the typewriter machines can use very few set widths and must thereby distort their faces.
- 3) Linofilm's fully comprehensive provision for every phase of justification covers all the requirements of typography without the handi-

caps of double typing or awkward and obvious spacing.

Typewritten cold type has been used for nearly forty years. In that period, with the continuing growth of offset and gravure, economies in typing against Linotype or Monotype operation and the ease of reproducing typewritten copy have stimulated the development of the typewriter composing machines. The same conditions, demonstrating an apparent saving by eliminating hot-metal composition, have given added impetus to inventors in the field of phototypesetting.

The first widely observed use of a standard typewriter to compose bodymatter featured a strike in 1919. The compositors were out but the other mechanical departments weren't affected in the plant producing *The Literary Digest* (a weekly magazine, now defunct). The publishers substituted typewriter composition for hot type, using zinc etchings from madeup page proofs and publication continued for several weeks until the strike was settled. The whole industry was excited by that use of typewritten matter to replace Linotype composition. But the typographic restrictions of a standard typewriter were as obvious as the crudity of photoengravings from ribbon-printed impact impressions made against the typewriter platen.

In the course of typewriter development, various improvements made for the general business uses of these machines were also an aid toward somewhat better cold typography. A paper ribbon, passing only once through the typewriter, eliminated the texture of standard silk ribbons and gave a better image for reproduction. In the earlier approach to improved justification (from the awkward appearance of single-unit set width of standard typewriters) the IBM Electric Executive appeared with four different character widths and corresponding carriage movements for justification.

The oldtime Hammond typewriter, first devised to use its principle of changeable type bars for foreign languages, later was modified into the Vari-Typer. While the latter was based on a single set width, the changeability of type bars made it a useful machine for cold type production—still marred by unsightly justification.

Then came the application of "differential spacing" and we have the Coxhead Model DSJ (differential spacing justifier). This typewriter is adapted to type characters of varying set width by automatically relating the type plates, the machine carriage and the escapement. Justification is accomplished through automatic spreading of the space between words. But all this requires two typings of the same copy: the first rough typing to determine the necessary spacing to attain an even righthand alignment, and the second typing with word-space controls determined by the first typing.



That factor of production costs (duplicate typing) applies likewise to the maintenance of uniform line lengths on the IBM Electric Executive. That machine adds or subtracts units of space within words as well as between them.

The latest model of Vari-Typer 160 uses a variety of set widths and the "DSJ" principle, likewise requiring two typings for even line measures.

The Friden Justewriter applies a punched-tape control to the second even-margin typing of such copy. The first (manual) typing sets a justifying mechanism by a code which is applied by the typist at the end of each successive line. This two-unit typewriter composing machine has had some commercial success for such special composition as listings.

**Typography with Cold Type** has rapidly become a new and specialized art. While type-on-paper and type-on-film can readily be cut apart into small lines or blocks, to be arranged as desired for eventual photoreproduction, all such manipulations consume time. And the requisite skill to handle such details of "paste makeup" is primarily the equipment of a commercial artist, as we have noted earlier. To provide the most direct results, with a minimum of hand manipulation, advance planning and precise typographic specifications have become more vital to efficient cold type composition than for the more flexible handling of composition in hot type.

A book page or similar block of bodymatter on Linotype slugs can readily be opened up with inserted leads between the lines. The same composition by Linofilm could be opened up as desired, but it would require another run of the controlling tape with the required leading adjustment of the Photographic Unit. But the leading of a page of bodymatter by cutting the film into separate, individual lines to be relocated and stuck into position with fixed separation would be extremely difficult and precise. Thus photostat matter must be properly estimated, fitted and specified in advance.

Typographic designers, whether for books, commercial printing or display advertising, are first confronted with the question as to whether a ragged right-hand edge may be desired or tolerated on the composed page. If they are using any of the phototypesetting machines that factor is merely one of preferred style. But if the matter is to be produced on one of the typewriter mechanisms (most widely used thusfar), the use of irregular righthand margins will save the cost of a second typing of the copy. While the growing use of this less formal type treatment may not be wholly due to the influence of typewriter composition, the economy of the simplest justification must have been a factor. Here, of course, Linofilm has no such limitations.

Trade composition plants have been pioneer users of cold type equipment, notably in phototypesetting. Typewriter composing machines have been considerably used for bookwork and for periodical printing, usually by offset, with numerous weeklies and a few dailies using the new processes. One trade plant, specializing in the Vari-Typer DSJ and IBM Electric, has noted the impact of the new methods on book designers and other typographers, quoted in *Publishers' Weekly*:

"In the production of technical books and workbooks of short runs, the cold type method (with typewriter mechanisms) is becoming a major composition process. . . . Nevertheless, the majority of graphic arts designers in book work have not wet their feet in the cold type technique. Perhaps it is because this advance in economical composition comes from an unexpected and plebeian background—the typewriter. The strong reaction against cold type by certain groups of designers and production men is more akin to artistic snobishness and prejudice than to sober evaluation."

The traditional craftsmen may feel that this new technique has brought newcomers into the field of typography who have neither knowledge nor respect for its fundamentals.

Whether by phototypesetting or by use of other cold type equipment, with the many gadget accessories now being promoted so vigorously, the end product must find its place, both in relative cost and in comparable typographic quality, among the millions of forms in hot type that are the output of printing and publishing.

**With this Summary** of the background developments and trade reception of new techniques, we must conclude that the long period of cold type evolution, both in photographic composition and with the use of the typewriter devices, has provided a favorable atmosphere for the introduction of Linofilm. The superiority of type-on-film for reproduction by the photomechanical processes has been firmly established—Fotosetter blazed that trail even though Fotosetter hasn't been economically successful in itself. Photon and Fotosetter, as used in a few plants around the country, have made the industry only the more interested in Linofilm's mechanical principles. Monophoto and the ATF Typesetter haven't yet made any real impression. But the nationwide industry agrees, virtually unanimously, that Linotype's experience with typographic requirements as the pioneer in machine composition must safeguard the prime need for type standards in phototypography. With the incidental needs met so effectively by Pro-Type, the major facilities of Linofilm become the answer to the newest needs of the graphic arts.



**COMPARATIVE ANALYSIS  
PHOTOTYPESETTING MACHINES**

TABLE I

	Fotosetter	Photon	Linofilm	Monophoto	ATF Typesetter
<b>KEYBOARD</b>					
<u>Combined with Camera</u>	X	X			
<u>Separate</u>			X	X	X
<b>Keybank Arrangement:</b>					
<u>Standard Typewriter</u>		X	X		X
<u>Based on hot metal composer</u>	X			X	
<b>Keyboard Record:</b>					
<u>Typewriter Proofs Available</u>		X	X		X
<u>Perforated paper tape</u>			X	X	X
<b>How Justified:</b>					
<u>Hand set to scale indicator</u>				X	
<u>Automatic</u>	X	X	X		X
<u>Interword</u>		X	X	X	X
<u>Intercharacter</u>	X	X			
<b>Special Controls:</b>					
<u>Letterspace</u>	X	X	X	X	X
<u>Auto. Quad</u>	X	X	X	X	X
<u>Auto. Center</u>	X	X	X	X	X
<u>Fit characters</u>		X	X	X	
<u>Align L.H. Margin</u>	X	X	X	X	X
<u>Align R.H. Margin</u>	X	X	X	X	X
<u>Blind space, var.</u>		X			
<u>Double-expose</u>		X		X	
<u>Character-killer</u>		X			X
<u>Line-killer</u>	X	X	X	X	X
<b>Pi Characters:</b>					
<u>Hand inserted</u>	X				
<u>Automatic, from special mats.</u>		X-8	X		X

(Based on latest available information.  
Consult manufacturer for further details).



**COMPARATIVE ANALYSIS  
PHOTOTYPESETTING MACHINES**

TABLE II

COMPOSING MACHINE	Fotosetter	Photon	Linofilm	Monophoto	ATF Typesetter
Rated speed Ens/min.	480	480 (a)	720	200	200
Min. Point Size	4	5	6 (b)	6	5
Max. Point Size	54	48	36 (c)	24	14
No. of Intermed. Sizes	11	13	18 (c)	Infinite	9
Fractional Sizes			X	X	
Stroboscop. Photog.		X	( X		
Static Photography	X		X	X	X
No. of Characters available for composition (d)	556	1440	1584	255	172
Combines pt. sizes	X	X	X		
Combines type faces	X	X	X	X	
Correct reading comp	X		X		X
Reverse reading comp		X		X	
Max. comp. width p.e (e)	54	54	42	60	45
Body size fixed with keyboarding	X	X	X		
Body size independent of keyboarding		with Tape X	when Desired	X	X
Horizontal rules	X	X	X	X	X
Vertical rules		X	X	X	

C. Printing Industry of America 1956

Note: 480 Ens/min. equals 14,400 Ems/hr.

(a) Maximum - limited to operator speed

(b) Smaller sizes obtainable through special grids

(c) Sizes up to 180 pt. through Linofilm Composer

(d) On machine for continuous composition

(e) Wider measures by subsequent enlargement

(Based on latest information available.  
Consult manufacturer for further details.)



TABLE III

**COMPARATIVE ANALYSIS  
PHOTOLETTERING MACHINES**

	Typro	Filmo-type	Pro-Type	Coxhead Liner
Min. Pt. Size	6	12	6	14
Max. Pt. Size	144	144	90	72
Pt. Sizes in range	18	12	32	
Characters in font	90	90	80	72
Characters available on machine	1300	1300		72
Prints by contact	X	X	X	X
Prints by camera				
Correct reading	X	X	X	X
Reverse reading			X	
Film or paper strip	X	X		X
Sheet film or paper			X	
Single line composition	X	X	X	X
Composes several lines			X	
Mix type faces	X	X	X	
Mix point sizes	X		X	
Auto development	X			X
Develop later		X	X	
Tint or shade type faces	X	X	X	X
Fit kerned characters	X	X	X	
Justify before photography			X	X
Modify type design				
Curve lines of type			X	
Max. width of composition Pica	100 ft.	100 ft.	17"	100 ft.
Width of film or paper strip	2"	2"		2"
Film or paper max. sheet size			17 x 22"	

(Based on latest information available. Consult manufacturer for further details.)

C. Printing Industry of America 1956